Colma Creek Flood Control Channel Maintenance Project

Initial Study/Mitigated Negative Declaration

Prepared for:
County of San Mateo
Department of Public Works
555 County Center, 5th Floor
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Horizon Water and Environment. *Colma Creek Flood Control Channel Maintenance Project - Initial Study/Mitigated Negative Declaration*. June 2016. (HWE 15.037) Oakland, CA.

Chapter 1
INTRODUCTION

The County of San Mateo (County) has prepared this Initial Study/Mitigated Negative Declaration (IS/MND) to provide the public, responsible agencies, and trustee agencies with information about the potential environmental effects of the proposed Colma Creek Flood Control Channel Maintenance Project (Project or proposed Project). This document was prepared pursuant to the requirements of the California Environmental Quality Act (CEQA) of 1970 (as amended) and the State CEQA Guidelines (14 California Code of Regulations 15000 et seq.).

1.1 Intent and Scope of this Document

This IS/MND has been prepared in accordance with CEQA, under which the Colma Creek Flood Control Channel Maintenance Project constitutes a "project." The County, as the lead agency under CEQA, will consider the potential environmental impacts of project activities when it considers whether to approve the Project. The IS/MND is an informational document to be used in the local planning and decision-making process. The IS/MND does not recommend approval or denial of the proposed Project.

The IS/MND describes the proposed Project and its environmental setting, including the Project area's existing conditions and applicable regulatory requirements. The IS/MND also evaluates potential environmental impacts from the proposed Project to the following resources:

- *Aesthetics*
- *Agricultural and Forestry Resources*
- *Air Quality*
- *Biological Resources*
- *Cultural Resources*
- *Geology, Soils, and Seismicity*
- *Greenhouse Gas Emissions*
- *Hazards and Hazardous Materials*
- *Hydrology and Water Quality*
- *Land Use and Planning*
- *Mineral Resources*
- *Noise*
- *Population and Housing*
- *Public Services*
- *Recreation*
- *Transportation and Traffic*
- *Utilities and Service Systems*

The proposed Project incorporates measures to ensure there would be no significant adverse impacts on the environment.

1.2 Public Involvement Process

Public disclosure and dialogue are priorities under CEQA. Accordingly, CEQA requires a period during the IS/MND process when interested stakeholders, interested public agencies, or the general public can provide comments on the impacts of the proposed Project. Pursuant to Sections 15073.5 and 15105[b] of the CEQA Guidelines, the County is now circulating this document for a 30-day public and agency review. All comments received prior to 5:00 p.m. on the date identified for closure of the public comment period in the Notice of Intent will be considered.

Input, questions, or comments on this project can be sent to:

Mark Chow, P.E., Principal Civil Engineer
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Redwood City, CA 94063-1665
Email: mchow@smcgov.org

1.3 Organization of this Document

This IS/MND document contains the following elements:

Chapter 1, *Introduction*. This chapter provides a brief project introduction, summarizes the scope and contents of the IS/MND, provides contact information for commenting on the document, and describes impact terminology used in this document.

Chapter 2, *Project Description*. This chapter summarizes the proposed Project, including descriptions of: the project purpose and goals; the project development process; project components; project implementation and oversight; avoidance and minimization measures; and related permits and approvals.

Chapter 3, *Environmental Checklist*. This chapter presents the environmental checklist used to evaluate the Project's potential environmental effects. The checklist is based on guidance provided in Appendix G of the state's CEQA Guidelines and the County's CEQA Guidelines. This chapter includes a brief environmental setting description for each resource topic and describes the proposed Project's anticipated environmental impacts on the various resource topics.

Chapter 4, *Environmental Factors Potentially Affected*. This chapter lists the environmental factors potentially affected by the proposed Project based on the environmental impact evaluation.

Chapter 5, *Determination*. This chapter contains a determination on the Project based on conclusions and recommendations of the environmental evaluation.

Chapter 6, *Preparers*. This chapter provides a list of persons involved in preparing this IS/MND.

Chapter 7, *References*. This chapter provides a bibliography of printed references, web sites, and personal communications used in preparing this IS/MND.

Appendix A. Colma Creek Flood Control Channel Maintenance – Resource Investigations

Appendix B. Air Quality and Greenhouse Gas Emissions Estimates

Appendix C. Lists of Special-Status Species Known to Occur in the Project Area

Appendix D. Biological Assessment

Appendix E. Wetland Delineation Report

Appendix F. Cultural Resources Memorandum

Appendix G. Noise Impact Calculations

Appendix H. Mitigation Monitoring and Reporting Program (MMRP)

1.4 Impact Terminology

This IS/MND uses the following terminology to describe environmental effects of the proposed Project:

- A finding of *no impact* is made when the analysis concludes that the Project would not affect the particular environmental resource or issue, or if the impact does not apply to the project.
- An impact is considered *less than significant* if the analysis concludes that there would be no substantial adverse change in the environment and that no mitigation is needed.
- An impact is considered *significant* if it results in a substantial adverse change in the physical conditions of the environment. Significant impacts are identified by using specific significance criteria as a basis of evaluation. Mitigation measures are identified to reduce these potential effects on the environment.
- This IS/MND identifies particular mitigation measures that are intended to lessen project impacts. The State CEQA Guidelines (14 CCR 15370) define mitigation as:
  - avoiding the impact altogether by not taking a certain action or parts of an action;
  - minimizing impacts by limiting the degree or magnitude of the action and its implementation;
  - rectifying the impact by repairing, rehabilitating, or restoring the impacted environment;
  - reducing or eliminating the impact over time by preservation and maintenance operations during the life of the action; and

- compensating for the impact by replacing or providing substitute resources or environments.

Chapter 2
PROJECT DESCRIPTION

2.1 Project Objective

The objective of the County of San Mateo's (County's) proposed Colma Creek Flood Control Channel Maintenance Project (Project or proposed Project) is to conduct maintenance activities as necessary along approximately 5.4 miles of the Colma Creek flood control channel to provide adequate flood conveyance capacity in the channel. The Colma Creek flood control channel (channel) provides flood protection for residents and businesses in the communities near the channel in South San Francisco, Colma, and Daly City.

Primary maintenance activities for the Project include: sediment removal at specific locations upstream of the Highway 101 crossing of Colma Creek; repair or replacement of degraded or damaged culverts; clearing of blocked culvert outfalls; repair of concrete/hardened channel banks and bed; debris and trash removal, vegetation management, and installation or maintenance of trash capture devices. The County proposes to conduct these maintenance activities over a 5-year period.

2.2 Project Location

The Colma Creek flood control channel provides drainage for approximately 16.6 square miles of the northern San Francisco Peninsula, including portions of Daly City, Colma, South San Francisco and San Bruno (**Figure 1**). The proposed Project activities would primarily occur in the City of South San Francisco, although some activities would also occur in the Town of Colma. The Colma Creek flood control channel has different channel dimensions and conditions along the 5.4 mile length of the Project area (as shown in **Figure 2**). Channel reaches include earthen trapezoidal channels, channels with concrete walls and earthen beds, fully concrete lined channels, and concrete box culverts. For the purpose of considering and evaluating potential environmental effects of the Project, the Project area in this IS/MND, is organized into three primary channel reaches:

- **Reach 1**. The upper maintenance reach includes the channel upstream from A Street/El Camino Real downstream to Spruce Avenue.
- **Reach 2**. The middle maintenance reach is from Spruce Avenue downstream to Produce Avenue.

  Reach 3. The lower maintenance reach is from Produce Avenue downstream to the mouth of Colma Creek.

Figure 1. Colma Creek watershed.

Colma Creek Flood Control Channel Maintenance Project

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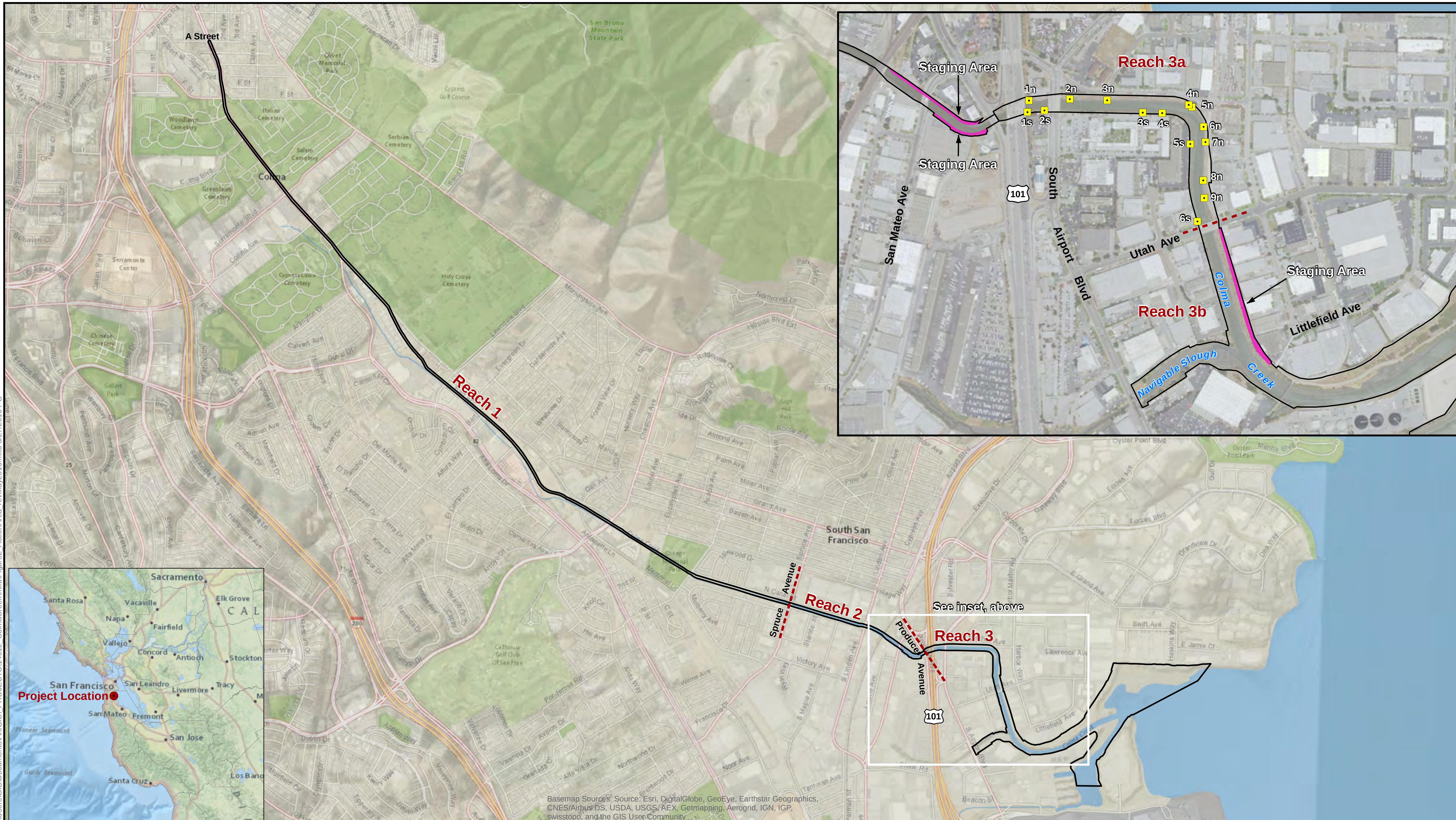

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Miles

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Action Area

Culvert

Reach Break

Colma Creek
Flood Control Maintenance Project

Figure 2

Action Area

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Land uses adjacent to the Project area are diverse and include residential homes, cemeteries, light manufacturing, commercial and office space, warehouses, airport services, vehicle services, transportation including the South San Francisco Bay Area Rapid Transit (BART) station, schools (e.g., El Camino High School, Los Cerritos Elementary School, South San Francisco High School, and Sunshine Gardens Elementary School), and recreational uses (e.g., Orange Memorial Park, Centennial Way Trail, and the San Francisco Bay Trail).

2.3 Project Background and Need

Colma Creek has a history of chronic flooding. The industrial area of South San Francisco near Colma Creek occupies a historic floodplain. The Colma Creek flood control channel was designed in the 1970s to convey a 50-year flood event and provide drainage for approximately 16.6 square miles of watershed contributing runoff to the channel.

During the 1960s and 1970s, many areas in the Colma Creek Watershed underwent urban or suburban development. As a result, soil erosion and sediment yield from the watershed was very high during that period. Continued soil erosion and sediment yield are a concern because accumulation of deposited sediment in the flood control channel can reduce the designed conveyance capacity of the channel. Reduced conveyance capacity increases the flooding risk for areas surrounding the channel.

Since the completion of the original flood control project in 1974, several additional channel improvements and bridges have been constructed along Colma Creek. These improvements have included channel widening, constructing vertical concrete channel walls, and constructing transition structures between channel segments. The following bridges were constructed across Colma Creek: Linden Avenue (1974), Spruce Avenue (1975), Utah Avenue (1976), South Airport Boulevard (1999), Peninsula Corridor Joint Powers Board (Caltrain) Mainline (2003), and San Mateo Avenue (2006) (County of San Mateo 2010).

In 1998, a 50-year flood event on Colma Creek caused significant property damage to businesses near the channel that were inundated with flood water (County of San Mateo 2010). This suggests that although the Colma Creek channel was designed to convey the 50-year event, there are several complicating factors which may result in the channel not having the intended design capacity. Maintaining the channel free of accumulated sediment is important to provide the intended flood conveyance capacity.

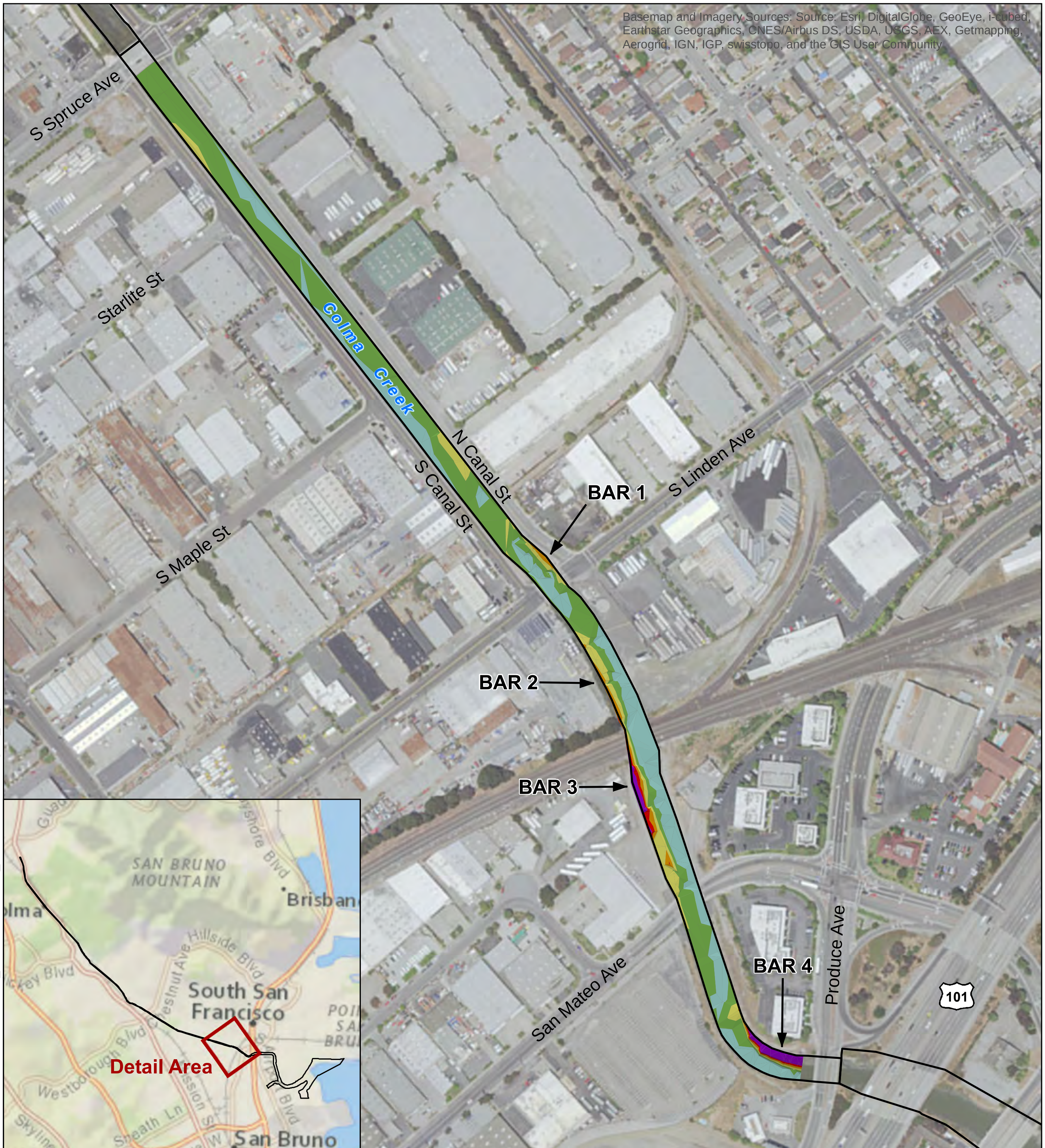
In September 2010, the County met with representatives from several regulatory agencies to review channel conditions, proposed routine maintenance activities, and potential CEQA and permitting needs for future maintenance activities. At that meeting, several questions were raised by regulatory agency staff regarding the potential impacts associated with sediment removal in the channel. Based on the questions raised by regulatory agencies, the County conducted several technical investigations during 2012-2014. These investigations are summarized in a report developed by Horizon Water and Environment (Horizon) in 2014, included as Appendix A (*Colma Creek Flood Control Channel Maintenance – Resource Investigations, July 3, 2014*). The Horizon report describes baseline sedimentary processes at Colma Creek, methods that could be used to monitor the wetlands response to sediment removal at Colma Creek, sediment reuse or disposal options for the Colma Creek flood control channel, and sediment testing and evaluation requirements for Colma Creek sediment removal activities.

In addition to these resource investigations, the County conducted surveys and sediment depth measurements in 2014. As a result of these investigations, the County determined that localized sediment removal is necessary along an approximately 0.6-mile segment of the Colma Creek flood control channel to maintain channel capacity and storm drain functions.

2.4 Proposed Project

The Project's primary activities are to remove localized sediment along the channel bed in Reach 2, and repair or replace degraded culverts and clear blocked culvert outfalls in Reach 3. The areas proposed for localized sediment removal in Reach 2 were determined based on recent technical studies that identified areas of recent sediment deposition and the channel's designed capacity, which accommodates up to two feet of sediment depth along the bed. After the first year of sediment removal, the County may remove sediment in subsequent years throughout the Project's 5-year timeframe. As described further in Section 2.6, after the first year of sediment removal, the County would monitor sediment accumulation in Reach 2 and determine the need for future sediment removal work. **Figure 3** shows the accumulated sediment depths within Reach 2, and **Figure 4** shows the locations of the culverts that require repair or replacement. Other routine maintenance activities that may occur in the Project area on an as-needed basis include:

- Vegetation management on channel banks and bed (including removal of invasive vegetation);
- Repair or maintenance of concrete/hardened channel banks and bed;
- Install and maintain trash capture devices;
- Remove debris that could accumulate and become flow obstructions (e.g., fallen trees, branches, debris, trash, or shopping carts);
- Install and repair fences on channel banks;
- Repair access roads; and
- Graffiti abatement.



Sediment Depth (feet)

0 - 0.5
0.5 - 1
1 - 1.5
1.5 - 2
2 - 2.5
2.5 - 4.75

Project Area

N

Feet

0 250 500

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Figure 3
Reach 2 with Sediment Depth

Colma Creek
Flood Control Maintenance Project

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Figure 4
Reach 3a Culverts

Project Area

Culvert

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Colma Creek
Flood Control Maintenance Project

Table 1 below summarizes maintenance activities proposed within each reach of the Project area. The following subsections describe reach conditions and proposed maintenance activities that would occur within each reach.

Table 1. Proposed Maintenance Activities

	Colma Creek Flood Control Channel Segments			
Maintenance Activities	**Reach 1: A St./El Camino Real downstream to Spruce Ave.**	**Reach 2: Spruce Ave. downstream to Produce Ave.**	**Reach 3a: Produce Ave. downstream to Utah Ave.**	**Reach 3b: Utah Avenue downstream to creek mouth**
Sediment removal on channel bed		X		
Repair or replacement of culverts; clearing blocked culvert outfalls			X	
Vegetation management on channel banks and bed (including removal of invasive vegetation)	X	X	X	X
Repair or maintenance of concrete/hardened channel banks and bed	X	X	X	
Install and maintain trash capture devices	X	X	X	
As needed general removal of obstructions (debris)	X	X	X	X
Install and maintain fences on channel banks	X	X	X	X
Repair access roads	X	X	X	X
As needed graffiti abatement	X	X	X	X

Reach 1: A Street / El Camino Real downstream to Spruce Avenue

Reach Description

This upper maintenance reach includes the channel from A Street/El Camino Real downstream to Spruce Avenue. This segment consists entirely of a concrete lined channel and concrete box culverts. Based on 2014 field observations (County of San Mateo/Horizon 2014), the reach generally functions as a zone of sediment transport, with minimal deposition observed throughout the reach. **Figure 5,** Photos 1 through 3 show existing site conditions within Reach 1. Downstream of A Street, the channel is culverted and then daylights near the entrance to the Holy Cross Cemetery along Mission Road. The channel is also culverted beneath the South San Francisco BART station and transitions to an open trapezoidal concrete channel immediately downstream of the BART station. This reach is not tidally influenced.

Proposed Maintenance Activities

Routine maintenance activities proposed within Reach 1 may include repair or maintenance of concrete channel banks and bed, removal of debris, graffiti abatement, installation and maintenance of trash capture devices, installation or repair of fencing, and control of vegetation in concrete joints on the channel banks and bed as necessary.

Reach 2: Spruce Avenue downstream to Produce Avenue

Reach Description

Within the middle maintenance reach of the Project area (Spruce Avenue to Produce Avenue), Colma Creek flows through a concrete U-shaped channel. Compared to upstream in Reach 1, the channel slope in Reach 2 decreases, the channel bed widens, and the banks become vertical. Approximately one foot of sediment has deposited across the channel bed, though in some locations deposition is greater (see Figure 3). This section of Colma Creek is referred as "Reach 2" and is tidally influenced, but is only inundated during high tides.

Proposed Activities

Proposed maintenance activities include removing sediment within Reach 2 at specific locations. As described above, due to the relatively wider channel and lower channel gradient (compared to Reach 1 upstream), sediment deposition and accumulation is an ongoing issue in Reach 2. In 2003, approximately 300 cubic yards of sediment was removed upstream of Produce Avenue bridge; no other sediment removal has occurred since then.

Within Reach 2, removal would occur only when sediment accumulates more than 2 feet above the channel bottom. This portion of channel was designed to maintain two feet of sediment along the bed and supports habitat for benthic invertebrates. Sediment management in Reach 2 may include the redistribution of sediment from areas of higher aggradation (such as to areas without much deposition, which do not yet have 2 feet of measured accumulation on the channel bed). In this way, sediment can sometimes be managed in the channel without requiring physical removal. As currently observed in Reach 2 and shown in Figure 3, due to hydraulic conditions, sediment has deposited more deeply along the right bank (south bank) in the area immediately downstream of the Caltrain railroad crossing and along the left bank (north bank) in the area upstream of Produce Avenue. Figure 5, Photos 5 and 6, show deposition in these areas.

Other routine maintenance activities proposed within Reach 2 may include repair or maintenance of concrete channel banks and bed, removal of debris, as-needed graffiti abatement, installation and maintenance of trash capture devices, installation or repair of fencing, repair of access roads, and control of vegetation in concrete joints on the channel banks as necessary.

Photo 1: Roadway ditch adjacent to upper Reach 1, which is below Mission Boulevard at this location. Photo is taken near Colma BART station.	
Photo 2: Mid Reach 1, looking upstream from McLellan Drive near the South San Francisco BART station. Channel transitions from box to trapezoidal shape. Note the minor accumulation of sediment and organic material in the larger trapezoidal channel.	

Figure 5:
Project Area Photographs

Photo 3: Lower Reach 1, at energy dissipater teeth (looking upstream). A small amount of sediment and debris accumulate near the teeth.	
Photo 4: Upstream portion of Reach 2 looking downstream near Spruce Ave. Minor sediment accumulation on channel bed.	

Figure 5:
Project Area Photographs

Photo 5: Reach 2 looking upstream at the Caltrain railroad bridge. Sediment deposits downstream of the bridge on the left side of the photo, where flow separation and eddying create a depositional environment.	
Photo 6: A large point bar in Reach 2 (looking downstream toward Produce Ave).	

Photo 7: Reach 3a looking downstream from Produce Avenue at low tide. Note earthen bed and banks comprised of fine sediment, some depositional bars along channel bed, and mid-bank bench with pickleweed.	
Photo 8: Looking toward the mouth of Colma Creek.	

Reach 3: Produce Avenue to Colma Creek Mouth

Reach Description

The segment of channel downstream of Produce Avenue to the mouth of Colma Creek is referred to as "Reach 3." This reach is further divided into two sub-reaches: Reach 3a includes the segment of channel downstream of Produce Avenue to Utah Avenue; Reach 3b includes the segment between Utah Avenue to the mouth of Colma Creek. At the Produce Avenue crossing, Colma Creek transitions to an earthen trapezoidal channel (see Figure 5, Photo 7). The channel is approximately 70 to 80 feet wide, and the bed is comprised of soft sediments. The banks have a narrow band of emergent marsh dominated by pickleweed (*Sarcocornia [=Salicornia] pacifica*), which transitions to an upland community dominated by ruderal species.

The channel widens as Colma Creek flows toward the Bay. At the mouth of the creek, there is a wetland complex characterized by broad expanses of mudflat habitat with narrow bands of intertidal marsh, rocky intertidal, and upland habitats along the shoreline-Bay ecotone. The mudflats serve as important foraging habitat for many shorebirds.

Proposed Activities

Within Reach 3a, proposed maintenance activities primarily include repairing or replacing degraded or damaged culverts and outfalls and clearing sediment and debris from blocked culvert outfalls. These activities would be limited to the area between Produce Avenue and Utah Avenue crossing, and would not occur within Reach 3b. Other routine maintenance activities that would occur throughout Reach 3 include removal of invasive vegetation in upland areas on the channel banks, debris removal at crossings, repair of access roads, installation or repair of fencing, and abatement of graffiti.

2.5 Project Implementation

2.5.1 Construction Methods

Sediment Removal

Sediment removal work within Reach 2 would be conducted during the dry season when flows in the channel are minimal (August through mid-October) and during low tide. Approximately 400 cubic yards of sediment would be removed from the areas where sediment has accumulated 2 feet or more (Bars 2, 3 and 4), as identified in Figure 3. Throughout the Project's 5-year timeframe, sediment removal activities are anticipated to occur on a routine basis (approximately every 3-4 years), or as needed if deeper sediment deposits develop. Section 2.6, *Project Monitoring,* describes the sequence of activities that would be conducted to assess the need for future sediment removal.

Site preparation would involve mobilizing equipment to the site and installing a silt curtain around the work area by hand. The silt curtain would be used to trap suspended sediment generated by maintenance work and prevent additional turbidity in adjacent channel areas during maintenance.

Sediment near the outer walls would be removed first and a small sediment berm would be left between the excavated area and the active channel. After the sediment is removed, the berm would be breached to allow the incoming tide to enter the excavated area. Consistent with the design of the channel within Reach 2, a minimum of two feet of sediment depth would be preserved along the channel bed.

Up to five construction workers would be on-site to complete sediment removal work. Mechanized equipment to remove sediment is anticipated to include a long-reach excavator or telescopic arm excavator operated from the top of bank. Smaller equipment including a walk-behind mini track loader (e.g. Bobcat MT-52 or similar) may be operated in the channel when flows are minimal during low tide. The loader would push sediment to an area toward the channel wall where the excavator can lift it out of the channel. A haul truck (standard 10 cubic yard) would be stationed at the top of bank to receive the sediment from the channel. The excavated sediment would be hauled and disposed at an approved and operating landfill for use as daily cover material for landfill operations. The nearest operating landfill is the Ox Mountain Sanitary Landfill located three miles east of Half Moon Bay on Highway 92. Prior to disposal at an operating landfill, the sediment would need to undergo testing and must meet the landfill operator's waste acceptance criteria. It is anticipated that the overall sediment removal work would take approximately 8 days to complete. Each location (Bars 2, 3, and 4 in Figure 3) would take approximately 4 days total to complete.

Repair or Replacement of Damaged Culverts and Outfalls

There are 14 culverts in Reach 3a between Highway 101 and the Utah Avenue bridge that require maintenance. These culverts range from 15- to 36-inch diameter and 20 to 50 feet long, and are constructed of reinforced concrete pipe (RCP) or corrugated metal pipe. The locations of these culverts are shown in Figure 4, and photos of the culverts are shown in **Figure 6**. Some culvert outfalls include existing sack concrete structures for energy dissipation and slope protection. Several culverts and associated outfall structures are broken or degraded, and may require repair or replacement.

The condition of the culverts was evaluated by WRECO in September 2015 and repair recommendations for each culvert were developed. Two (2) culverts would be replaced with RCP or high-density polyethylene pipe of the same diameter; 12 culverts would have rock slope protection (RSP) added to the outlet or would include replacement of existing sack concrete with RSP; and all 14 culverts would have duckbill check valves added to their outlets. The duckbill check valves would prevent water from entering the culverts at high tides, thereby limiting sediment transport into the culvert. **Table 2** summarizes the specific maintenance activities that would occur at each culvert.

Table 2. Overview of Proposed Culvert Maintenance Activities in Reach 3a

Culvert Maintenance Site	Activity	Estimated Dredge Volume (cubic yards)	Estimated Net Fill Volume (cubic yards)
1n	Add duckbill check valve	0.5	0.5
1s	Add rock riprap and duckbill check valve	13.5	15
2n	No work proposed	0	0
2s	Replace 25 linear feet of existing culvert, add RSP, and add duckbill check valve	4	4
3n	Replace 60 linear feet of existing culvert, add rock riprap, and add duckbill check valve	6	7
4n	Replace sack concrete with RSP and add duckbill check valve	4	4
4s	Replace 20 linear feet of existing culvert, add RSP, and add duckbill check valve	6	7
5n	Replace sack concrete with RSP and add duckbill check valve	4	2
5s	Replace sack concrete with RSP and add duckbill check valve	4	4
6n	Replace sack concrete with RSP and duckbill check valve	6	4
6s	Add duck bill check valve	0.5	0.5
7n	Replace sack concrete with RSP and add duckbill check valve	4	2
8n	Add RSP and duckbill check valve	4	2
9n	Add RSP and duckbill check valve	4	4

Habitat types in the footprint of the culvert repair sites include upland, intertidal marsh, and earthen channel. The compacted upper bank portion of the channel is upland habitat dominated by non-native annual grasses and forbs. Intertidal marsh areas are dominated by pickleweed (*Sarcocornia* [=*Salicornia*] *pacifica*) interspersed with marsh gumplant (*Grindelia stricta*), alkali heath (*Frankenia salina*), and jaumea (*Jaumea carnosa*). At the culvert outlets, the channel habitat includes intertidal areas that are largely devoid of vegetation.

Site preparation for the culvert repairs would involve mobilizing equipment to the work area and installing a silt curtain around the culvert work area during low tide. If dewatering is necessary, a temporary coffer dam would be installed and a pump would be used to dewater the work area. As described in BMP-3, during any dewatering work, extracted water would likely be discharged to upland areas nearby to water plants/landscaping or would be contained and transported to a local wastewater treatment facility for treatment. Pumped water could also be discharged back to the channel in accordance with the proposed project's National Pollutant Discharge Elimination System (NPDES) construction general permit and/or San Francisco Bay Region Municipal Regional Stormwater NPDES Permit. Where feasible, equipment would operate from the top of bank on the landward side of the existing concrete flood wall. A temporary construction easement would be established to allow equipment access to the repair site and Environmentally Sensitive Area fencing would be used to mark the limits of the work area.

Culvert 6s.
Add duckbill check valve

Culvert 9n.
Add RSP and duckbill check valve

Figure 6:
Culvert Photos

Culvert 8n. Add RSP and duckbill check valve	
Culvert 5s. Replace culvert, add RSP, and add duckbill check valve	

Figure 6:
Culvert Photos

Culvert 7n. Replace sack concrete with RSP and add duckbill check valve	
Culvert 6n. Replace sack concrete with RSP and duckbill check valve	

Figure 6: Culvert Photos

Culvert 5n. Replace sack concrete with RSP and add duckbill check valve	
Culvert 4n. Replace sack concrete with RSP and add duckbill check valve	

Figure 6: Culvert Photos

Culvert 4s. Replace culvert, add RSP, and add duckbill check valve	
Culvert 3s. Add RSP and duckbill check valve	

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Figure 6: Culvert Photos

Culver 3n. Replace sack concrete with RSP and add duckbill check valve	
Culvert 2n. None proposed	

Figure 6: Culvert Photos

Culvert 1n. Add duckbill check valve	
Culvert 1s. Add RSP and duckbill check valve	

Figure 6:
Culvert Photos

It is anticipated that culvert replacement work would be conducted using an excavator to remove the degraded culvert section, prepare the new culvert bed, and then lower the new pipe section in place. Once the replacement culvert is installed or repaired at a site, the trench would then be backfilled, compacted, and restored to match surrounding surfaces. Where RSP is added, a haul truck would bring in the rock and an excavator would be used to set the rock into place in the channel. To remove existing sack concrete, an excavator would be used to remove the material. It is anticipated that all excavated material would be taken directly to a landfill. Duckbill check valves would likely be installed with hand tools and labor. Typical plan and profile details for culvert repair and replacement are provided in **Figure 7.**

For the purposes of this analysis, it is assumed that culverts requiring replacement and/or addition of rock riprap would be repaired in one work day. It was also assumed that the culverts requiring addition of duckbill check valves would occur over a span of one work day. As shown in Table 2, eleven culverts require culvert replacement and/or addition of rock riprap and all duckbill valve replacements would occur in one day. Thus, for the purposes of this analysis, it is estimated that culvert repair and replacement work would occur over a span of 12 days.

Other Routine Maintenance Activities (as needed)

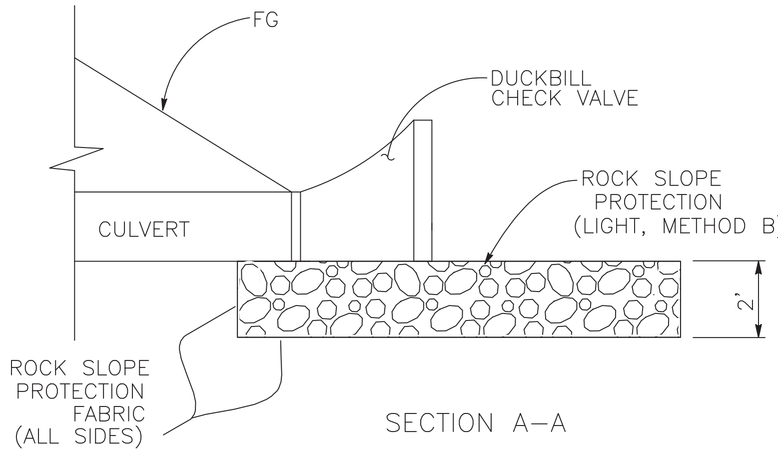
The following subsections describe other routine maintenance activities that would be conducted on an as-needed basis.

Clearing Blocked Culverts and General Removal of Debris and Obstructions

Removal of sediment and debris that is blocking culverts or otherwise obstructing structures and facilities may be necessary to maintain flood control capacity. Facilities that may require clearing include culvert and storm drain outlets, and the dissipater teeth upstream of Spruce Avenue. As needed, the County would remove such obstructions by excavating localized portions of the channel during dry or low-tide conditions from the top of bank. This activity also includes routine removal of fallen trees, branches, piping, and garbage immediately adjacent to flood control structures and trash capture facilities.

Vegetation Management

Sections of the channel which consist of a trapezoidal concrete channel with joints in the channel walls or joints between the walls and channel bottom, are often colonized by wetland or weedy vegetation in the joints. Vegetation such as cattails would be hand pulled or hand cut from the joints. Vegetation removal from the channel banks and adjacent access roads is often necessary to maintain access to the channel and preserve the integrity of the structures. No pickleweed or other native saltmarsh vegetation would be removed or disturbed. Invasive upland species such as pampas grass, ice plant, and fennel would be removed from all channel segments as necessary. Removal of non-native *Spartina* downstream of Spruce Avenue would be coordinated with the San Francisco Estuary Invasive *Spartina* Project.



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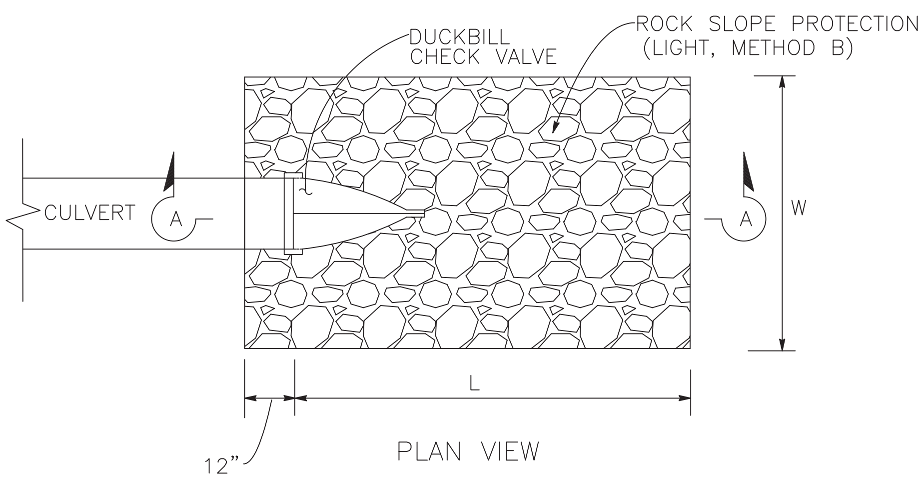

PLAN VIEW

PIPE SIZE	L (Ft)	W (Ft)
6"	11	5
12"	11	5
15"	11	5
18"	11	5
24"	14	6
36"	20	9

ROCK SLOPE PROTECTION DETAILS

Source: WRECO 2015

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Figure 7
Culvert Repair Typical Details

Repairs at Hardened Channel Banks and Bed

This activity includes repairing damaged or failed sections of concrete wall revetments, riprap, or sacked concrete bank revetments. Minor damage to concrete channel walls or bed, such as crumbling or chipping, would be repaired using grout. Larger-scale repair work may require concrete patching or reforming of the channel wall. Such work would be conducted when the channel is at its lowest or completely dry, and when rain is not in the 72-hour forecast. In addition, periodic cleaning of weep holes (small holes in the channel's concrete walls that drain excess water) may be necessary to prevent blockage and allow for water to drain. Because swallows or other migratory birds frequently nest in these holes, to avoid impacts on migratory birds, weep hole cleaning within 50 feet of active nests would occur between August 15 and February 1, outside of the typical breeding season for birds.

Other Maintenance Activities

Other routine maintenance activities that would be conducted on an as-needed basis include removal of debris, repair of access roads, abatement of graffiti, installation and maintenance of trash capture devices, and repair of fencing. Repair of access roads may involve re-grading, repairing cracks, and/or addition of surface material. Installation or repair of chainlink or cable rail fencing would occur on the top of channel banks or walls, and may consist of drilling into existing concrete to install removable posts or pouring concrete post foundations. With the exception of access road repairs, these activities would be non-ground-disturbing. Most routine maintenance work would be conducted using hand tools. Debris removal may require use of heavy construction equipment (e.g., telescopic excavator). For the purposes of this analysis, it is estimated that debris removal would be needed up to 25 times per year. Debris and trash would be disposed at the Ox Mountain Sanitary Landfill located approximately 3 miles east of Half Moon Bay on Highway 92.

2.5.2 Construction Staging, Stockpiling, and Access Approach

As shown in Figure 2, staging of equipment and materials would occur within the maintenance access road along the north side of Reach 2 between San Mateo Avenue and Produce Avenue. Another staging area would be located within the maintenance access road along the east side of Reach 3 downstream of the Utah Avenue bridge crossing. Sediment removed from Reach 2 would be temporarily placed along the maintenance access road parallel to the south side of Reach 2 between San Mateo Avenue and Produce Avenue. The removed sediment would be allowed to dry prior to permanently disposing the material at an appropriate landfill. Consistent with BMP-16, straw wattles or other erosion control materials would be placed around the stockpile area to prevent sediment-laden water flowing into the channel.

Reach 2 would be accessed via Highway 101 and local access would occur via Produce Avenue, San Mateo Avenue, Linden Avenue, North and South Canal Streets, and Spruce Street. Within the upper portion of Reach 2 (between the dissipater teeth and Linden Avenue), a long reach excavator would need to operate from the top of bank on North and South Canal Street. Downstream of Linden Avenue, Reach 2 would be accessible from an existing maintenance road just north of the channel. Reach 3 would be accessible directly from Mitchell Avenue and from Utah Avenue via a service road that parallels the east side of Colma Creek.

2.5.3 Timing of Work

Sediment removal and disposal and culvert repair activities are anticipated to begin in the summer of 2017 (August/September) and be completed by October 15. Thereafter, sediment removal would likely occur every few years throughout the Project's 5-year timeframe, and as needed depending upon the sediment and debris accumulation that occurs around structures. Trash collection, vegetation management, and other maintenance activities that would occur outside the channel may commence in summer 2017 and occur on a routine basis throughout the year.

All sediment removal and culvert repair and replacement activities within Reaches 2 and 3 would occur between 8:00 a.m. and 5:00 p.m., Monday through Friday, consistent with the City of South San Francisco Noise Ordinance, unless alternate schedules are approved by the City. All other routine maintenance activities would also occur during weekdays between 8:00 a.m. and 5:00 p.m.

2.5.4 Impact Avoidance and Minimization

The County strives to protect public health and safety and natural resources to the maximum extent feasible. In conducting routine maintenance activities in the Colma Creek channel, the County seeks to avoid environmental impacts, such as by establishing work windows outside of sensitive life cycle events for special-status species. Project maintenance activities would include implementation of countywide standard best management practices (BMPs) from the County of San Mateo Watershed Protection Program's *Maintenance Standards* (County of San Mateo 2004) and San Mateo Countywide Water Pollution Prevention Program, to avoid and minimize adverse effects on people and the environment. BMPs that may be implemented to avoid or minimize adverse effects of maintenance activities are presented in **Table 3**. BMPs include minimizing the work site to the minimum area necessary; providing staff training on sensitive biological resources, proper handling of hazardous materials, etc.; dust management; protocols for hazardous spills; and many others. These measures are implemented pre-construction, during construction, and post-construction, as specified.

Table 3. BMPs Applicable to the Proposed Project

BMP Number	BMP Title	BMP Description
BMP-1	Timing of Work	A. Maintenance activities occurring below the High Tide Line or Ordinary High Water will take place during the low-flow period and between August 1 and October 15. Maintenance activities within Reach 3 and adjacent to any marsh habitat will be confined between September 1 and October 15. Exceptions may be made for this project with advance approval of Regional Water Quality Control Board (RWQCB), California Department of Fish and Wildlife (CDFW), National Marine Fisheries Service (NMFS), and/or U.S. Fish and Wildlife Service (USFWS) as appropriate. B. Minor maintenance activities that may occur year-round include trash removal, fence maintenance, graffiti abatement, and removal of obstructions that create potential hazardous conditions. C. The work period for completing maintenance activities in the channel shall be timed with precipitation forecasts. No in-channel work shall occur during wet weather. Wet weather is defined as when there has been ¼ inch of rain in a 24-hour period. No work shall occur after a dry out period of 24 hours after a wet weather event has occurred. D. The Project personnel will monitor the 72-hour forecast from the National Weather Service (htt://www.nws.noaa.gov). When there is a forecast of more than 40% chance of rain or at the onset of an unanticipated precipitation, Project personnel shall removal all equipment from the channel and shall implement erosion and sediment control measures. All routine maintenance activities shall cease until after the dry out period as described in (C), above.
BMP-2	Environmental Awareness Training	For each activity, all Project personnel will participate in a worker environmental awareness training program. Under this program, Project personnel will be informed about the presence of listed species and habitats associated with the species and that unlawful take of the animal or destruction of its habitat is a violation of the Federal and State Endangered Species Acts (ESA and CESA, respectively). Prior to Project activities, a qualified biologist approved by CDFW, USFWS, and NMFS will instruct all Project personnel about (1) the description and status of the species; (2) the importance of their associated habitats; and (3) a list of measures being taken to reduce impacts on these species during Project implementation. A fact sheet conveying this information will be prepared for distribution to the Project crew and anyone else who enters the Project site. A member of the Project crew will be designated as the point of contact for any employee or contractor who might encounter a listed species. The representative's name and telephone number will be provided to CDFW, USFWS, and NMFS prior to the initiation of any activities.
BMP-3	Water Quality Protection and Biological Resource Protection Impact Avoidance and Minimization During Dewatering	Prior to initiating construction in the channel, the primary method for keeping water out of the work area in Reach 2 shall entail creating a small sediment berm and silt curtain between the work area and the active channel. Within Reach 3, a silt curtain would be installed around the work area during low-tide. If dewatering is

BMP Number	BMP Title	BMP Description
		necessary, a temporary cofferdam would be installed to divert water around the work area. The following procedures shall be implemented for water quality protection and biological resource protection: A. A silt curtain shall be installed around the in-water work areas by hand and shall be installed at the lowest possible tides to minimize the potential for fish to be in the work area. The silt curtain would be used to trap suspended sediment generated by maintenance work and prevent additional turbidity in adjacent channel areas during maintenance. B. For any culvert repair/replacement work that requires dewatering or fish exclusion, in addition to installation of a silt curtain (described above), cofferdams or other exclusion structures (e.g., nets) shall be installed at the lowest possible tides to minimize the potential for fish to be in the work area. C. Fish exclusion structures shall be constructed of woven mesh or netting with a maximum mesh opening of 3/32 inch. The structures shall remain in place during instream construction activities and shall be monitored daily during instream construction to ensure that they are effectively excluding fish. Any pumps used for dewatering shall be screened with 3/32-inch (or finer) mesh material. D. Once the fish exclusion structure is constructed, qualified fisheries biologists shall survey the exclosure by making a minimum of three passes with fish landing nets, dipnets, seines, buckets, by hand, or by electrofishing, using the protocols established by NMFS (2000). All fish captured, including special-status species, will be placed into a suitable holding container of cool, aerated stream water and then relocated at least 150 feet down-current of the construction area. E. Prior to capturing fish, the most appropriate release location(s) shall be determined using the following criteria: (1) water temperature shall be similar to the capture location, (2) there shall be ample cover habitat for the captured fish, and (3) there shall be a low likelihood for the fish to reenter the work site or become impinged on the exclusion net or screen. F. If a qualified fisheries biologist determines that the exclosure has been compromised, instream construction shall be halted until the biologist has repeated the fish relocation procedures according to NMFS (2000) protocols, and the exclosure has been repaired. G. If determined necessary to isolate work areas from tidal inundation, temporary cofferdams may be needed. Cofferdams shall only be built from materials such as sandbags, clean gravel, or water bags (rubber bladders) which will cause little siltation or turbidity. Visqueen shall be placed over sandbags to minimize water seepage into the maintenance areas. The visqueen shall be firmly anchored to the streambed to minimize water seepage. If necessary, the footing of the dam shall be keyed into the channel bed at an appropriate depth to capture the majority of subsurface flow needed to dewater the streambed.

BMP Number	BMP Title	BMP Description
		H. During dewatering of the channel, the decrease in water surface elevation (WSE) shall be controlled such that WSE does not change at a rate that increases turbidity to the creek that could be deleterious to aquatic life and the likelihood of stranding aquatic life up- and downstream of the creek. I. If dewatering is necessary for work in Reach 3, extracted water from the work area shall not be discharged to the flowing channel to the extent feasible. However, the County may discharge pumped water back into channel in accordance with conditions of the NPDES Construction General Permit (SWRCB Order No. 2009-0009-DWQ) and/or San Francisco Bay Region Municipal Regional Stormwater NPDES Permit. (RWQCB Order No. R2-2015-0049). Extracted water may be discharged to upland areas nearby, such as to water plants/landscaping or contained and transported to a local wastewater treatment facility for treatment. J. When construction is completed, cofferdams, flow exclusion structures, and silt fences shall be removed as soon as possible. Impounded water shall be released at a reduced velocity to minimize erosion, turbidity, or harm to aquatic life. To the extent feasible, the disturbed area shall be restored to pre-construction conditions upon completion of the project.
BMP-4	Work in Wetlands	A. For work occurring in wetlands, the construction footprint area shall be minimized to the extent feasible. Limits of work shall be clearly marked with brightly colored fencing or flagging. B. The County shall conduct weekly inspections of the site to ensure contractors have not gone beyond the limits of work. If the contractor has gone beyond the limits of work, the County shall re-establish the fencing and conduct immediate restoration of any damage to sensitive habitats outside the work limits. C. All equipment operating in wetlands or on soft sediments shall operate on mats or will be specialized low ground pressure equipment. D. Immediately after construction, the County shall restore the surface topography and drainage to pre-construction conditions.
BMP-5	Breeding Bird Survey and Protective Buffers	A. For maintenance activities involving heavy equipment, ground disturbance, or vegetation removal that are scheduled during the nesting season (March 15 to August 30 for smaller bird species such as passerines; February 15 to September 15 for raptors), a focused survey for active bird nests shall be conducted by a qualified biologist within 7 days prior to the beginning to project activities. The minimum survey radii surrounding the work area shall be the following: i) 250 feet for passerines; ii) 500 feet for small raptors such as accipiters, iii) 1,000 feet for larger raptors such as buteos. If active nests are found, the County shall consult with CDFW and USFWS regarding appropriate action to comply with the Migratory Bird Treaty Act of 1918 and the Fish & Game Code, section 3503. B. Active nests shall be designated as "Ecologically Sensitive Areas" and protected (while occupied) during routine maintenance activities with the establishment of temporary construction fencing, barriers, and/or flagging surrounding the nest site. The typical minimum distances of the protective buffers surrounding

BMP Number	BMP Title	BMP Description
		each identified nest site is usually the following: i) 1,000 feet for large raptors such as buteos; ii) 250 feet for small raptors such as accipiters; iii) 250 feet for passerines. A biological monitor shall monitor the behavior of the birds (adults and young, when present) at the nest site to ensure that they are not disturbed by project-related activities. Nest monitoring shall continue during project-related construction work until the young have fully fledged, are no longer being fed by the parents and have left the nest site, as determined by a the approved biological monitor. C. Presence/absence of Ridgway's Rail in the project area will be based on data collected by the Invasive Spartina Project, which conducts annual breeding season surveys in the project area. D. In the absence of data available from the Invasive Spartina Project, the County will conduct protocol-level surveys for Ridgway's Rail prior to conducting Reach 3 maintenance activities involving heavy equipment, ground disturbance, or vegetation removal that are scheduled during the Ridgway's Rail nesting season (February 1 to August 31) and would occur within 700-ft of suitable habitat for Ridgway's Rail. The County will submit to CDFW and USFWS the rail survey methodology and results prior to the start of maintenance activities within Reach 3. E. If the surveys confirm there are no breeding rails within 700 feet of the rail calling center, work within Reach 3 could occur from June 1 to October 31.
BMP-6	Spill Prevention and Control	A. The construction Contractor will be required to develop and submit a *Spill Prevention and Response Plan* for approval by the County. B. 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 guidelines stated in the *Spill Prevention and Response Plan*. C. Spill response 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. D. County staff will routinely inspect the work site to verify that spill prevention and response measures are properly implemented and maintained. E. 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 of rather than buried. Absorbent materials will be collected and disposed of properly and promptly. F. As required by law, all significant releases of hazardous materials, including oil will be reported immediately to the Governor's Office of Emergency Services Warning Center, (800) 852-7550.
BMP-7	Equipment Maintenance & Fueling	Proper equipment maintenance and fueling procedures will ensure that no fluids are discharged into watercourses, and that any spills are promptly cleaned up, reported (if necessary), and properly disposed of.

BMP Number	BMP Title	BMP Description
		A separate area shall be designated for equipment maintenance and fueling, away from any slopes, watercourses, or drainage facilities. Where equipment is expected to be stored for more than a few days, cleanup materials and tools shall be kept nearby and available for immediate use. Equipment shall not be stored in areas that will potentially drain to watercourses or drainage facilities. If equipment must be stored in areas with the potential to generate runoff, drip pans, berms, sandbags, or absorbent booms should be employed to contain any leaks or spills. All equipment will be maintained free of petroleum leaks. All vehicles operated within 250 ft of the Colma Creek flood control channel will be inspected daily for leaks and, if necessary, repaired before leaving the staging area. Inspections will be documented in a record that is available for review on request.
BMP-8	Sand Bags/Rock Socks	Sandbags may be used during construction to form dewatered areas such as cofferdams or clean water bypasses. Sandbags placed around drainage inlets divert flow away from the inlet. Rock socks may be used to protect inlets by providing filtration of runoff while allowing flow to enter the storm drain system. <u>Construction Guidelines</u>: ▪ When used in the Colma Creek channel, this BMP must be used in accordance with permit conditions. ▪ Secure ends of sandbags to ensure material does not scatter. ▪ When used as a barrier, stack bags tightly together and in alternative (brick-layer) fashion. <u>BMP Maintenance</u>: ▪ During construction, inspect daily during the workweek. Schedule additional inspections during storm events. Make any required repairs. ▪ Replace damaged sandbags/rock socks. ▪ Remove sediment when deposits reach ½ the height of the sandbag barrier. ▪ Replace rock socks when ½ full of sediment or when water no longer flows through rock sock or when water is not clean after flowing through rock sock.
BMP-9	Non-Hazardous Materials	▪ Berm and cover stockpiles of sand, dirt or other construction material with tarps when rain is forecast or if not actively being used within 14 days. ▪ Use (but don't overuse) reclaimed water for dust control.
BMP-10	Hazardous Materials	▪ Label all hazardous materials and hazardous wastes (such as pesticides, paints, thinners, solvents, fuel, oil, and antifreeze) in accordance with city, county, state, and federal regulations. ▪ Store hazardous materials and wastes in water tight containers, store in appropriate secondary containment, and cover them at the end of every work day or during wet weather or when rain is forecast.

BMP Number	BMP Title	BMP Description
		▪ Follow manufacturer's application instructions for hazardous materials and be careful not to use more than necessary. Do not apply chemicals outdoors when rain is forecast within 24 hours. ▪ Arrange for appropriate disposal of all hazardous wastes.
BMP-11	Waste Management	▪ Cover waste disposal containers securely with tarps at the end of every work day and during wet weather. ▪ Check waste disposal containers frequently for leaks and to make sure they are not overfilled. Never hose down a dumpster on the construction site. ▪ Clean or replace portable toilets, and inspect them frequently for leaks and spills. ▪ Dispose of all wastes and debris properly. Recycle materials and wastes that can be recycled (such as asphalt, concrete, aggregate base materials, wood, gyp board, pipe, etc.) ▪ Dispose of liquid residues from paints, thinners, solvents, glues, and cleaning fluids as hazardous waste. ▪ All temporary fences, barriers, and/or flagging shall be completely removed from work sites and properly disposed of upon completion of maintenance activities.
BMP-12	Construction Entrances and Perimeter	▪ Establish and maintain effective perimeter controls and stabilize all construction entrances and exits to sufficiently control erosion and sediment discharges from the construction work areas including staging areas. ▪ Sweep or vacuum any street tracking immediately and secure sediment sources to prevent further tracking. Never hose down streets to clean up tracking.
BMP-13	Maintenance and Parking	▪ Designate an area fitted with appropriate BMPs for vehicle and equipment parking and storage. ▪ Perform major maintenance, repair jobs, and vehicle and equipment washing off site. ▪ If vehicle maintenance must be done onsite, work away from storm drains and over a drip pan big enough to collect fluids. ▪ Recycle or dispose of fluids as hazardous waste. ▪ No vehicle or equipment cleaning will be done onsite.
BMP-14	Sediment and Erosion Control	▪ Protect storm drain inlets, gutters, ditches, and drainage courses with appropriate BMPs, such as gravel bags, fiber rolls, berms, etc. ▪ Prevent sediment from migrating offsite by installing and maintaining sediment controls, such as fiber rolls, silt fences, or sediment basins. Erosion control fabrics will be constructed of biodegradable materials such as coir or jute, unless otherwise authorized by CDFW. ▪ Keep excavated soil on the site where it will not collect into the street. ▪ Transfer excavated materials to dump trucks on the site, not in the street, as feasible.

BMP Number	BMP Title	BMP Description
		▪ Cover haul trucks transporting soil, sand, or other loose materials off-site. ▪ All exposed soils within the work area will be stabilized immediately following the completion of earthmoving activities to prevent erosion into the channel. ▪ The County will monitor the above-described sediment and erosion control BMPs during and after each storm event for effectiveness. Modifications, repairs and improvements to these BMPs shall be made as needed to protect water quality.
BMP-15	Concrete, Grout & Mortar Application	▪ Install the necessary containment structures to control the placement of wet concrete and to prevent it from entering into the channel outside of those structures. No concrete shall be poured within the high flow line if the 15-day weather forecast indicates any chance of rain. ▪ When working with wet concrete, a monitor shall be on-site to inspect the containment structures and ensure that no concrete or debris enters into the channel outside of those structures. Runoff from the concrete shall not be allowed to enter the channel at any time. ▪ If feasible, poured concrete shall be excluded from the wetted channel for a period of 30 days after it is poured. During that time, the poured concrete shall be kept moist, and runoff from the concrete shall not be allowed to enter a live stream. If the 30-day period is infeasible, the County shall institute a minimum 3-day curing period and apply a non-toxic sealant designed for use in aquatic environments. The sealant shall be allowed to cure for a minimum of 72 hours and until the sealant is dry. ▪ If rain occurs after pouring or concrete cannot be excluded from the wetted channel for a period of 30 days, the County shall monitor the pH of any water that has come into contact with the poured concrete. If the water has a pH of 9.0 or greater, the water shall be pumped to a tanker truck or to a lined off-channel basin and allowed to evaporate or be transported to an appropriate facility for disposal. During the pH monitoring period, all water that has come in contact with poured concrete shall be isolated and not allowed to enter the water or otherwise come in contact with fish and other aquatic resources. The water shall be retested until pH values become less than 9.0. ▪ Store concrete, grout, and mortar under cover, on pallets, and away from drainage areas. These materials must never reach a storm drain. ▪ Wash out concrete equipment/trucks offsite or in a contained area, so there is no discharge into the underlying soil or onto surrounding areas. Let concrete harden and dispose of as garbage. ▪ Collect the wash water from washing exposed aggregate concrete and remove it for appropriate disposal offsite.
BMP-16	Staging, Stockpiling of Soil, and Access	▪ Staging, access, and parking areas will be located outside of sensitive habitats to the extent feasible. ▪ Stockpiled soils shall be located away from the creek and a straw wattle or other erosion control material shall surround the stockpile until it is disposed of or used.

BMP Number	BMP Title	BMP Description
		▪ Access to the routine maintenance sites will be via existing roads and access ramps.
BMP-17	Vehicle Idling and Maintenance	▪ Idling times shall be minimized either by shutting equipment off when not in use or reducing the maximum idling time to 5 minutes. Clear signage shall be provided for construction workers at all access points. ▪ All construction equipment shall be maintained and properly tuned in accordance with manufacturer's specifications. All equipment shall be checked by a certified mechanic and determined to be running in proper condition prior to operation.
BMP-18	Dust Management Controls	The County will implement the Bay Area Air Quality Management District (BAAQMD) Basic Dust Control Measures. 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. All vehicle speeds on unpaved roads shall be limited to 15 mph. 5. 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. 6. 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. 7. 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. 8. Post a publicly visible sign with the telephone number and person to contact at the County regarding dust complaints. Following the review of any dust complaints, the County project manager shall respond and take corrective action within 48 hours.
BMP-19	Vegetation Removal and Trimming	A. With the exception of culvert maintenance work in Reach 3, if any other areas with pickleweed or vegetation within 50 feet from the edge of pickleweed need to be cleared for maintenance activities, the County shall obtain approval from CDFW with an Amendment Request to their Routine Maintenance Agreement. B. A qualified biologist of biological monitor shall be present during all routine maintenance activities at sites within pickleweed habitat or within 50 feet of pickleweed habitat. The biologist will document compliance with the avoidance and minimization measures. The biologist shall have authority to stop

BMP Number	BMP Title	BMP Description
		project activities if deemed necessary for any reason to protect any special status species. If the biologist has requested work stoppage because of any species, the CDFW shall be notified within 24 hours. C. Disturbance or removal of vegetation shall not exceed the minimum necessary to complete operations. D. Trimming of vegetation shall be limited to what is necessary to allow the level of access needed or to restore normal channel flows. Branches and/or limbs overhanging the channel and impacting water flows shall be properly pruned. Only those branches in the lower third of any woody plant and less than six (6) inches in diameter may be trimmed to accommodate maintenance activities. No vegetation on the bank or top-of-bank shall be removed by excavation or cutting off below the soil. All pruned material shall be removed from the area and properly disposed of. E. Invasive plant material during maintenance activities shall be bagged and appropriately incinerated or disposed of in a landfill or permitted composting facility.
BMP-20	Vegetation Replacement	All non-tidal exposed/disturbed areas and access points draining to the channel and left barren of vegetation following maintenance activities shall be re-vegetated with native plants or seeded with a blend of erosion control grass seeds and locally native vegetation. Non-native grass species shall not exceed 25% of the total seed mix by count, and all nonnative grass seed shall be sterile (i.e. incapable of reproducing). Re-vegetation shall be completed immediately (within two weeks) after construction activities cease. Seed shall be covered with broadcast straw, jute netting, coconut fiber blanket or a similar erosion control blanket/mulch. Erosion control blankets with monofilament or woven plastic strands shall not be used.

2.6 Project Monitoring and Sediment Removal Triggers

Project monitoring involves a sequence of activities, including the following:

(1) Channel visual assessment: Annually, the County will visually inspect the Colma Creek flood control channel to assess the degree of sediment accumulation, other maintenance issues such as trash, debris, or vegetation blockages, and culvert conditions. Based on the visual assessment of channel conditions, the District will evaluate the need for maintenance.

(2) Channel sediment depth measurement: For areas within Reach 2 where there has been noticeable sediment accumulation based on the visual channel assessment, the County will measure sediment depth at several locations in the channel to compare to previous sediment depths. Sediment depth will be measured against the concrete channel bed using a steel rod. Measurements will be spatially located and logged using a GPS receiver.

(3) Sediment volume assessment: Based on the sediment depth measurements, as described in step (2) above, the volume of accumulated sediment in the channel reach will be estimated. The focus of this assessment is Reach 2, where Reach 2 is further subdivided into the following subreaches:

- Reach 2a – Spruce Street downstream to South Linden Avenue
- Reach 2b – South Linden Avenue downstream to San Mateo Avenue
- Reach 2c – San Mateo Avenue downstream to Produce Avenue

(4) A threshold of 250 cubic yards of accumulated sediment in Reach 2 would be required to initiate any subsequent sediment removal work in a given year. This volume is based on the flood control channel's design (to accommodate 2 feet of sediment on the channel bed) and average annual deposition rates for Colma Creek (County of San Mateo/Horizon, 2014).

(5) Bay wetlands topographic assessment: To determine whether periodic sediment removal from the Colma Creek flood control channel (Reach 2) may result in a reduced sediment supply to nearby wetlands at the mouth of Colma Creek and a potential lowering of the wetland surface at the creek mouth, periodic topographic mapping of three transects within the wetlands will be conducted. The need and frequency to monitor and survey wetland elevations at the creek mouth area is based on the volume of sediment to be removed from the Colma Creek Reach 2, as follows:

a) Sediment removal volume is less than 500 cubic yards. For annual sediment removal volumes less than 500 cubic yards for Reach 2, downstream topographic surveying at the Colma Creek river mouth wetlands is not necessary. This volume is based on the estimate of average annual deposition rates for Colma Creek (County of San Mateo / Horizon, 2014).

b) Sediment removal volume is greater than 500 cubic yards. For sediment removal volumes greater than 500 cubic yards for Reach 2, downstream topographic surveying of transects in the Colma Creek mouth wetlands is required. Topographic mapping of the wetlands area will be completed for future use and comparison.

c) Following a winter season with a 10-year recurrence interval peak discharge event occurring at Colma Creek, transects in the creek mouth wetlands area will be surveyed to provide a comparative baseline for future evaluations.

d) In the event that during the 5-year maintenance program period, neither a 10-year peak discharge event occurs, nor does the District ever remove more than 2,000 cubic yards of sediment in a given year from Reach 2 such that topographic surveying of the Colma Creek mouth wetlands is not required, then the District shall at a minimum conduct a survey of the creek mouth wetlands area in years (5) and (10) of the program period.

Topographic surveys of the Colma Creek mouth wetlands may use a total station or real-time kinematic (RTK)-GPS. Horizon Water and Environment (Horizon) mapped tidal wetland elevations at the mouth of Colma Creek in September 2013. These results can be used as a comparative baseline for future surveys at the creek mouth (County of San Mateo / Horizon, 2014).

2.7 Required Permits and Approvals

The permits and regulatory compliance requirements for the proposed Project are described in **Table 4** by permitting agency. In addition to the requirements summarized below, the project must conform to the policies and standards established in the current Town of Colma General Plan and City of South San Francisco General Plan, which are relevant to all resource topics analyzed under CEQA.

Table 4. Permit and Regulatory Requirements Applicable to the Proposed Project

Regulatory Agency	Law/Regulation	Purpose	Permit/Authorization Type
U.S. Army Corps of Engineers (USACE) – San Francisco District	Clean Water Act (CWA) Section 404	Regulates placement of dredged and fill materials into waters of the United States.	Individual Permit
	Rivers and Harbors Act Section 10	Regulates work in navigable waters of the U.S.	Section 10 Compliance
San Francisco Bay Regional Water Quality Control Board	CWA Section 401	Water quality certification for placement of materials into waters of the United States.	401 Water Quality Certification is required for federal permits
	Porter-Cologne Water Quality Control Act	Regulates discharges of materials to land and protection of beneficial uses of waters of the State.	Waste Discharge Requirements (WDRs)

Regulatory Agency	Law/Regulation	Purpose	Permit/Authorization Type
	CWA Section 402	Regulates discharges of pollutants	NPDES Construction General Permit
California Department of Fish and Wildlife (CDFW) – Bay Delta Region	Fish and Game Code (F&G Code) Section 1600	Applies to activities that will substantially modify a river, steam or lake. The Agreement includes reasonable conditions necessary to protect those resources.	Notification of Streambed Alteration-Routine Maintenance Agreement (1602 permit)
USFWS/ National Marine Fisheries Service (NMFS)	Endangered Species Act (ESA)	USACE must consult with USFWS and NMFS if threatened or endangered species may be affected by the project.	Biological Opinions issued in conjunction with USACE Section 404 compliance
State Historic Preservation Officer	National Historic Preservation Act (NHPA) Section 106	USACE must consult with State Historic Preservation Officer and Native American Tribes if historic properties or prehistoric archaeological sites may be affected by the project.	Consultation in conjunction with USACE Section 404 compliance
BART	Local Policies and Requirements	County must obtain a Permit to Enter prior to conducting any channel maintenance work within BART property.	Permit to Enter
City of South San Francisco	Local Policies and Requirements	County must apply for an encroachment permit to access work areas that traverse City of San Francisco right-of-way.	Encroachment permit
Town of Colma	Local Policies and Requirements	County must apply for an encroachment permit to access work areas that traverse Town of Colma right-of-way.	Encroachment permit

Chapter 3
ENVIRONMENTAL CHECKLIST

1. Project Title:	Colma Creek Flood Control Channel Maintenance Project
2. Lead Agency Name and Address:	County of San Mateo, Department of Public Works
3. Contact Person, Phone Number and Email:	Mark Chow, P.E., Principal Civil Engineer (650) 599-1489, mchow@smcgov.org
4. Project Location and APN:	Colma Creek Flood Control Channel; various APNs
5. Property Owner:	County of San Mateo
6. General Plan Designation:	Colma Creek is designated as "Public" land.
7. Zoning:	Parks and Recreation (PR), Public/Quasi-Public (PQP), El Camino Real/Chestnut Mixed Use High Density (ECR/CMXH), Open Space (OS), Transit Village High Density Residential (TV-RH), Freeway Commercial (FC)
8. Description of Project:	See Chapter 2, *Project Description*.
9. Surrounding Land Uses and Setting:	Surrounding land uses include a combination of land zoned as Mixed Industrial, Public/Quasi-Public, Business Commercial, Commercial/Mixed Use, Medium Density Residential, Parks and Recreation, and Freeway Commercial (U.S. Highway 101). See Chapter 2, Section 2.2 for additional detail.
10. Other Public Agencies whose Approval or Input May Be Needed:	▪ California Department of Fish and Wildlife ▪ California State Historic Preservation Office ▪ National Marine Fisheries Service ▪ Regional Water Quality Control Board, San Francisco Bay Region ▪ United States Army Corps of Engineers ▪ United States Fish and Wildlife Service

This chapter of the IS/MND assesses the proposed Project's environmental impacts based on the environmental checklist provided in Appendix G of the state's CEQA Guidelines. The environmental resources and potential environmental impacts of the proposed Project are described in the individual subsections below. Each section (3.1 through 3.18) provides a brief overview of existing environmental conditions for each resource topic to help the reader understand the conditions that could be affected by the proposed Project. In addition, each section includes a discussion of the rationale used to determine the significance level of the Project's environmental impact for each checklist question.

Reference documents reviewed for relevant information are cited as applicable.

3.1 AESTHETICS. Would the project:	Less than Significant with Mitigation	Less Than Significant Impact	No Impact
a. Have a significant adverse effect on a scenic vista, views from existing residential areas, public lands, water bodies, or roads?		X	

The proposed Project primarily involves the following activities: localized sediment removal within Reach 2 of the Colma Creek flood control channel, repair or replacement of existing culverts, and other routine maintenance activities throughout all three reaches of the channel.

There are no designated scenic vistas in the vicinity of Reaches 1 and 2 of the channel. However, recreationists using the Centennial Way Trail, which parallels Reach 1 from Antoinette Lane to the South San Francisco BART station, would have temporary views of any routine maintenance work that occurs along this reach. Similarly, recreationists at Orange Memorial Park, which is located on both sides of the channel west of West Orange Avenue, would have temporary views of maintenance activities that take place within Reach 1. Residents that have views of the channel are located in an apartment complex that borders Sister Cities Park to the south of the channel and west of Spruce Street. These residents and other recreationists using Sister Cities Park trail, which parallels the southern side of the channel, would have temporary views of maintenance activities occurring within Reach 1. Other residents that may have partial views of the channel include apartment buildings and townhouses in the vicinity of Trader Joe's and northwest of Lawndale Boulevard, and homes along Mayfair Avenue and North Canal Street (between Orange Avenue and Spruce Avenue). Residents on the ground floor may have limited views of the channel due to fencing and intervening vegetation. Activities that may be visible from these viewpoints include minor vegetation management on the channel banks and removal of debris and graffiti.

There are no residential areas along Reach 2; however primary views of sediment removal activities would be visible from adjacent roads such as North Canal Street, South Canal Street, Spruce Avenue, and Linden Avenue. Some views of Reach 2 may be available from hotels off of South Airport Boulevard. Motorists and pedestrians traveling on these roads may have temporary views of equipment and trucks used to excavate sediment from the channel from top of bank. Given the industrial character of the area and the short duration of sediment removal activities within Reach 2, the effect on views from adjacent roadways would be minimal.

Along Reach 3b, views of the channel are readily available from the San Francisco Bay Trail (Bay Trail). From South Airport Boulevard, the Bay Trail parallels the southern side of the reach, crosses over the reach via a pedestrian bridge, and then parallels the San Francisco Bay (Bay) to the north of Reach 3b. From this trail, recreationists (e.g., walkers, joggers, and bicyclists) have scenic views of the Bay and shoreline vegetation. These recreationists would have temporary close-up views of construction vehicles and equipment stored at the staging area south of Utah Avenue.

Given that the proposed maintenance activities would generally improve visual conditions in the Project area by removing unsightly trash and debris and the short-term duration of such activities, the proposed Project would not have a substantial adverse effect on scenic vistas, views from residential areas, public lands, water bodies, or roads. This impact is considered **less than significant**.

b. Significantly damage or destroy scenic resources, including, but not limited to, trees, rock outcroppings, and historic buildings within a state scenic highway?			X
The proposed Project would not involve destruction of scenic resources like trees, rock outcroppings, or historic buildings adjacent to a scenic highway. The nearest scenic highway is Interstate 280 (I-280), approximately 1.2 miles away from Reach 1 and approximately 1.8 miles away from Reaches 2 and 3 where the majority of the proposed maintenance activities would take place. Due to distance, the Project area is not visible from I-280. Therefore, the proposed Project would have **no impact** on trees, rock outcroppings and historic buildings adjacent to a state scenic highway.			
c. Significantly degrade the existing visual character or quality of the site and its surroundings, including significant change in topography or ground surface relief features, and/or development on a ridgeline?		X	
The proposed Project involves localized sediment removal, repair and replacement of degraded culverts, and other routine maintenance activities such as vegetation management and clearing of debris in culvert outfalls within the Colma Creek flood control channel. Such activities would not alter the topography, ground relief features, and/or development on a ridgeline. As described in response to question 3.1a, proposed maintenance activities would be intermittently visible from four public recreational areas (the Centennial Way Trail, Orange Memorial Park, Sister Cities Park Trail, and the Bay Trail). However, as previously discussed, proposed routine maintenance activities (e.g., clearing blocked culvert outfalls, vegetation management, removal of invasive vegetation, graffiti removal) would be short in duration and would in fact improve the visual character and quality of the Project area. For these reasons, this impact would be **less than significant**.			
d. Create a new source of significant light or glare that would adversely affect day or nighttime views in the area?			X
Construction work would generally occur between 8:00 a.m. and 5:00 p.m., Monday through Friday. There would be no nighttime construction that would require lighting, installation of permanent lighting such as street lights or the use of any materials or surfaces that would create a new source of light or glare. The proposed Project would have **no impact** on the community as a result of light pollution.			
e. Be adjacent to a designated Scenic Highway or within a State or County Scenic Corridor?			X
As previously described, Reach 1 is approximately 1.2 miles away from the nearest State scenic highway (I-280) and Reaches 2 and 3 are approximately 1.8 miles away from I-280. There are no other nearby State or County scenic corridors. As such, **no impact** would occur.			
f. If within a Design Review District, conflict with applicable General Plan or Zoning Ordinance provisions?			X

The Project area is not within a designated Design Review District and therefore would not conflict with any General Plan or Zoning Ordinance provisions. **No impact** would occur.			
g. Visually intrude into an area having natural scenic qualities?		X	
Recreationists using the Centennial Way Trail, Orange Memorial Park, Sister Cities Park Trail, and the Bay Trail may have brief views of construction equipment and maintenance vehicles throughout the duration of project construction. However, because maintenance activities would be short-term and ultimately improve the visual character and quality of the surrounding area, the proposed Project is expected to have a **less-than-significant** impact on the natural scenic quality of the area.			

3.2 AGRICULTURAL AND FOREST RESOURCES. Would the project:			
	Less than Significant with Mitigation	**Less Than Significant Impact**	**No Impact**
a. For lands outside the Coastal Zone, convert Prime Farmland, Unique Farmland, or Farmland of Statewide Importance (Farmland), as shown on the maps prepared pursuant to the Farmland Mapping and Monitoring Program of the California Resources Agency, to non-agricultural use?			X
The Project area consists of an urban channel surrounded by a combination of light industrial, residential, and commercial uses in the City of South San Francisco. The California Department of Conservation (CDC) Farmland Mapping and Monitoring Program (FMMP) has designated the project site as "Urban and Built Up Land" (CDC 2014). No Prime Farmland or any other farmland exists within or adjacent to the project area. As such, the proposed Project would not convert Prime Farmland, Unique Farmland, or Farmland of Statewide Importance to non-agricultural use. There would be **no impact**.			
b. Conflict with existing zoning for agricultural use, an existing Open Space Easement, or a Williamson Act contract?			X
The Project area is not under a Williamson Act contract (CDC 2012) nor is it within an area zoned for agricultural use. Therefore, the proposed Project would have **no impact** on existing zoning for agricultural use and Williamson Act contracts.			
c. Involve other changes in the existing environment, which, due to their location or nature, could result in conversion of Farmland to non-agricultural use or conversion of forest land to non-forest use?			X
As described above in response to question 3.2a, the Project is in a predominantly urban area surrounded by light industrial, residential, and commercial uses. There is no agricultural or forest land on or adjacent to the Project area. Therefore, the proposed Project would not result in the conversion of Farmland to non-agricultural use and would not result in the conversion of forest land to non-forest use. **No impact** would occur.			
d. For lands within the Coastal Zone, convert or divide lands identified as Class I or Class II Agriculture Soils and Class III Soils rated good or very good for artichokes or Brussels sprouts?			X
The proposed Project is not located within the Coastal Zone. As a result, this criterion does not apply to the proposed Project.			
e. Result in damage to soil capability or loss of agricultural land?			X

See the discussion above in response to question 3.2a. **No impact** would occur.			
f. Conflict with existing zoning for, or cause rezoning of, forest land (as defined in Public Resources Code Section 12220(g)), timberland (as defined by Public Resources Code Section 4526), or timberland zoned Timberland Production (as defined by Government Code Section 51104(g))?			X
See the discussion above in response to question 3.2c. **No impact** would occur.			

3.3 AIR QUALITY. Would the project:	Less than Significant with Mitigation	Less Than Significant Impact	No Impact
a. Conflict with or obstruct implementation of the applicable air quality plan?		X	

The proposed Project is located in the San Francisco Bay Area Air Basin (SFBAAB), which includes all of Napa, Contra Costa, Alameda, Santa Clara, San Mateo, San Francisco, and Marin Counties, the southern portion of Sonoma County, and the western portion of Solano County. The Bay Area Air Quality Management District (BAAQMD) is the regulatory agency responsible for assuring that national and state ambient air quality standards are attained and maintained in the SFBAAB.
The proposed Project would be considered to have a significant impact if it would conflict with or impair implementation of applicable air quality plans established by BAAQMD or local general plans. The SFBAAB is in nonattainment for the following state standards: ozone, particulate matter less than 10 microns in diameter (PM_{10}), and particulate matter less than 2.5 microns in diameter ($PM_{2.5}$). In addition, the SFBAAB is in nonattainment for federal ozone and $PM_{2.5}$ standards. On January 9, 2013, the U.S. Environmental Protection Agency (USEPA) issued a final rule to determine that the Bay Area attains the 24-hour $PM_{2.5}$ standard. This USEPA rule suspends key State Implementation Plan requirements as long as monitoring data continues to show that the Bay Area attains the standard. Despite this USEPA action, the Bay Area will continue to be designated as "non-attainment" for the national 24-hour $PM_{2.5}$ standard until such time as the BAAQMD submits a "redesignation request" and a "maintenance plan" to the USEPA, and the USEPA approves the proposed redesignation. The SFBAAB is in attainment or unclassified for all other criteria air pollutants. As such the BAAQMD has prepared air quality plans to address these nonattainment issues.

Applicable air quality plans include the Bay Area 2005 Ozone Strategy, 2010 Bay Area Clean Air Plan, and air quality-related policies in the general plans for the cities of South San Francisco and the Town of Colma. The Bay Area 2005 Ozone Strategy includes stationary source control measures to be implemented through BAAQMD regulations; mobile source control measures to be implemented through incentive programs and other activities; and transportation control measures to be implemented through transportation programs in cooperation with the Metropolitan Transportation Commission (MTC), local governments, transit agencies and others. The Bay Area 2010 Clean Air Plan includes a control strategy that includes stationary and area source, mobile source, transportation control, land use and local impact, energy and climate, and additional measures to control ozone and its precursors (ROG and NOx), PM_{10}, $PM_{2.5}$, and toxic air contaminants (TACs). The general plans contain measures related to encouraging attainment of federal and state ambient air quality standards by new projects, implementing and planning for alternative transportation methods, minimizing exposure of residents to objectionable smoke and odors, and adopting standard dust abatement measures.

The proposed Project would involve temporary emissions generated by various maintenance activities, but would not result in induced growth nor result in a permanent new source of emissions. Although construction emissions would not result in any conflicts with local air quality plans and would not result in a significant impact, as a standard practice the County would implement BMP-17 (Vehicle Idling and Maintenance) which aims to avoid excess emissions including limiting vehicle idling. The proposed Project does not include any specific source activities covered in the Bay Area 2010 Clean Air Plan or Bay Area 2005 Ozone Strategy. The proposed Project would not affect or alter existing or planned land uses from those anticipated in the City of South San Francisco's and Town of Colma's general plans for long-range air quality planning. In addition, the proposed Project would not facilitate further growth. Therefore, the proposed Project would not conflict with an applicable air quality plan and this impact would be **less than significant**.

b.	Violate any air quality standard or contribute significantly to an existing or projected air quality violation?		X	

The SFBAAB is a state and federal non-attainment area for ozone and $PM_{2.5}$, and a state non-attainment area for PM_{10}. A project would have a significant impact if it would contribute substantially to these air quality violations. San Mateo County, as the lead agency, has determined that the mass emission thresholds of significance adopted by the BAAQMD in 2010 are appropriate air quality thresholds based on substantial evidence.

A substantial contribution is defined as a contribution above the BAAQMD CEQA threshold of significance for criteria pollutants including ozone precursors ROG and NOx. The BAAQMD has established mass emission thresholds of significance to determine if air emissions would contribute to an existing or projected air quality violation or result in a cumulatively considerable net increase of criteria pollutant such that the air basin is non-attainment for ambient air quality standards. These are shown in **Table 5** for construction-related emissions and **Table 6** for operation-related thresholds.

Project construction activities would require daily use of construction equipment and vehicles powered by diesel and gasoline fuel, the combustion of which would emit criteria air pollutants, including ROG, NOx, carbon monoxide (CO), and exhaust-based PM_{10}, and $PM_{2.5}$. In addition, Project ground-disturbing activities would release fugitive dust emissions of fine particulate matter – both PM_{10} and $PM_{2.5}$.

The proposed maintenance-related criteria pollutant emissions from Year 1 would result from the combustion of fossil-fueled construction equipment, material hauling, and worker trips. These emissions were estimated using the CalEEMod version 2013.2.2, which assumed that all proposed maintenance activities (sediment removal, culvert repair, and other maintenance activities) would occur consecutively by 5 construction workers. All other maintenance activities and the potential equipment needed for those activities were combined together as one 25-day maintenance phase. It was assumed 400 cubic yards would be off-hauled during sediment removal activities, resulting in 40 haul truck trips. Culvert repair activities were assumed to require 61 cubic yards of imported fill and export of 72 cubic yards of dredge material. Additional modeling assumptions are detailed in Appendix B. As shown in Table 5, prior to implementation of BMPs, maintenance-related emissions from the proposed Project would be less than the significance thresholds, with the exception of fugitive dust. Because the BAAQMD recommends that all projects implement BMPs to reduce fugitive dust emissions to ensure that such impacts are less than significant, without implementation of dust-control BMPs, the Project would have a potentially significant impact. However, the proposed Project includes BMPs to provide dust control during ground-disturbing activities and minimize the potential for PM_{10} and $PM_{2.5}$ fugitive dust emissions. Specific applicable BMPs include, but are not limited to: BMP-10 (Non-Hazardous Materials), BMP-14 (Sediment and Erosion Control), and BMP-18 (Dust Management Controls). With implementation of these BMPs, particularly BMP-18, the proposed Project would comply with the BAAQMD's fugitive dust significance thresholds and impacts would be **less than significant**.

Table 5. Criteria Pollutant Emissions During Construction

Year	Total Construction Emissions (tons)							
	ROG	NO_X	CO	SO_2	Fugitive PM_{10}	Exhaust PM_{10}	Fugitive $PM_{2.5}$	Exhaust $PM_{2.5}$
Year 1	0.03	0.25	0.21	0.00036	0.0071	0.015	0.0014	0.014
Peak Daily Emissions (pounds/day)								
Peak Daily	1.41	13.2	11.9	0.02	0.43	0.72	0.10	0.78
Construction Significance Thresholds	54	54	---	---	BMPs	82	BMPs	54
Exceed the Thresholds?	No	No	---	---	---	No	---	No

Notes:

CO = carbon monoxide; NO_X = oxides of nitrogen; PM_{10} = particulate matter 10 microns or less in diameter; $PM_{2.5}$ = fine particulate matter 2.5 microns or less in diameter; ROG = reactive organic gases; SO_2 = sulfur dioxide. --- = no applicable standard.

Source: CalEEMod modeling results are provided in Appendix B.

Table 6. Annual Maintenance-related Emissions (after Year 1) from the Proposed Project

Year	Total Construction Emissions (tons)							
	ROG	NO_X	CO	SO_2	Fugitive PM_{10}	Exhaust PM_{10}	Fugitive $PM_{2.5}$	Exhaust $PM_{2.5}$
Area	0.12	0	0	0	--	0	--	0
Energy	0	0	0	0	--	0	--	0
Mobile	0	0	0	0	--	0	--	0
Offroad	0.024	0.24	0.16	0.00033	--	0.011	--	0.011
Waste	--	--	--	--	--	0	--	0
Water	--	--	--	--	--	0	--	0
Total	0.14	0.24	0.16	0.00033	--	0.011	--	0.011
Significance Thresholds	10	10	--	--	--	15	--	10
Exceed the Thresholds?	No	No	---	---	---	No	---	No
Peak Daily Emissions (pounds/day)								
Peak Daily	2.59	19.1	12.5	0.026	0	0.91	0	0.86
Significance Thresholds	54	54	---	---	BMPs	82	BMPs	54
Exceed the Thresholds?	No	No	---	---	---	No	---	No

Notes:

CO = carbon monoxide; NO_X = oxides of nitrogen; PM_{10} = particulate matter 10 microns or less in diameter; $PM_{2.5}$ = fine particulate matter 2.5 microns or less in diameter; ROG = reactive organic gases; SO_2 = sulfur dioxide. --- = no applicable standard.

Source: CalEEMod modeling results are provided in Appendix B.

Following the Year 1 proposed maintenance activities, annual maintenance activities would be conducted on an as-needed basis. For the purposes of estimating these post-Year 1 annual maintenance-related emissions, it was assumed that all potential construction equipment (excavator, concrete mixer, haul truck, pump) required for these maintenance activities would be used concurrently for 25 days per year. Other emission sources include hand-held tools used for vegetation management. The proposed Project's future maintenance (operational) emissions were estimated with CalEEMod version 2013.2.2 assuming that these activities would consist only of the "other maintenance work" activities and that all construction equipment needed for the other maintenance work would be used at the same time during a 25-day period, as further detailed in Appendix B. While the operational emissions indicated in Table 6 do not include emissions associated with the operation of heavy equipment for sediment removal activities in Reach 2, which would only occur every 3-4 years, these sediment removal emissions would not be expected to be greater than the total construction-related emissions shown in Table 5 and the combined post-Year 1 annual emissions (other routine maintenance and sediment removal activities) would not exceed the significance thresholds, with the exception of fugitive dust. As described above, since the BAAQMD requires implementation of BMPs to ensure fugitive dust impacts would be less than significant, the proposed Project could have a potentially significant impact for fugitive dust prior to implementation of BMPs. However, since the proposed Project would include BMP-9 (Non-Hazardous Materials), BMP-14(Sediment and Erosion Control), and BMP-18 (Dust Management Controls), which would minimize the potential occurrence of fugitive dust, the proposed Project's emissions from the maintenance activities and potential sediment removal activities would be below the BAAQMD CEQA significance thresholds and this impact would be **less than significant**.

c.	Result in a cumulatively considerable net increase of any criteria pollutant for which the project region is non-attainment under an applicable Federal or State ambient air quality standard (including releasing emissions which exceed quantitative thresholds for ozone precursors)?		X	

As defined in the BAAQMD's CEQA Guidelines, project-level emissions that are below the mass emissions thresholds are considered to be less than cumulatively considerable. As described above, the proposed Project's emissions of fugitive dust would be potentially significant without implementation of BMPs, and less than significant with implementation of the dust-control BMPs. Therefore, with implementation of BMP-9 (Non-Hazardous Materials), BMP-14 (Sediment and Erosion Control), and BMP-18 (Dust Management Controls),emissions of all criteria pollutants would be **less than significant**, rendering the Project's contribution to cumulatively significant impacts less than considerable.

d.	Expose sensitive receptors to significant pollutant concentrations, as defined by the BAAQMD?		X	

Maintenance-related activities could result in the generation of toxic air contaminants (TACs), specifically diesel particulate matter (DPM), from off-road equipment exhaust emissions. For the purposes of this analysis, it was assumed that sediment removal work at the two sites would take approximately 8 days, and culvert repair/replacement work would require approximately 1 day of work at a given culvert maintenance site (for a total culvert repair time period of 12 days). Other routine maintenance activities would be variable, but it was assumed no more than 1 work day would be necessary at a given location, and that routine maintenance work would occur up to 25 total days in a given year. Due to the variable nature of the proposed maintenance activities, the generation of TAC emissions in most cases would be temporary, especially considering the short amount of time such equipment is typically operated within an influential distance of sensitive receptors. Furthermore, maintenance-related impacts would be most significant adjacent to the maintenance site vicinity, and the impacts would decrease rapidly with distance. Concentrations of mobile-source diesel PM emissions are typically reduced by 70 percent at a distance of approximately 500 feet (California Air Resources Board (CARB) 2005).

The nearest sensitive receptors (residences) to Reaches 1, 2, and 3 of Colma Creek are, respectively, within approximately 30 feet, 200 feet, and 1,400 feet. Reaches 2 and 3 are generally surrounded by commercial and/or industrial uses, including hotels along Reach 3 (nearest hotel to the channel edge is approximately 70 feet). Sediment removal and culvert repair activities in Reaches 2 and 3 would potentially involve the longest use of construction equipment in a given location; however, these activities would last at most 12 days and would generally only occur at a given area for a day or two. Although sensitive receptors are located closer to the proposed Project's maintenance activities in Reach 1 of Colma Creek, the maintenance activities requiring the use of construction equipment (debris removal and concrete patching activities) would likely only occur at any given location for a day or two. This impact would be less than significant. Nonetheless, the proposed Project includes BMPs to limit vehicle and equipment idling (see BMP-18: Dust Management Controls). Other activities would be performed with hand-held tools, which would be electric or emit low levels of TACs due to their small size. As such, potential impacts related to exposing TACs to sensitive receptors would be **less than significant**.

e.	Create objectionable odors affecting a significant number of people?		X	

Project maintenance activities would not result in the generation of permanent or long-term objectionable odors. Odors associated with the intermittent operation of gasoline and diesel-powered equipment might be detected by nearby sensitive receptors, but these odors would be of short duration and would not affect a substantial number of people. Sediment excavated from the channel may contain decaying organic material that may create an objectionable odor. The excavated sediment would be directly exported off-site to a landfill. The intensity of the odor perceived by a receptor depends on the distance of the receptor from the maintenance activities and the amount and quality of the exposed material. It is not anticipated that the proposed Project's temporary odor generation from excavated sediment would affect a substantial number of people because the overall sediment removal work is anticipated to only take up to 8 work days to complete, most sensitive receptors would be located at least 200 feet from the Reach 2 sediment removal activities, and the sediment would be hauled offsite immediately. Therefore, any odors that could be produced would be short-term and temporary and this impact would be **less than significant**.

f.	Generate pollutants (hydrocarbon, thermal odor, dust or smoke particulates, radiation, etc.) that will violate existing standards of air quality onsite or in the surrounding area?		X	

Proposed maintenance activities could result in the generation of several criteria pollutants from off-road equipment exhaust emissions. In addition, this equipment and the handling of sediment may generate fugitive dust, a potentially significant impact. As discussed above, the criteria pollutants potentially generated by maintenance equipment exhaust are not anticipated to violate existing standards of air quality. Furthermore, the implementation of BMP-9 (Non-Hazardous Materials), BMP-14 (Sediment and Erosion Control), and BMP-18 (Dust Management Controls) would minimize dust generation; proposed maintenance activities would not violate existing air quality standards. Therefore, this impact would be **less than significant**.

3.4 BIOLOGICAL RESOURCES. Would the project:	**Less than Significant with Mitigation**	**Less Than Significant Impact**	**No Impact**
a. Have a significant adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special status species in local or regional plans, policies, or regulations, or by the California Department of Fish and Wildlife or U.S. Fish and Wildlife Service?		X	

For the purposes of this assessment, special-status species are those that are listed as rare, species of concern, candidate, and threatened or endangered by the USFWS, NMFS or CDFW[1]. Special-status plant and animal species with the potential to occur in the proposed Project area were identified through a review of the following resources:

- California Natural Diversity Database Query within a 7-quadrangle area[2] for the San Francisco South USGS quadrangle (CDFW 2016; Appendix C)
- USFWS Information for Planning and Conservation (IPaC) Report for the Project area (Appendix C)

Biological information reviewed in the preparation of this section include:

- USFWS Biological Opinion for the Colma Creek Flood Control Project, which involved 0.5 mile of concrete lining of the channel between Spruce and San Mateo Avenues (2003)
- NMFS letter of concurrence for the Colma Creek Flood Control Project's effects to Central California Coast (CCC) steelhead (*Oncorhynchus mykiss*) (2002)

Biological reports referenced in this section include:

- Biological Assessment for the Colma Creek Flood Control Channel Maintenance Project (Horizon 2015a) (Appendix D)
- Wetland Delineation for the Colma Creek Flood Control Channel Maintenance Project (Horizon 2015b) (Appendix E)

Horizon Water and Environment (Horizon) conducted numerous reconnaissance-level biological surveys in the Project area between 2012 and 2015. A habitat evaluation for Ridgway's Rail [=California Clapper Rail] (*Rallus obsoletus*) and salt marsh harvest mouse (*Reithrodontomys raviventris*) was conducted on July 18, 2013. The results of the Ridgway's Rail and salt marsh harvest mouse habitat assessment are provided in the Biological Assessment (Appendix D).

A discussion of the proposed Project's potential impacts on special-status species and the level of impacts are provided below.

[1] Includes California Rare Plant Rank (CRPR) listed species.
[2] There are no USGS quadrangles west of the San Francisco South or Montara Mountain USGS quadrangles.

Environmental Setting

The Colma Creek flood control channel provides drainage for approximately 16.6 square miles of the northern San Francisco Peninsula, including portions of Daly City, Colma, South San Francisco, and San Bruno. The Project area is predominately comprised of modified riverine and estuarine habitats associated with Colma Creek. Land uses adjacent to the Project area include residential, commercial and light industrial facilities, transportation infrastructure (U.S. 101, Caltrain, South San Francisco BART station, San Francisco International Airport, etc.), schools, and recreational uses at Orange Memorial Park, Centennial Way Trail, and the Bay Trail. For the purpose of considering and evaluating potential effects of the proposed Project, the Project area is organized into three primary channel reaches:

- **Reach 1**: The upper maintenance reach includes the channel upstream from A Street/El Camino Real downstream to Spruce Avenue (non-tidal).
- **Reach 2**: The middle maintenance reach is from Spruce Avenue downstream to Produce Avenue (tidal).
- **Reach 3**: The lower maintenance reach is from Produce Avenue downstream to the mouth of Colma Creek at San Francisco Bay (tidal). This reach is further organized into two sub-reaches: Reach 3a (from Produce Avenue to Utah Avenue) and Reach 3b (Utah Avenue to the mouth of Colma Creek).

Habitats in the Project area include: constructed and earthen channel, mudflat, tidal marsh, and ruderal and developed areas. In Reach 1, Colma Creek flows through a constructed, concrete channel. The Colma Creek channel in Reach 2 is also concrete. As shown in Figure 3 in Chapter 2, *Project Description,* varying amounts of sediment has accumulated across the channel bed in this reach, though in some locations deposition is greater than 2 feet (Bars 2, 3, and 4), the depth at which Reach 2 was designed to accommodate. At the Produce Avenue crossing, Colma Creek transitions to an earthen channel. The channel is approximately 70 to 80 feet wide and the bed is comprised of soft sediments. The banks have a narrow band (~15 to 20 feet wide) of emergent marsh dominated by pickleweed (*Sarcocornia [=Salicornia] pacifica*), which transitions to an upland community dominated by ruderal species. The channel widens as Colma Creek flows toward the Bay. At the mouth of the creek, there is a wetland complex characterized by broad expanses of mudflat habitat with narrow bands of intertidal marsh along the shoreline-Bay ecotone. The mudflat habitat transitions to emergent marsh dominated by pickleweed. The vast majority of the Project area is surrounded by developed land with limited habitat available for wildlife. A ruderal plant community dominates lands that have been disturbed but not permanently developed.

Plants, Mammals, Reptiles, and Amphibians

Special-status plant, reptile, amphibian, and mammal species known to occur in the vicinity of the Project area are listed in Table C-1 of Appendix C. These species were identified using the 7 quadrangle search of CNDDB and the USFWS IPaC report for the project area mentioned above. All these species have either no potential to occur, or are not expected to occur in the Project area because no suitable habitat or only marginally suitable habitat is present. Thus, special-status plants, reptiles, amphibians and mammals are not expected to be adversely affected by the proposed Project, and no mitigation is required. As a precautionary measure, the County would implement several avoidance and minimization measures, which have been incorporated into the BMPs presented in Table 3 of Chapter 2, *Project Description.*

Fish

Special-status fish known to occur in this portion of San Francisco Bay include Steelhead (, CCC Distinct Population Segment (DPS); Green Sturgeon (*Acipenser medirostris),* southern DPS; and Longfin Smelt (*Spirinchus thaleichthys*), Bay-Delta DPS.

CCC Steelhead is federally listed as threatened. Two sites in Colma Creek were sampled in September 1981 as part of a fish distribution study (Leidy 1984). No *O. mykiss* were collected, and field notes state the creek was very disturbed at the time of this study (Leidy 1984). In May 2002, Leidy surveyed Colma Creek between the mouth and headwaters. No *O. mykiss* were observed, nor was suitable habitat present (Leidy 2002). Leidy et al. (2005) concluded that the Colma Creek watershed currently does not contain suitable habitat to support salmonids. The Project area does not currently support spawning, rearing, or migration habitat for CCC Steelhead. Though not expected, adult Steelhead could stray into the Project area during migration periods (typically December – March [Moyle 2002]) but are not expected to be present in the Project area during the proposed maintenance in-water work window of August 1 to October 15. Thus, the Project would likely have a less than significant on CCC Steelhead.

Green Sturgeon is federally listed as threatened. The Project area does not support spawning habitat for Green Sturgeon. Juvenile, sub-adult, and adult fish use San Francisco Bay for feeding and other non-reproductive purposes (Heublein et al. 2009, Lindley et al. 2011). Although not expected, Green Sturgeon may be present in Reach 3 of the Project area and open water portions of the Bay near the mouth of Colma Creek. Reaches 1 and 2 of the Project area are generally unsuitable for Green Sturgeon. Reach 3 of the Project area provides potentially suitable non-reproductive habitat for Green Sturgeon. Maintenance activities proposed in Reach 3a (primarily repair and replacement of degraded culverts) are not expected to result in direct harm to Green Sturgeon or measurably impact their spawning, rearing, or migration habitat. Although the ecology of Green Sturgeon is generally poorly understood, this species tends to concentrate in deep areas of estuaries (Miller and Kaplan 2001). Green Sturgeon may feed in intertidal areas during high tide (Miller and Kaplan 2001), but are not expected to be present along intertidal marsh fringes such as those in the Project area. If work were to occur when Green Sturgeon are present and fish exclusion measures installed during high tide, a significant impact may occur. However, implementation of BMP-3 (Stormwater Protection and Biological Resource Protection Impact Avoidance and Minimization During Dewatering) would ensure that fish exclusion structures would be installed during low tide, when Green Sturgeon are least likely to be present in the Project area. Thus, with implementation of BMP-3, impacts on Green Sturgeon would be less than significant.

Longfin Smelt is state listed as threatened and is a federal candidate species. Larval, juvenile, and adult Longfin Smelt may be present in the Project area, which is located in the Central portion of the San Francisco Bay Estuary, but spawning does not occur in this portion of the estuary (Robinson and Greenfield 2011). Larvae are more likely to occur in the Central Bay in wet years. Juvenile and adults are commonly collected in the Central Bay during spring and summer surveys (Merz et al. 2013). Leidy (2007) did not find Longfin Smelt when sampling Colma Creek. Reach 3 of the Project area, and possibly Reach 2, provide potentially suitable non-reproductive habitat for Longfin Smelt. Sediment removal would occur in Reach 2 and culvert maintenance activities would be conducted in Reach 3a. Therefore, potentially significant impacts on Longfin Smelt could occur if work were to occur when Longfin Smelt are present and fish exclusion measures are installed during high tide. Proposed BMPs outlined in Chapter 2, Table 3 would reduce the potential for individuals to be harmed. Specifically, implementation of BMP-3 (Stormwater Protection and Biological Resource Protection Impact Avoidance and Minimization During Dewatering) would minimize impacts by ensuring that fish exclusion structures are installed during low tide when Longfin Smelt are least likely to be present in the Project area. Exclusion structures would prevent fish from entering the work area, minimizing the potential for impacts to larval, juvenile, and adult Longfin Smelt. With these measures in place, the proposed Project would have less than significant impacts on the Bay-Delta DPS of Longfin Smelt.

Birds

Special-status birds known to occur in the vicinity of the Project area include Ridgway's Rail, American Peregrine Falcon (*Falco peregrinus anatum*), Saltmarsh Common Yellowthroat (*Geothlypis trichas sinuosa*), and Alameda Song Sparrow (*Melospiza melodia pusillula*) (Table C-1, Appendix C).

Ridgway's Rail is state listed as endangered, and federally listed as endangered. In the 1990s, Ridgway's Rail began breeding in the marshes near the mouth of Colma Creek. The breeding population grew steadily, likely due to the increasing invasive *Spartina* infestation. Prior to the onset of the invasive *Spartina* control program, Ridgway's Rail were consistently breeding along the lower portions of Colma Creek and in the marshes near the mouth of the channel. Ridgway's Rail density in the vicinity of the action area was considered high for the Bay (0.5 to 3 birds per acre) (ISP 2008).

Since invasive *Spartina* control began in 2006, there has been a rapid decline in the number of rails detected in the area. Recent surveys along the lower portions of Colma Creek and its mouth (2012-2016) have failed to detect Ridgway's Rail (ISP 2015), and currently there is no suitable habitat present in the Project action area. It is anticipated that Ridgway's Rail could return if/when dense stands of *Spartina* or other suitable vegetation becomes re-established and if source populations are still extant. Because the Project site is discrete (relatively isolated), recolonization may take longer than it would at a site with contiguous marshlands.

Ridgway's Rail is currently absent from the Project area, and suitable habitat is not expected to re-establish in the Project area within the timeframe of the proposed Project. Therefore, the Ridgway's Rail is not expected to breed in the Project area or be present during proposed maintenance activities.

American Peregrine Falcon (Peregrine Falcon) was listed as endangered under the federal ESA in 1970 and endangered and fully protected under CESA in 1971. The falcon's decline was attributed in part to contamination by the pesticide DDT, which became concentrated in the tissues of the peregrine and resulted in thin eggshells that broke under the pressure of incubating adults. Banning of DDT in 1971 and captive breeding programs led to the recovery of the species. The Peregrine Falcon was removed from the federal List of Endangered and Threatened Wildlife and Plants on August 25, 1999, and was delisted in California in 2009. However, the Peregrine Falcon is currently designated as a Fully Protected Species under the Fish and Game Code; it is illegal to kill, harm or harass a Peregrine Falcon in California. The species also remains protected under the federal Migratory Bird Treaty Act.

Peregrine Falcons are known to nest on man-made structures, and there are reports of the species nesting in the “A” of the United Airlines building south of the Project area (eBird.org, 2016), which is approximately 0.5 miles south of the Utah Avenue bridge, and approximately 2,000 feet from the Project’s downstream staging area (the closest Project component). Thus, the species is considered to be present in close proximity to the Project area.

Saltmarsh (or San Francisco) Common Yellowthroat is a California Species of Special Concern. This species is endemic to the greater San Francisco Bay region. Yellowthroats nest in herbaceous vegetation (e.g., Poison Hemlock [*Conium maculatum*]), cattails, tules, and some shrubs (e.g., Coyote Brush [*Baccharis pilularis*]) (Gardali and Evens. 2008). This species could nest along the margins of the Colma Creek in Reach 3.

Alameda Song Sparrow is a California Species of Special Concern. This species is found in pickleweed-dominated salt marshes in the southern portion of the San Francisco Bay. It nests in gumplant (*Grindelia* spp.) shrubs. The Project area contains pickleweed-dominated intertidal marsh, as well as scattered gumplant shrubs. Thus, this species may potentially nest in the Project area.

Maintenance activities would not result in loss or degradation of habitat for special-status birds. However, construction-related impacts to nesting birds may result in nest failure or abandonment, an impact that would be considered potentially significant. Implementation of BMP-5 (Breeding Bird Survey and Protective Buffers) would require nesting birds surveys prior to conducting activities involving heavy equipment, ground disturbance, or vegetation removal during the nesting season (February 15 to August 15). If active nests are found, the County will consult with CDFW and the USFWS regarding appropriate action to comply with the Migratory Bird Treaty Act of 1918 and the Fish & Game Code, section 3503. With implementation of BMP-5, potential impacts on special-status bird species would be less than significant.

In conclusion, based on the above discussion, through implementation of BMP-3 (Stormwater Protection and Biological Resource Protection Impact Avoidance and Minimization During Dewatering) and BMP-5 (Breeding Bird Survey and Protective Buffers), potential impacts on special-status species would be **less than significant**.

b.	Have a significant adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, regulations, or by the California Department of Fish and Wildlife or U.S. Fish and Wildlife Service?	X		

Although portions of Colma Creek historically supported riparian habitat, all reaches of Colma Creek in the Project area have been heavily modified for the purposes of flood conveyance. Reaches 1 and 2 consist of constructed concrete flood control channels that lack riparian habitat or other sensitive natural communities.

The margins of the channel in Reach 3 support a narrow band (approximately 15 to 20 feet wide) of emergent marsh dominated by pickleweed, which is considered a sensitive natural community [Pickleweed (*Sarcocornia pacifica*) Alliance] (CDFG 2010). Culvert maintenance would affect approximately 115 square feet of pickleweed-dominated habitat. Loss of this sensitive natural community would be considered a significant impact. Implementation of BMP-4 (Work in Wetlands) would minimize potential impacts to wetlands by requiring the construction contractor to minimize the construction footprint in wetlands, mark limits of work with fencing or flagging, inspect fencing to minimize damage to sensitive habitats outside the limits of work, and require construction equipment in wetlands to operate on mats or be specialized low ground pressure equipment. This BMP also requires restoration of surface topography and drainage to pre-construction conditions. However, because implementation of BMP-4 would not result in avoidance of all pickleweed-dominated habitat, impacts on this sensitive natural community is considered a significant impact. Implementation of **Mitigation Measure BIO-1** would reduce and offset unavoidable impacts to this sensitive natural community by providing compensatory mitigation. With implementation of this mitigation measure, potential impacts on sensitive natural communities would be **less than significant**.

Mitigation Measure BIO-1: Provide Compensatory Mitigation for Unavoidable Impacts to Sensitive Natural Communities and Federally Protected Wetlands

Upon USACE's approval, the County shall implement the Colma Creek Flood Control Channel Maintenance Project Multi-Agency Compensatory Mitigation Plan developed for the Project (Horizon 2015c), consistent with the terms of the Clean Water Act Section 404 Permit issued for the Project and Final Compensatory Mitigation requirements of the permit. The Compensatory Mitigation Plan includes re-establishment of 0.1 acres of intertidal marsh in Reach 3 of the Project area (**Figure 8**). The mitigation site is on County-owned land.

To ensure success of the wetland mitigation site, the County shall monitor the site and prepare and submit annual reports for five years after the wetland mitigation site is constructed. The performance criteria shall include, but not be limited to:

- Less than 5% cover by non-native species with a California Invasive Plant Inventory rating of high in wetland areas of the mitigation site.
- Native vegetation shall be monitored to ensure a minimum of 10% cover after one year, 20% cover after 3 years, 50% cover after 4 years, and 70% cover after 5 years.
- Remedial actions, such as planting or weed removal, shall be conducted to ensure that the cover objectives are met.
- Two years after construction, the site shall be at least 75 percent inundated at high tide, and no ponding should occur at low tide.
- Remedial grading shall be implemented if hydrology performance criteria are not met. The County shall submit annual reports for 5 years to resource agencies documenting the results of the mitigation wetland.

During construction of the wetland mitigation, all BMPs listed in Chapter 2, Table 3 shall be implemented as appropriate for the mitigation actions. Although a small area of existing wetlands would be temporarily affected by the creation of the mitigation wetland, this impact is considered self-mitigating as wetlands would re-establish in that area. With implementation of the BMPs, no significant impacts are anticipated to occur from implementation of compensatory mitigation activities.

In the event that the conceptual Compensatory Mitigation Plan is not approved by regulatory agencies, the County shall implement compensatory mitigation consisting of creation, re-establishment, or enhancement of 0.1 acre of intertidal marsh wetland habitat at an off-site location in proximity to the Project area or purchase of credits at a regulatory agency-approved mitigation bank or contribution to a regulatory agency-approved in-lieu fee program.

Colma Creek
Flood Control Maintenance Project

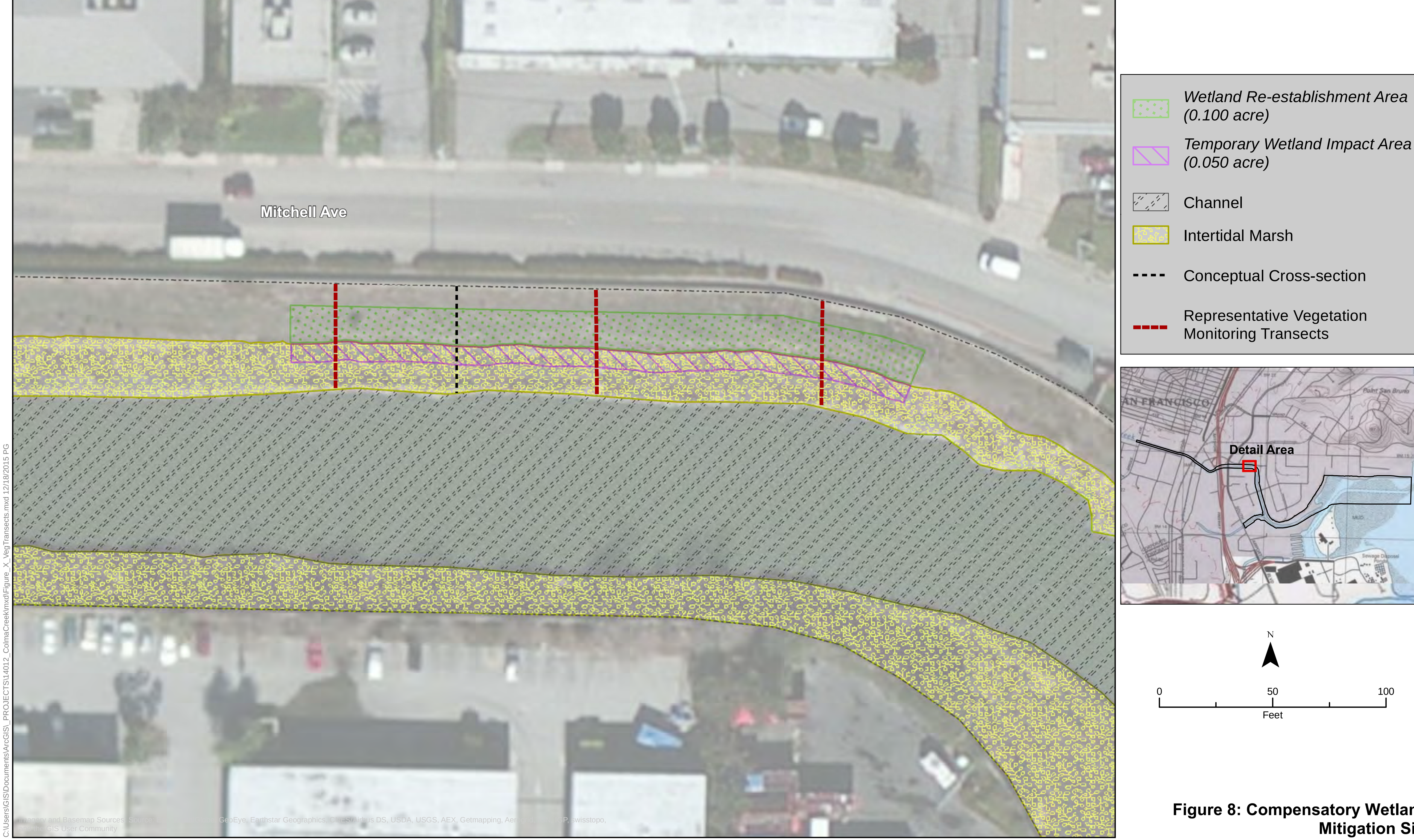

Figure 8: Compensatory Wetland Mitigation Site

c.	Have a significant adverse effect on federally protected wetlands as defined by Section 404 of the Clean Water Act (including, but not limited to, marsh, vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption, or other means?	X		

A jurisdictional waters delineation for the Project area was conducted in August 2014. The delineation report is provided in Appendix E. Non-wetland waters identified include channel, intertidal mudflat, rocky intertidal, and open water. Intertidal marsh was the only wetland type identified.

Proposed sediment removal in Reach 2 would result in temporary impacts to low quality non-wetland (other) waters of the U.S. These areas are expected to be rapidly recolonized by infauna. Removal of contaminated sediment from the aquatic environment would result in a beneficial water quality impact. As discussed in response to question 3.9c in the *Hydrology and Water Quality* section below, following completion of sediment removal activities, natural channel processes and suspended sediment sources and loads would not be substantially altered from pre-Project conditions. Thus, impacts to jurisdictional waters of the U.S. in Reach 2 are considered less than significant.

Proposed culvert maintenance activities in Reach 3a would result in temporary and permanent impacts to other waters of the U.S. Construction-related impacts for culvert maintenance would be considered temporary because the work area would return to baseline conditions within one year. However, these temporary impacts would be mitigated at a 0.1:1 ratio to account for potential temporal loss of functions and values between the time of maintenance and full recovery of the site to baseline conditions.

Replacement of degraded culverts and installation of RSP in Reach 3a would result in permanent impact to other waters. Permanent fill of other waters would be considered significant. **Mitigation Measure BIO-1**, which requires compensatory mitigation for loss of other waters of the U.S. would reduce impacts on other waters to less than significant. Proposed culvert maintenance activities in Reach 3a would also result in temporary and permanent impacts to intertidal wetlands dominated by pickleweed. Temporary impacts would include disturbance to the intertidal wetlands. Replacement of degraded culverts and installation of RSP would result in permanent impact to wetlands. As discussed above in response to question 3.4b, impacts on intertidal wetland habitat would be considered significant. Implementation of BMP-4 (Work in Wetlands) would reduce impacts to wetlands as the area of disturbance to wetlands would be contained to the minimum area necessary to complete Project activities. However, permanent impacts to intertidal wetlands due to culvert installation would be unavoidable.

Unavoidable impacts would be reduced to less than significant after implementation of **Mitigation Measure BIO-1**. Under Mitigation Measure BIO-1, compensatory mitigation would be implemented to create or re-establish 0.1 acre of intertidal wetland habitat within Reach 3a of Colma Creek, the same location of the wetland impacts (Figure 8). Implementation of Mitigation Measure BIO-1 would reduce impacts to federally protected wetlands to less than significant.

Project-related impacts and proposed mitigation ratios are summarized in **Table 7**.

The mitigation ratio for permanent impacts to wetlands and other waters from culvert maintenance activities in Reach 3a was calculated using *12501-SPD Regulatory Program Standard*

Operating Procedure for Determination of Mitigation Ratios (USACE 2013), and resulted in a ratio of 1.7:1. Based on the impact areas and mitigation ratios, the required amount of compensatory mitigation is 0.082 acre of intertidal marsh wetland. Mitigation Measure BIO-1 prescribes re-establishment of 20% more than the required compensatory mitigation amount, for a total of 0.10 acre of wetland habitat creation to ensure success criteria are met for the required 0.082 acre area. With implementation of Mitigation Measure BIO-1, potential impacts on wetlands and waters of the U.S. would be **less than significant**.

Table 7. Summary of Jurisdictional Waters and Wetland Impacts and Mitigation Ratios

Activity	Impact	Mitigation Ratio	Justification	Impact Quantity (ft^2)	Mitigation Quantity (ft^2)
Sediment Removal, Reach 2	Temporary Other Waters Impact	0	Temporary impacts would return to baseline conditions within one year. Although sediment would be removed, this would be a net benefit as the sediment is contaminated. Sediment removal would result in a negligible short-term decline of functions and values.	8,050	0
Culvert Maintenance, Reach 3a	Temporary Other Waters Impact	0.1:1	Temporary impacts to wetland and waters due to culvert maintenance would return to baseline conditions within one year. However, compensatory mitigation is provided for the short-term decline in temporal loss of functions and values.	8,070	807
Culvert Maintenance, Reach 3a	Temporary Wetland Impact	0.1:1		14,610	1,461
Culvert Maintenance, Reach 3a	Permanent Other Waters Impact	1.7:1	Calculated using *12501-SPD Regulatory Program Standard Operating Procedure for Determination of Mitigation Ratios* (USACE 2013). See Appendix A in Colma Creek Flood Control Channel Maintenance Project Multi-Agency Compensatory Mitigation Plan for the Mitigation Ratio Checklist (Horizon 2015c).	655	1,114
Culvert Maintenance, Reach 3a	Permanent Wetlands Impact	1.7:1		115	196
			Total Mitigation Required (ft^2):		3,577
			Total Mitigation Required (acres):		0.082

d. Interfere significantly with the movement of any native resident or migratory fish or wildlife species or with established native resident migratory wildlife corridors, or impede the use of native wildlife nursery sites?		X	

The Project area is not identified as an Essential Connectivity Corridor or a Natural Landscape Block (Spencer et al. 2010). The Project area is surrounded by urban areas, and does not provide a significant wildlife corridor for terrestrial wildlife species. Reaches 2 and 3 of the Project area are designated critical habitat for the CCC Steelhead and southern DPS Green Sturgeon and Essential Fish Habitat under the Pacific Coast Salmon Fishery Management Plan, as these reaches are tidal portions of the San Francisco Estuary. However, there are no spawning grounds for salmonids or Green Sturgeon within or upstream of the Project area, and Colma Creek is not an important migratory route for these species. Maintenance activities would be limited to discrete areas and would not block fish movement. However, these fish may be present during maintenance activities and a significant impact could occur during culvert maintenance or sediment removal activities. As prescribed by BMP-1 (Timing of Work), sediment removal would be conducted during the summer months when flow is minimal or absent (between August 1 and October 15) and during low tide, and thus would not interfere with fish movement. Implementation of BMP-1 would reduce impacts to designated fish migration habitat.

Portions of the Project area provide suitable breeding habitat for migratory bird species protected under the Migratory Bird Treaty Act. Disturbance of nesting activity would be considered a potentially significant impact. However, implementation of BMP-5 (Breeding Bird Survey and Protective Buffers) would reduce impacts to migratory birds to less than significant.

With BMP measures in place, the proposed Project would have a **less than significant** impact on native migratory fish and wildlife corridors and their nursery sites.

e. Conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance (including the County Heritage and Significant Tree Ordinances)?			X

The proposed Project would not conflict with the City of South San Francisco's tree preservation ordinance or tree protection policies contained in the City of South San Francisco General Plan or Town of Colma General Plan as the Project is not anticipated to require removal of any trees. The general plans for the Town of Colma and City of South San Francisco contain numerous goals, policies, and action items to protect biological resources. As shown in Table 3 in Chapter 2, *Project Description,* the proposed Project incorporates a variety of BMPs to avoid or minimize impacts to sensitive habitats, wildlife, and fisheries resources. Thus, the Project would not conflict with any local policies or ordinances for protection of biological resources; **no impact** would occur.

f. Conflict with the provisions of an adopted Habitat Conservation Plan, Natural Conservation Community Plan, other approved local, regional, or State habitat conservation plan?			X

The proposed Project is not located within an adopted Habitat Conservation Plan, Natural Conservation Community Plan, or other approved local, regional, or State habitat conservation plan. Therefore, the Project would have **no impact** on adopted conservation plans.				
g.	Be located inside or within 200 feet of a marine or wildlife reserve?			X
The Project is not located inside or within 200 feet of a marine or wildlife reserve. Therefore, the Project would have **no impact** on marine or wildlife reserves.				
h.	Result in loss of oak woodlands or other non-timber woodlands?			X
Oak woodlands or non-timber woodlands are not present within the proposed Project area. Therefore, the Project would have **no impact** on oak woodlands or non-timber woodlands.				

3.5 CULTURAL RESOURCES. Would the project:	Less than Significant with Mitigation	Less Than Significant Impact	No Impact
a. Cause a substantial adverse change in the significance of a historical resource as defined in Section 15064.5?			X

A significant impact would occur if the proposed Project causes a substantial adverse change to a historical resource, including historic-period architectural resources or the built environment such as buildings, structures, and objects. A substantial adverse change could result from physical demolition, destruction, relocation, or alteration of the resource.

Basin Research Associates conducted a cultural resources assessment in 2015 (see Appendix F) to determine the presence of any cultural resources within the Project area. As part of this assessment, a prehistoric and historic site record and literature search was conducted by the Northwest Information Center (NWIC) of the California Historical Resources Information System (CHRIS) at Sonoma State University. The study included a review of records and maps on file at the NWIC within the Project's direct area of potential effects (APE) and within a 0.25-mile radius of the Project area. Basin Research Associates also reviewed materials from the Bancroft Library at the University of California at Berkeley. The Native American Heritage Commission (NAHC) was contacted for a review of the Sacred Lands Files. Letters were sent to the nine individuals/groups listed by the NAHC; five responded with no immediate concerns and four did not respond. For additional information about Basin Research Associates' literature review, see Appendix F.

The records search and literature review determined that five historic cemeteries and a building associated with the cemetery architecture (the Salem Memorial Park Office/Chapel) are adjacent to the Colma Creek flood control channel in Reach 1. These cemeteries include the Eternal Home Cemetery (a Jewish cemetery established in 1901), Salem Memorial Park Cemetery (a Jewish cemetery established in 1901), the Home of Peace Cemetery (established in 1901), Cypress Lawn Memorial Park/Cypress Lawn Cemetery (established in 1892), and Holy Cross Cemetery (established in 1886-1887). According to Basin Research Associates, these resources have been evaluated as eligible for the National Register of Historic Places and the California Register of Historic Resources (CRHR) or as contributors to a cemetery district that represents an excellent example of cemetery design during the period 1889-1945. These cemeteries do not appear on the *Historic Properties Directory for San Mateo,* but are listed in the Town of Colma General Plan, Historical Resources Element (Town of Colma 1999).

The record search also concluded that two recorded sites, CA-SMA-380 and CA-SMA-355, are located in the APE in Reaches 3 and 1, respectively. Furthermore, one recorded historic-era resource (CA-SMA-353H) is possibly present adjacent to the APE within Reach 2. CA-SMA-353H is less than 30 feet away from the APE. None of these sites have been formally evaluated for the CRHR. However, the two sites within the APE are under fill ranging from a minimum of 5 feet and up to 29 feet deep. None of the proposed maintenance activities will require ground disturbance to a depth that would impact the sites. Regarding CA-SMA-353H, because sediment removal and disposal work would be confined to the channel and from the access road(s) adjacent to the sediment removal work area, no impacts to this historic-era resource would occur.

According to Basin Research Associates' findings, Colma Creek is mostly culverted near the above-described cemeteries. As such, the proposed Project would not affect the setting or cultural landscape of the cemeteries as the maintenance activities would not alter the setting in this area. Therefore, the proposed Project would not affect any historical resources as defined in Section 15064.5 of the CEQA Guidelines (**no impact**).

b. Cause a significant adverse change in the significance of an archaeological resource pursuant to Section 15064.5?	X		

The Project area, situated along the periphery of San Francisco Bay, was a favorable environment for the Native American prehistoric population. Native American occupation and use of the general area appears to extend over 5,000-10,000 years and possibly longer. Prehistoric site types recorded in the region consist of shell mounds, lithic scatters, quarries, habitation sites (including burials), bedrock mortars or other milling feature sites, petroglyph sites, and isolated burial sites.

The aboriginal inhabitants of the region belonged to the group known as the "Coastanoan," also known as the Ohlone. No known villages were noted in, adjacent to, or near the Project area. The closest known village, *Sipliskin* (in San Bruno), was "probably at the former small lake in the valley of Colma Creek along the Daly City-Colma municipal boundary" (Levy 1978:485, Fig. 1, #15; Brown 1973-1974; Milliken 1983, 1995, 2006 as cited in Basin Associates 2015 [Appendix F]).

Starting around 1769, early Spanish expeditions likely followed existing aboriginal trails as they moved northward through California from Mexico. Between 1769 and 1776, a number of Spanish expeditions passed through the Coastanoan territory. Although the routes cannot be determined accurately, the Colma Creek alignment was likely avoided due to its marshy conditions.

In the mid-19th century, the majority of the rancho and pueblo lands, and some of the ungranted land, were subdivided. San Mateo County was created in 1856, extending from the southern part of San Francisco County; it was enlarged by annexing part of Santa Cruz County in 1868.

Based on the records search and literature review of the APE, three prehistoric resources have been recorded within Reaches 1 (sites CA-SMA-299 and -355) and 3 (site CA-SMA-380), and one recorded historic-era archaeological resource (CA-SMA-353H) is potentially adjacent to Reach 2. Site CA-SMA-299 is reported to have been destroyed by mining activities. The two remaining recorded prehistoric sites are present within the APE and were discovered during coring operations. CA-SMA-380, within Reach 3, is located under historic fill at depths ranging from 17 to 29 feet; CA-SMA-355, within Reach 1, is buried 5 to 24 feet below surface. None of the proposed maintenance activities would occur at such depths and thus are not anticipated to affect these resources. The recorded historic-era resource near Reach 2 is not anticipated to be affected by the project construction since most work would occur within the channel and from the County's maintenance road adjacent to the channel.

Because the primary maintenance activities would be limited to sediment removal in concrete sections of the channel (no belowground excavation necessary) and repair/replacement of damaged culverts would unlikely reach depths below 5 feet, it is anticipated that the proposed Project would have no impact on archaeological resources. However, despite the negative results from the cultural resources assessment, it is possible that subsurface deposits may exist or that evidence of such resources has been obscured by more recent natural or cultural factors, primarily the ongoing sedimentation that has occurred in Reach 2 of Colma Creek. As such, the potential to encounter unknown archaeological resources remains and this impact would be potentially significant. Implementation of **Mitigation Measure CUL-1**, which outlines practices to be implemented in the event of accidental discovery or resources, would reduce this impact to **less than significant**.

Mitigation Measure CUL-1: Unexpected Discovery of Cultural Resources
Not all cultural resources are visible on the ground surface. Prior to the start of construction or ground-disturbing activities, the County shall ensure all field personnel are educated of the possibility of encountering buried prehistoric or historic cultural resources. Personnel will be trained that upon discovery of buried cultural resources, work within 50 feet of the find must cease and the County will contact a qualified archaeologist immediately to evaluate the find. Once the find has been identified and found eligible for listing on the National Register of Historic Places or the California Register of Historical Resources, plans for treatment, evaluation, and mitigation of impacts to the find shall be developed and implemented according to the qualified archaeologist's recommendations. This measure will ensure that prehistoric and historic cultural resources are appropriately protected. Prehistoric or historic cultural materials that may be encountered include the following: unusual amounts of bone or shell, flaked or ground stone artifacts, historic-era artifacts, human remains, or architectural remains.

c. Directly or indirectly destroy a unique paleontological resource or site or unique geologic feature?	X		

Based on the above responses to questions 3.5a and 3.5b, no paleontological resources or unique geological features are known to occur on the Project site. Therefore, the potential for encountering such resources is low. Nonetheless, due to the potential for paleontological resources or unique geologic features to remain buried and unknown until the time of ground disturbance, this impact is considered potentially significant. Implementation of **Mitigation Measure CUL-1** would reduce this impact to a **less-than-significant** level.

d. Disturb any human remains, including those interred outside of formal cemeteries?	X		

Based on the records search conducted, no human remains are known to occur on the Project site. Therefore, it is unlikely that human remains would be encountered in the Project area during project construction. However, sediment removal and repair and replacement of existing culverts could result in damage to accidentally discovered human remains, a potentially significant impact. Through implementation of **Mitigation Measure CUL-2**, which requires consultation with the Native American Heritage Commission, this impact would be reduced to a **less-than-significant** level.

Mitigation Measure CUL-2: Inadvertent Discovery of Human Remains

If human remains are accidentally discovered during project construction activities, the County will implement the requirements of California Health and Human Safety Code section 7050.5. Potentially damaging excavation will cease in the area of the remains, with a minimum radius of 50 feet, and the San Mateo County Coroner will be notified. The Coroner is required to examine all discoveries of human remains within 48 hours of receiving notice of a discovery on private or state lands (Health and Safety Code section 7050.5[b]). If the Coroner determines the remains are those of a Native American, he or she will contact the NAHC by phone within 24 hours of making that determination (Health and Safety Code section 7050[c]). Pursuant to the provisions of PRC section 5097.98, the NAHC shall identify a Most Likely Descendent (MLD). The MLD designated by the NAHC shall have at least 48 hours to inspect the site and propose treatment and disposition of the remains and any associated grave goods.

e. Cause a substantial adverse change in the significance of a tribal cultural resource as defined in Section 21074?	X		

Assembly Bill (AB) 52, which was approved in September 2014 and went into effect on July 1, 2015, requires that state lead agencies consult with a California Native American tribe that is traditionally and culturally affiliated with the geographic area of a proposed project, if so requested by the tribe. The bill, chaptered in Section 21084.2 of the State CEQA Guidelines, also specifies that a project with an effect that may cause a substantial adverse change in the significance of a Tribal Cultural Resource (TCR) is a project that may have a significant effect on the environment. TCRs are defined in Section 21074. Mitigation measures for TCRs, if present, must be developed in consultation with the affected California Native American tribe prior to the release of a negative declaration, mitigated negative declaration, or environmental impact report for a project. Section 21084.3 identifies mitigation measures that include avoidance and preservation of TCRs and treating TCRs with culturally appropriate dignity, taking into account the tribal cultural values and meaning of the resource.

The Project was initiated prior to July 1, 2015 and no formal AB 52 consultation has taken place. However, the NAHC conducted a search of their Sacred Lands files and did not identify any such resources within the Project area. In addition, nine individuals identified by the NAHC as potentially having traditional knowledge about the Project location were contacted by letter, and then followed up by phone calls and emails. Five of those contacted stated that they had no immediate concerns about the Project; the remaining four could not be reached for comment.

No TCRs have been identified within the Project area; however, unanticipated archaeological sites or human remains discovered during construction may be determined to be TCRs. Implementation of **Mitigation Measures CUL-1 and CUL-2** would reduce this impact to a **less-than-significant** level.

3.6 GEOLOGY AND SOILS. Would the project:			
	Less than Significant with Mitigation	**Less Than Significant Impact**	**No Impact**
a. Expose people or structures to potential significant adverse effects, including the risk of loss, injury, or death involving the following, or create a situation that results in:			
i. Rupture of a known earthquake fault, as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map issued by the State Geologist for the area or based on other significant evidence of a known fault? Refer to Division of Mines and Geology Special Publication 42 and the County Geotechnical Hazards Synthesis Map.			X
The nearest Alquist-Priolo Zone encompasses the Northern San Andreas Fault, approximately 1.8 miles west of Colma Creek (CDC 1982). Colma Creek runs generally parallel to this segment of the Northern San Andreas Fault. The proposed Project would not involve construction of structures or permanently expose people to the Project area for prolonged periods of time (the proposed Project would extend for 8 days at a time). There would be no potential for the proposed Project to expose people or structures to adverse effects caused by the rupture of a known earthquake fault within the Project area; there would be **no impact**.			
ii. Strong seismic ground shaking?			X
As with any location within the San Francisco Bay Area, occurrence of a large magnitude (M) earthquake leading to strong seismic ground shaking is highly probable. The probability of one or more large earthquakes (M 6.7 or greater) in the Bay Area between 2007 and 2036 is estimated at 63 percent, with a large margin of error of plus/minus 22 percent (USGS 2008). Ground shaking within the Project area would be "moderate" from a seismic event along the Calaveras Fault (7.0 M) or Mt. Diablo Fault (6.7 M), "strong" from the Hayward Fault (6.8 M), "very strong" from the San Gregorio Fault (7.5 M), and "violent" from the Northern San Andreas (7.9 M) (Association of Bay Area Governments [ABAG] 2016). However, the Project would not involve new construction or increased permanent occupation. Thus, there would be **no impact** on people or property due to earthquake induced ground shaking.			
iii. Seismic-related ground failure, including liquefaction and differential settling?			X
The Project area is underlain by continental and marine deposits, alluvium, or artificial fill (CDC 1991). As is typical in alluvium and artificial fill soils, the Project area is highly susceptible to earthquake induced settling and liquefaction. U.S. Geological Survey mapping (USGS 2006) classifies the threat of liquefaction within the Project area from High (within Reach 1) to Very High (within Reaches 2 and 3). However, Project activities would be limited to localized sediment removal along the channel bed in Reach 2, repair of culvert outfalls in Reach 3a, and minor routine			

maintenance activities for all reaches. The proposed Project does not include construction of new buildings or facilities that would be subject to ground failure or liquefaction. Therefore, there would be **no impact** related to loss, injury, or death due to seismic-related ground failure or liquefaction.			
iv. Landslides?			X
The Project area and adjacent lands are predominately flat. USGS regional mapping classifies the Project area as not susceptible to slope failures or earthquake induced landslides (USGS 1997). Although the entirety of Reaches 1 and 2 are concrete lined channels, some portions of Reach 3 consist of earthen banks. The potential for minor bank failures exists. However, any bank failure would be very minimal and would not impact people or structures. There would be **no impact**.			
v. Coastal cliff/bluff instability or erosion? Note: This question is looking at instability under current conditions. Future, potential instability is looked at in Section 7 (Climate Change).			X
Colma Creek discharges into San Francisco Bay with very low energy via a vast mudflat and salt marsh. The topography in and around the salt marsh is very gradual and is a depositional environment. The proposed Project would involve placement of structures or people on coastal bluffs and would not impact coastal erosion. There would be **no impact**.			
b. Result in significant soil erosion or the loss of topsoil?		X	
Reaches 1 and 2 are entirely concrete lined, while Reach 3 transitions from a concrete channel to an engineered, earthen channel. Proposed sediment removal activities in Reach 2 would be conducted in the channel bed and would not increase bank erosion or result in loss of topsoil. Culvert repairs proposed in Reach 3a would stabilize channel banks and prevent bank erosion. Potential effects of the proposed Project are considered **less than significant**.			
c. Be located on a geologic unit or soil that is unstable, or that would become unstable as a result of the project, and potentially result in on- or off-site landslide, lateral spreading, subsidence, severe erosion, liquefaction or collapse?			X
The entirety of the Project area is underlain by continental and marine deposits, alluvium, or artificial fill (CDC 1991), and is classified as urban land, or urban land-Orthents complex (Natural Resources Conservation Service [NRCS] 2015). As described in Chapter 2, *Project Description,* the proposed Project includes relatively minor and low impact maintenance activities. None of these activities would destabilize the underlying geologic or soil unit significantly or result in on- or off-site landslides, lateral spreading, subsidence, severe erosion, liquefaction, or collapse. There would be **no impact**.			
d. Be located on expansive soil, as noted in the 2010 California Building Code, creating significant risks to life or property?			X

The proposed Project does not involve maintenance or construction at facilities that are temporarily or permanently occupied by people. Thus, expansive soils have no bearing on the proposed Project.			
e. Have soils incapable of adequately supporting the use of septic tanks or alternative wastewater disposal systems where sewers are not available for the disposal of wastewater?			X
The proposed Project does not require the use or installation of new or existing septic tanks/ waste disposal systems. The proposed Project would have **no impact**.			

3.7 CLIMATE CHANGE. Would the project:			
	Less than Significant with Mitigation	**Less Than Significant Impact**	**No Impact**
a. Generate greenhouse gas (GHG) emissions (including methane), either directly or indirectly, that may have a significant impact on the environment?		X	

Project maintenance activities would require the use of construction equipment and vehicles powered by diesel and gasoline fuel, particularly for the sediment removal, culvert replacement and debris removal activities. Combustion of these fuels by the equipment and vehicles would emit GHGs. The proposed Project's Year 1 activities and related emissions would be temporary. Following Year 1, the proposed Project's maintenance activities would be performed on an as-needed basis for a limited number of days each year, and would not require the long-term use of construction equipment. The proposed Project would only emit GHG emissions during the maintenance activities.

The proposed Year 1 maintenance-related GHG emissions would result from the combustion of fossil-fueled construction equipment, material hauling, and worker trips. These emissions were estimated using the CalEEMod version 2013.2.2, with an assumed three maintenance phases (sediment removal, culvert repair, and other maintenance activities) that would occur consecutively by an assumed 5 construction workers. All other maintenance activities and the potential equipment needed for those activities were combined together as one 25-day maintenance phase. It was assumed 400 cubic yards would be off-hauled during sediment removal activities, resulting in 40 haul truck trips. Culvert repair activities were assumed to require 61 cubic yards of imported fill and export of 72 cubic yards of dredge material. Additional modeling assumptions are detailed in Appendix B. The proposed Project's total Year 1 maintenance-related GHG emissions are estimated at approximately 32 metric tons of carbon dioxide equivalent ($MTCO_2e$).

Future maintenance activities would result in GHG emissions from fossil-fueled equipment and landscaping equipment use. The proposed Project's future maintenance (operational) emissions were generally estimated with CalEEMod version 2013.2.2 assuming that these activities would consist only of the "other maintenance work" activities and that all construction equipment needed for the other maintenance work would be used at the same time during a 25-day period, as further detailed in Appendix B. Since sediment removal activities would only occur every 3-4 years, emissions associated with the operation of heavy equipment for the sediment removal activities were not quantified and not included in the GHG estimates of post-Year 1 annual maintenance-related emissions, which were estimated to be approximately 30 $MTCO_2e$. However, sediment removal emissions would not be expected to be greater than the total construction-related GHG emissions (approximately 32 $MTCO_2e$) and the combined annual maintenance emissions, including sediment removal, would be up to approximately 62 $MTCO_2e$.

San Mateo County, as lead agency, has determined that the BAAQMD established "bright line" threshold for GHG emissions is an appropriate significance threshold. The "bright line" threshold is the proposed threshold for projects and represents the threshold under which they are not anticipated to result in a significant impact to global climate change or impede the goals of AB 32. The proposed Project's anticipated Year 1 and post-Year 1 maintenance activities would be substantially less than the BAAQMD's annual threshold of 1,100 $MTCO_2e$. The BAAQMD threshold

was developed with the goal of complying with AB 32, and based upon a review of the California Air Pollution Control Officers Association's guidance for threshold development and other agency's significance thresholds. Therefore, since the proposed Project's emissions would be well below such significance thresholds, the impact would be **less than significant**.			
b. Conflict with an applicable plan (including a local climate action plan), policy, or regulation adopted for the purpose of reducing the emissions of greenhouse gases?		X	
The State has implemented AB 32 to reduce GHG emissions. The proposed Project does not pose any conflict with the most recent list of CARB's early action strategies nor is it considered as one of the sectors at which measures are targeted. The Scoping Plan Update (CARB 2014) mentions water as a key focus area and calls for effective regional integrated planning that maximizes efficiency and conservation efforts in the water sector, and calls for measures that reduce GHG emissions and maintain water supply reliability. The Project is consistent with the water focus area in the Scoping Plan Update in that this project would maintain the structural and functional integrity of the Colma Creek flood control channel. The proposed Project is not one that would be required to report emissions to CARB. Therefore, the emissions generated by the Project would not be expected to have a substantial impact on global climate change. The proposed Project would be consistent with the measures outlined in both the local general plans and climate action plans. Potentially applicable climate action plans include those from the City of South San Francisco, the Town of Colma, and the BAAQMD. In particular, these plans encouraged limits to vehicle idling and reductions in off-road and on-road equipment fleets through use of newer more efficient and/or alternatively fueled equipment. The proposed Project would be consistent with these goals by limiting idling times and using hand tools as an alternative to fueled equipment to the extent feasible. In addition, the proposed Project would be consistent with the water conservation recommendations in the climate action plans by minimizing water use for dust control efforts to the minimum necessary. The San Francisco Bay Conservation and Development Commission (BCDC) has developed policies regarding climate change planning for the San Francisco Bay. In particular BCDC policies develop and implement climate change adaptation with regional partners and stakeholders. The Project area east of Spruce Avenue is within low lying areas and identified as an area potentially threatened by future sea level rise (above 1.4 meters) (Pacific Institute 2009). This project's goal does not include future improvements that may be considered to address climate change impacts in particular from sea level rise and changes to flooding frequency and distributions. The proposed Project is consistent with BCDC policies by encouraging habitat protection in areas with high natural habitat value (wetlands). This project is important for maintaining existing strategies associated with the vulnerabilities associated with climate change due to changes in frequency and intensity of rain events, sea level rise, and changes in storm surges. For the above-described reasons, the Project would not conflict with AB 32 and local plans. Therefore, this impact is considered **less than significant**.			
c. Result in the loss of forest land or conversion of forest land to non-forest use, such that it would release significant amounts of GHG emissions, or significantly reduce GHG sequestering?			X

There is no existing forest land within the Project. The Project would have **no impact**.			
d. Expose new or existing structures and/or infrastructure (e.g. – leach fields) to accelerated coastal cliff/bluff erosion due to rising sea levels?			X
The shoreline close to the Project area has a gradual slope with no coastal cliffs/bluffs in close proximity to work areas. The proposed Project would have **no impact**.			
e. Expose people or structures to a significant risk of loss, injury or death involving sea level rise?		X	
Most of the shoreline and eastern portion of South San Francisco is developed over fill material and former marshland. The Project area east of Spruce Avenue is within these low lying areas and identified as areas potentially threatened by future sea level rise (above 1.4 meters) (Pacific Institute 2009). However, the proposed Project does not involve construction or modification of new or existing structures temporarily or permanently occupied by people. Impacts of sea level rise would be considered **less than significant**.			
f. Place structures within an anticipated 100-year flood hazard area as mapped on a Federal Flood Hazard Boundary or Flood Insurance Rate Map or other flood hazard delineation map?		X	
Federal Emergency Management Agency (FEMA) mapping designates the Colma Creek channel as an area within the 1% Annual Chance Flood Hazard zone (i.e., 100-year flood event), specifically the area near Orange Memorial Park (Reach 1), the area between South Maple Avenue and the railroad tracks (Reach 2), and the area east of South Airport Boulevard to the Bay (Reach 3) (FEMA 2012). Additionally, the area between the railroad tracks (Reach 2) and South Airport Boulevard (Reach 3) is areas identified within the 0.2% Annual Chance Flood Hazard zone (i.e., 500-year flood event) (FEMA 2012). However, the Project does not involve construction or modification of new or existing structures temporarily or permanently occupied by people. In fact, the proposed Project would have a beneficial impact to adjacent properties by increasing the cross-sectional area and conveyance capacity of the channel, therefore reducing the risk of flooding of adjacent properties. Therefore, this impact would be **less than significant**.			
g. Place within an anticipated 100-year flood hazard area structures that would impede or redirect flood flows?		X	
The proposed Project involves localized removal of accumulated sediment within Reach 2 in order to restore the conveyance capacity of the channel. In addition, other routine maintenance activities, such as vegetation management along the channels and banks, clearing blocked culvert outfalls, installation/maintenance of trash collection devices, and removal of in-channel debris, help restore and maintain channel conveyance. While these maintenance activities would occur within a FEMA (2012) designated 100-year flood hazard area, such activities would improve flood conveyance capacity and reduce the risk of flooding for areas adjacent to the channel. Therefore, this impact would be **less than significant**.			

3.8 HAZARDS AND HAZARDOUS MATERIALS. Would the project:			
	Less than Significant with Mitigation	**Less Than Significant Impact**	**No Impact**
a. Create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials (e.g. – pesticides, herbicides, other toxic substances, or radioactive material)?		X	

Project construction would potentially require the routine transfer, use, storage, or disposal of hazardous materials. During sediment removal activities, hazardous materials typically associated with construction activities, such as fuel, oil, and lubricants would be employed in the Reach 2 and 3 project work and staging areas. The County would comply with all relevant federal, state, and local statutes and regulations related to transport, use, storage, or disposal of hazardous materials, and all materials designated for disposal would be evaluated for appropriate state and federal hazardous waste criteria. As described in Chapter 2, *Project Description,* up to 400 cubic yards of sediment would be removed per year, though sediment removal would not occur every year. Based on sediment testing conducted in 2014 at a time when the County considered potential reuse of the sediment for wetland restoration, the results indicated that the cadmium, lead, zinc, polycyclic aromatic hydrocarbons (PAHs), and total polychlorinated biphenyls (PCBs) concentrations in the sediment were above the San Francisco Bay Regional Water Quality Control Board's screening levels for wetland reuse (Pacific EcoRisk 2014). As a result of the sediment testing, sediment removed from Reach 2 would most likely be disposed of at the Ox Mountain Sanitary Landfill where the sediment could be used as daily cover material. Prior to disposal at this landfill, additional sediment testing would need to be conducted to ensure the material is acceptable for use as daily cover and, if found unsuitable, would be disposed of at another permitted landfill (if the sediment is deemed acceptable) or a hazardous waste disposal facility. The County would consult with the Ox Mountain Sanitary Landfill and other regulatory agencies, as necessary, to ensure proper disposal of the sediment. Through compliance with relevant regulatory requirements regarding the transport, use, storage, and disposal of hazardous materials, this impact would be **less than significant**.

b. Create a significant hazard to the public or the environment through reasonably foreseeable upset and accident conditions involving the release of hazardous materials into the environment?		X	

During sediment removal activities within Reach 2, some limited quantities of hazardous materials such as fuels, oils, hydraulic fluids, adhesives, and other substances would be used at the work area. Spills of these hazardous materials could result in a significant hazard to the public or environment if not handled properly. However, the County would implement BMP-6 (Spill Prevention and Control), BMP-7 (Equipment Maintenance and Fueling), and BMP-10 (Hazardous Materials). These measures would minimize the potential for accidental spills during construction and provide measures to contain them if they do occur. Although not anticipated, these measures would minimize the potential for any upset or accident conditions involving the release of hazardous materials into the environment. By implementing the above-referenced BMPs, this impact would be **less than significant**.

c. Emit hazardous emissions or handle hazardous or acutely hazardous materials, substances, or waste within one-quarter mile of an existing or proposed school?		X	
The closest schools to the Project area include El Camino High School (0.1 mile away), Los Cerritos Elementary School (0.2 mile away), South San Francisco High School (0.3 mile away), and Sunshine Gardens Elementary School (0.3 mile away). While El Camino High School and Los Cerritos School are within one-quarter mile of the Project area, by adhering to BMP-6 (Spill Prevention and Control), BMP-7 (Equipment Maintenance and Fueling), and BMP-10 (Hazardous Materials), the proposed Project would not result in any adverse effects related to emitting acutely hazardous materials, emissions, substances, or waste near an existing or proposed school. Moreover, given the nature of the proposed Project, which involves routine maintenance activities of the Colma Creek flood control channel, an insignificant amount of hazardous materials would be used in the vicinity of these schools. For these reasons, this impact would be **less than significant**.			
d. Be located on a site which is included on a list of hazardous materials sites compiled pursuant to Government Code Section 65962.5, and as a result, would it create a significant hazard to the public or the environment?			X
According to the California Department of Toxic Substances Control (DTSC) EnviroStor database, the proposed Project is not located on a site which is included on a list of hazardous materials sites compiled pursuant to Government Code Section 65962.5 (DTSC 2016). Thus, **no impact** would occur.			
e. For a project located within an airport land use plan or where such a plan has not been adopted within two miles of a public airport or public use airport, result in a safety hazard for people residing or working in the project area?		X	
The San Francisco International Airport is located less than 0.5 mile from Reach 3 of the Project area. The proposed Project would not result in any significant safety hazards for people residing or working in the Project area. Noise and air quality emissions associated with operations of the airport would be addressed through Occupational Safety and Health Administration regulations related to work on or near heavy construction equipment in the Project area. Thus, potential impacts to airport operations or to workers within the Project area would be **less than significant**.			
f. For a project within the vicinity of a private airstrip, result in a safety hazard for people residing or working in the project area?			X
See the response to question 3.8e, above. The Project area is not located within the area of a private air strip. **No impact** would occur.			
g. Impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan?			X

All Project maintenance activities would occur within the Colma Creek channel with work conducted from the top of the bank or in the channel itself. Staging areas would be located on the access roads along the top of bank. No road closures would be required. The proposed Project would not interfere with any known county or city emergency response or evacuation plans. Thus, there would be **no impact**.			
h. Expose people or structures to a significant risk of loss, injury, or death involving wildland fires, including where wildlands are adjacent to urbanized areas or where residences are intermixed with wildlands?			X
The Project area is not located in an area susceptible to wildland fires as it is situated in an urban setting and general lack of combustible vegetation. Land uses surrounding the Project area include manufacturing, warehouses, office space, and other service center shops; no wildlands are intermixed with such uses. As such, there would be no significant risk of loss, injury, or death involving wildland fires. **No impact** would occur.			
i. Place housing within an existing 100-year flood hazard area as mapped on a Federal Flood Hazard Boundary or Flood Insurance Rate Map or other flood hazard delineation map?			X
The Project does not involve the development of housing. Therefore, this criterion does not apply to the proposed Project.			
j. Place within an existing 100-year flood hazard area structures that would impede or redirect flood flows?		X	
The Project involves localized removal of accumulated sediment within Reach 2 in order to restore the conveyance capacity of the channel. One of the primary goals of the maintenance project is to reduce flooding risks. In addition, other routine maintenance activities, such as vegetation management along the channels and banks, clearing blocked culvert outfalls, installation/maintenance of trash collection devices, and removal of in-channel debris, help restore and maintain channel conveyance. While these maintenance activities would occur within a FEMA designated 100-year flood hazard area, such activities would improve flood conveyance capacity and reduce the risk of flooding for areas adjacent to the channel (FEMA 2012). Therefore, this impact would be **less than significant**.			
k. Expose people or structures to a significant risk of loss, injury or death involving flooding, including flooding as a result of the failure of a levee or dam?		X	
The proposed Project would decrease flooding risks by removing accumulated sediment and restoring the channel conveyance capacity. Similarly, other routine maintenance activities such as removal of in-channel debris and culvert obstructions and vegetation management, would improve channel conveyance capacity. Repair and replacement of existing culverts, including the placement of RSP at culvert outfalls, would increase bank stabilization and reduce risks of erosion. The proposed Project would reduce the risks associated with flooding. This impact would be **less than**			

significant.			
l. Inundation by tsunami, seiche, or mudflow?		X	

A tsunami is a wave or series of waves that occurs following an earthquake, landslide, or volcanic eruption at sea. Tsunamis grow in height as they move over shallow waters and may result in coastal flooding. Although infrequent, tsunamis have been observed in San Francisco Bay since 1900, ranging in depth from 4 to 44 inches (California Geological Survey [CGS] 2015). All of Reach 3b downstream of Utah Avenue is located within a tsunami inundation area (CGS 2009). Although the Colma Creek channel was originally constructed to convey 50-year flood events, accumulated sediment has reduced the cross-sectional area and reduced the total conveyance capacity of the channel. Implementation of the Project would restore channel conveyance and provide increased protection from flooding associated with both stormflows and tsunami waves approaching from San Francisco Bay.

A seiche is a standing wave in enclosed or partially enclosed body of water, such as a lake, bay, or estuary, which oscillates back and forth from one side of the waterbody to the other. Even during a large seismic event, a seiche is not likely to affect the San Francisco Bay region, nor the Colma Creek channel. Risks from a seiche at the Project area is low.

Mudflows are a type of landslide that occur when steep, unstable slopes of soft, wet, unconsolidated earth become fluid following precipitation events. Local topography is generally flat. The potential for mudflows to affect the Project area is very minimal.

Potential impacts from tsunami, seiche, or mudflow would be **less than significant**.

3.9 HYDROLOGY AND WATER QUALITY. Would the project:			
	Less than Significant with Mitigation	**Less Than Significant Impact**	**No Impact**
a. Violate any water quality standards or waste discharge requirements (consider water quality parameters such as temperature, dissolved oxygen, turbidity, and other typical stormwater pollutants [e.g., heavy metals, pathogens, petroleum derivatives, synthetic organics, sediment, nutrients, oxygen-demanding substances, and trash])?		X	

The Project area is in the South Bay Basin, which is covered under the San Francisco Bay Regional Water Quality Control Board's Basin Plan (RWQCB 2013). Beneficial uses for Colma Creek as identified in the Basin Plan include the following: warm freshwater habitat (WARM), wildlife habitat (WILD), water contact recreation (REC-1), and noncontact water recreation (REC-2).

The proposed Project would involve activities that could temporarily adversely affect water quality, including increased turbidity, disturbance of existing contaminants in the sediment, dewatering activities, and accidental release of chemicals. Construction activities that would pose a water quality threat are discussed below.

<u>Ground-Disturbing Activities</u>

The proposed sediment removal and culvert repair/replacement activities would occur within the Colma Creek channel and involve bed and bank disturbance, which could result in increased turbidity, degrading the water quality in the creek. Increased turbidity and secondary effects of turbidity on water temperature and dissolved oxygen concentrations could impair beneficial uses related to wildlife habitat in the Project area. Implementation of BMP-1 (Timing of Work), BMP-8 (Sand Bags/Rock Socks), BMP-12 (Construction Entrances and Perimeter), BMP-14 (Sediment and Erosion Control), and BMP-3 (Stormwater Protection and Biological Resource Protection Impact Avoidance and Minimization During Dewatering) would adequately prevent against erosion and sediment transport during and after sediment removal and culver repair/replacement activities. Further, project construction would occur during the dry summer and fall months when there is little risk for wet weather, which typically results in sediment erosion and transport to waters and increased turbidity in the water column.

<u>Dewatering Activities</u>

While culvert repair/replacement activities would be conducted during the summer and fall season when water level is lowest, some water may be in the work areas. Therefore, dewatering may be required. As described in Chapter 2, *Project Description,* the County would install a silt curtain around the work area. However, if necessary, a temporary coffer dam would be installed and a pump would be used to dewater the work area.

The installation, operation, and removal of the dewatering system could result in temporary water quality impacts. Installation and removal of the coffer dams would disturb the channel bed and bank, which could result in increased turbidity in the water column and migration of sediment to areas downstream. If not monitored and maintained, temporary coffer dams in the channel could fail, releasing sediment further downstream. These effects would significantly impact water quality. Implementation of BMP-3 (Stormwater Protection and Biological Resource Protection Impact

Avoidance and Minimization During Dewatering) and BMP-8 (Sandbags/Rock Socks) would minimize impacts on water quality by prescribing measures to ensure that sediment is not transported unnecessarily during and after dewatering activities.

Accidental Release of Hazardous Materials

Project construction would include the potential storage, use, transport, and/or disposal of hazardous materials (e.g., fuels, oils, solvents) for construction equipment. All construction materials and equipment would be stored in designated staging areas at the top of the bank. As described in Chapter 2, mechanized equipment to remove sediment would likely involve use of a long-reach excavator or telescopic arm excavator operated from the top of the bank. Smaller equipment including a walk-behind mini track loader may be used in the channel. For culvert repair/replacement work, equipment would also operate from the top of bank but some heavy equipment would need to operate in the channel. Accidental spills of these materials or improper material disposal could pose a significant risk to water quality.

Potentially significant impacts on water quality due to accidental releases of fuels, lubricants, hydraulic fluids, and other chemicals associated with operating equipment would be minimized by implementing the following BMPs:

- BMP-6: Spill Prevention and Control
- BMP-7: Equipment Maintenance & Fueling
- BMP-9: Non-Hazardous Materials
- BMP-11: Hazardous Materials
- BMP-11-: Waste Management
- BMP-13: Maintenance and Parking
- BMP-14: Sediment and Erosion Control
- BMP-15: Concrete, Grout & Mortar Application

Furthermore, the proposed Project would be required to comply with all applicable federal, state, and local permits, such as the CWA Section 404 Individual Permit (issued by USACE), CWA Section 401 Water Quality Certification (issued by the San Francisco Bay RWQCB), and the San Francisco Bay Region Municipal Regional Stormwater NPDES Permit (Permit No. CAS612008). Adherence to the above-listed BMPs and permit requirements would prevent potential violations to water quality standards or waste discharge requirements. Potential impacts of the proposed Project would be **less than significant**.

b. Significantly deplete groundwater supplies or interfere significantly with groundwater recharge such that there would be a net deficit in aquifer volume or a lowering of the local groundwater table level (e.g., the production rate of pre-existing nearby wells would drop to a level which would not support existing land uses or planned uses for which permits have been granted)?			X

Project-related maintenance activities would not interact with groundwater resources, nor significantly increase impervious surface area. There would be **no impact** to groundwater

resources.			
c. Significantly alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, in a manner that would result in significant erosion or siltation on- or off-site?			X
The proposed Project would involve sediment removal, vegetation removal from the concrete channel bed and joints, culvert repair/replacement, removal of debris and other obstructions in the channel, and other routine maintenance activities to maintain the existing, designed capacity for flood conveyance in the Colma Creek channel. These activities would not alter the existing drainage pattern of Colma Creek, as the channel alignment and drainage pattern are set and established between engineered channel banks. The Project would not alter the drainage pattern of Colma Creek in a manner that would result in significant erosion or siltation on- or off-site. Therefore, project impacts would be **no impact**.			
d. Significantly alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, or significantly increase the rate or amount of surface runoff in a manner that would result in flooding on- or off-site?			X
As discussed above in response to question 3.9c, the proposed Project would maintain the designed flood conveyance capacity of the Colma Creek channel to prevent flooding. The proposed Project would not affect the rate or amount of surface runoff leading to the channel and would prevent flooding. There would be **no impact**.			
e. Create or contribute runoff water that would exceed the capacity of existing or planned stormwater drainage systems or provide significant additional sources of polluted runoff?			X
The purpose of the proposed Project is to maintain the channel which receives stormwater runoff. The proposed maintenance activities would ensure the channel continues to provide the necessary capacity to receive and convey stormwater drainage from the surrounding watershed. The proposed Project would not contribute runoff water or additional sources of polluted runoff. The Project would benefit the existing stormwater drainage system; there would be **no impact**.			
f. Significantly degrade surface or groundwater water quality?		X	
As discussed above in response to question 3.8a in Section 3.8, "Hazards and Hazardous Materials," past sediment testing conducted in the Project area indicated that the sediment within Reach 2 contains elevated concentrations of contaminants including cadmium, lead, zinc, PAHs, and total PCBs concentrations (Pacific EcoRisk 2014). Thus, by removing contaminated sediment in Reach 2, the proposed Project would improve water quality in the channel. With respect to the Project's potential impacts on water quality during construction, refer to the			

discussion above in response to question 3.9a. Potential impacts to water quality would be minimized through implementation of applicable BMPs and adherence to federal, state, and local regulatory agency permit requirements. Potential project-related impacts to water quality would be **less than significant**.				
g.	Result in increased impervious surfaces and associated increased runoff?		X	
Within Reach 3a, the proposed Project proposes to repair and replace existing culverts and replace existing sack concrete outfall areas of 12 culverts with RSP. The resulting amount of impervious surface area would not substantially change such that increased runoff would occur. Potential impacts would be **less than significant impact**.				

3.10 LAND USE AND PLANNING. Would the project:	Less than Significant with Mitigation	Less Than Significant Impact	No Impact
a. Physically divide an established community?			X

The Project area is primarily located in the southeastern portion of the City of South San Francisco; a small portion of the Project area is located in the Town of Colma. The proposed Project's primary activities include removal of localized sediment along the Colma Creek flood control channel bed (Reach 2) and repair or replacement of degraded culverts in Reach 3a to provide adequate flood conveyance capacity in the channel. The proposed Project would ensure that the channel provides flood protection for residents and businesses in the communities near the channel in South San Francisco, Colma, and Daly City. The Project would in fact avoid and minimize potential flooding impacts to residents and businesses (e.g., reduce road closures) near the channel and thereby avoid division of these communities.

For these reasons, the proposed Project would not divide an established community. There would be **no impact**.

	Less than Significant with Mitigation	Less Than Significant Impact	No Impact
b. Conflict with any applicable land use plan, policy or regulation of an agency with jurisdiction over the project (including, but not limited to, the general plan, specific plan, local coastal program, or zoning ordinance) adopted for the purpose of avoiding or mitigating an environmental effect?			X

The proposed Project would not conflict with any applicable land use plan, policy, or regulation of an agency with jurisdiction over the project. Applicable land use plans include the City of South San Francisco's General Plan (1999) and the Town of Colma General Plan (1999). The proposed Project would not result in any changes to existing land uses in the vicinity. The majority of proposed maintenance activities would take place within the County's right-of-way. However, depending on where maintenance work is needed, the County may obtain right-of-entry agreements from private landowners, encroachment permits from the City of South San Francisco and the Town of Colma, and a permit to enter from BART. Maintenance work would not be conducted if necessary right-of-entry agreements are not secured. Therefore, there would be **no impact** related to conflicts with applicable land use plans, policies, or regulations.

	Less than Significant with Mitigation	Less Than Significant Impact	No Impact
c. Conflict with any applicable habitat conservation plan or natural communities conservation plan?			X

The proposed Project would not conflict with a habitat conservation plan or natural communities conservation plan as none exists for the Project area. Therefore, **no impact** would occur.

	Less than Significant with Mitigation	Less Than Significant Impact	No Impact
d. Result in the congregating of more than 50 people on a regular basis?			X

Proposed maintenance activities would involve no more than five workers at the Project area at a given time. Given that few workers would be required and the nature of the proposed Project (limited to routine maintenance work within the Colma Creek flood control channel), it would not

result in congregating of more than 50 people on a regular basis. **No impact** would occur.			
e. Result in the introduction of activities not currently found within the community?		X	
The primary activities of the proposed Project include sediment removal within Reach 2 and repair and replacement of degraded culverts within Reach 3a. Other routine maintenance activities that would be conducted include vegetation management, clearing of debris from culvert outfalls, fence repair, access road repair, removal of debris, and install/maintain trash capture devices. Although sediment removal within the channel has not been conducted since 2003, it should be noted that the County frequently conducts routine maintenance on facilities that they own. Thus, the proposed Project would not represent activities not currently found in the community. Given the short-term and temporary duration of sediment removal activities and other routine maintenance activities, this impact would be **less than significant**.			
f. Serve to encourage offsite development of presently undeveloped areas or increase development intensity of already developed areas (examples include the introduction of new or expanded public utilities, new industry, commercial facilities, or recreation activities)?			X
As the main objective of the proposed Project is to conduct maintenance activities along the Colma Creek flood control channel to provide adequate flood conveyance capacity in the channel, it is not expected to substantially increase development intensity in the area. Therefore, the proposed Project would not encourage off-site development of presently undeveloped areas or increase development intensity of already developed areas; **no impact** would occur.			
g. Create a significant new demand for housing?			X
The proposed Project does not include the provision of new services or employment that would attract new residents or otherwise increase demand for housing within the area. Therefore, there would be **no impact**.			

3.11 MINERAL RESOURCES. Would the project:	Less than Significant with Mitigation	Less Than Significant Impact	No Impact
a. Result in the loss of availability of a known mineral resource that would be of value to the region or the residents of the State?			X
The Project area is located in a developed area comprised of commercial, industrial, and residential uses. Based on the State mineral resources mapping (CDC 1982 and 1996), the Project area is designated MRZ-1, which is defined as an area where adequate information indicates that no significant mineral deposits are present. Construction activities would primarily occur within the channel and at nearby temporary staging areas. Neither construction nor operation of the proposed Project would result in the loss of availability of known mineral resources. The proposed Project would have **no impact**.			
b. Result in the loss of availability of a locally important mineral resource recovery site delineated on a local general plan, specific plan or other land use plan?			X
Refer to the discussion above for question 3.11a. The proposed Project would not conflict with mineral resource policies outlined in the Town of Colma and City of South San Francisco general plans or land use plans. The proposed Project would have **no impact**.			

3.12 NOISE. Would the project result in:	Less than Significant with Mitigation	Less Than Significant Impact	No Impact
a. Exposure of persons to or generation of noise levels in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies?	X		

The proposed Project would primarily occur within the City of South San Francisco's city limits but would also occur within the Town of Colma. The noise elements of the two local general plans were established to reduce existing and future operational noise impacts or land use compatibility conflicts and do not provide noise level thresholds for construction-related activities. However, generally applicable policies to the proposed Project from the general plans include:

- **Policy 9-G-1:** Protect public health and welfare by eliminating or minimizing the effects of existing noise problems, and by preventing increased noise levels in the future. (City of South San Francisco 1999)
- **Policy 5.06.311:** The Town should review proposed development with regard to potential noise generation impacts, to ensure that the tranquil atmosphere for the Town's memorial parks is maintained. (Town of Colma 1999)
- **Policy 5.06.315:** An ordinance should be adopted limiting days and hours of construction to provide quiet time. (Town of Colma 1999)

Noise levels or restrictions on the timing of loud noises have been established in the respective noise ordinances of the two local governments and are applicable to the proposed Project. The City of South San Francisco's noise ordinance exempts construction and maintenance activities from complying with the noise levels as long as: (1) construction occurs on weekdays between the hours of 8 a.m. and 8 p.m. or on weekends within approved daytime hours, (2) that no individual equipment produces a noise level greater than 90 decibels (dB) 25 feet away from the noise source, or noise levels at any point outside of a property do not exceed 90 dB (City of South San Francisco 2016). The Town of Colma's noise ordinance exempts construction activities from its noise standards (Town of Colma 2013).

The proposed Project's sediment removal and culvert repair and replacement activities within Reaches 2 and 3 would occur between 8 a.m. and 5 p.m., Monday through Friday, unless alternate schedules are approved by the local governments. In addition, all other routine maintenance activities (in Reaches 1 through 3) would also occur during weekdays between 8 a.m. and 5 p.m.

As discussed in response to question 3.12d below, noise from individual construction equipment used during maintenance activities would potentially cause noise levels to be greater than 90 A-weighted decibels (dBA) at 25 feet from the project site and potentially outside of the Colma Creek project work area, which is the City of South San Francisco's threshold to exempt construction activities from complying with the established noise levels in its ordinance. Estimated noise at 25 feet would be 95.8 dBA and the noise at the project boundary, which is as close as approximately 30 feet from the middle of the channel, would be approximately 94.2 dBA. Proposed project activities would exceed the City of South San Francisco's construction noise ordinance threshold for exemption, and would be considered a significant impact. However, implementation of **Mitigation**

Measure NOI-1 would ensure that the proposed Project complies with the City of South San Francisco's noise ordinance requirements by implementing a variety of noise-minimizing (and vibration-minimizing) measures, including ensuring use of noise-reducing devices on construction equipment, restricting concurrent equipment use, and/or locating noise sources farther from sensitive receptors. In addition, BMP-17 (Vehicle Idling and Maintenance) would ensure that all construction equipment is maintained and properly tuned in accordance with manufacturer's specifications. With implementation of BMP-17 and Mitigation Measure NOI-1, the proposed Project would be in compliance with the City of South San Francisco's requirement that noise levels at any point outside of a property do not exceed 90 dB.

The proposed project would not result in any new permanent sources of noise. The proposed Project's Year 1 maintenance activities and post-Year 1 maintenance activities would be consistent with the Town of Colma's noise ordinances and/or applicable general plan policies. With implementation of Mitigation Measure NOI-1, the proposed Project would also be consistent with the City of South San Francisco's noise ordinance. This impact would be **less than significant.**

Mitigation Measure NOI-1: Implement Noise- and Vibration-Reducing Measures

San Mateo County and/or its contractor shall ensure that noise-generating construction equipment is equipped with mufflers or other noise-reducing features. In addition, where feasible, construction equipment shall be operated 50 or more feet from any residences. Vibration damping devices shall be used to the extent feasible.

b.	Exposure of persons to or generation of excessive ground-borne vibration or ground-borne noise levels?	X		

Vibration and ground-borne noise levels were estimated by following methods described in the Federal Transportation Administration (FTA) *Transit Noise and Vibration Impact Assessment* (FTA 2006) to determine the peak particle velocity (PPV) that would potentially impact (damage) buildings and the vibration noise level (vibration decibels or VdB) that would potentially cause human annoyance from ground-borne vibration. Construction equipment causes vibrations that spread through the ground and diminish in strength with distance (FTA 2006). PPV and vibration noise levels for construction equipment to be used during the proposed project's maintenance activities are shown in **Table 8**.

Table 8. Standard PPV and Vibration Levels for the Proposed Project's Potential Construction Equipment

Equipment (or equivalent)	PPV at 25 ft (inches per second)	Vibration Level (L_v) at 25 ft (VdB)	Vibration Level (L_v) at 55 ft (VdB)	Vibration Level (L_v) at 150 ft (VdB)
Large bulldozer (used as substitute for an excavator)	0.089	87	78	64
Loaded trucks	0.076	86	77	63
Small bulldozer	0.003	58	49	35

Note: Distances of 55 feet and 150 feet represent the approximate distances to the nearest residential sensitive receptor in Reach 1 and to the nearest potential sensitive receptor type (i.e., a hotel) in Reaches 2 and 3.

The vibration threshold for buildings occurs at a PPV of 0.12 (inch/second) for buildings extremely susceptible to vibration damage, which represents the lowest (most sensitive) threshold. Although the perceptibility threshold is about 65 VdB, human response to vibration is not usually significant unless the vibration exceeds 70 VdB.

It was assumed that the greatest vibratory equipment on the project site would have similar vibration sound levels as a large bulldozer. Residences along Reach 1 would be approximately 55 feet from the middle of the work area (i.e., potential Reach 1 maintenance activities in the channel). Other noise-sensitive receptors near Reaches 2 and 3 would include hotels, which would be located approximately 150 feet from the middle of the work area. There are no buildings within 20 feet of the project work areas where potential building damage could occur based on the PPV threshold of 0.12. For impacts to humans (annoyance from vibration noise), operation of equipment such as a large bulldozer (which is used as a substitute equipment for an excavator) within 55 feet of a noise-sensitive receptor would result in VdB levels greater than the human annoyance threshold of 70 VdB (see Table 8). Proposed maintenance activities in Reach 1 would significantly impact residents due to vibration noise above the human annoyance threshold. The proposed Project would implement **Mitigation Measure NOI-1 (Implement Noise- and Vibration-Reducing Measures)** to reduce vibrational impacts on human annoyance to not result in a significant level of human annoyance. In addition, given the short-term nature of construction activities occurring in a given location, particularly in Reach 1 which contains the closest residences, the exceedances above the 70 dB threshold would not significantly exceed criteria thresholds for annoyance to people in the project area or damage to structures. Therefore, with implementation of Mitigation Measure NOI-1, vibration impacts would be **less than significant**.

c.	A significant permanent increase in ambient noise levels in the project vicinity above levels existing without the project?			X

The proposed Project's sediment removal, culvert repair, and other maintenance activities would occur for short durations and at varying locations along the 5.4 miles of the Colma Creek flood control channel. There would be no permanent increase in ambient noise levels in the Project vicinity since the proposed Project would not result in new permanent noise sources. Therefore, **no impact** would occur.

d.	A significant temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project?	X		

The FTA has established guidance on noise and vibration impact assessments for construction equipment (FTA 2006). To roughly estimate anticipated construction noise levels at nearby sensitive receptor locations, the FTA recommends that the noisiest two pieces of equipment be used in these noise estimations along with the following assumptions:

- full power operation for a full one hour,
- there are no obstructions to the noise travel paths,
- typical noise levels from construction equipment are used, and
- all pieces of equipment operate at the center of the project site.

Using these simplifying assumptions, the noise levels at specific distances can be obtained using the following equation:

$$L_{eq}(equip) = EL_{50ft} - 20log_{10}(D/50)$$

Where:

L_{eq} (equip) = the noise emission level at the receiver at distance D over 1 hour.

EL_{50ft} = noise emission level of a particular piece of equipment at reference distance of 50 feet.

D = the distance from the receiver to the piece of equipment in feet.

In order to add the two noisiest pieces of equipment together, the following equation applies:

$$L_{total} = 10\ log_{10}(10^{\frac{L1}{10}} + 10^{\frac{L2}{10}})$$

Where:

L_{total} = The noise emission level of two pieces of equipment combined

L_1 = The noise emission level of equipment type 1

L_2 = The noise emission level of equipment type 2

Based on reference guides, typical noise levels for the equipment used in the proposed project were used to estimate the noise levels at the nearest sensitive receptors (FTA 2006). The values used for the reference noise level at 50 feet are shown in **Table 9**, below.

Table 9. Noise Levels for Construction Equipment

Equipment Type	Noise Level at 50 feet (dBA)
Pneumatic Tool	85
Pump	76
Excavator	85
Front-end Loader	85
Truck	88
Source: FTA 2006	

A substantial temporary or periodic short-term increase in ambient noise level standards associated with construction noise, such as would occur under the proposed Project, is addressed in the City of South San Francisco's adopted noise ordinance. The proposed Project's activities would be exempt from the Town of Colma's noise ordinance. Temporary impacts during maintenance activities under the proposed Project would be considered significant if they would substantially interfere with sensitive land uses, such as residences and businesses. Substantial interference could result from a combination of factors, including: exposing sensitive receptors to the generation of substantial (i.e., equal to or greater than 90 dBA in the daytime and equal to or greater than 80 dBA at nighttime for residence and 100 dBA in the daytime and at nighttime for commercial and industrial) noise levels at sensitive receptor locations; and/or conducting construction activities that would affect noise-sensitive uses during the nighttime.

Using the equations above and the two noisiest pieces of equipment (an excavator and a truck), the noise levels at the nearest receptor measured from the middle of the project work area (i.e., residences along Reach 1, approximately 55 feet away) would be 88.9 dBA. Ambient noise levels at the work area boundary and 25 feet from the equipment use were discussed in impact question 3.12a above, and found to be greater than the City of South San Francisco's noise requirement (less than 90 dB). Estimated noise at 25 feet would be approximately 95.8 dBA and the noise at the project boundary, which is as close as approximately 30 feet from the middle of the channel, would be approximately 94.2 dBA. Results of noise calculations conducted as described above are provided in **Appendix G**.

Construction noise at the nearest sensitive receptor (approximately 88.9 dBA) would be greater than existing noise levels at nearby sensitive receptor locations, but less than the daytime threshold of 90 dBA at any sensitive receptor location. In addition, the proposed Project's maintenance activities generally would be short-term and intermittent, and would be particularly of short duration in any given area in Reach 1 (up to 1 day in a given location). The use of diesel powered construction equipment for these activities would similarly be temporary and episodic, for a limited period of time. Further, the proposed Project's activities would be conducted during daytime hours and in compliance with local noise ordinances. Because **Mitigation Measure NOI-1** is required to ensure that ambient noise levels would also comply with the City of South San Francisco's noise ordinance requirements for the construction exemption, temporary increases in ambient noise levels would be **less than significant**.

e.	For a project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, expose people residing or working in the project area to excessive noise levels?		X	

The San Francisco International Airport is located less than 0.5 mile from Reach 3 of the Project area. However, the proposed Project would not occur within any of the San Francisco International Airport's noise compatibility zones, including the nearest zone that has a community noise equivalent level (CNEL) of 65 dB (Ricondo & Associates et al. 2012). Because the entire project area is outside of CNEL compatibility zones, the proposed Project would not be subject to any land use or design restrictions identified in the airport plan, and would be compatible with the *Comprehensive Airport Land Use Compatibility Plan for the Environs of San Francisco International Airport*. Thus, potential impacts to airport operations or to workers within the Project area would be **less than significant**.

f.	For a project within the vicinity of a private airstrip, expose people residing or working in the project area to excessive noise levels?			X

See the discussion provided in response to question 3.12e, above. The Project area is not located within the area of a private air strip. **No impact** would occur.

3.13 POPULATION AND HOUSING. Would the project:	Less than Significant with Mitigation	Less Than Significant Impact	No Impact
a. Induce significant population growth in an area, either directly (for example, by proposing new homes and businesses) or indirectly (for example, through extension of roads or other infrastructure)?		X	
The proposed Project would involve routine maintenance activities along the Colma Creek flood control channel. The primary maintenance activities include localized sediment removal and repair or replacement of degraded culverts, which are expected to occur from August/September through October 15 in Year 1 of construction. Thereafter, this work would occur periodically every few years. During the construction phase for both the sediment removal and culvert maintenance work, up to five construction workers would be employed. All other maintenance activities would be conducted by existing maintenance crews. It is expected that regional labor could meet the construction workforce requirements. While some workers might temporarily relocate from other areas, the increase would be minor and temporary. The proposed Project would not involve construction of new homes or businesses in the area or extend new roads or other infrastructure in undeveloped areas. Therefore, the Project would not result in an increase in the local population and would be considered **less than significant**.			
b. Displace existing housing (including low- or moderate-income housing) in an area that is substantially deficient in housing, necessitating the construction of replacement housing elsewhere?			X
As described above, the proposed Project includes routine maintenance of the Colma Creek flood control channel and would not displace existing housing. Therefore, the Project would result in **no impact** related to displacement of housing necessitating the construction of replacement housing elsewhere.			

3.14 PUBLIC SERVICES. Would the project result in significant adverse physical impacts associated with the provision of new or physically altered government facilities, need for new or physically altered governmental facilities, the construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios, response times or other performance objectives for any of the public services:

		Less than Significant with Mitigation	Less Than Significant Impact	No Impact
a.	Fire protection?			X
b.	Police protection?			X
c.	Schools?			X
d.	Parks?			X
e.	Other public facilities or utilities (e.g. – hospitals, or electrical/natural gas supply systems)?			X

The City of South San Francisco Fire Department provides fire protection to the Project area. The closest fire station is Station 61, located at 480 North Canal Street (at the corner of Spruce Avenue and North Canal Street).

The City of South San Francisco Police Department provides law enforcement for the Project area. The police station is located at 33 Arroyo Drive, near El Camino Real, and within 900 feet from Reach 1 of the Colma Creek Flood Control Channel.

The South San Francisco Unified School District (SSFUSD) is the primary school district within the Project area. SSFUSD includes ten elementary schools, three middle schools, and three high schools (City of South San Francisco, 2016a). The closest schools to the Project are El Camino High School (0.1 mile away) and Los Cerritos Elementary School (0.2 mile away).

The City of South San Francisco's Parks and Recreation Department manages 264.9 acres of parks and open space, averaging 4.1 acres per 1,000 residents (City of South San Francisco, 2016b).

The proposed Project would not involve construction of any new facilities nor involve any long-term activities that would result in increased demand for police, fire, or other public services. As described in Section 3.16, *Transportation/Traffic,* project construction would not require any road closures and therefore not cause substantial delays for emergency vehicles. The primary goal of the proposed Project is to provide adequate flood conveyance capacity in the channel.

In conclusion, the proposed Project would have **no impact** on public services related to fire, police, schools, parks, or other public utilities.

3.15 RECREATION. Would the project:	Less than Significant with Mitigation	Less Than Significant Impact	No Impact
a. Increase the use of existing neighborhood or regional parks or other recreational facilities such that significant physical deterioration of the facility would occur or be accelerated?		X	
The closest recreational uses in the Project vicinity include the Sister Cities Park Trail, which parallels the Colma Creek flood control channel to the west of Spruce Avenue (near Reach 2), and Orange Memorial Park and Centennial Way Trail, both of which are located on both sides of the channel in Reach 1. In addition, the Bay Trail is located near Reach 3b. Sediment removal and culvert repair activities would not affect access to the Bay Trail or the Sister Cities Park trail. However, other routine maintenance activities could potentially limit access to these trails depending on the location of future maintenance needs. Any impacts to trails would be temporary and limited to one day at any location. Given that trail impacts would be temporary and the availability of other recreational facilities in the Project vicinity, impacts related to increased use of other neighborhood, regional parks, and recreational facilities would be **less than significant**.			
b. Include recreational facilities or require the construction or expansion of recreational facilities which might have an adverse physical effect on the environment?			X
The proposed Project does not include any recreational facilities nor would it result in an increase in use of nearby recreational facilities such that construction or expansion of any recreational facilities would be necessary. Therefore, the proposed Project would have **no impact**.			

3.16 TRANSPORTATION/TRAFFIC. Would the project:			
	Less than Significant with Mitigation	**Less Than Significant Impact**	**No Impact**
a. Conflict with an applicable plan, ordinance or policy establishing measures of effectiveness for the performance of the circulation system, taking into account all modes of transportation including mass transit and non-motorized travel and relevant components of the circulation system, including, but not limited to, intersections, streets, highways and freeways, pedestrian and bicycle paths, and mass transit?	X		

Reach 1 starts at A Street/El Camino Real in the Town of Colma and ends at Spruce Avenue in the City of South San Francisco. Reach 2 is located just west of U.S. Highway 101 (Highway 101) and Reach 3 is east of Highway 101 near the South Airport Boulevard exit. Level of service (LOS) standards and other traffic management standards and policies are established by the City/County Association of Governments of San Mateo County (C/CAG), the City of South San Francisco General Plan, and the Town of Colma General Plan. The Transportation Element of the City of South San Francisco General Plan also includes policies, programs, and standards to provide new linkages to advance an integrated multi-modal transportation system that encourages public transit and meets needs of pedestrians and bicyclists. One of the policies in the Transportation Element is to develop a standard method of evaluating traffic impacts of individual developments as the City of South San Francisco does not have an adopted LOS calculation method (City of South San Francisco 1999). The Circulation Element of the Town of Colma General Plan includes policies and tasks to improve circulation throughout Colma. In addition, the San Mateo County Comprehensive Bicycle and Pedestrian Management Plan (2011) includes goals, objectives, and policies to guide development and implementation of bicycle and pedestrian projects throughout the County.

Regional access to the Project area is available from both El Camino Real/Highway 82 and Highway 101 (also referred to as the Bayshore Highway). Within the Project area, Highway 101 is 9-lane, north-south divided highway. According to the most recent data published by California Department of Transportation (Caltrans), at the Produce Avenue and Highway 101 junction, the Annual Average Daily Traffic (AADT) on Highway 101 (northbound) is about 222,000 vehicles and the AADT on Highway 101 (southbound) is about 241,000 vehicles (Caltrans 2014). According to the Transportation Element of the City of South San Francisco General Plan, South Airport Boulevard has a capacity of 40,000 vehicles per day, Spruce Avenue has a capacity of 36,000 vehicles per day, and South Linden Avenue has a capacity of 18,000 vehicles per day (City of South San Francisco 1999).

The Colma Creek flood control channel is accessible from several local roads. Reach 1 is accessible from Orange Avenue and Chestnut Avenue. As described in Chapter 2, *Project Description,* local access to Reach 2 is anticipated to occur via Highway 101, Produce Avenue, San Mateo Avenue, Linden Avenue, North and South Canal Streets and Spruce Avenue. Reach 3a would be accessible from Highway 101, South Airport Boulevard, Mitchell Avenue, and from Utah Avenue via a service road that parallels the east side of Colma Creek. Portions of South Airport Boulevard have bicycle lanes (Class II facility) and other portions are considered a bicycle route (Class III facility). In addition, Utah Avenue and Linden Avenue are also considered bicycle routes (Class III facilities).

There are several public transit lines in the project vicinity. Public transit lines in the vicinity of Reach 3 include San Mateo County Transit District (SamTrans) routes 397, 292, KX, and 38. SamTrans routes in the vicinity of Reaches 2 and 3 include routes 37, 131, 133, 35, and 122. In addition, as described in Chapter 2, Reach 1 is culverted beneath the South San Francisco BART station. The Caltrain railroad also crosses over Reach 2 to the west of Highway 101.

Project construction would temporarily increase traffic volumes on Highway 101 and the local roads described above. Traffic would primarily increase from construction worker trips and the hauling of sediment to the Ox Mountain Sanitary Landfill. The haul route may include Produce Avenue, Highway 101, Highway 380, Highway 280, Highway 35, Highway 92, and the Ox Mountain Dump Road. **Table 10**, below summarizes the average daily traffic volumes on freeways that could be used for off-hauling materials from the Project area.

Table 10. Daily Traffic Volumes on Regional Highways in Project Vicinity

Regional Highways	Location	Daily Traffic (Vehicles per Day)	Trucks (as percentage of daily traffic)
101	SB Produce Avenue	220,000	N/A
380	280 Intersection	142,000	2.15%
280	San Bruno, Junction at Route 35 North	114,000	0.24%
35	Junction Route 92	3,100	8.73%
92	Route 35 South	25,000	5.4%

Sources: Caltrans 2014a and 2014b

During construction of the proposed Project's primary activities, the expected increase in traffic would take place between 7:00 a.m. to 6:00 p.m., Monday through Friday for the approximately 20 work days total. During the sediment removal phase, it is assumed that a total of 400 cubic yards of sediment would be removed over a 4-day period. Based upon an estimated 5 construction workers, any miscellaneous midday trips, and a total of 100 cubic yards of sediment that require off-hauling per day, the estimated increase in trips along local roads would be approximately 17 daily round trips over the course of a 4-day period. For the proposed culvert repair and replacement work, the estimated increase in trips along local roads would be approximately 8 round trips per day, based upon an estimated 5 construction workers, miscellaneous midday trips needed by workers, and approximately 2 truck trips necessary to deliver and off-haul material from the work area. Based on the above, the increase in daily traffic during project construction would represent a minor increase in annual average daily traffic, and would therefore result in a less-than-significant effect on traffic flows.

After construction is complete, additional sediment removal may be necessary in subsequent years. In the long-term, the annual amount of sediment removed from the channel would not exceed 500 cubic yards. Assuming five construction workers would be needed over a 5-day period for future sediment removal work and that up to 100 cubic yards would be off-hauled on a daily basis, the annual truck trips would be 17 round trips per day, similar to the initial sediment removal work proposed. In addition, other routine maintenance activities including fence repair, access road repair, vegetation management, graffiti abatement, and repair of concrete channel banks would occur. These activities generate no more than a few truck trips at a given time. Similar to the construction phase, operation of the proposed Project would not result in a substantial increase in traffic.

Most of the local roads in the vicinity of the Colma Creek flood control channel have sidewalks. During the project construction phase, no lane closures would be necessary. Construction vehicles and equipment may need to cross Utah Avenue from the staging area adjacent to Reach 3a. From this staging area, slow moving trucks traveling across Utah Avenue to and from the culvert maintenance sites could temporarily increase safety hazards for both bicyclists and motorists. Implementation BMP-18 (Dust Management Controls) would ensure that the roadway is kept clear of debris and dust. However, this measure would not address the traffic safety hazards posed by the presence of construction vehicles and equipment traveling to and from the culvert maintenance sites. Therefore, potential impacts related to conflicts with bicycle performance or safety would be potentially significant. Implementation of **Mitigation Measure TRA-1,** which requires installation of warning signs and flaggers (if necessary), would address potential traffic safety hazards that could occur when equipment and vehicles travel to and from the maintenance work areas. Based on the minimal amount of Project-related traffic added to the roads and with implementation of these measures, potential conflicts with bicycle performance or safety would be **less than significant**.

Mitigation Measure TRA-1: Prepare and Implement a Traffic Control Plan

The County and/or its contractor will prepare and implement a traffic control plan to reduce traffic impacts on local roads in the City of South San Francisco and Town of Colma, to reduce potential traffic safety hazards with bicyclists with motorists, and ensure adequate access for construction vehicles, as appropriate. The County and construction contractor will coordinate construction activities with South San Francisco Fire Department, as appropriate. The traffic control plan will provide for the appropriate control measures including (but not limited to) barricades, warning signs, speed control devices, and other measures. The traffic control plan may also require flaggers near the work areas.

b. Conflict with an applicable congestion management program including, but not limited to, level of service (LOS) standards and travel demand measures, or other standards established by the County congestion management agency for designated roads or highways?			X

LOS standards are established by congestion management agencies and other municipalities to evaluate and regulate long-term traffic impacts associated with development. In the Project area, LOS standards and other traffic management standards and policies are established by the C/CAG Congestion Management Authority, the City of South San Francisco General Plan, and Town of Colma General Plan. LOS standards do not directly apply to temporary construction projects such as the proposed Project. Based on the traffic estimates described in response to question 3.16a, above, the proposed Project would not result in a substantial increase in traffic during construction activities. Once construction is complete, operation of the proposed Project would be limited to as-needed routine maintenance activities and occasional monitoring of sediment levels in Reach 2,

<table>
<tr><td colspan="4">which would only generate a few trips at a time. For these reasons, the proposed Project would not conflict with LOS standards established in the C/CAG, South San Francisco General Plan, or Town of Colma General Plan. No impact would occur.</td></tr>
<tr><td>c. Result in a change in air traffic patterns, including either an increase in traffic levels or a change in location that results in significant safety risks?</td><td></td><td></td><td>X</td></tr>
<tr><td colspan="4">The Project area is located approximately one mile north of the San Francisco International Airport (SFO). The proposed Project does not involve construction of any above-ground structures that could affect air traffic. Therefore, the proposed Project would result in no impacts related to changes in air traffic patterns.</td></tr>
<tr><td>d. Significantly increase hazards to a design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment)?</td><td>X</td><td></td><td></td></tr>
<tr><td colspan="4">The proposed Project would not involve any improvements to public roads nor would it increase hazards due to a design feature or incompatible use. Construction worker vehicles and haul trucks associated with the Project would share public roads (e.g., Airport Road, Produce Avenue, and San Mateo Avenue) with other vehicles. The use of these roads to access the sediment removal sites and culvert repair/replacement sites could potentially increase traffic hazard concerns due to the presence of slow moving trucks requiring access to staging and work areas. The potential for conflicts with bicycle traffic along Utah Avenue could increase as well. While the number of maximum daily truck trips (approximately 17 per day) would be low and the duration of project construction would be short, this conflict is considered potentially significant. Implementation of Mitigation Measure TRA-1 would reduce traffic safety hazard impacts to less than significant.</td></tr>
<tr><td>e. Result in inadequate emergency access?</td><td>X</td><td></td><td></td></tr>
<tr><td colspan="4">Vehicle access to and from the priority maintenance sites would occur along local roads, the County’s access roads adjacent to the Colma Creek flood control channel to the extent feasible. As previously described, depending on where maintenance work is needed, the County may need to obtain right-of-entry agreements from private landowners, encroachment permits from the City of South San Francisco and Town of Colma, and a permit to enter from BART. Construction vehicles and equipment would be parked in designated staging areas adjacent to Reaches 2 and 3 of the channel. The proposed Project would not require lane closures and, as previously described in response to question 3.16a, project construction would not generate any substantial delays on local roads and with implementation of Mitigation Measure TRA-1, the Project would not cause substantial delays for emergency vehicles. Thus, impacts related to emergency access would be less than significant.</td></tr>
</table>

f. Conflict with adopted policies, plans, or programs regarding public transit, bicycle, or pedestrian facilities, or otherwise decrease the performance or safety of such facilities?		X	

The proposed Project would not result in long-term changes to public transit, bicycle, or pedestrian facilities. During the Project's construction phase, there may be temporary and minor decreases in performance and safety of public transit and bicycle facilities due to construction vehicles traveling along local roadways. Bicycle lanes along Utah Avenue may be closed temporarily to accommodate construction vehicles traveling to and from the work areas. There may be minor delays along San Mateo Avenue, Produce Avenue, and Utah Avenue due to entering and exiting of construction equipment. However, no traffic lanes would require closure. As such, because project construction would be short-term and temporary, conflicts with adopted policies, plans, or programs regarding public transit, bicycle facilities that would decrease the performance or safety of such facilities, would be less than significant and the impact would be **less than significant**.

g. Cause noticeable increase in pedestrian traffic or a change in pedestrian patterns?		X	

The proposed Project would not generate new or permanently change existing pedestrian traffic. While there are sidewalks in the Project vicinity (e.g., along Spruce Avenue, Produce Avenue, and Utah Avenue), construction activities would only temporary affect these pedestrian facilities when construction vehicles and equipment need to access specific maintenance site. Therefore, impacts related to changes in pedestrian traffic would be **less than significant.**

h. Result in inadequate parking capacity?		X	

The proposed Project would create a short-term parking demand for construction workers and construction vehicles at the Project area. However, the construction staging areas on the County-owned access roads adjacent to Reaches 2 and 3 would adequately accommodate construction workers' parking demand and would not affect parking capacity in the Project area. For these reasons, the proposed Project would have a **less-than-significant** impact with respect to adequate parking capacity.

3.17 UTILITIES AND SERVICE SYSTEMS. Would the project:			
	Less than Significant with Mitigation	**Less Than Significant Impact**	**No Impact**
a. Exceed wastewater treatment requirements of the applicable Regional Water Quality Control Board?			X
The proposed Project would not generate wastewater demands (refer to discussion of growth inducement in response to question 3.13a. in Section 3.13, *Population and Housing*, above). As such, the proposed Project would have **no impact** related to exceedance of wastewater treatment requirements.			
b. Require or result in the construction of new water or wastewater treatment facilities or expansion of existing facilities, the construction of which could cause significant environmental effects?			X
The proposed Project would not generate wastewater or require water supply. The proposed Project would not require construction of new or expansion of existing water or wastewater treatment facilities. Therefore, the proposed Project would have **no impact**.			
c. Require or result in the construction of new stormwater drainage facilities or expansion of existing facilities, the construction of which could cause significant environmental effects?			X
The proposed Project would not require or result in of the need to construct new or expanded stormwater drainage facilities. The main objective of the proposed Project is to conduct maintenance activities to provide adequate flood conveyance capacity in the channel, reducing localized flooding. The proposed Project would have a beneficial effect on existing stormwater infrastructure. **No impact** would occur.			
d. Have sufficient water supplies available to serve the project from existing entitlements and resources, or are new or expanded entitlements needed?		X	
Minimal amounts of water could potentially be needed for dust control and equipment cleaning during maintenance activities such as sediment removal or culvert outfall repair work. The proposed Project would not require new water supplies or resources. Therefore, the proposed Project's impact on local water supplies would be temporary and **less than significant**.			
e. Result in a determination by the wastewater treatment provider which serves or may serve the			X

	project that it has adequate capacity to serve the project's projected demand in addition to the provider's existing commitments?			

See discussion above in response to questions 3.17a and 3.17b. The proposed Project would not affect wastewater treatment capacity; **no impact** would occur.

f.	Be served by a landfill with insufficient permitted capacity to accommodate the project's solid waste disposal needs?		X	

As described in Chapter 2, *Project Description,* up to 400 cubic yards of sediment would be removed initially and, thereafter, up to 500 cubic yards of sediment would be removed, though sediment removal would not occur every year. This sediment would likely be disposed at the Ox Mountain Sanitary (also referred to as Corinda Los Trancos) Landfill for use as daily cover for landfill operations, the nearest operating landfill to the project site. Other maintenance activities such as clearing blocked culverts and removal of debris from the channel, and repair of hardened streambanks would also generate small volumes of debris that require disposal at that landfill.

The Ox Mountain Sanitary Landfill in San Mateo County has a maximum throughput capacity of 3,598 tons/day and remaining capacity of 26,898,089 cubic yards (CalRecycle 2015). Prior to disposal, the sediment would be tested to determine suitability for landfill cover. Although sediment testing was previously conducted in 2014 by Pacific EcoRisk to determine the suitability of potentially reusing the sediment for wetland cover material, the analysis did not address some parameters required by the Ox Mountain Sanitary Landfill. Example parameters that would need to be tested include concentrations of gas, diesel, motor oil, volatile organic compounds, and metals (Dewild, pers. comm. 2016). In the event that sediment removed from Reach 2 of the channel is hazardous, this waste would require disposal at a hazardous waste facility. The Kettleman Hills Facility (B-18 landfill), located in Kettleman City, CA, is the closest hazardous waste facility to the Project area. The Kettleman Hills Facility (B-18 landfill) has a remaining capacity of 6,000 cubic yards as of 2000 (CalRecycle 2015). Currently, the operator of this landfill is proposing to extend its hazardous waste operations by increasing capacity at the existing B-18 landfill and construct a new hazardous waste landfill (B-20 landfill) once B-18 reaches capacity (Waste Management 2015). DTSC has tentatively approved the plan to expand the B-18 landfill but this decision is in the appeals process. Without expansion, the facility would close very soon from the date of this document (Lorentzen, pers. comm. 2014). With the expansion, the Kettleman Facility would remain open for another 8 years. The Clean Harbors facility (Class 1), located in Buttonwillow, CA may also be used for hazardous waste disposal. Clean Harbors is permitted to receive 10,500 tons per day and expects to remain open until 2040. Because the Ox Mountain landfill has sufficient capacity, and since either the Kettleman Hills or Clean Harbors facilities would have available capacity to receive sediment, if sediment is found to be hazardous, the proposed Project would have a **less than significant** impact on landfill capacity.

g.	Comply with Federal, State, and local statutes and regulations related to solid waste?		X	

As discussed above in Section 3.8, *Hazards and Hazardous Materials*, any excavated sediment would be subject to federal, state and local regulations regarding proper disposal. Potential impacts associated with solid waste would be further minimized through implementation of applicable BMPs (see Chapter 2, *Project Description*):

- BMP-6: Spill Prevention and Control
- BMP-10: Hazardous Materials
- BMP-11: Waste Management
- BMP-13: Maintenance and Parking
- BMP-15: Concrete, Grout & Mortar Application

Adherence to all applicable statues, regulations, and BMPs would ensure that Project activities have a **less than significant** impact.

h. Be sited, oriented, and/or designed to minimize energy consumption, including transportation energy; incorporate water conservation and solid waste reduction measures; and incorporate solar or other alternative energy sources?		X	

The proposed Project would require a relatively small amount of fuel (primarily gas, diesel, and motor oil) for various maintenance activities including vehicle travel, sediment removal within Reach 2, and maintenance of the Reach 3a culverts. Maintenance activities would only be conducted when the channel conditions exceed thresholds that would be monitored annually, as described in Chapter 2. Maintenance activities would be scheduled together to reduce the number of work trips and energy consumption. Given the relatively small construction crew that would be needed to conduct the proposed maintenance activities (approximately five construction workers), the amount of fuel consumed for worker commute trips would be minimal. In addition, staging areas would be located adjacent to the work areas, which would reduce the length of vehicle trips to and from the work area. Fuel for construction worker commute trips would be minimal when compared to the fuel used by construction equipment and for hauling. This impact would be **less than significant**.

i. Generate any demands that will cause a public facility or utility to reach or exceed its capacity?			X

The proposed Project does not involve construction or maintenance of any facility that relies on public utilities. There would be **no impact** on public facilities.

3.18 MANDATORY FINDINGS OF SIGNIFICANCE.			
	Less than Significant with Mitigation	**Less Than Significant Impact**	**No Impact**
a. Does the project have the potential to degrade the quality of the environment, significantly reduce the habitat of a fish or wildlife species, cause a fish or wildlife population to drop below self-sustaining levels, threaten to eliminate a plant or animal community, reduce the number or restrict the range of a rare or endangered plant or animal, or eliminate important examples of the major periods of California history or prehistory?	X		
As discussed throughout this Initial Study checklist, significant but mitigable impacts were identified for biological resources, cultural resources, noise and vibration, and transportation/traffic. With implementation of BMPs and mitigation measures identified in this IS/MND (see Mitigation Measures BIO-1a, BIO-1b, CUL-1, CUL-2, TRA-1, and NOI-1), the proposed Project would not have the potential to substantially reduce the habitat of fish or wildlife species, cause a fish or wildlife population to drop below self-sustaining levels, threaten to eliminate a plant or animal community, reduce the number or restrict the range of a rare or endangered plant or animal, or eliminate important examples of the major periods of California history or prehistory. With implementation of the above-described mitigation measures, this impact would be **less than significant.**			
b. Does the project have impacts that are individually limited, but cumulatively considerable? ("Cumulatively considerable" means that the incremental effects of a project are considerable when viewed in connection with the effects of past projects, the effects of other current projects, and the effects of probable future projects.)		X	
As defined by the State of California, cumulative impacts reflect "the change in the environment which results from the incremental impact of the project when added to other closely related past, present, and reasonably foreseeable probable future projects. Cumulative impacts can result from individually minor but collectively significant projects taking place over a period of time" (CEQA Guidelines, Section 15355[b]). In the immediate project vicinity, the County has plans to repair and heighten the flood control wall on the right bank of Colma Creek downstream of Utah Avenue in Reach 3b. This flood			

control wall project is in the planning phase; construction would occur after the proposed Project is complete. The County also plans to repair approximately 100-foot-long segments of failing concrete sheet pile walls along the channel at Produce Avenue. These walls would be replaced with concrete, steel, or vinyl sheet piles.

Based on review of the City of South San Francisco's Planning Division website (City of South San Francisco 2016) and CEQANet (OPR 2016), planned office/research and development (R&D) and commercial projects in the general area include:

- 494 Forbes Boulevard (two 4-5 story office/R&D buildings on a 7.48-acre site)
- 249 E. Grand (4 office/R&D buildings and 4-level parking garage on a 15.75-acre site)
- Britannia Modular Lab 3 (demolition of existing building and construction of 2 office/R&D buildings and a subterranean parking garage on an approximately 3-acre site)
- 213-221 East Grand Ave Office/R&D Project (9-story office/R&D building and a multi-level parking garage on a 6.2 acre site)
- BioMed Realty at 475 Eccles Boulevard (Two 4-story office/R&D buildings on a 6.1-acre site)
- Gateway Business Park Master Plan at 800-1000 Gateway Boulevard (4 parcels totaling 22.6 acres)
- 850-900 Gateway Precise Plan (demolition of two existing buildings and construction of two office/R&D buildings)
- Genentech Building 31 at 1511 Grandview
- Britannia Cove at Oyster Point (7 office/R&D buildings, hotel, retail space, and parking garage)
- Terrabay Specific Plan Phase II/III (2 office towers, commercial, performing arts center, and child care center)
- Costco Business Center at 900 Dubuque Avenue (re-use of existing commercial building as a new Costco Business Center)
- Marriott Fairfield Inn & Suites at 127 West Harris (5-story hotel)
- Centennial Village at 180 El Camino Real (demolition of existing shopping center; construction of a new shopping center with 285 apartment units on 14.5-acre site)
- Park SFO Expansion at 195 No. Access Road (parking garage expansion for airport parking facility)

Residential and mixed use projects planned in the City of South San Francisco include:

- Brookwood at 488 Linden Avenue (5-story, 38 residential units with mechanical parking stackers)
- Brookwood at 255 Cypress Avenue (5-story, 46 residential units with mechanical parking stackers)
- Pinefino at 211 Airport Boulevard (7-story, 83 residential units with 2-story parking garage)
- The Rotary Miller Avenue Senior Housing Community at 300 Block of Miller (91-senior residential units)

- Ford Avenue Property Development (7-story, two residential buildings with 260 units at Airport Road/Miller Avenue)
- Wynd Fair Complex at 840 Linden Avenue (3-story, 5 residential units with a parking garage)
- Mission & McLellan at 1309 Mission Road (20 condo units with commercial space)
- City Ventures at 1256 Mission Road (36 residential units with a mix of townhomes and single dwellings)

In addition, the City of South San Francisco's Public Works Department plans to construct two light signal improvement projects: one at Mission Street/Evergreen (near Reach 1) and another at Grand Avenue/Magnolia Avenue (north of Reach 2). Both of these projects will be complete by May 2016. The City of South San Francisco also plans to conduct safety improvements at the B Street and Orange Avenue intersection, which will be completed by April 2016 (Bautista, pers. comm., 2016). These traffic safety projects would be completed prior to construction of the proposed Project.

Many of the development projects listed above are currently in the planning or environmental review phases. Of the above-listed development projects, the following are under construction: 249 E. Grand Avenue Project, hotel at Britannia Cove at Oyster Point, and the City Ventures project. Other projects that are in the construction plan review phase and, therefore, may be constructed in the near future include: the Genentech Building 31 project, Terrabay Specific Plan Phase II/III (north commercial tower), Marriott Fairfield Inn & Suites, Centennial Village, Pinefino project, and Mission & McLellan project.

Based on the above discussion, construction of the proposed Project would likely overlap in duration with some of these development projects. Construction of these projects in addition to the proposed Project could result in cumulative impacts related to air pollutant emissions, GHG emissions, and traffic delays on local roadways. However, given that the construction duration of the proposed Project would be short (approximately 20 work days total) and would generate a maximum of 17 daily truck trips, the proposed Project's contribution would not be cumulatively considerable (**less than significant**).

c.	Does the project have environmental effects which will cause significant adverse effects on human beings, either directly or indirectly?	X		

Based on the analysis provided in the above resource sections, with incorporation of BMPs (listed in Table 3), the proposed Project would result in less-than-significant impacts for the following resource topics: air quality, geology and soils, hydrology and water quality, and hazards and hazardous materials. Mitigation measures pertaining to noise, transportation/traffic, cultural resources, and biological resources would reduce Project-related impacts to a less-than-significant level. As such, implementation of BMPs and mitigation measures would ensure that the effects on human beings would be **less than significant**.

Chapter 4
ENVIRONMENTAL FACTORS POTENTIALLY AFFECTED

The environmental factors checked below would potentially be affected by this Project, as indicated by the checklist on the preceding pages.

	Aesthetics		Agricultural and Forestry Resources		Air Quality
X	Biological Resources	X	Cultural Resources		Geology / Soils
	Greenhouse Gas Emissions		Hazards and Hazardous Materials		Hydrology / Water Quality
	Land Use / Planning		Mineral Resources	X	Noise
	Population / Housing		Public Services		Recreation
X	Transportation/Traffic		Utilities / Service Systems	X	Mandatory Findings of Significance

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Chapter 5
DETERMINATION

The conclusions and recommendations contained herein are professional opinions derived in accordance with current standards of professional practice. These conclusions are based on the evaluation of the Proposed Project in light of existing site conditions, technical studies and resource evaluations conducted for the Project and in the project area; comparison of the Proposed Project conditions to local and regional plans; other references and information sources as listed in Chapter 7, *References*; interviews; and site visits. For further information, see the environmental background information contained in the permanent file on this project. These background documents are available for public review at the County Department of Public Works office at 555 County Center, 5th Floor, Redwood City, CA 94063.

On the basis of this initial evaluation:

☐ I find that the proposed project COULD NOT have a significant effect on the environment, and a NEGATIVE DECLARATION will be prepared.

☒ I find that although the proposed project could have a significant effect on the environment, there will not be a significant effect in this case because revisions in the project have been made by or agreed to by the project proponent. A MITIGATED NEGATIVE DECLARATION will be prepared.

☐ I find that the proposed project MAY have a significant effect on the environment, and an ENVIRONMENTAL IMPACT REPORT is required.

☐ I find that the proposed project MAY have a "potentially significant impact" or "potentially significant unless mitigated" impact on the environment, but at least one effect 1) has been adequately analyzed in an earlier document pursuant to applicable legal standards, and 2) has been addressed by mitigation measures based on the earlier analysis as described on attached sheets. An ENVIRONMENTAL IMPACT REPORT is required, but it must analyze only the effects that remain to be addressed.

☐ I find that although the proposed project could have a significant effect on the environment, because all potentially significant effects (a) have been analyzed adequately in an earlier EIR or NEGATIVE DECLARATION pursuant to applicable standards, and (b) have been avoided or mitigated pursuant to that earlier EIR or NEGATIVE DECLARATION, including revisions or mitigation measures that are imposed upon the proposed project, nothing further is required.

Mark Chow
Signature

6/7/2016
Date

Name: MARK CHOW
County of San Mateo Public Works Department

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Chapter 6
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Chapter 7
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None.

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None.

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Chapter 4. Environmental Factors Potentially Affected

None.

Chapter 5. Determination

None.

Chapter 6. List of Preparers

None.

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Appendix A
COLMA CREEK FLOOD CONTROL CHANNEL MAINTENANCE – RESOURCE INVESTIGATIONS

Colma Creek Flood Control Channel Maintenance

Resource Investigations

July 3, 2014

COUNTY OF SAN MATEO
FOUNDED 1856

Horizon
WATER and ENVIRONMENT

COUNTY OF **SAN MATEO**
DEPARTMENT OF PUBLIC WORKS

James C. Porter
Director

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July 2, 2014

To: Brenda Blinn, California Department of Fish and Wildlife (CDFW)
Brenda Goeden, San Francisco Bay Conservation and Development Commission (BCDC)
Suzanne DeLeon, California Department of Fish and Wildlife (CDFW)
Shin-Roei Lee, San Fransisco Bay Regional Water Quality Control Board (RWQCB)
Katerina Galacatos, U.S. Army Corps of Engineers (USACE)
Joseph Terry, U.S. Fish and Wildlife Service (USFWS)

Subject: Colma Creek Flood Control Channel Maintenance Project Technical Studies

Dear Regulatory Partners,

The County of San Mateo Department of Public Works (County) maintains the Colma Creek flood control channel in northern San Mateo County to provide conveyance capacity according to design flows for the channel. The accumulation of sediment and debris can reduce channel conveyance capacity and increase the flood risk. The County is coordinating with several regulatory agencies in preparation for submitting permit applications to authorize routine maintenance activities at Colma Creek as part of the Colma Creek Flood Control Channel Maintenance Project (Maintenance Project).

The County's proposed channel maintenance activities for Colma Creek are described in the revised Project Summary dated November 30, 2012 (*Colma Creek Flood Control Channel Maintenance Project, Sections A, B, and C Project Summary*). Maintenance activities are organized according to location along the channel, with three Maintenance Segments as follows:

1. Colma Creek mouth upstream to Produce Avenue – this is a tidal reach with endangered species.
2. Produce Avenue to the channel dissipater teeth (upstream of Spruce Avenue) – this is a tidal reach without endangered species.
3. Dissipater teeth (upstream of Spruce Avenue) to A Street/El Camino Real – non tidal reach, upper extent of channel enters into Mission Road box culvert.

Routine maintenance activities at the Colma Creek flood control channel include:

- Removing obstructions around structures and facilities, including fallen trees, branches, debris, trash, and shopping carts;
- Installing and maintaining trash capture devices;

- Removing sediment and vegetation in channel beds;
- Vegetation control on stream banks;
- Bank and culvert repairs; and
- Removing invasive vegetation.

On September 8, 2010, representatives from the U.S. Army Corps of Engineers (USACE), San Francisco Bay Regional Water Quality Control Board (RWQCB), and U.S. Fish and Wildlife Service (USFWS) met with the County to review the Maintenance Project and discuss its permitting process. During that meeting, several questions were raised by regulatory agency staff including, what might the potential impacts of sediment removal at Colma Creek be, what are the existing habitat conditions at the creek and nearby tidal marsh, and what is the appropriate CEQA compliance for the routine maintenance activities? The meeting notes from the September 2010 regulatory meeting are provided as Attachment Cvr-Ltr-1.

The County and its consultant Horizon Water and Environment (Horizon) undertook a series of technical investigations to address the key questions from the September 2010 meeting. Enclosed for your review is a sequence of memoranda which address the fundamental questions raised at the September 2010 meeting. The memoranda enclosed for your review address the following topics:

- **Memorandum 1 – Literature Review of Sediment Removal and Tidal Wetlands:** This memorandum addresses a request at the September 2010 meeting to review published studies that investigate sediment conditions at San Francisco Bay and, if available, review studies that address the topic of how sediment removal may affect marsh and wetland habitat.

- **Memorandum 2 – Sediment Processes:** This memorandum addresses a request at the September 2010 meeting to describe the baseline sedimentary processes occurring at Colma Creek.

- **Memorandum 3 – Sediment Monitoring at Colma Creek Wetlands:** This memorandum describes the methods that can be used to monitor the wetlands response to sediment removal at Colma Creek, and provides preliminary monitoring recommendations.

- **Memorandum 4 – Sediment Reuse and Disposal:** This memorandum describes sediment reuse or disposal options for the Colma Creek flood control channel and describes the process for selection and approval of the sediment disposal or reuse action.

- **Memorandum 5 – Sediment Testing Approach:** This memorandum provides an overview of sediment testing and evaluation requirements for Colma Creek sediment removal activities and proposes an approach to fulfill these requirements.

- **Memorandum 6 – Tidal Wetland and Habitat Mapping:** During the September 2010 meeting, regulatory agency staff raised concerns regarding how periodic sediment removal could potentially impact tidal wetlands in Colma Creek, some of which may provide habitat for the California Clapper Rail (CCR) (*Rallus longirostris obsoletus*) and salt marsh harvest mouse (SMHM) (*Reithrodontomys raviventris*). Memorandum 6 documents the current extent and distribution of tidal wetlands and CCR and SMHM habitat (collectively referred to as "endangered species") in the Colma Creek project area. The baseline provided by Memorandum 6 can be used as a basis to evaluate conditions and measure changes following the onset of maintenance activities.

- **Memorandum 7 – CEQA Approach:** This memorandum summarizes potentially appropriate CEQA compliance approaches for the maintenance program at Colma Creek.

On March 5, 2014, the County, its consultant Horizon, and representatives from several regulatory agencies met to discuss maintenance and permitting needs at Colma Creek. At the March 2014 meeting, the County and Horizon provided a presentation summarizing some of the key findings from the technical studies conducted at Colma Creek, which are summarized in the memoranda included with this submittal. The meeting notes from the March 5, 2014 meeting are attached as Attachment Cvr-Ltr-2.

At this time, the County is submitting these memoranda for regulatory agency review and comment. We anticipate that the County will be submitting permit applications to conduct routine maintenance activities at Colma Creek later this year.

The County of San Mateo thanks you very much for your participation in this process and for providing guidance and recommendations. Working together, we believe we can achieve the dual goals of providing adequate flood protection for areas along Colma Creek while also enhancing and improving water quality conditions and natural resources at the creek and river mouth marsh area.

Very truly yours,

Mark Chow

Mark Chow, P.E.
Principal Civil Engineer
Utilities-Flood Control-Watershed Protection

MC:CF
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Attachments: Cvr-Ltr-1: Meeting notes from September 8, 2010 Colma Creek regulatory meeting
Cvr-Ltr-2: Meeting notes from March 5, 2014 Colma Creek regulatory meeting

Enclosures: Memorandum 1 through 7 addressing resource conditions at Colma Creek flood control channel

cc: Carole Foster, Watershed Protection Specialist, Utilities-Flood Control-Watershed Protection
Ken Schwarz – Horizon Water and Environment

Attachment Cvr-Ltr-1

Colma Creek Longterm Maintenance Regional General Permit Meeting with Regulatory Agencies

Location: US Army Corps of Engineers office - 1455 Market Street, San Francisco

Time and Date: 10:30am, September 8, 2010

Attendees: Mark Chow- County of San Mateo Department of Public Works (County), Carole Foster-County, Julie Casagrande- County, Katherine Hart- Regional Water Quality Control Board (RWQCB), Joseph Terry- US Fish and Wildlife Service (FWS), Ian Liffmann- US Army Corps of Engineers (Corps).

Notes:

The County brought a slide show presentation, which was distributed via a file sharing site.

Joseph expressed concern that the periodic removal of sediment from the Colma Creek system could result in wetland and mudflat loss over time, due to the lack of deposition. This loss could be accelerated by sea level rise. County and Corps will research whether studies have been conducted that monitored this phenomenon in the region, and will look into what types of monitoring may work to analyze this. Benchmarks could be installed to monitor elevation changes (in mudflat, pickleweed, and *Spartina* habitat within the mitigation sites). Threshold and baseline conditions need to be determined.

The issue of feral cat feeding in the vicinity of the mitigation sites was raised, since they can prey on or otherwise disturb clapper rail, which nest in the area. The idea of educational signage was brought up, which the County will look into.

The maintenance program would be broken down into three segments of Colma Creek- tidal with endangered species concerns, tidal without endangered species concerns, and non-tidal without endangered species concerns. The County is already required to maintain 2 feet of sediment in the sections with a concrete floor that are tidal, and would only remove excess sediment in these areas.

It was brought up that the County should contact Greg Martinelli (DFG) in order to discuss the salt marsh harvest mouse (SMHM), since it is a fully protected species for CA. The County noted that the narrow strip configuration of the pickleweed habitat in the Maintenance Plan area is not ideal SMHM habitat. It is unclear if DFG will assume presence or not.

It was discussed that it would be unlikely that any SF garter snakes would be in the area, due to the numerous barriers and the fact that salty or brackish water would eliminate some of the snake's primary food sources (such as California red legged frog and Pacific chorus frog).

Trash removal would be one of the maintenance activities. In all open channel segments, it was proposed to be conducted year round, and in the tidal wetland areas would only be conducted outside of clapper rail breeding season. All trash removal would be conducted during low tides, and the County stated that a biologist would always be on site for these activities. Joseph said he will look into whether or not buffer zones would be needed during upland trash removal during clapper rail breeding season, and recommended that the County ask DFG about this as well. If a 50 ft or greater buffer zone is required, then trash removal activities can not be performed from Feb. 1 to Aug. 31 in any section with the potential for Clapper Rail presence.

Sediment removal would occur on a relatively regular basis (every few years), and as needed if accumulations start to occur around structures. The technique used would be to remove sediment from near the walls or structures, while leaving a strip of it between the removal area and the active channel. Then, after the work is complete, the incoming tide would re-distribute the remaining sediment into the low spots. The County's plan is for any removed sediment to be disposed of in upland areas. Another possibility was discussed and it involves taking the sediment to the lower section of Colma Creek and re-depositing it along the wetland edge to replenish them, or to construct an island with the dredged sediment in order to create nesting habitat for clapper rail. Depositing sediment in SF Bay would require a permit from BCDC. It was brought up that the sediment removal would not occur downstream of the connection with Navigable Slough. Sediment removal in the reach from Utah Avenue to Navigable Slough would be accessed via SF Bay and conducted by boats or floats. Sediment removal in the earthen portions of the Channel is not anticipated, however, the County requests it be included into the permit in case it is needed in the future.

Katie stated that the Board does not have issues with removal of debris like carts and mattresses. Mark stated that larger items would be removed by attaching a chain or rope to the debris and pulling it out of the channel using equipment operated from the upland area (top of bank).

Vegetation removal would not necessarily occur every year, but would happen on an as-needed basis. The main focus would be on hand removal of vegetation from weep holes and expansion joints, but would also include removal of in-channel vegetation on sediment bars if it might otherwise cause capacity issues. Vegetation removal of non-native invasives may be required in the upper reach (concrete portion) along the top of bank. In tidal zones, the vegetation is mostly *Spartina*, and removal or eradication would be conducted by the Invasive *Spartina* Project, therefore vegetation removal conducted by the County would consist solely of upland work. Primary upland non-native vegetation requiring removal include iceplant, pampas grass, and Himalayan blackberry. One of the wildlife concerns with vegetation removal in the concrete portion of the Channel involves disturbing nesting swallows. Project timing outside of the typical bird nesting season (including swallows) will avoid impacts to migratory birds.

The section of Channel improved by BART (along Mission Road) is not yet maintained by the County. The County is anticipating taking over maintenance once BART has completed correction of its punch list items. Vegetation has not been maintained in the Channel since 2002.

Wall repairs would involve the use of grout to fill cracks and concrete to fix failing sections. Protections would be put in place during repairs to ensure that grout and concrete do not impact flow in the creek. Repairs to earthen structures would not necessarily be needed, but some repairs may be needed around outfalls and places that involve old sacked concrete.

For mitigation ideas, Joseph suggested that the County contact Melisa Helton (FWS) and Peggy Olofson (Invasive *Spartina* Project) regarding clapper rail impacts and the island creation by sediment fill alternative. FWS may have a mitigation option available through the Don Edwards San Francisco Bay National Wildlife Refuge.

The BO would potentially be good until a change in the project occurred, or until take exceeded the BO limit. It would depend on how the BO ends up being written. An incidental take statement with number of individuals for the life of the project or 20 years is probably the best approach, and if X amount of mitigation area has been lost, then reinitiate consultation. There is still a potential for clapper rail harassment even if work is conducted outside of the nesting season (e.g. harassment of foraging behavior).

The County was asked to provide acreage estimates for potential clapper rail habitat, and to separate sparse habitat from good habitat, as well as an estimate of how much habitat would be impacted by the Maintenance Plan. They were also asked to conduct surveys to determine the size of the tidal wetlands in order to ensure there isn't significant loss over time.

The question of whether or not the sediment/vegetation removal was actually needed was raised. The County explained that the Colma Creek system is only rated to handle up to a 50-year storm event, and that the sediment/vegetation removal is needed to at least maintain that capacity. Sediment/vegetation removal is also necessary to protect the structural integrity of the Channel and to keep storm drains clear to prevent localized flooding of neighborhoods. Sediment was last removed from the Colma Creek system in 2003.

Research on impacts to saltmarsh related to sediment removal is needed. Ian said that he would look into whether or not the Corps has monitored fluctuations in tidal wetland size in the past, and see if other permits have been issued with special conditions involving a baseline for concern for wetland loss.

The County was asked to provide estimates of the amount of sediment that would be removed on a yearly basis, and in what areas it would be removed (rough approximations). They were also asked to provide estimates of the size of mudflats at low tide. It was not determined at which low tide conditions measurements should be conducted (e.g. lower low tide vs. higher low tide).

Ian said a 5-year permit could be issued and subsequently renewed. County anticipates sediment removal activities will take place 1 time per a 5-year permit term.

Maintenance Plan Monitoring/Reporting options: 1) Report once per year on what activities the County conducted and estimates of what will be conducted the following year or 2) Notify agencies for each activity prior to maintenance. The group preferred option 1.

Two Corps numbers were assigned to the Maintenance Plan – use 303210.

Attachment Cvr-Ltr-2

Colma Creek Longterm Maintenance Permit Meeting with Regulatory Agencies

Location: US Army Corps of Engineers office - 1455 Market Street, San Francisco

Time and Date: 1:00 PM, March 5, 2014

Attendees: Mark Chow- San Mateo County Flood Control District (District), Carole Foster- District, Julie Casagrande- District, Shin-Roei Lee- Regional Water Quality Control Board (RWQCB), Joseph Terry- US Fish and Wildlife Service (USFWS), Ian Liffmann- US Army Corps of Engineers (Corps), Peggy Olofson- Invasive Spartina Project (ISP), Brenda Goeden- Bay Conservation and Development Commission (BCDC), Suzanne DeLeon- California Department of Fish and Wildlife (CDFW), Brenda Blinn- CDFW, Jules Evens- Avocet Research Assoc., Ken Schwarz- Horizon Water and Environment (Horizon).

<u>Notes:</u>

Horizon brought a slide show presentation, which was distributed via a file sharing site.

The maintenance program would be broken down into three segments along Colma Creek- tidal with endangered species concerns, tidal without endangered species concerns, and non-tidal without endangered species concerns. The District is already required to maintain 2 feet of sediment in the section from San Mateo Avenue to Spruce Avenue, and would only remove excess sediment in these areas.

During the previous Colma Creek maintenance permit meeting held in 2010 between regulatory agencies and the District, several questions were asked by the agencies. Horizon was authorized by the District in April 2013 to address those questions by conducting research and studies. Horizon compiled a series of memos on the findings, which will be distributed to all agencies once complete.

Joseph requested that one additional question be addressed regarding the potential for sediment contamination and recommended conducting additional testing prior to reuse.

Questions and answers are detailed below:

1) What is the acreage for potential California Clapper Rail (CLRA) and Salt Marsh Harvest Mouse (SMHM) habitat?

California clapper rail (CLRA) survey results from 2005-2013 were presented; the population in and around Colma Creek decreased from 2005 to 2013 and CLRA have not been observed since 2011. Jules stated that the change in population is a result of the removal of invasive *Spartina* (i.e. CLRA habitat).

Joseph asked how far upstream were CLRA previously observed. Follow-up note: For the most part, Navigable Slough confluence is the upstream-most point in Colma Creek where CLRA have been observed, with the exception of one observation made approximately 300-ft upstream of Navigable Slough in 2004. ISP is currently conducting CLRA surveys in Colma Creek.

Jules and Peggy spoke on CLRA habitat in the vicinity of Colma Creek; Invasive *Spartina* treatment began in 2006 and was conducted in phases at Colma Creek. Jules first observed CLRA at Colma Creek in the 90's and the population grew dramatically at that point, likely due to the increasing Invasive *Spartina* infestation. He mentioned that Colma Creek may be an ecological trap as it is not clear how successful CLRA are in terms of reproduction in Colma Creek. Colma Creek is one of three sites in the Bay that were identified by USFWS where it was recognized that once invasive *Spartina* was removed, there was no native plant that could recolonize the mudflats that would provide habitat for CLRA. It was recognized early on that CLRA would be gone from Colma Creek once the *Spartina* was gone.

Invasive *Spartina* dominated mudflats and channels in Colma Creek, Navigable Slough, San Bruno Channel, and SamTrans Peninsula. There were 40+ CLRA in Colma Creek area before invasive S*partina* removal (reported by Joseph). This is a high number of rails compared to acreage due to the dense occurrence of invasive *Spartina*. There were no indications that CLRA were nesting at Colma Creek. Invasive *Spartina alterniflora* (and hybrids) occur in lower elevation mudflats. *S. foliosa* (native *Spartina*) generally occupy higher elevation mudflats. Mudflats around Colma Creek are generally too low to support native *Spartina*, except around the fringe of the pickleweed marsh. If sediment accumulation due to invasive *Spartina* colonization continues, and if it is not a flood issue, *S. foliosa* could be established in certain areas in Colma Creek or San Bruno Marsh.

Feral cat feeding stations continue to occur along Colma Creek, including on the SamTrans Peninsula.

Salt marsh harvest mouse (SMHM) is State and Federally endangered and is a fully protected species for California. Ken showed a map from the species memo of potential SMHM habitat. Habitat is shown as high to low quality, but these designations are relative to the site and not to other marshes. If compared to other marshes, habitat would be considered low due to the narrow strip configuration of the pickleweed habitat in the Maintenance Plan area. Joseph said for recent consultations that USFWS has done in this area, USFWS has assumed SMHM are absent. Therefore, USFWS may possibly consider them absent from the Colma Creek area. No SMHM trapping has been done in the Colma Creek vicinity.

Horizon conducted wetland and habitat mapping for the maintenance program area. Results will be available in the finalized memos.

2) Is sediment/vegetation removal actually needed? What amount of sediment would be removed on a yearly basis and where would it be removed?

The channel is currently rated for a 50 year event. The portion of the channel that was realigned by BART was built to a 200-year rating.

Horizon conducted a sediment accumulation assessment of the Colma Creek channel to determine cross-sections and sediment volume. Sediment was found to accumulate in wedges in point bars on the inside bends of the channel. Maps of the sediment accumulation study will be available in the finalized memos. This does not pose an imminent reduction to conveyance capacity. Mark mentioned that the problem with sediment accumulation in these areas is the potential for storm drain outfalls to be blocked and rendered non-functional. For example, the pipe outlet just upstream of Produce Avenue is currently blocked by sediment build up due to the point bar formation. South San Francisco (SSF) currently pumps water over the wall in order to bypass the pipe. This was meant to be a temporary fix. This area would need to be repeatedly dredged by “localized sediment removal”. Brenda Goeden asked if the pipe outlet at this site was installed too low.

Bathymetric surveys were conducted downstream of South Airport Blvd in 2006 and again in 2013. These surveys were compared to the 1975 as-built design and hydraulic modeling of a 50-year flood event. The channel was likely scoured sometime before the 2006 bathymetric survey and accumulated sediment over the next several years. The channel may now be in an equilibrium state in terms of sediment aggradation and incision since the existing channel is similar to 1975 as-builts.

3) What is the state of research on the impacts to saltmarsh due to sediment removal?

Horizon conducted a literature review and developed a reference study memo. Sediment removal and salt marsh accretion: The magnitude of sediment removal is relative to the sediment load. Is particle size appropriate for wetlands? Does sediment end up in San Bruno Marsh? Ken showed conference poster which shows grain size correlation. Horizon brought the article “Sediment transport in the SF Bay Coastal System”, which was distributed via a file sharing site.

4) Would sediment removal in the flood control channel decrease the sediment supply to wetlands at the mouth of Colma Creek?

How much monitoring needed is based on the amount of sediment removed. Recent studies have only begun to investigate the connection between sediment removal in flood control channels and the sustainability of tidal wetlands. Although a plausible cause-and-effect relationship between sediment removal and wetland degradation is suggested, there is a very high degree of variability in this effect due to local watershed conditions, local on-site physical conditions at the wetland (slope, sediment texture, etc.), and broader regional effects such as the general pool of suspended fine grain sediment available in the Bay.

The County has begun collecting data to inform the development of a sediment management strategy for Colma Creek. Important considerations in the development of the strategy include: (1) the magnitude of sediment removal relative to watershed sediment load, (2) sediment particle size, and (3) location in the channel. Key factors to consider in tidal wetland response include: (1) recent trends in erosion or deposition, (2) local circulation patterns, and (3) resilience to changes in sediment concentrations.

Based on these considerations the County is developing a monitoring and adaptive management plan to help guide its sediment maintenance strategy. Collection of baseline data in the Colma Creek/San Bruno Marsh Complex is already underway. This baseline data collection includes surveying channel bathymetry, mapping of wetland habitats, and quantifying sediment deposition rates. The County will also evaluate the sediment textures and patterns in the tidal wetlands and compare those textures to the sediment deposited in the Colma Creek flood control channel. This comparison will help evaluate how dependent the tidal wetlands are to the locally supplied sediment from Colma Creek. The County will be able to compare these data with post-project measurements to quantify changes in sediment deposition and habitat distribution, if any.

Sediment movement could be very well connected or it may not be. Horizon determined there is no urgent need to remove sediment. This presents a good opportunity to continue to collect information.

5) Identify monitoring practices for sediment removal.

Potential monitoring approaches: continue to conduct mudflat mapping, sediment accumulation assessments, bathymetric surveys. Additional question should be asked regarding sea level rise and what will be the effects on the channel. Better to install plates to monitor yearly. Bathymetric survey maybe beneficial after big events (flood, earthquake, fire, etc.).

Current Maintenance and Permitting Needs:

- Reach 2- Localized sediment removal (~200-300 Cubic Yards annually); Broader sediment removal (maybe 2020-2025)
- Reach 3- Localized sediment removal (~100-200 CY every few years); Continue to survey and monitor need for wider dredging.
- Potential reuse of sediment for clapper rail habitat enhancement and sea level rise resilience. Can sediment be reused locally. Joseph recommended that if a small amount of sediment is to be removed, it may be more be beneficial to transport the sediment to other projects.

General comments:

Shin-Roei: Monitoring of channel cross-sections should look for reasons for changes in sediment accumulation; could be due to constrictions such as bridges– Need to address true causes of sediment deposition in some areas.

Brenda Goeden: Is District on board with continuing current level of monitoring? Mark replied that District is interested in determining what kind of sediment dredging is needed to maintain flood capacity in the channel. Brenda commented that it is refreshing to see the County looked at the level of need for dredging and conducted monitoring.

Mark: Instead of sediment removal, District may be more interested in sediment redistribution within the channel. i.e. Dredge on the side and move sediment to the middle.

Jules: San Francisco common yellowthroat and Alameda song sparrow are other sensitive species with the potential to benefit from increase in habitat in upper areas.

Joseph: How much sediment would be needed for marsh mounds? Peggy suggested that islands could be built at the creek mouth or on the east side of SamTrans Peninsula, though SamTrans area would not provide buffer from predators (feral cats). There are different ways to build mounds/berms. Sediment tends to stay in place once deposited.

Peggy: Presented opportunities for "big picture" habitat enhancement. SamTrans parking area could be moved to provide habitat. Historic boat docking "fingers" in San Bruno Channel, currently used for parking, could be cut off from mainland and restored to provide habitat islands. Mudflat islands currently exist at mouth of Colma Creek. Could be added to as long as it wouldn't be a flooding issue.

Ken: General picture is that there needs to be maintenance (mostly small, localized maintenance), and although not much sediment would need to be moved at this time, there are opportunities for accumulated sediment to be used beneficially.

Ken: Fine, turbid sediment coming out of large pipes just downstream of S. Airport.

Joseph: Recommended doing as much sediment removal at one time so sediment could be used for large restoration project. Asked why there was a 2 foot sediment accumulation requirement in part of the channel. Jules et. al. answered that it provides mudflat habitat for invertebrates/shorebirds.

Carole: There are several small pipe outfalls downstream of S. Airport Blvd to the mouth which may need to be maintained in the near future. These outfalls are located in salt marsh habitat.

Mark asked could former *Spartina alterniflora* clumps be used to build up marsh habitat. Peggy responded that hydrology may not allow sediment build up at *Spartina alterniflora* clumps. Material is continuing to decay.

Brenda: If CLRA/SMHM habitat was originally low, how will Peggy's ideas for restoration help CLRA, especially if CLRA have not been successfully nesting. Will it still be a population sink? SMHM habitat will still be isolated. Peggy: CLRA habitat at Colma is also isolated, i.e. not much habitat nearby. There could be an opportunity to build up lower elevation marshes to allow native *Spartina* to colonize and provide nesting habitat. There would still be predator problems if restoration area is not isolated from the land. There would need to be major outreach and predator management efforts.

Suzanne: Worried about making a decision to dredge just because of restoration potential. There are a lot of obstacles to successful CLRA restoration. Is there another option for the outfall dredging? Ken responded that sediment could be moved within the channel (spread to center of channel away from outfalls) without providing habitat benefit downstream. This would buy the District time until more major dredging is needed.

Ian: State Lands – State of California has law that prevents conservation easement for lasting more than 66 years. Therefore, under federal regulations, restoration under a conservation easement has to be in perpetuity (San Bruno Marsh is State Lands).

Suzanne: Rails (CLRA and Ca. black rail) are fully protected species and cannot be mitigated for impacts by the State. Need to be careful that we don't say that restoration is mitigation for take of rails for this project. Brenda asked how this project could have take on rails if there are no rails present. Joseph responded that if removing sediment in the upstream channel decreases habitat recovery potential downstream, then that may be considered take.

Brenda: If the District performs dredging and reuses the sediment to enhance the downstream marsh, would the District's purpose, as viewed by USFWS, be enhancing a marsh to reestablish clapper rail, or are they just enhancing a marsh that doesn't have clapper rail? Since there is no current habitat for CLRA.

Peggy: Colma Creek/San Bruno Marsh was never intended by ISP as a site to try to reestablish CLRA habitat since the marsh elevations are too low for native *Spartina* colonization. Colma is not one of the ISP revegetation sites.

Joseph: Because of the overall loss of habitat due to invasive *Spartina* removal efforts, USFWS has an interest in potentially recovering the population to some extent. If there was major dredging by the District that precluded the ability of the marsh to accrete sediment, USFWS would consider that an effect if sediment is not reused downstream.

Shin-Roei: Sediment removal has associated impacts that will require mitigation. Temporary impacts would occur. Sediment serves a value even in a concrete channel such as to filter runoff pollutants. Vegetation removal would require mitigation.

Ken: Dredging to open blocked outfalls provides a water quality benefit in that it prevents water from backing up into storm drains/roads. Two feet of sediment is kept at the base. Those impacts in terms of water quality issues should be self-mitigating.

Joseph: Sediment removal downstream of Utah Avenue would be considered impacting CLRA foraging habitat by the USFWS.

Ken: County would like to move forward in applying for permits for maintenance this year.

Carole: If stream is currently in equilibrium, how long will dredging last/what is the benefit? Is it worth it to dredge as much as possible in order to provide restoration potential? Ken: Unknown, however, if channel will take care of its own sediment, then dredging would not be needed. If higher elevations are determined from ongoing monitoring, then dredging may be necessary at a later date.

Shin-Roei: District should also look into cause for sediment accumulation, if there is a pattern for needing to dredge in one spot continually. Ken: Causes are apparent due to existing infrastructure. Shin-Roei: The RWQCB would likely require that any capital improvement projects should address the causes of the issue. The channel is very wide with no vegetation, which causes sediment to drop out in low velocities. Mark: Channel is only built to 50-year rating, except the portion realigned by BART at Colma/SSF boundary.

Carole: Is there benefit of including areas downstream of 101 for dredging in the District's permits if we may never dredge in that area? Ian: If we address what's needed in maintenance permits, then if dredging is needed, we would not need to enter the permitting process again. We should build in performance criteria for when dredging would be needed and what would be mitigation requirements.

Carole: If we do not dredge during the life of the permit, would we still need to mitigate? Ian: if permits are programmatic and not for a project, then the District would not need to mitigate until it is ready to dredge.

Joseph: Would rather not have to do a programmatic Biological Opinion (BO) if it would need to be amended. He prefers writing BO for “worst case scenario”. Beneficial reuse of sediment downstream would likely be considered self-mitigating.

Suzanne: 5 year RMA would be best route for maintenance. District would not need to mitigate unless there are impacts. Pipe outfalls downstream of 101 could be included in RMA. Impacts to vegetation habitat would require mitigation. CDFW would hope the District would have an idea up front as to what maintenance activities will be conducted in the following year, and would require mitigation at that time.

Shin-Roei: RWQCB would issue a 5 year Waste Discharge Requirement and would need to pre-approve BMPs and Avoidance and Minimization measures. If there are unavoidable impacts, then they would require mitigation. Permit would require annual reporting.

Brenda: Will find out BCDC jurisdiction on Colma Creek. BCDC would issue a 5 year maintenance permit for work in their jurisdiction. There are BCDC policies that prevent marsh fill. However, there is a possibility for BCDC to permit marsh fill in small “pilot” areas in Colma Creek. BCDC would probably not require mitigation for maintenance activities, but would support other Agency required mitigation.

Shin-Roei and Brenda: RWQCB and BCDC (Brenda) can be contacted for standards/methods on testing sediment quality for various uses.

Carole: When would need to do the testing? Brenda: agencies would want to know the general quality of the sediment proposed for reuse before permits are issued.

Joseph: If District has committed to reusing sediment for marsh habitat enhancement and the sediment is found to be contaminated, then alternate sediment would need to be found in order to complete mitigation requirements. Alternative mitigation plans could be included in the BO.

Mark asked if debris such as shopping carts and mattresses could be removed prior to permit approval. All of the agencies present agreed that minor debris removal could be conducted without permits.

Trash boom:

Ian: If in a tidal area, it would be Corps jurisdictional. May have Nationwide Permit that would cover that activity.

Suzanne: It would be subject to CDFW permitting requirements. If fish are present (may require fish studies), then boom would need to be passable.

Joseph: If no clapper rail issues, then would not need to involve USFWS.

Shin-Roei: Cannot determine at this time, but may require RWQCB permit. They have permitted other agencies for trash capture device installation/maintenance (not trash booms).

Memorandum 1

Literature Review of Sediment Removal and Tidal Wetlands

Colma Creek Flood Control Channel Maintenance Project

Memorandum 1

July 1, 2014

Subject: **Literature Review of Sediment Removal and Tidal Wetlands**

1. Purpose

The purpose of this memorandum is to review studies that address, or relate to, a fundamental question at Colma Creek, namely: how might periodic sediment removal from flood control channels or at other San Francisco Bay locations affect Bay intertidal habitats.

Unfortunately, research into this topic is only in its infancy (See Gluchowski et al., 2012 in Attachment 1-1). In the absence of definitive studies that address this issue, this memorandum focuses on the general subject matter of sediment circulation in the Bay, and sediment supply and deposition processes in the Bay. These studies provide a basis to evaluate how maintenance activities at Colma Creek may affect nearby intertidal habitats.

This memorandum proceeds with the following sections:

2. General overview of tidal wetland processes,
3. Review of historic changes in sediment supply to the S.F. Bay,
4. Tidal wetland extent and trends in S.F. Bay,
5. Impact of sediment removal on tidal wetlands,
6. Consideration of sea level rise and other potential future impacts to tidal wetlands in the Bay,
7. Conclusions and next steps including recommendations for monitoring studies to guide future channel maintenance activities, and
8. References.

2. Overview of Tidal Wetlands Processes

"Tidal wetlands" occupy the edges of an estuary and are periodically inundated by tides. Tidal wetland habitats are generally differentiated by elevation between the lowest and highest tides. These habitats include intertidal mudflats, tidal channels, regularly inundated tidal marsh plains, and infrequently inundated upland transition zones at the edge of the wetland (Philip Williams & Associates and Phyllis M. Faber, 2004). Tidal wetland habitats support a diverse range of flora and fauna. They also provide beneficial ecosystem services such as filtering pollutants, providing habitat for estuarine fish, reducing the size of storm surges, and serving as an organic carbon sink (Mudd, 2011).

Tidal wetlands are depositional environments, characterized by fine sediment substrates, emergent vegetation, and dendritic channel networks (Ganju et al. 2005). They are dynamic environments and tend to occupy a relatively narrow elevation band. The morphology of tidal wetlands depends on a variety of factors including upstream sediment supplies, tidal action, the intertidal plant community, and biological dynamics (Stralberg et al., 2011).

A complex interplay of inputs and outputs maintains the presence of tidal wetlands including sediment deposition from storms, an accumulation of autochthonous detritus (i.e., derived from within a wetland), river flooding, inundation from tidal creeks, and wind generated high water levels. The fluxes of suspended sediment play a large role in forming and maintaining tidal wetlands. Sediment is carried into a tidal marsh or mudflat and deposited on flood tides, which causes the tidal marsh or mudflat to increase in elevation. Ebb tides carry sediment out when wind-waves cause erosion or inhibit cohesive sediment deposition (Philip Williams & Associates, 2005). Decreased suspended sediment levels, in either contributing riverine or estuarine environments, can halt the accretion needed to sustain tidal wetlands (Ganju et al. 2005). In an estuary, suspended sediment available to a wetland represents a balance between transport energy and sediment supply. The form of the resulting wetland reflects how these processes are either limited, in balance, or dominant. Transport energy and the time available to deliver sediment to the wetland may be abundant or limited. Conversely, the quantity of sediment may be limited (Schoellhamer, 2011).

3. Historic Changes in Sediment Supply

Since the Gold Rush era, the San Francisco Bay estuary has undergone dramatic anthropogenic changes that have irreversibly altered the Bay ecosystem including impacts to tidal marshes, changes in sediment supply, and the introduction of invasive plant and animal species. Approximately 90 percent of the tidal wetlands on the edge of the Bay have been destroyed over the last 160 years (Philip Williams & Associates and Phyllis M. Faber, 2004). Tidal wetlands have been lost through filling, diking and draining (usually for agriculture or livestock grazing), and diking to create salt ponds, managed marshes, or other diked wetlands (Ely and Owens Viani, 2010).

The sediment supply to the Bay has been severely altered since the late 1800s through hydraulic mining and dam construction. Hydraulic mining in the Sierra Nevada during the Gold Rush—in which high pressure jets of water were used to mine gold from placer deposits—washed large amounts of sediment into mountain tributaries, main stem Sierra Nevada rivers, lower Central Valley rivers, and eventually the Bay (Gilbert 1917). Much of this sediment was initially stored in terraces, floodplains, instream bars, and other depositional landforms. However, ultimately the pulse of sediment from hydraulic mining was deposited in the downstream baylands, primarily in the Carquinez Strait, Suisun, San Pablo, and Central bays (Schoellhamer, 2011). According to Nichols et al. (1986), sediment from hydraulic mining contributed to a permanent reduction in open-water areas of the Bay.

During the mid-1900s, numerous large dams were constructed on major Central Valley tributaries, resulting in sediment trapping and reduced sediment supply to the Bay. In addition, erosion control projects and flood control bypasses on the Sacramento River reduced the downstream sediment delivery (Schoellhamer, 2011). Krone (1979) (cited in Mckee et al. 2012) estimated that roughly 80 percent of the sediment load to the Bay comes from the Central Valley (i.e., the Sacramento-San Joaquin River Delta), but hypothesized that this number would decline due to increased water development and demand. By the end of the 1900s, the sediment supply from the Central Valley to the Bay was approximately equal to that delivered from local Bay tributaries (Schoellhamer et al., 2005, cited in Schoellhamer, 2011). Recent estimates by Mckee et al. (2012) suggest that local Bay tributaries are now the dominant source of sediment to the Bay, contributing more than 60 percent of the total sediment load.

By the end of the 20th century, the combination of reduced sediment supply from Sierra Nevada and Central Valley sources and the depletion of sediment from hydraulic mining began to reduce the amount of erodible sediment in the Bay (Schollhamer, 2011). Using U.S. Geological Survey data of suspended sediment concentration (SCC) from 1991 to 2007, Schoellhamer (2011) found that the SCC decreased by a statistically significant 36% beginning in 1999. The "sudden clearing" was hypothesized to be caused by the depletion of the erodible pool of sediment (Schoellhamer, 2011).

4. Tidal Wetland Extents and Trends in S.F. Bay

Wind wave erosion, tidal current redistribution of sediment, changes in sediment supply, and sea level rise have altered the intertidal flat system in the South Bay. The U.S. Geological Survey measured the impact of changes in watershed sediment supply on erosion and sedimentation patterns in the Bay as a whole, and in the South Bay in particular (Jaffe and Foxgrover, 2006a, 2006b; Foxgrover et al., 2004).

Figure 1 shows maps of how the South Bay intertidal flat area, bathymetry and tidal wetlands have changed from 1858 to 2005. The intertidal flat area has decreased by about 25 percent from 1858 to 2005 from approximately 60 to 51 km^2. The rate of intertidal loss remained fairly constant from 1858 to 1956, and then increased from 1956 to 1983 mainly due to subtidal dredging for bayland fill projects and cement production. From 1985 to 2005, the tidal wetland area increased slightly, from deposition in the main channel and shallow subtidal regions. Similar to the case of intertidal flat areas, tidal marsh areas (wetlands) decreased dramatically in the South Bay from 1858 to 2005. The bathymetry of the South Bay has generally remained stable in the same time period, with a deeper central channel, up to approximately 20 meters depth, and shallower shoals and mudflats outside the channel, up to about 5 meters depth (Jaffe and Foxgrover, 2006b).

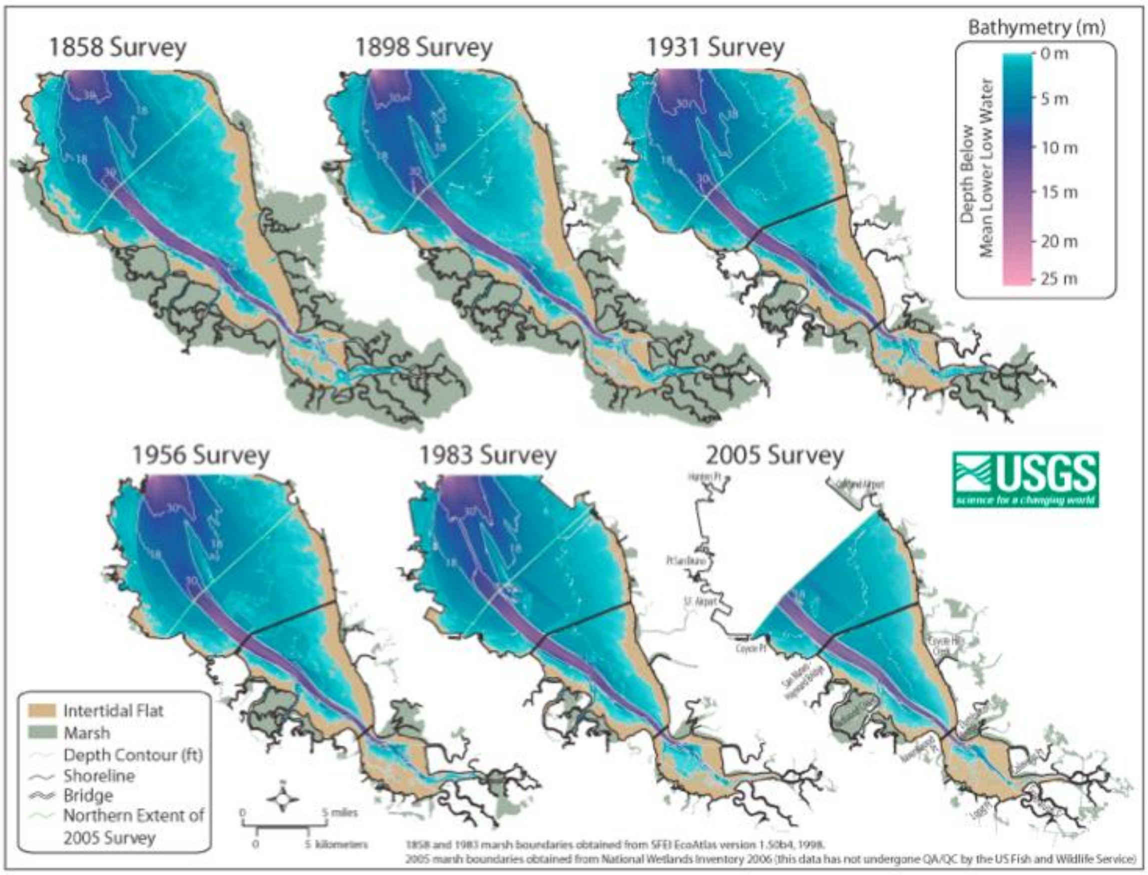

Figure 1: Maps of the Intertidal Flat Area, Bathymetry and Tidal Marsh in the South Bay, 1858 to 2005 (After Jaffe and Foxgrover, 2006b)

Recent sediment budgets for the Bay suggest that the South Bay as a whole is slightly net erosional, and contributes sediment to the Central Bay (Philip Williams & Associates, 2005). However, erosion and sedimentation patterns vary within the South Bay. The intertidal flats along the east shore of the South Bay tend to be more erosional, while those along the west shore—including those at the mouth of Colma Creek—have remained stable (Jaffe and Foxgrover, 2006b). The far South Bay, south of Dumbarton Bridge has remained largely depositional (Philip Williams & Associates, 2005).

The South Bay Salt Ponds Restoration Project, which began in 2008, is the largest tidal wetland restoration project on the West Coast. The project will restore about 15,100 acres of industrial salt ponds to tidal wetland and other habitats (SBSPRP, 2007). Prior to the initial construction of the project, a key question that was raised was whether the conversion of salt ponds to tidal wetlands would result in the loss of intertidal flats. If the balance of deposition and erosion is shifted to more erosion through the creation of sediment sinks in the subsided ponds that are opened to tidal exchange, then the loss of sediment could affect tidal marshes elsewhere in the South Bay (Jaffe and Foxgrover, 2006b). Ongoing measurements by the USGS of the suspended sediment flux past the Dumbarton Narrows are being used to assess the possible effects of the implementation of the project on sediment transport. Measurements from November 2008 to October 2009 indicated a net sediment transport into the South Bay from the Central Bay (Shellenbarger et al., 2011). The preliminary data has indicated that there is sufficient sediment to support tidal wetland development for the life of the project (SBSPRP, 2012).

Sediment deposition rates and patterns can also be influenced by vegetation type and cover. The introduction of non-native, invasive *Spartina* (cordgrass) in the Bay has been responsible for the conversion of many mudflats and tidal channels to low marsh habitat. The Colma Creek/San Bruno Marsh complex was aggressively colonized by hybrid *Spartina alterniflora* and became dominated by this plant. This colonization converted mudflats to low marsh (ISP 2008), which increases trapping efficiency of suspended sediment. In 2006, the Invasive Spartina Project (ISP) began spraying herbicide (imazapyr) in the Colma Creek/San Bruno Marsh complex (ISP site 18) in an effort to eradicate invasive *Spartina,* which covered approximately 60 acres in the Colma Creek/San Bruno Marsh complex (ISP 2008). Field surveys, aerial imagery, and ISP monitoring reports (ISP 2012) indicate that the cover of *Spartina* spp. in the Colma Creek/San Bruno Marsh complex has been drastically reduced. This reduction in vegetation cover makes mudflats, low marsh and tidal channels more susceptible to wind-wave erosion and reduces the sediment trapping efficiency in intertidal areas.

5. Impacts of Sediment Removal on Tidal Wetlands

As described in the previous section, recent research conducted by Mckee et al. (2012), building on early work by Schoellhamer et al. (2005), demonstrates the increasing importance of local Bay tributaries in supplying sediment to the Bay. These findings have recently led researchers (and regulators) to ask whether periodic sediment removal (i.e., “dredging” or “desilting”) of flood control channels will further reduce the sediment delivery needed to build and sustain tidal wetlands. To begin answering this question, researchers have recently characterized sediments in East Bay flood control channels (See Gluchowski et al., 2012, Attachment 1-1) to better understand the role local watershed sediments play in sustaining the Bay’s tidal wetlands.

Even with data on sediment characteristics in flood control channels now being collected, answering the question of whether local sediment removal will cause erosion or loss of nearby tidal wetlands remains complex. One needs to understand the relative contribution that watershed (fluvial sediment) and estuarine sediments play, individually and collectively, in sustaining the tidal wetlands. The answer to this question is likely to be highly variable throughout the Bay because it will depend on watershed parameters (e.g., size, topography, land use, and geology), channel conditions (e.g., morphology, discharge), and tidal wetland characteristics (e.g., hydrodynamics, location relative to sediment sources, ecological factors).

Moreover, the relative importance of fluvial and estuarine sediments in sustaining the tidal wetlands is likely to vary depending on spatial scale. For example, it may be that wetlands in the upper tidal reaches of the Colma Creek channel are more directly influenced by fluvial sediments delivered directly from the Colma Creek watershed. Whereas, sedimentation processes further bayward in the San Bruno Marsh may be dominated by more regional estuarine sources (or at least sediment derived from outside of the local watershed). Understanding the sediment textural patterns at Colma Creek and its nearby tidal wetlands will help determine the relative role of the fluvial-delivered local watershed sediment in supporting the tidal wetlands. If the tidal wetlands are comprised primarily of finer grained sediments delivered from the general Bay circulation of suspended sediment, then the relative role of Colma Creek may not be as important as a sediment supply. However, if the sediment texture and type in the tidal wetlands is coarser with more sand, then that is more directly dependent on delivery from the local watershed.

Even with good data and robust modeling or simulation of the creek and tidal system, there would still be a high degree of uncertainty in determining the importance of sediment sources for sustaining individual wetlands. Thus, in most instances it is practical to consider the physical attributes of the sediment removal project and the local tidal wetlands within the specific site context. Understanding this setting will help assess if a sediment removal project is potentially impacting to nearby wetlands. Important considerations for the sediment removal project should include:

1) What is the magnitude of sediment removal relative to watershed sediment load,
2) What are the sediment particle sizes to be removed, and
3) Where is sediment to be removed in the channel?

Key factors to consider for potentially affected wetlands should include:

1) What are the recent trends in erosion or deposition at the wetland,
2) What are local circulation patterns, and
3) What is the resilience of the wetland to changes in sediment concentrations?

These factors are being considered during the County’s development of a sediment maintenance strategy for Colma Creek. Memorandum 2 *Sediment Processes* of this series of technical memoranda submitted to regulatory agencies, provides specific information on sedimentation patterns and rates at the Colma Creek flood control channel.

Finally, it is worth noting that from a Bay-wide perspective, any sediment removed from a channel can no longer contribute to the erodible pool of sediment that builds and sustains tidal wetlands. This is particularly true for fine texture (silt and clay) sediments. Thus, the best case scenario (from a wetlands sustainability perspective) would be to take sediment that is removed from flood prone areas (of flood control channels) and place it in tidal wetlands or in locations where it can later be resuspended. This beneficial reuse of sediment is often considered a win-win scenario in channel maintenance projects, and the County may consider pursuing this course of action provided that it is cost-effective and the sediment is suitable for reuse in wetland creation.

6. Sea Level Rise, Long-term Environmental Changes, and Tidal Wetland Adaptation

Sea-level rise (SLR) caused by global climate change can exacerbate beach and shoreline erosion, threaten critical infrastructure, and inundate coastal and estuarine wetlands. Projections of SLR through the end of the 21st century range from 18 cm to nearly 2 m, with some studies suggesting that rises of up to 5 m may be possible (Stralberg et al., 2011). By shifting the areas of deeper tidal inundation landward, SLR drives wetland evolution by changing the hydrology, hydrodynamics, and sediment dynamics of the coastal and estuarine environments (Working Group on Sea Level Rise and Wetland Systems, 1997).

In addition to SLR, a host of other long-term changes can affect tidal wetlands within the Bay. **Table 1** shows projected long-term changes likely to affect the Bay with respect to present conditions.

Table 1: Predicted Long-Term Changes to the Bay, 2050 Projections, and Consequences

Environmental Change	2050 Projections	Potential Consequences
Temperature rise	+2.5 (1.5 – 4.5)°C	Changes in phenology and biogeography of estuarine and marine species Causes species introductions and local extinctions Reduces survival, reproduction, and growth of eelgrass and native oysters
Total precipitation	~0 (+/-25) cm/y	Uncertain prediction – but potentially more or less freshwater discharge entering Bay, with resulting changes in salinity either higher or lower
Timing of runoff	20 (5-25) days earlier	Uncertain prediction – but potentially more erratic winter precipitation pattern, with earlier precipitation, extended dry periods, etc. – with

Environmental Change	2050 Projections	Potential Consequences
		resulting effects on salinity
Sea level rise	+7 to 22 cm	Existing wetlands to be inundated under higher mean sea levels Landward shift of wetland systems where space/gradient allows, some wetlands to be lost where landward shift is not possible (see Figure 2) Habitat will be in deeper water, less suitable for some species because of turbidity Higher tide and tidal range may increase erosion and alter shorelines, mudflats, and marsh boundaries Increase in tidal range may increase intertidal area; depends on sediment characteristics and sediment supply rate Increase salt penetration due to enhanced estuarine circulation Increase in tidal range and depth will increase strength of tidal currents, possibly erosion
Wind speed	Uncertain	With increased wind velocities, potentially increased resuspension of sediment from wetlands and tidal flats exposed to wind driven currents (uncertain outcome/effect)
Storm frequency	Uncertain	Increased erosion with increased storm frequency (less certainty in outcome)
Acidification	+0.14 to 0.35 pH units	Impaired calcification of native oysters, possibly impacts to other species
Additional indirect physical interactions	Uncertain	Higher sea level with stronger currents coinciding with storms (storm surge) amplifies sea level and accelerates erosion Higher erosion and lower sediment supply depletes mudflats and marshes

Environmental Change	2050 Projections	Potential Consequences
		Reduced runoff, increase freshwater storage and demand, and potential levee failures result in higher salinity
Levee failures in Delta	Uncertain – estimated risk of 70% probability to affect 20 Delta islands:	Short term, rapid rise in salinity (if in wet season); long term, chronically higher salinity
Change Delta configuration	Uncertain	Depending on operating criteria, potential increase in salinity
Population growth	Uncertain	Increased demand for all ecosystem services; increased urbanization, impacts from transportation and infrastructure
Water demand	+2 km^3/year	Decreased outflow and increased salinity
Reduction in sediment supply	Uncertain	Continued shortage of sediments to build and maintain marshes, mudflats. Increase in water clarity possibly leading to eutrophication
Introduced species	Uncertain	Impossible to predict; depends on what species and where

Source: Reproduced from Table 1, Kimmerer & Weaver, 2010.

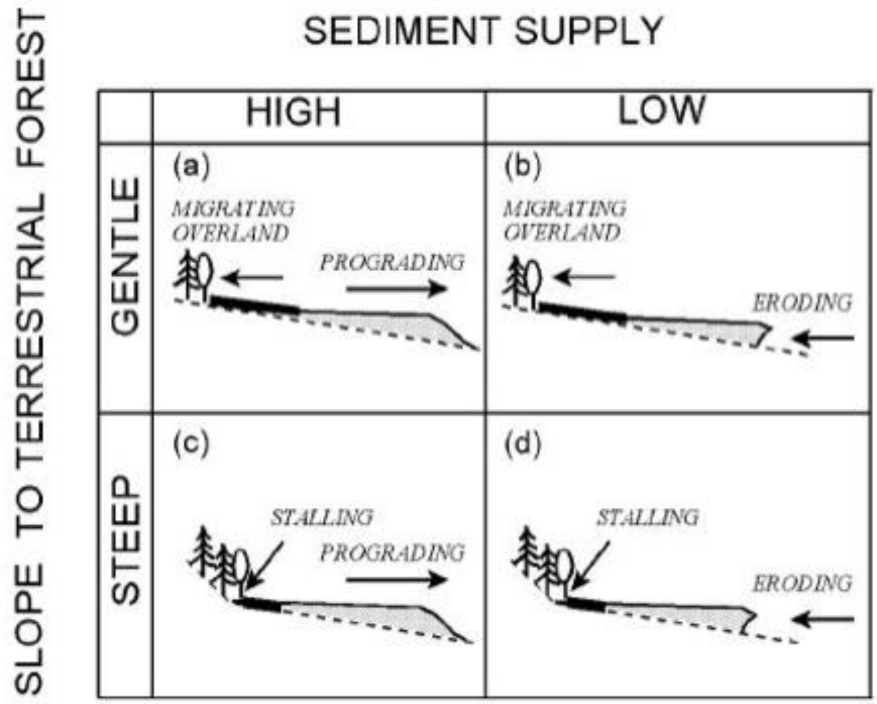

Figure 2: Four Modes of Wetland Response to Rising Sea Level (Source: Working Group, 1997; adapted from Brinson et al., 1995)

Figure 2 shows four modes of wetland response to SLR developed by the Working Group on Sea Level Rise and Wetland Systems (1997) as defined by extremes in landscape slopes and sediment supply. In case (a), with lower slopes and high sediment supply, the higher wetland will encroach on upland areas by migrating overland because of a positive balance of sediment supply. In case (a), the seaward extent of the wetland complex will "prograde". In case (b), low slopes and lower sediment supply leads to erosion of the wetland at its seaward extent because of higher inundation depths and lower sediment supply. In case (c), the expansion of the wetland that occurs in (a) is stalled by steep slopes, but the wetland progrades seaward due to increased sediment supply. In case (d), steep slopes and a low sediment supply cause wetland erosion at the seaward wetland fringe (Working Group 1997).

Though not shown in Figure 2, urban areas requiring protection from higher sea levels will likely require additional infrastructure. The net result for urban areas requiring protection is similar to either cases (c) or (d) in Figure 2. Because of the critical location of San Francisco International Airport, highway U.S 101, a highly used railroad line, and other industrial/commercial activities at the mouth of Colma Creek, it is likely that if higher sea levels occur then landward protection will follow.

Stralberg et al. (2011) developed a model to evaluate tidal wetland sustainability in response to varying rates of SLR. The model separated the Bay into 15 biogeomorphic regions based on sediment and salinity characteristics, and incorporated wetland accretion (the vertical accumulation of sediment and organic material), and evaluated the response to two levels of SLR (0.52 m and 1.65 m rise from 2010 to 2110) and different values of SSC and organic material accretion. Wetlands in areas with low SSC (25 mg/L) were found to not sustain their current elevation for more than 40 years under either SLR rate. Under higher levels of SSC, mid-wetland elevations would be sustainable under a high rate of SLR for longer periods of time (up to 80 years with 300 mg/L SSC), but not for the full time period evaluated. Across all scenarios evaluated, the model projects a shift in intertidal habitats, with loss of high wetland areas, and gains in low wetland and mudflats in the study area. The conclusions of Stralberg et al. (2011) provide a poor prognosis for the long-term sustainability of tidal wetlands in the Bay under SLR. However, opportunities for sustainable tidal wetland restoration even under high SLR may be found, but are limited to areas with high SSC (greater than 200 mg/L). Under low SLR scenario, the potential for long-term wetland sustainability should remain high, depending on future SSC levels (Stralberg et al., 2011).

Maintaining existing tidal wetlands and restoring past tidal wetlands with projected SLR is an ongoing management challenge for the Bay, and requires two conditions: (1) providing sufficient space for tidal wetlands to migrate landward (where possible) and (2) providing sufficient sediment supply to tidal wetlands (where sediment sources are available) (SPUR, 2009). As with most tidal wetlands around the Bay, the Colma Creek/San Bruno Marsh Complex is greatly constrained in its ability to migrate landward due to development in close proximity to the wetland boundary. Thus, for these wetlands to be sustained under projected SLR scenarios they would require increased sediment deposition (either naturally-delivered or artificially supplemented) to keep pace with SLR. Such a situation may be unrealistic depending upon the future depth of tidal inundation. Also, it is important to better understand the existing sediment supply and how that supports the existing wetlands near Colma Creek. It would be unrealistic to hope for an increased sediment supply to support the wetlands near the mouth of Colma Creek if the baseline sediment supply is already low or constrained.

7. Conclusions and Next Steps

In recent decades the dominant source of sediment to the Bay has shifted from the Delta to local watersheds (Mckee et al., 2012). Coincident with this shift, suspended sediment concentrations have declined markedly. This “sudden clearing” of suspended sediment is hypothesized to be caused by the depletion of the erodible pool of sediment in the Bay (Schoellhamer, 2011). These findings, along with large-scale plans for restoration of diked and subsided tidal marshes, have focused attention on the increasing importance of local Bay tributaries in sustaining tidal wetlands in the Bay.

Recent studies have only begun to investigate the connection between sediment removal in flood control channels and the sustainability of tidal wetlands. Although a plausible cause-and-effect relationship between sediment removal and wetland degradation is suggested, there is a very high degree of variability in this effect due to local watershed conditions, local on-site physical conditions at the wetland (slope, sediment texture, etc.), and broader regional effects such as the general pool of suspended fine grain sediment available in the Bay.

The County has begun collecting data to inform the development of a sediment management strategy for Colma Creek. Important considerations in the development of the strategy include: (1) the magnitude of sediment removal relative to watershed sediment load, (2) sediment particle size, and (3) location in the channel. Key factors to consider in tidal wetland response include: (1) recent trends in erosion or deposition, (2) local circulation patterns, and (3) resilience to changes in sediment concentrations.

Based on these considerations, the County is developing a monitoring and adaptive management plan to help guide its sediment maintenance strategy. Collection of baseline data in the Colma Creek/San Bruno Marsh Complex is already underway.

The sequence of memoranda which follow, including Memorandum 2 *Sediment Processes*, Memorandum 3 *Sediment Monitoring at Colma Creek*, Memorandum 4 *Sediment Reuse and Disposal*, and Memorandum 5 *Sediment Testing Approach* - further describe specific sediment conditions at Colma Creek and provide recommendations and approaches that the County will undertake to continue monitoring sediment conditions and collecting baseline information.

As described in the following memoranda, the County will continue to collect baseline data for channel bathymetry, mapping of wetland habitats, and quantifying sediment deposition rates. The County is also evaluating the sediment textures and patterns in the tidal wetlands and comparing those conditions to the sediment deposited in the Colma Creek flood control channel. This comparison will help evaluate how dependent the tidal wetlands are to the locally supplied sediment from Colma Creek. The County will be able to compare these data with post-project measurements to quantify changes in sediment deposition and habitat distribution, if any. Other monitoring parameters to be considered during development of the sediment maintenance strategy include measurements of SSC and/or the use of sedimentation-erosion tables at various locations in the Colma Creek/San Bruno Marsh Complex.

The County is also considering opportunities to beneficially reuse sediment to off-set potential impacts associated with routine sediment removal, while restoring marsh habitat and providing added resiliency for sea level rise.

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Memorandum 2

Sediment Processes

Colma Creek Flood Control Channel Maintenance Project

Memorandum 2

July 1, 2014

Subject: **Sediment Processes**

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1. Purpose

The objectives of this memorandum are to:

1. Describe current sediment deposition conditions along the Colma Creek channel,
2. Estimate the average annual rate of sediment deposition in the channel, and
3. Identify and recommend target annual sediment removal volumes and locations.

These objectives are based on questions that members of the Colma Creek regulatory project team asked the County of San Mateo, Department of Public Works (County) at a project meeting in September 2010 (see Attachment Cvr-Ltr-1) related to sediment processes at Colma Creek. The findings presented in this memorandum are aimed to address those key questions and to support the County with their longer-term flood management and sediment removal planning.

This memorandum proceeds with the following sections:

2. Description of Watershed and Reach Current Conditions
3. Sediment Accumulation Assessment
4. Sediment Accrual Rates
5. Sediment Removal Estimates
6. Sediment Texture Analysis and Management Implications
7. Summary and Next Steps
8. References

2. Description of Watershed & Reach Current Conditions

2.1 Watershed Description

The Colma Creek watershed drains 16.6 square miles (mi^2) of the northern San Francisco Peninsula, including portions of Daly City, Colma, South San Francisco, and San Bruno (Figure 2-1). Approximately 65% of the watershed is developed with impervious or semi-impervious surfaces (Figure 2-2). Undeveloped portions of the watershed include the southwest face of San Bruno Mountain.

The watershed experienced a period of rapid urbanization in the 1960s and early 1970s. This development led to construction of engineered flood control channels to convey watershed discharge. During this period of rapid development, sediment discharge from the Colma Creek watershed was extremely high. In the late 1960s and early 1970s, the U.S Geological Survey (USGS) measured sediment yield from various land use types in the watershed and found that construction areas generated approximately 24,000 cubic yards (CY) of sediment per mi^2 in an average rainfall year, whereas open space and urban sediment yields were 270 and 680 CY/mi^2, respectively (USGS 1973). While the pace of development in the watershed has slowed considerably and Best Management Practices (BMPs) and permit conditions more recently have reduced sediment discharges from construction sites, sediment management continues to be important for maintaining flood control channel capacity.

2.2 Reach Descriptions

The County has delineated three primary reaches in Colma Creek for planning and conducting maintenance (Figure 2-3). These reaches were delineated based on hydrologic conditions (tidal segments versus non-tidal) and presence of potential biological resource constraints (i.e., areas with and without special-status species). For consistency purposes, the County’s main reach boundaries are used in this document. Sub-reach designations within the primary reaches were developed for this study to further delineate changes in fluvial geomorphic processes that affect sedimentation patterns. A brief description of each reach and sub-reach follows. Representative photographs of the channel are provided in Attachment 2-1. The photograph references included in the text below refer to the photos in Attachment 2-1.

Reach 1: A Street/El Camino Real to Dissipater Teeth (19,615 ft)

The maintenance section of the Colma Creek flood control channel begins near the intersection of A Street and El Camino Real (Figure 2-3).

Downstream of A St., the channel is culverted for a long section, then daylights near the entrance to the Holy Cross Cemetery along Mission Road. Now open, the channel has a U-shaped cross-section; no sediment accumulation was observed. Approximately 500 feet (ft) upstream of McLellan Drive, a smaller tributary draining the northwestern watershed joins the main Colma Creek channel; no sediment accumulation was observed. At this confluence, the channel transitions to a trapezoidal shape with a larger cross-sectional area to accommodate the flow from the northwest tributary (Photo 2).

The channel is culverted beneath the South San Francisco BART station, but then becomes an open trapezoidal channel downstream of the BART station (similar in size and shape to the upstream channel shown in Photo 2.) Channel conditions remain similar to the downstream end of Reach 1 at the energy dissipater teeth (Photo 3), which are located 300 ft upstream of Spruce Ave (Figure 3).

In summary, the entire length of Reach 1 generally functions as a zone of sediment transport, with minimal deposition observed through the reach.

Reach 2: Dissipater Teeth (Spruce Ave) to Produce Ave (3,357 ft)

<u>Reach 2a: Dissipater Teeth to S. Linden Ave (1,773 ft)</u>
Downstream of the dissipater teeth, the channel slope decreases (Figure 2-3), the bottom width widens, and the banks become vertical. This portion of the flood control channel was constructed between 2004 and 2006. In 2011, the segment from the dissipater teeth to 80 feet downstream of Spruce Avenue was partially reconstructed, including reconstruction of the right and left bank walls and conversion from earthen bottom to concrete bottom as part of the Colma Creek Flood Control Channel Wall Repair Project. The entire reach is straight (i.e., no sinuosity). The channel bed and banks are concrete (Photo 4), and a relatively uniform layer of sediment is deposited on the bed. This reach is subject to tidal inundation (tidal action extends approximately 1,000 ft upstream of the Spruce Avenue). The water level at Spruce Ave goes up several feet during high tide events.

<u>Reach 2b: S. Linden to San Mateo Ave (890 ft)</u>
Sub-reach 2b was also constructed in 2006 and has the same channel dimensions as Reach 2a. Reach 2b has a more complex alignment and more crossings than Reach 2a. This results in more complex depositional patterns. For example, downstream of the Caltrain railroad crossing the channel alignment shifts slightly to the south, and flow separation and eddying along the south (right) bank creates a depositional environment. An extensive longitudinal bar has developed along the south bank. This bar is approximately 200 ft long and 20 ft wide (Photo 5).

<u>Reach 2c: San Mateo Ave to Produce Ave (694 feet)</u>
This is a short segment of the flood control channel that was constructed in 1997. The County removed approximately 300 CY of sediment from this sub-reach in 2003. The channel dimensions are similar to Reaches 2a and 2b. A relatively sharp channel bend results in deposition at the interior of the channel bend. This occurs because flow velocities in the interior of the channel bend are less than at the outer bend owing to centrifugal and helical flow conditions. This situation is similar to a point bar in a natural creek; areas of perpetual deposition where velocities are reduced. Due to this channel bend, it is expected that this

location will continue to be depositional (Photo 6). Reach 2c is more influenced by tidal flows than Reach 2b

Reach 3: Produce Ave to Mouth (6,336 ft)

<u>Reach 3a: Produce to S. Airport Blvd (496 ft)</u>
At Produce Avenue, the channel transitions from concrete to natural bed and bank materials. While the cross-section widens slightly downstream of Produce Avenue, the channel remains relatively confined due to the Highway 101 and S. Airport Boulevard crossings. Flow confinement through the multiple crossings appears to favor sediment transport rather than deposition as significant sediment accumulation was not observed in this sub-reach (see Section 3 of this memorandum).

<u>Reach 3b: S. Airport Blvd to Mouth (5,840 ft)</u>
Downstream of S. Airport Boulevard, the channel cross-section widens and Colma Creek takes on the characteristics of a channel that experiences complete tidal exchange. The channel bed is relatively more shallow and wide (compared to the concrete reaches upstream) and has a gradual bank-slope transition to a saltmarsh fringe found on mid-bank and upper-bank benches that flank the channel (Photo 7). The channel gradually increases in width towards the mouth of the creek (Photo 8). Channel benches and point bars on inside bends support a saltmarsh vegetation community dominated by pickleweed (*Sarcocornia* [=*Salicornia*] *pacifica*). Since 2006, there has been extensive herbicide application in this reach, as well as reaches further upstream such as the point bar upstream of Produce Ave., as part of an effort to eradicate invasive *Spartina*.

3. Sediment Accumulation Assessment

This section describes the methods and results from the sediment accumulation evaluation.

3.1 Methods

Reach 1
A visual survey of Reach 1 was conducted to assess sediment deposition; a minimal amount of sediment was observed in the reach (see Section 2 of this memorandum above). Due to the hydraulic conditions (little roughness, and relative slope) it is expected that the small amount of sediment accumulated in this reach will likely be flushed downstream during a moderate discharge event (1-2 year return frequency), rather than continue to accumulate in the channel bed as stored sediment. Consequently, no sediment management is expected to occur and no further investigation was conducted.

Reach 2
Because most of Reach 2 has a uniform concrete channel bed, direct measurement of sediment accumulated in the channel was feasible. On July 11, 2013, Horizon staff measured depths of sediment in the channel from Spruce Avenue to approximately 40 ft upstream of the Produce

Ave crossing, where the channel transitions to a natural bottom (Figure 2-3). The survey ended at the limit of the concrete-lined channel because it was difficult to distinguish the extent of recently deposited sediments in the natural channel bed.

Sediment depths were measured using a 5.5-foot piece of rebar demarcated with 0.5 ft increments. The rebar was driven into the sediment by hand until the stake contacted the concrete bottom. Sediment depths were visually estimated to nearest tenth of a foot (0.1 ft). Measurement locations were recorded with a Trimble GeoXT GPS receiver (Photo 9).

In Reach 2a, sediment depths were measured at three points along cross-sections (the center of the channel, and 10 ft from each sidewall) spaced at 200 ft intervals along the channel length. In Reaches 2b and 2c, where deposition was less uniform, probing locations were more frequent to better characterize depositional areas.

The GPS points and corresponding sediment depths were imported into ArcGIS 10.1. A triangulated irregular network (TIN) surface representing sediment depth was created within the confines of the concrete channel and sediment volumes were calculated based on channel area.

Reach 3

A bathymetric survey of the Reach 3b was completed by Meridian Surveying Engineering, Inc. (MSE) in October 2007. To estimate sediment accumulation, the bathymetric survey was repeated by MSE in May 2013 (Photo 10).

From the survey data, MSE created surfaces and generated 1 ft contours in AutoCAD Land Desktop (2007) and AutoCAD Civil 3D (2013). Both surfaces were referenced to the State Plane horizontal datum (California Zone III, NAD83) and to the North American Vertical Datum of 1988 (NAVD88). Note that sediment accumulation in Reach 3a was not measured because the 2007 bathymetric survey did not cover this portion of the channel. Visual observations of Reach 3a suggest there has been limited deposition in this sub-reach. It is believed that this sub-reach functions primarily as a zone of transport because multiple bridge crossings confine streamflow, which promotes transport rather than deposition.

<u>Surface comparison</u>

Various components of the 2007 Land Desktop drawing were no longer compatible with the current version of Civil 3D, leaving the surface unrenderable. Due to issues with the legacy data format and the difficulty of deciphering point descriptions to rebuild the surface from the original survey data, the 2007 1 ft contours were exported to a GIS shapefile and the surface was recreated as a TIN in ArcGIS 10.1 using 3D Analyst. The 2013 surface was also exported to ArcGIS as a TIN for comparison.

The 2013 surface was compared to the 2007 surface in ArcGIS 10.1 using the Surface Difference tool. The tool maps and calculates changes in elevation and volumes of aggradation and degradation between two surfaces. The comparison was limited to the extents of the 2007 bathymetric survey, which was performed at lower water surface elevation than the 2013 survey. The 2007 and 2013 survey data were also compared to 1975 as-built drawings of the flood control channel for a portion of Reach 3b (S. Airport Blvd downstream to Utah Avenue).

3.2 Results

Reach 2

In Reach 2a sediment depths were relatively uniform, mostly between 0 and 1 ft, with the exception of a depositional bar (Bar 1) formed along the north bank just upstream of the Linden Avenue bridge (Figure 2-4). In Reach 2b, there was up to 2 feet of deposition on the south bank between Linden Ave bridge and the Southern Pacific Railroad (SPRR) bridge (Bar 2), and up to 3 ft on the south bank downstream of the SPRR bridge (Bar 3). In Reach 2c there was up to 4 ft of deposition on the north bank upstream of Produce Ave bridge (Bar 4).

According to the surface volume calculations, approximately 5,900 CY of sediment have accumulated in Reach 2. The calculations do not account for displacement of channel volume by bridge pilings, but this was considered to be negligible for the purposes of this analysis. Sediment accumulation was not measured in a small section of Reach 2c (approximately 40 feet) because of the difficulty of distinguishing the natural channel bottom from recent deposition.

Reach 3

According to the survey data, between 2007 and 2013 approximately 14,500 CY of sediment were deposited, and 4,800 CY were scoured, yielding a net accumulation of 9,700 CY in Reach 3b (Figure 5). Deposition was most prevalent in the section between S. Airport Blvd and the Utah Avenue crossings, and along the inside of channel meander bends (Figure 2-5).

While the comparison between 2007 and 2013 surveys indicates sediment deposition throughout much of Reach 3, comparison to the 1975 as-built drawings suggests a more complex pattern of deposition and erosion in this reach over time. Figure 2-6 provides representative cross-sections from the 1975 as-built drawings and the 2007 and 2013 surveys. The data show that the 1975 and 2013 cross-sections are similar, while the 2007 data consistently shows a deeper channel. These data indicate that scour occurred at some point between the 1975 and 2007 surveys, and aggradation occurred between 2007 and 2013. The causes of scour and erosion in Reach 3 are not clear. Possible mechanisms include changes in cross-sectional area (i.e., expansion/contraction), downstream backwater effects due to the Utah Avenue bridge, tidal boundary conditions, or flood-induced natural scour. Additional monitoring and modeling would be needed to assess the relative contribution of each of these factors.

Furthermore, it is important to note that sediment sources in Reach 3 include watershed-derived sediments as well as marine sediments from tidal exchange. While the relative contribution of each of these sources is not known, it is hypothesized that a large fraction of the sediment in the channel is derived from watershed sources given the historically high sediment yields documented for Colma Creek (USGS 1973) and the relatively modest suspended sediment concentrations observed in the San Francisco Bay (Bay) in recent years (Schoelhamer 2011).

Analysis limitations

The 2007 surface, which was used as the reference surface for channel changes, was recreated using 1 ft contours from the original surface rendering. In contrast, the 2013 surface was created from a dense point cloud and includes topographic details between the contour intervals. Therefore, some changes in microtopography may not have been captured. The 2007 and 2013 surveys were completed at different water surface elevations. The surface comparison analysis was limited to the extents of the boat-based bathymetric surveys. Above water ground elevations were surveyed in both years, but cross-section locations and point density between the two years were not consistent for comparison. Therefore, the analysis does not include changes in deposition or erosion that were above the water surface elevations at the time of the surveys. It is expected that some deposition has occurred on bars, including Mitigation Sites 2b and 2c (Figure 2-5). However, the volume of sediment deposited in the area outside the boundaries of the bathymetric survey is believed to be small relative to the amount accumulated in the main channel.

4. Sediment Accrual Rates

4.1 Approach and Assumptions

The purpose of estimating sediment accrual rates is to gain a general understanding on the time required for sediment to accumulate in the Colma Creek channel to a significant level that would require maintenance. Estimating sediment accrual rates is done by evaluating the volume of deposited material (described above in Section 3) over a given time period. Reference time periods are established based on intervals between channel construction or sediment removal activities. It is also necessary to consider the hydrologic conditions during the period of study, and whether discharge conditions were representative of average conditions, or were influenced by particularly wet or dry seasons. The regional climate includes a high degree of annual variation in precipitation whereby the largest sediment transport events occur periodically.

The following channel construction and maintenance activities frame the time periods used to estimate sediment accrual rates:

- Reaches 2a and 2b were constructed in October 2006 and no sediment removal has been conducted since that time.
- Reach 2c was constructed in June 1997. Approximately 300 CY of sediment was removed from the channel in 2003 upstream of the Produce Avenue bridge.

- Reach 3b was surveyed in October 2007 and no sediment removal has been conducted since that time.
- The portion of Reach 3b between S. Airport Blvd and Utah Avenue was constructed in 1975 and no large-scale sediment removal has been conducted since that time.

For this study we assume that annual rainfall totals provide a general portrayal of relative water and sediment discharge conditions for the watershed. Figure 2-7 shows annual rainfall totals for the 1997 to 2013 (partial) water years measured at the nearby San Francisco WB AP station (Figure 2-1). As shown in Figure 2-7, the average rainfall for this period is slightly greater than the annual average rainfall for the entire period of record at this gaging station (1930-present). Figure 2-7 also shows that most years are considered normal, or relatively dry or wet within the general distribution of events over the longer-term record. None of the years during the 1997-2013 study period are indicative of severe drought or extreme wet conditions.

4.2 Sediment Accrual Results

Based on the flood control channel history and hydrologic conditions described above, Table 2-1 provides an estimate of annual deposition rates for the Colma Creek flood control channel by reach.

Table 2-1. Estimated Annual Sediment Accrual Rates in the Colma Creek Flood Control Channel

Reach	Length (ft)	Total Volume Accumulated (CY)	Time Period (years)	Average Annual Deposition Rate (CY/yr)	Average Annual Deposition Rate (CY/linear ft/yr)
2a	1,773	2,800	6.8 (Oct 2006 -July 2013)	415	0.23
2b	890	1,900		279	0.31
2c	694	1,500†	16 (July 1997 - July 2013)	94	0.14
3a	496	Not Measured	NA	NA	NA
3b	5,840	9,700	5.75 (Oct 2007 - May 2013)	1687	0.29
Total	**9,693**	**15,600**	**NA**	**2,475**	**NA**

†= 1,200 CY measured in 2013 plus 300 CY removed in 2003.

The data in Table 2-1 show that sediment accumulation rates are similar throughout Reaches 2 and 3. Higher deposition rates were expected in Reach 2a because the channel slope decreases substantially from Reach 1 (Figure 2-3), which would promote deposition. High deposition rates observed in Reach 3b may be the result of antecedent scour, shallower slope, greater tidal influence, hydraulic backwater effects, or a combination thereof.

4.3 Sediment Accrual Relative to Watershed Sediment Yield

The sediment budget approach is used by geomorphologists to identify and evaluate sediment inputs, outputs, and storage in a watershed or drainage system. At Colma Creek, comparing sediment contributed to the channel system from the watershed (input), sediment yield passed out of the watershed to the Bay (output), and sediment held in the Colma Creek channel (storage) is useful to better understand the sediment delivery system. Understanding these components may also help guide maintenance and provide a basis to relate channel sediment processes and the bay wetlands at the mouth of Colma Creek.

While a detailed sediment budget was not developed for this study, a general budget can be estimated. In 1973 during (or following) the period of heavy erosion in the watershed from development, the USGS estimated watershed sediment yields of 680 and 270 CY/mi^2 for urban and open space landscapes, respectively (USGS 1973). Assuming 65% of the watershed is urban and 35% is open space, a composite annual watershed sediment yield is approximately 8,900 CY. This can be considered as an approximate "input" to the sediment budget. From Table 2-1 above, the average annual deposition volume, measured in Reaches 2 and 3 during the 1997-2013 period, was 2,475 CY (Table 2-1). This volume residing in the channel can be considered as "storage" in the sediment budget for the period of accumulation analyzed. The channel storage (2,475 CY) is approximately 28% of the watershed sediment input (8,900 CY). This suggests that more than three-quarters of the annual watershed sediment input (~6,400 CY) passes through the Colma Creek watershed-channel system and exits as sediment yield (output) to the Bay.

It is important to note that this is a very approximate evaluation. This sediment budget does not include sediment that is tidally introduced to the Colma Creek channel. Sediment that is watershed derived and transported in the channel, but possibly resuspended/deposited by the tides is incorporated into the watershed contribution (input) described above. Sediment that is introduced from the Bay is not included in the watershed input described above (i.e., 8,900 CY), but is reflected in the measured sediment accumulation in the channel (i.e., 2,745 CY). Because of this, the overall sediment input to the channel (including the tidal contributions) is larger than the watershed input described above. Therefore, the volume of sediment that passes through the channel and is delivered to the Bay (i.e., the annual sediment yield) is likely greater than three-quarters of the annual watershed sediment. Likewise, the volume of sediment stored in the channel is a small portion (i.e., less than 25%) of the annual watershed sediment yield to the Bay. This general sediment budget is important to consider when evaluating the potential impacts of sediment removal on the wetlands near the mouth of Colma Creek.

5. Sediment Removal Estimates

As discussed previously, the Colma Creek flood control channel has a design capacity to convey a 50-year flood event. The County will need to periodically remove sediment accumulated in the channel to maintain this capacity. This section discusses sediment removal strategies and provides estimates for anticipated sediment removal volumes.

5.1 Reach 2

The terms of the 2002 Regional Water Quality Control Board Permit authorizing the construction of the Reach 2 project require the County to maintain a minimum of 2 feet of sediment on the Reach 2 channel bed (San Mateo County 2012). Nearly all of Reach 2 currently has less than 2 feet of sediment on the bed (Figure 2-4). The estimated available sediment storage between the current surface and 2 feet above the channel bed is approximately 11,000 CY (Table 2-2). Assuming roughly 750 CY of sediment are deposited in Reach 2 annually, it would take approximately 15 years to fill the bed with 2 feet of sediment (Table 2-2). This is a simplification assuming the equal distribution of sediment across the channel bed. The effects of large flood events, non-uniform sediment deposition patterns, and other sources of depositional variability all complicate the actual rate at which the available capacity might be filled.

Nonetheless, at this time there is considerable storage available in the Reach 2 channel. Large-scale sediment removal is unlikely to be necessary in the near future (1 to 10 years), assuming no major flood events occur. The County may seek to manage sediment accumulation on bar features that exceed the 2 ft threshold through local excavation. We recommend maintaining the shape and location of existing depositional bar features, but "skim" the bars when they exceed the 2 ft threshold.

Based on current elevations and the 2 ft sediment channel bed requirement, Reach 2 may require removal of approximately 250 CY of sediment (Table 2-2) to restore capacity. The estimated volume of sediment to be removed from Reach 2 annually is also 250 CY.

Table 2-2. Estimated Annual Sediment Accrual Rates and Projected Maintenance Frequency for Reach 2 of the Colma Creek Flood Control Channel.							
Reach	**Length (ft)**	**Sediment Volume in 0 to 2 ft Depth (CY)**	**Sediment Volume Above 2 ft Depth (CY)**	**Total Storage Volume of 0 to 2 ft Depth (CY)**	**Available Storage between 2013 sediment surface and 2 ft depth (CY)**	**Estimate Annual Deposition (CY)**	**Estimated Years Required to Fill Available Storage between 0 to 2 ft depth**
2a	1,773	2,800	-	9,000	6,200	412	15.1
2b	890	1,900	75	4,900	3,000	279	10.8
2c	694	1,200	175	2,900	1,700	94	18.1
Total	**3,357**	**5,900**	**250**	**16,800**	**10,900**	**755**	**14.7 (average)**

5.2 Reach 3

Between 2007 and 2013, sediment accumulation in Reach 3 was greatest between S. Airport Blvd and Utah Avenue (Figure 2-5). In contrast, this portion of the channel experienced significant scour between the 1975 and 2007 surveys. Recent hydraulic modeling completed for this portion of the channel indicates that the 2013 conveyance capacity is similar to, if not slightly greater than, the 1975 as-built condition (WRECO, unpublished data, 2014). Therefore, at this time sediment removal in Reach 3 is not needed to maintain flood capacity for the design storm event (i.e., 50-year return interval).

6. Sediment Texture Analysis and Management Implications

In September 2010, representatives from the USACE, RWQCB, and U.S. Fish and Wildlife Service (USFWS) met with the County to review the sediment maintenance strategy for Colma Creek and discuss its permitting process. During that meeting, questions were raised by regulatory agency staff regarding how periodic sediment removal at Colma Creek could potentially impact the tidal wetlands near the mouth of Colma Creek. Regulatory staff requested that the County review if these potential impacts had been researched or monitored in the San Francisco Bay region (San Mateo County, 2010).

To investigate the resource agencies' concerns about potential impacts to wetlands near the mouth of Colma Creek, Horizon and the County reviewed studies conducted in San Francisco Bay that address issues such as sediment dynamics, sediment removal, and their relationship to tidal wetland sustainability. The results of this literature review are presented in Memorandum 1, *Literature Review of Sediment Removal and Tidal Wetlands* (Horizon 2014).

To further this investigation, Horizon conducted a sediment grain size analysis in the Colma Creek flood control channel and in the wetlands near the mouth of Colma Creek. The objective of this assessment was to determine if sediment grain size in the channel and wetlands are similar or different.

If the sediment grain sizes are similar, then channel sediments may contribute to sustaining wetlands near the mouth of Colma Creek. However, this association of similar textured sediment does not in itself guarantee a causal relation. As described above, the volume of sediment stored in the channel is likely less than 20-25% of the sediment that is passing through the channel system and delivered to the Bay. However, if grain sizes are significantly different (e.g., sediment in the channel is sand and the wetland soils are silt), then it could be argued that sediment stored in the channel is not as important for sustaining the wetlands near the mouth of the channel.

Four sediment samples were collected; two from the channel and two from the wetlands at the locations shown on Figure 3. The sediment samples were sent to Soil and Plant Laboratories in San Jose, CA for particle size analysis by hydrometer. The results of the analyses are shown in Table 2-3, Figure 2-8, and Attachment 2-2.

Table 2-3. Sediment Grain Size Analysis for Samples Collected from Colma Creek Flood Control Channel and Tidal Wetlands near the Mouth of the Channel

Sample ID	% Gravel		% Sand			% Silt	% Clay	Texture
	Coarse (5-12)	Fine (2-5)	Very Coarse (1-2)	Coarse (0.5-1)	Med. To Very Fine (1-2 mm)	(.002-.05)	(0-.002)	NA
C1	0	0.3	4.9	8	39	16.6	31.3	Sandy Clay Loam
C2	0.2	1.6	5.8	14.2	56	7.6	16.3	Sandy Loam
W1	0	1	1.9	1.2	62.9	15.6	18.3	Sandy Loam
W2	0	0.3	3.4	4.1	55.5	21.6	15.3	Sandy Loam

Gravel fraction expressed as percent by weight of oven-dried sample passing a 12mm (1/2 inch) sieve. Particle sizes in millimeters.

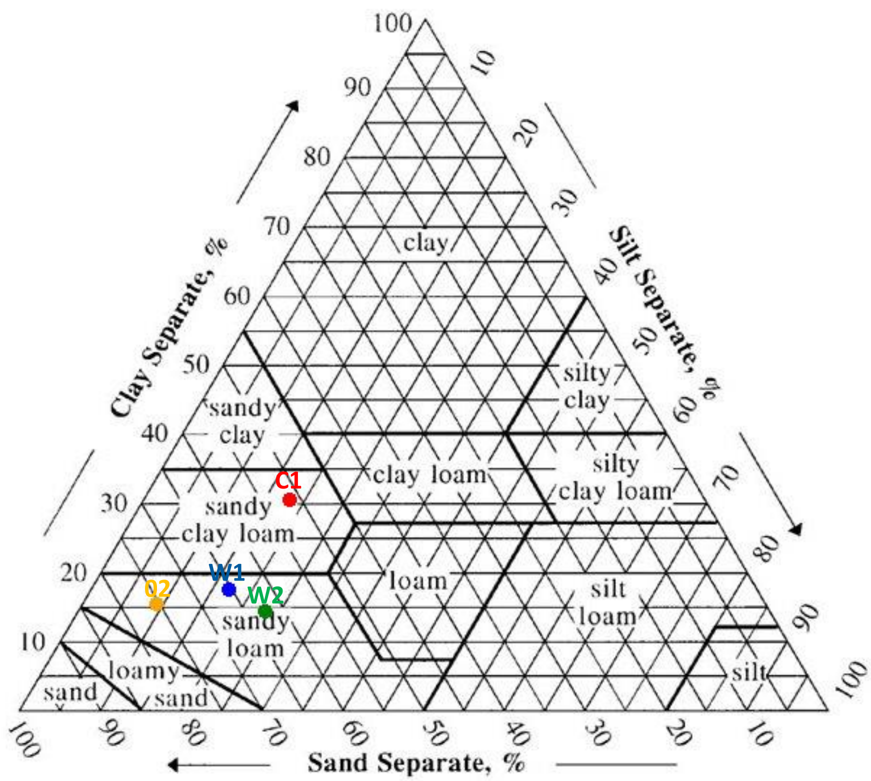

Figure 2-8. Texture of sediments sampled in the flood control channel (C1 and C2) and wetlands (W1 and W2) near the mouth of Colma Creek

The data show that samples collected in the channel and wetlands have similar grain size distributions. This suggests that sediment stored in the channel bed may ultimately contribute to sustaining wetlands near the mouth of Colma Creek. This also indicates that sediment removed from the channel for flood control maintenance may be suitable for creation of wetlands, assuming that the sediment meets screening criteria for beneficial reuse (RWQCB 2000). Opportunities for wetland creation or enhancement will be addressed further in a separate technical memorandum which describes potential sediment reuse and disposal options.

7. Summary & Next Steps

The Colma Creek watershed experienced a period of rapid urbanization in the 1960s and early 1970s, which led to extremely high sediment yield from the watershed. While the pace of development in the watershed has slowed considerably, sediment management continues to be important for maintaining flood control channel capacity.

Sediment accrual rates in the Colma Creek flood control channel were estimated using a combination of (1) direct measurements of sediment accumulation and (2) repeated bathymetric surveys. In Reach 2, approximately 5,900 CY of sediment has accumulated in the channel. Most areas of the channel have less than 1 foot of sediment in the bed. However, there are some isolated areas of sediment accumulation (bars) greater than 4 ft deep. The 2002 Regional Water Quality Control Board Permit authorizing the construction of the Reach 2 project requires the County to maintain a minimum of 2 feet of sediment on the Reach 2 channel bed. Large-scale sediment removal is unlikely to be necessary in the near future (1 to 10 years), assuming no major flood events occur, but skimming of the bars that exceed the 2 ft threshold, or redistributing sediment to areas without much accumulation, may be needed to restore capacity. Besides providing conveyance capacity, an additional and equally important objective for sediment removal activities is to clear sediment away from blocked culvert outfalls. While large scale sediment removal activities may not be needed in the near term, more focused or localized sediment removal to clear blocked culverts may be needed on an annual basis. The estimated volume of sediment to be removed from or redistributed within Reach 2 annually is approximately 250 CY.

In Reach 3b, approximately 9,700 CY of sediment accumulated in the channel between October 2007 and May 2013. The net sediment deposition rate in Reach 3b is estimated to be approximately 1,700 CY annually. However, this depositional pattern appears to have followed a significant scour event(s) that lowered the channel bed well below the design elevation. At this time, sediment removal in Reach 3 is not needed to maintain flood capacity for the design storm event (i.e., 50-year return interval).

It is anticipated that the County will use the estimates of sediment accumulation provided in this memorandum to plan channel maintenance activities and evaluate potential impacts of such activities. Additional monitoring is recommended to further understand sedimentation rates and patterns of deposition and erosion. Preliminary sediment testing suggests that sediments in the channel and wetlands at the mouth of Colma Creek have similar grain size distributions. Thus, sediment removed from the channel may be suitable for creation of wetlands, assuming that the sediment meets screening criteria for beneficial reuse. Opportunities for beneficial reuse of sediment are addressed in Memorandum 4, *Sediment Reuse and Disposal* and Memorandum 5*, Sediment Testing Approach*.

8. References

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San Francisco Regional Water Quality Control Board (RWQCB). 2000. Beneficial Reuse of Dredged Materials: Sediment Screening and Testing Guidelines. Draft. May.

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Schoellhamer, D.H. 2011. Sudden Clearing of Estuarine Waters upon Crossing the Threshold from Transport to Supply Regulation of Sediment Transport as an Erodible Sediment Pool is Depleted: San Francisco Bay, 1999. *Estuaries and Coasts*. Available: http://www.waterboards.ca.gov/waterrights/water_issues/programs/bay_delta/docs/cmnt081712/sldmwa/schoellhamer2011.pdf. Accessed: May 14, 2013.

U.S. Geological Survey. 1973. Effects of Urbanization on Sedimentation and Floodflows in the Colma Creek Basin, California. Technical Report 6. Prepared by J.M. Knott. February. Available: http://pubs.usgs.gov/of/1973/0146/report.pdf. Accessed: August 14, 2013.

WRECO. 2014. Unpublished HEC-RAS modeling results for Colma Creek.

Figure 2-1. Colma Creek watershed.

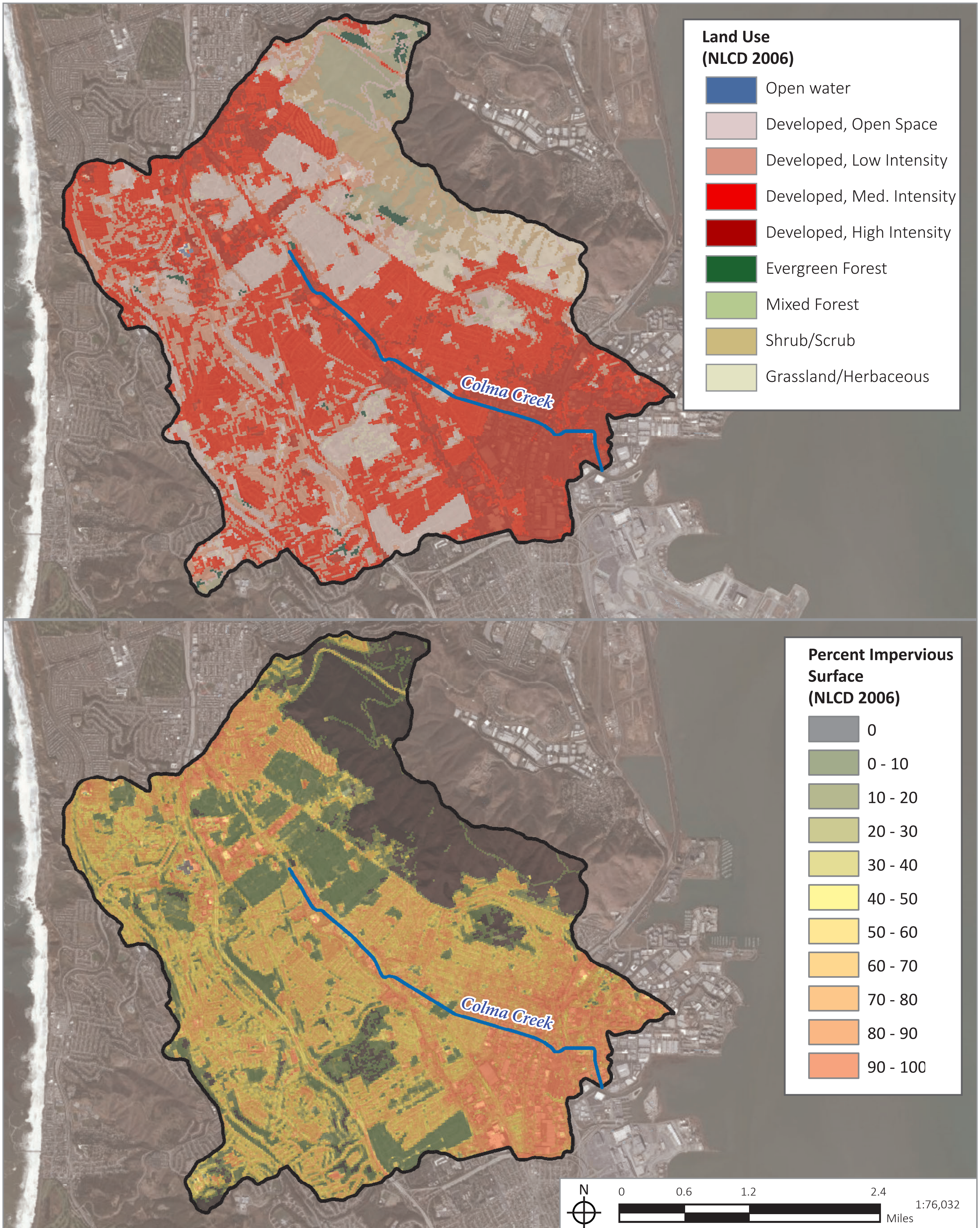

Figure 2-2. Colma Creek watershed land use and percent impervious surfaces (NLCD 2006).

Colma Creek Flood Control Channel Maintenance Project

Horizon WATER and ENVIRONMENT

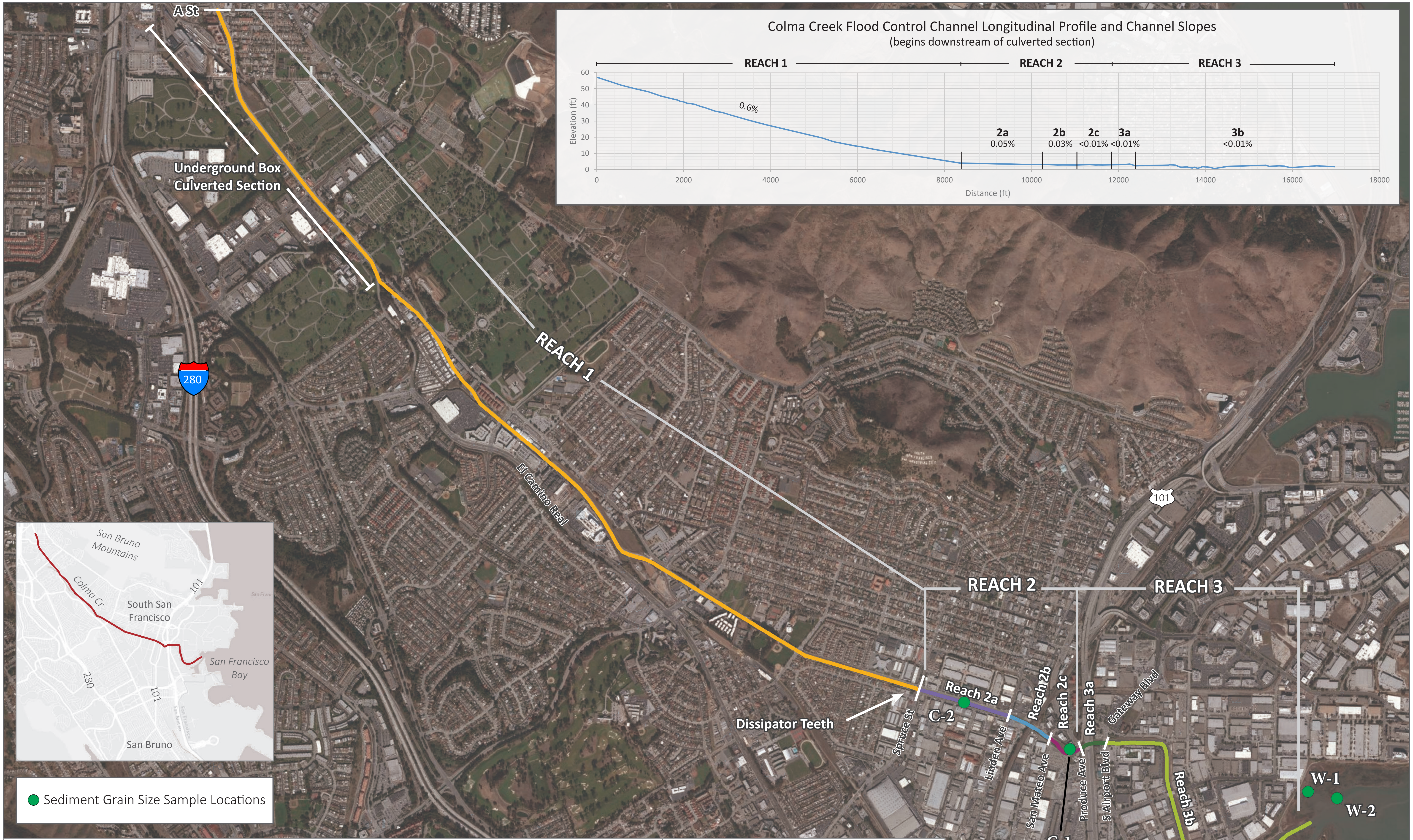

Figure 2-3. Colma Creek study reaches.

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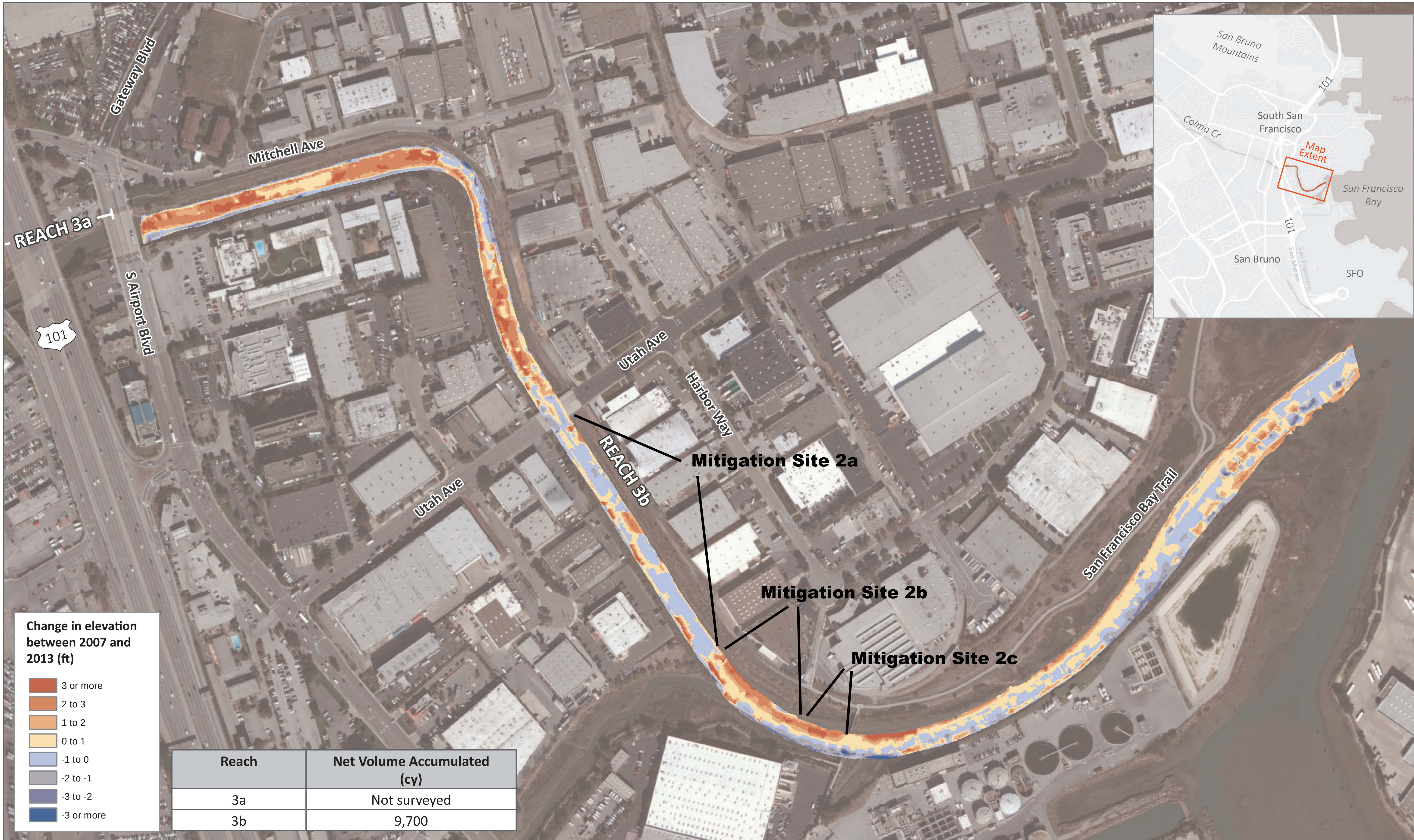
Reach	Total Volume Accumulated (cy)
2a	2,800
2b	1,900
2c	1,200

Figure 2-4. Surface representing sediment depth in Colma Creek Flood Control Channel Reaches 2a-2c calculated from 7/11/13 survey.

Colma Creek Flood Control Channel Maintenance Project

Horizon WATER and ENVIRONMENT



Reach	Net Volume Accumulated (cy)
3a	Not surveyed
3b	9,700

Figure 2-5. Surface representing change in channel bed topography between October 2007 and May 2013 bathymetric surveys.

Colma Creek Flood Control Channel Maintenance Project

Horizon WATER and ENVIRONMENT

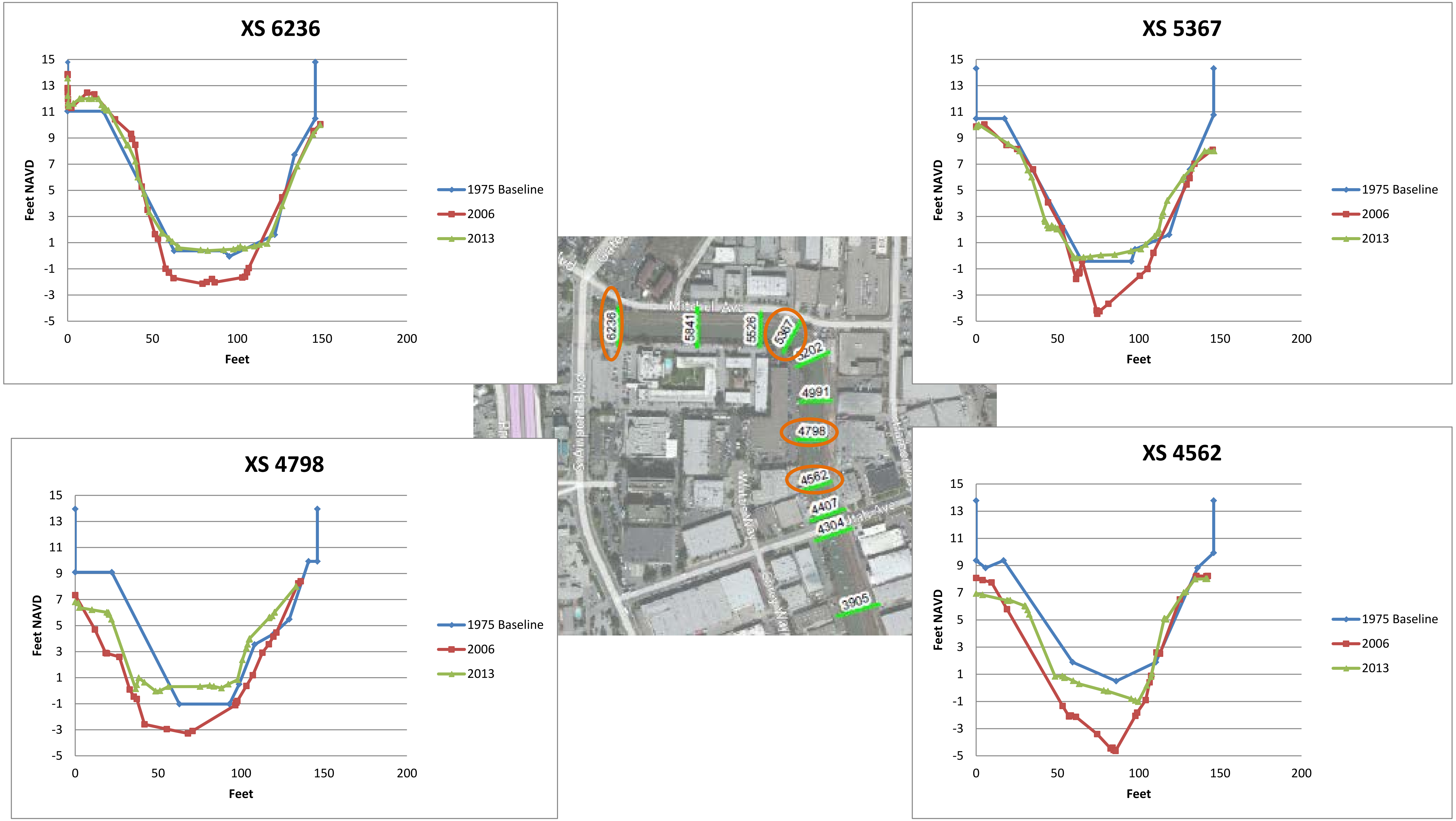


Figure 2-6. Representative Cross-sections from Survey Data Collected in Colma Creek Reach 3b. (Data from WRECO 2014)

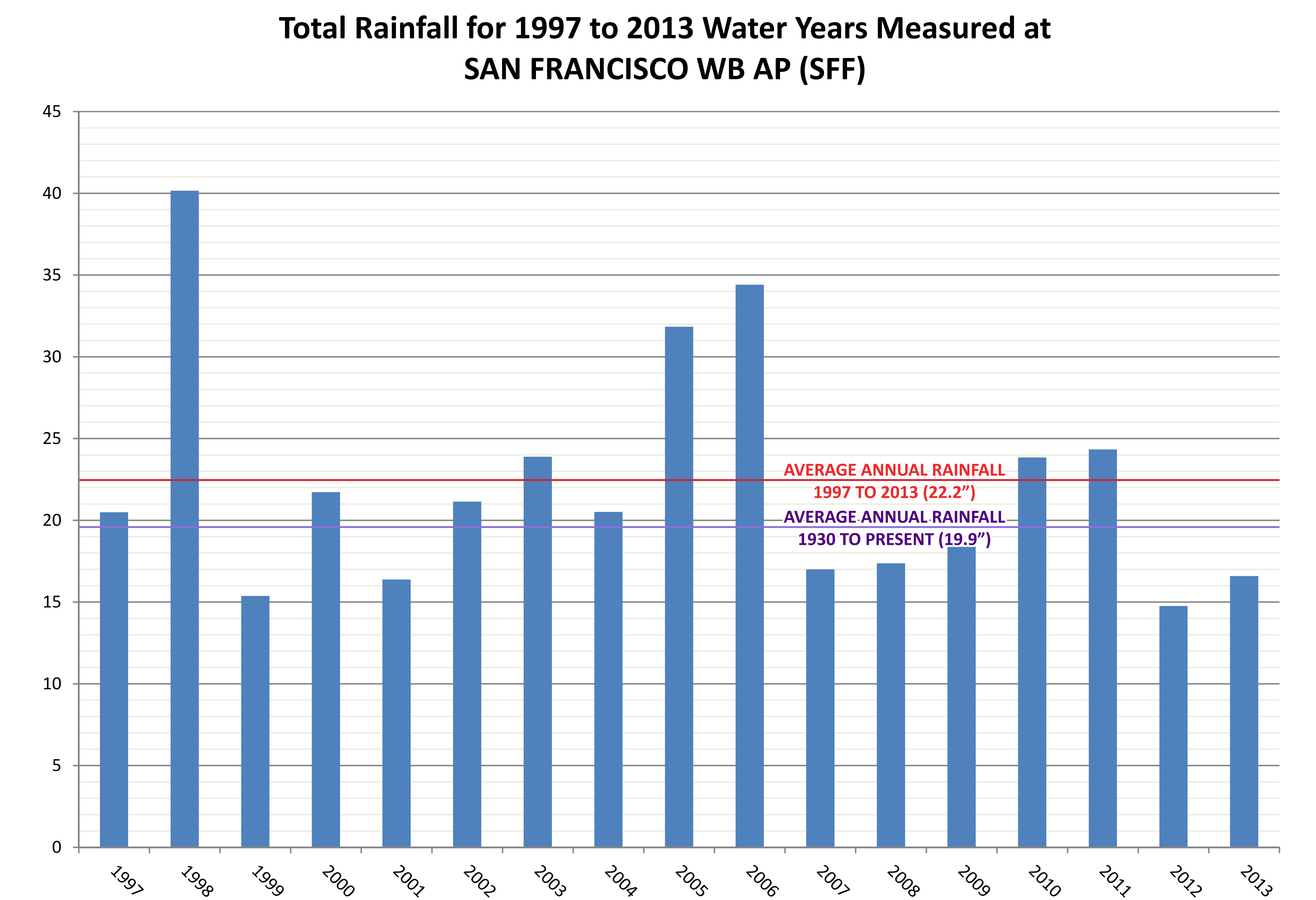


Figure 2-7. Rainfall totals for water years 1997 to 2013 at San Francisco WB AP weather station at San Francisco International Airport (Source: CDEC 2013).

Photo No.	Date:	Description:	Photo
1	08/23/2013	Tributary drainage in the upper watershed that feeds into Colma Creek. The actual Colma Creek Flood Control Channel runs under Mission Road at this location.	
2	08/23/2013	Mid Reach 1, looking upstream from McLellan Drive near the South San Francisco BART station. Channel transitions from box to trapezoidal shape. Note the minor accumulation of sediment and organic material in the larger trapezoidal channel.	

Photo No. 3	**Date:** 08/23/2013	
Description: Lower Reach 1, at energy dissipater teeth (looking upstream). A small amount of sediment and debris accumulate near the teeth.		
Photo No. 4	**Date:** 07/11/2013	
Description: Reach 2a looking downstream near Spruce Ave. Minor sediment accumulation on channel bed.		

Photo No. 5	**Date:** 07/11/2013	
Description: Reach 2b Looking upstream at the Caltrain railroad bridge. Sediment deposits downstream of the bridge on the left side of the photo, where flow separation and eddying create a depositional environment.		
Photo No. 6	**Date:** 07/11/2013	
Description: A large point bar in Reach 2c (looking downstream toward Produce Ave).		

Photo No. 7	Date: 07/11/2013	
Description: Looking downstream from Produce Avenue at low tide. Note earthen bed and banks comprised of fine sediment, some depositional bars along channel bed, and mid-bank bench with pickleweed.		
Photo No. 8	**Date:** 12/19/13	
Description: Looking toward the mouth of Colma Creek.		

Photo No.	Date:	Description:	Photo
Photo No. 9	**Date:** 07/11/2013	Measuring sediment depth in Reach 2a.	
Photo No.10	**Date:** 05/22/2013	Bathymetric survey of Reach 3b using an Innerspace echosounder and Trimble RTK-GPS.	

Attachment 2-2

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Report No : **13-226-0062**
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Date Printed : 08/19/2013
Date Recd : 8/14/2013

SOIL APPRAISAL ANALYSIS

Sample Description Sample ID	Half Sat %	pH s.u.	ECe dS/m	Organic Matter %	SAR	Gravel %		Percent of Sample Passing 2mm Screen					USDA Soil Classification	Lab No.
								Sand						
						Coarse 5 - 12	Fine 2 - 5	Very Coarse 1 - 2	Coarse 0.5 - 1	Med. to Very Fine 0.05 - 0.5	Silt .002-.05	Clay 0-.002		
C1						0	0.3	4.9	8	39	16.6	31.3	Sandy Clay Loam	24203
C2						0.2	1.6	5.8	14.2	56	7.6	16.3	Sandy Loam	24204
W1						0	1	1.9	1.2	62.9	15.6	18.3	Sandy Loam	24205
W2						0	0.3	3.4	4.1	55.5	21.6	15.3	Sandy Loam	24206

Half Saturation %= approximate field moisture capacity. Salinity , saturation extract = ECe (dS/m at 25 degree C). Gravel fraction expressed as percent by weight of oven-dried sample passing a 12mm (1/2 inch) sieve. Particle sizes in millimeters.

Memorandum 3

Sediment Monitoring at Colma Creek Wetlands

Colma Creek Flood Control Channel Maintenance Project

Memorandum 3

July 1, 2014

Subject: **Sediment Monitoring at Colma Creek Wetlands**

1. Purpose

The purpose of this memorandum is to outline monitoring practices that can be used to assess the impacts of sediment removal on intertidal wetlands associated with Colma Creek. This memorandum provides an overview of methods that can be used to monitor the wetlands response to sediment removal, and preliminary monitoring recommendations.

2. Monitoring Methods

The key question, as introduced above, is whether periodic sediment removal in the Colma Creek flood control channel could result in a reduced sediment supply to the nearshore wetlands, and could this lead to erosion? This question frames the preliminary monitoring approach outlined in this memorandum. Measureable endpoints that may indicate such sediment delivery impacts are occurring include:

- Reduction in spatial extent of the wetlands,
- Decrease in elevation of mudflats or marsh plain,
- Decrease in the rate of sediment accretion on mudflats or the marsh plain, or
- Decline in the suspended sediment concentration in waters in the vicinity of the wetlands.

Various methods can be used to monitor these endpoints and detect trends in wetland conditions. This section describes several methods that may be useful for monitoring wetlands associated with Colma Creek.

2.1 Spatial Extent of Wetlands

Repeated mapping of the extents of tidal mudflats and marsh communities can provide a relatively coarse-scale assessment of trends in wetland accretion or erosion. Wetland mapping can be accomplished using a combination of field surveys and remote sensing. Field surveys typically include mapping wetland boundaries with a sub-meter global positioning system (GPS).

Field mapping efforts can be supported by desktop interpretation of ortho-rectified aerial imagery.

Horizon mapped the extent of tidal wetland in the maintenance project area in September 2013 (See Memorandum 6 *Tidal Wetland and Habitat Mapping*). This mapping effort serves as a baseline for assessing erosion/sedimentation trends in the maintenance project area. This survey could be repeated on a regular basis (e.g., biennial) as part of the monitoring program. The benefits of this type of mapping are that it is relatively easy to perform and is cost effective. Drawbacks include potential lack of precision in distinguishing subtle changes in erosion or sedimentation, and there can be inconsistencies, or bias, if different people conduct the field mapping.

2.2 Wetland Elevation

Topographic Survey

Topographic survey can be used to monitor trends in wetland accretion or erosion, and provides a higher degree of accuracy than the field mapping technique described in the previous section. A network or grid of survey points could be established in the maintenance project area and surveyed on a regular basis (e.g., biennial). This network of survey points could be used to monitor changes in mudflat and marsh plain elevations, as well as spatial extent of wetlands.

Various types of equipment can be used to provide relatively precise measurement of elevation. Commonly used survey techniques include total stations, real-time kinematic (RTK)-GPS, and Light Detection and Ranging (LiDAR) technologies. Total stations generally provide the greatest vertical accuracy (sub-centimeter for high-end equipment) and may be suitable to detect small changes in erosion or sedimentation. RTK-GPS can be more efficient to use than a total station, but the vertical accuracy may be less than total stations (~1 cm). LiDAR is not recommended for repeated surveys of the maintenance project area because of high cost and accuracy issues in measuring marsh plain elevations (see Schmid et al. 2011). It is important to note that topographic survey technology changes rapidly, so the equipment and techniques used could change over the life of the monitoring period.

Sedimentation-Erosion Tables

A sedimentation-erosion table or surface elevation table (SET) can be used to measure changes in wetland surface elevation with very high precision (within 1.5 mm) (Boumans and Day 1993, Callaway and Siegel 2002). As shown in Figure 3-1, a SET consists of aluminum base pipe that is set permanently at a fixed location in a wetland. The upper, portable part of the SET consists of a plate with 9 pins. The pins are lowered to the sediment surface and the distance above the plate is measured to the nearest millimeter.

Figure 1. Photo of researchers using a set plate (USGS 2013)

The benefit of using a SET to monitor changes in wetland elevation is that it can provide a highly accurate and precise measurement of wetland elevation. The drawbacks are that the initial set-up and equipment costs are relatively high, and using the equipment is time consuming and requires specialized training. Furthermore, the SET is typically placed in vegetated marsh, rather than mudflats. The marsh plain may not be as sensitive to changes in sediment supply as mudflats.

2.3 Suspended Sediment Concentrations

Monitoring suspended sediment concentrations (SSC) can provide an indication of the sediment supply available for wetland accretion. SSC can be measured directly by taking grab samples from the water column. SSC can be measured indirectly by monitoring turbidity (such as with an optical turbidity probe) and then calibrating the turbidity measurements to SSC in grab samples. A baseline SSC needs to be established to compare the post-maintenance condition to. In theory, if SSC in the vicinity of the Colma Creek wetlands decline after sediment removal it could be inferred that there is less sediment available to sustain wetlands.

3. Recommendations

Preliminary monitoring recommendations include: pre- and post-maintenance mapping of the extent of mudflats and marsh, and repeated topographic survey using a total station or RTK-GPS. Installation of a SET in the project vicinity should be considered if large-scale sediment removal is planned; this monitoring would not be necessary if only small amounts of sediment are periodically removed from the channel. If implemented, the SET monitoring effort should be integrated with other regional Bay research efforts conducted by the U.S. Geological Survey, local universities, or the Coastal Conservancy. This will help with consistency in methods and provide a better understanding of regional trends in sedimentation and erosion.

Monitoring SSC is not recommended because relating suspended sediment conditions at the wetlands to the degree of sediment removed from, or remaining at, the flood control channel is imprecise. Developing a cause and effect understanding between sediment removal in the flood control channel and changes in SSC at the wetlands/marsh would be extremely difficult. SSC are highly variable in time and space. For example, sediment concentrations during two similar sized rainfall and discharge events may yield sediment concentrations that differ by orders of magnitude. This is due to potential differences in antecedent soil moisture and runoff response in the watershed, tidal conditions, or other factors affecting ambient sediment conditions in the Bay that are outside of the influence of Colma Creek. Thus, simply comparing SSC before and after sediment removal maintenance at the Colma Creek wetlands would not provide a meaningful basis to evaluate the potential effects of local sediment removal in the flood control channel. Therefore, this monitoring approach is not recommended.

Finally, it is important to recognize that elevations in intertidal wetlands are dynamic and continually change due to tides, storm activity, subsidence, and biotic activity (Boumans and Day 1993). Furthermore, sediment supply and SSC in Colma Creek is influenced by watershed land uses. Thus, the Colma Creek monitoring program will need to include monitoring at appropriate reference sites to understand local (or regional) trends in tidal wetland dynamics that are independent of maintenance activities.

4. References

Boumans, R. M. J., and J. W. Day, Jr. 1993. High precision measurements of sediment elevation in shallow coastal areas using a sedimentation-erosion table. Estuaries 16:375-380.

Keil A. Schmid, Brian C. Hadley, and Nishanthi Wijekoon. 2011. Vertical Accuracy and Use of Topographic LIDAR Data in Coastal Marshes. Journal of Coastal Research: Volume 27, Issue 6A: pp. 116 – 132.

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Memorandum 4

Sediment Reuse and Disposal

Colma Creek Flood Control Channel Maintenance Project

Memorandum 4

July 1, 2014

Subject: Sediment Reuse and Disposal

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1. Purpose

The County of San Mateo Department of Public Works (County) has maintenance responsibility for the Colma Creek flood control channel. Periodic sediment removal from the flood control channel is an anticipated and routine maintenance activity. Sediment removed from the channel will require disposal. A specific sediment disposal option (or site) will be planned for and identified as the need for sediment removal activities arise. Typically, sediment removal and disposal activities would not be necessary every year, and would more likely only be necessary every few years.

Sediment disposal activities must be approved by the San Francisco Bay Regional Water Quality Control Board (RWQCB), San Francisco Bay Conservation and Development Commission (BCDC), and other regulatory agencies in accordance with federal and state regulations, including the federal Clean Water Act and the state Porter-Cologne Water Quality Control Act. The County seeks to support ecologic sustainability and minimize environmental impacts as feasible while also providing their flood management duties.

The purpose of this memorandum is to describe sediment reuse or disposal options for the Colma Creek flood control channel and to describe the process for selection and approval of the sediment disposal or reuse action. This memorandum continues with a summary of sediment reuse and disposal alternatives (Section 2) and an overview of the review and approval process for sediment disposal activities (Section 3).

2. Sediment Reuse and Disposal Alternatives

In general, sediment and dredged material reuse and disposal options for maintenance of the Colma Creek flood control channel can be characterized into six categories. These categories include: (1) on-site reuse or redistribution in the flood control channel or easement area; (2) on-site reuse at the nearshore tidal wetlands and mudflats at the Colma Creek mouth; (3) off-site reuse at tidal wetland, channel, or floodplain sites around the Bay (including restoration sites); (4) upland reuse, such as commercial fill; (5) landfill disposal; and (6) hazardous waste disposal options (if necessary). These disposal options are further described below, and listed in preferential order according to how well they support the County's objectives to minimize environmental impacts.

- **Option 1: On-site reuse or redistribution in the flood control channel.** This includes reusing the sediment on-site in the flood control channel, or redistributing the sediment from accumulated bars to other areas in the channel bottom within the same section of flood control channel that don't have deep sediment accumulation. For example, sediment excavated from the channel bottom could be placed adjacent to the active channel in a "bench" area to enhance soil, vegetation, and riparian habitat conditions. Sediment could also be used on-site for bank stabilization purposes (in areas with earthen banks). Such on-site use would need to be evaluated for any potential loss in channel conveyance capacity and flood management considerations. On-site sediment reuse may likely not be favorable based on flood management requirements.

- **Option 2: On-site reuse at the nearshore tidal wetlands at the Colma Creek mouth.** Under this approach, removed sediment from the flood control channel would be relocated for beneficial reuse at the tidal wetlands/marsh areas immediately downstream of the Colma Creek flood control channel, where the channel enters the Bay. Sediment would be evaluated and screened for its appropriate reuse at the wetlands/marsh area. Because the flood control sediments would, over time, eventually be delivered to the wetlands/marsh zone in the Bay – this approach attempts to echo natural sediment delivery and geomorphic processes. This approach also supports longer term climate change adaptation and coastal resiliency strategies which seek to enhance Bay wetlands and marsh areas with sediment as natural buffers to address future sea level rise.

- **Option 3: Off-site reuse at tidal wetland, channel, or floodplain sites around the Bay.** Option 3 beneficially reuses the sediment removed from the flood control channel at another tidal wetland, channel, or floodplain setting to support ecologic functioning, habitat enhancement, or sea level rise buffering. This approach is very similar to Option 2, but the sediment would be relocated off-site to another wetland or marsh area along the San Francisco Bay shoreline. Similar to Option 2, sediment type and quality would need to be screened for appropriate use. Additionally, logistic considerations of distance, cost, and potentially other permitting would also need to be evaluated for off-site reuse.

  Under this option, sediment could be used at an already approved and permitted restoration project. This is a specific case where an approved and permitted project requires the use of sediment to fill a wetland or enhance in-stream habitat. It is important to note that this sediment disposal plan in no way encourages or sanctions the filling of existing wetlands. However, for restoration projects that are already approved and permitted, it may be preferable to use sediment materials that share similar properties. In this way, using good quality excavated channel sediment for reuse in a wetland, channel, or floodplain setting may be preferable or advantageous to using other fill material or soils. An example of a pre-approved restoration site is the Hamilton/Bel Marin Keys Wetlands Restoration Project in Marin County or the Eden Landing portion of the South Bay Salt Ponds Restoration effort.

- **Option 4: Agricultural or commercial reuse (dry upland sites).** Under this option, sediment would be reused for upland agricultural or commercial uses that are dry, whereby the sediment would not be secondarily eroded to stream channels or water bodies. Demand for dry sediment is high, particularly for use as soil amendment for agricultural crops, construction of foundation pads for buildings or structures, or permanent fill of pits or to land leveling. The availability and demand for such sediment use in other upland areas in San Mateo County would need to be evaluated.

- **Option 5: Landfill disposal.** In this option, the sediment would be disposed at an approved and operating landfill for use as daily cover material for landfill operations. The nearest operating landfill is the Ox Mountain Sanitary Landfill located three miles east of Half Moon Bay on Highway 92.

- **Option 6: Hazardous waste disposal.** This option is for sediments containing hazardous levels of contaminants. Hazardous waste will be disposed at appropriate hazardous waste facilities. The nearest landfill that accepts hazardous waste is located in Kettleman City, California.

Based on the volume of sediment to be removed from the flood control channel, and its type and quality, these six options would be considered. The preference is to select disposal options that most beneficially reuse the sediment with the least environmental impacts.

As discussed further below, sediment quality is a key driver in selecting appropriate sediment reuse or disposal options. Option 1 minimizes potential impacts in that the sediment would be reused and redistributed in the channel. However, as described above, it is likely that such on-site reuse would be limited due to flood management requirements for channel capacity. Option 2 may then be the next most environmentally suitable strategy, depending on the amount of sediment removed from the channel, as the approach is consistent with longer term geomorphic goals of delivering sediment to the Bay, and longer term strategies to preserve marsh habitats in light of sea level rise. Off-site reuse at other tidal wetland/marsh areas may be limited by costs associated with hauling distances, but may provide more ecologic benefits at a different site. Off-site disposal at agricultural, commercial, or landfill locations would likely be allowable for the majority of channel sediment disposal from an urban watershed like Colma Creek that may have anthropogenic contaminants. Option 6 would only be used if Colma Creek sediment is deemed hazardous.

The specific reuse or disposal approach for a given sediment removal maintenance project would be identified and clarified as part of the channel maintenance planning process. Any sediment reuse or disposal option would require review and approval by the RWQCB, and other federal and state agencies as applicable, prior to conducting sediment removal activities. This process is further described below.

3. Sediment Reuse and Disposal Approval Process

Sediment identified for removal will require sampling and testing to better understand its quality and the potential presence of pollutants. All sediment samples will be analyzed according to the forthcoming conditions of the RWQCB Waste Discharge Requirements issued for the maintenance work. The list of required sampling parameters/analytes may be modified after a history of sampling is obtained. Because sediment testing is very costly, the County in coordination with the RWQCB, may identify that some tests may not be necessary.

Analytes tested will vary depending on the proposed reuse of the sediment as follows:

- If sediment is reused or redistributed on-site (Option 1), no testing is required because it is assumed the sediment quality would not change from existing conditions.
- If sediment is reused at wetland, marsh, or floodplain locations where the newly placed sediment would be in contact with a water body (Options 2 and 3), analysis would be conducted according to the "wetland surface" testing requirements stated in the *Beneficial Reuse of Dredged Materials: Sediment Screening and Testing Guidelines* (RWQCB 2000). Required analysis includes sediment chemistry and acute toxicity testing.
- If sediment is reused for upland agricultural or commercial use where sediment would be permanently removed from the system (i.e., there would be no contact with water bodies), then sediment chemical contaminant concentrations would be tested according to the "wetland foundation, levee, and construction fill" requirements stated in the *Beneficial Reuse of Dredged Materials: Sediment Screening and Testing Guidelines* (See Attachment 4-1, RWQCB 2000). Required analysis includes sediment chemistry analytes listed in Table 5 of Attachment 4-1, RWQCB (2000).
- If sediment is taken to a landfill for use as cover material or to an off-site restoration project, sediment quality testing would be conducted as required by RWQCB permits issued to those sites and in compliance with California Department of Toxic Substances Control (DTSC) waste acceptance regulations.
- Sediment exhibiting levels in the hazardous range, as defined by the DTSC, would be taken to a permitted hazardous waste facility.

4. Other Sediment Sampling and Reporting Details

In general, samples will be taken from the finest sediment at a sampling site and every attempt will be made to collect sediments that are representative of the materials to be removed. Most contaminants are associated with fine-grained sediment, and it is therefore important that some of the samples contain the finest sediment that is present at a given project site. Fine sediments include mud, silts, and finer sandy materials. A suitable field test for grain size is to rub sediments between the fingers: finer sediments will feel smooth, whereas coarser sediments will be gritty (SWRCB 2008).

Laboratory results will be reviewed and compared to the most current federal and state sediment quality guidelines and objectives. These may include threshold values for freshwater sediment published in NOAA Quick Screening Reference Tables (aka SQuiRT) (NOAA 2008), guidance in the *Beneficial Reuse of Dredged Materials: Sediment Screening and Testing Guidelines* (Attachment 4-1, RWQCB 2000), RWQCB Basin Plan Water Quality Objectives (RWCQB 2010), the *Water Quality Control Plan for Enclosed Bays and Estuaries – Part I Sediment Quality* (SWRCB 2009), the recently released RWQCB Environmental Screening Levels (ESLs) for sites with contaminated soil (RWQCB 2013), and California Human Health Screening Levels (CHHSLs) for soil from the state Office of Environmental Health Hazard Assessment (OEHHA 2010).

The County will submit the complete set of laboratory reports to the regulatory agencies, along with a narrative report interpreting the results in comparison with the approaches described above. The County will maintain records of field sampling methods, locations, depths, analysis, and results.

Any observed contamination as evidenced by chemical-like odors, oily sheens, or irregularly colored sediment would be immediately reported to the local fire department's hazardous materials team and the appropriate RWQCB staff person in the Cleanups and Investigations Unit. The RWQCB will direct the County on how to handle and remove potentially hazardous sediment. In addition, if sediment test results are found to exceed water quality criteria, the County will coordinate with the RWQCB to develop an action plan to properly handle and dispose of the sediment. Under the guidance of the RWQCB, the sediment removal activity may proceed according to the action plan or the maintenance activity may not be conducted.

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Attachment 4-1

Draft Staff Report

Beneficial Reuse of Dredged Materials: Sediment Screening and Testing Guidelines

May 2000

For Planning Purposes Only

This document is for planning uses and the determination of general suitability of dredged material for beneficial reuse projects. The permits needed for beneficial reuse of dredged material will be based on site-specific conditions.

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Executive Summary

In this staff report, we present guidelines for testing requirements and evaluation of test results for the placement of dredge materials in beneficial reuse environments. The beneficial reuse options addressed are: wetland creation and restoration, levee maintenance, construction fill, and daily cover at sanitary landfills. This document updates a previous San Francisco Bay Regional Water Quality Control Board document (SFBRWQCB, 1992) and contains updated information on ambient concentrations of contaminants in San Francisco Bay sediments and updated biological effects concentrations (ER-Ls and ER-Ms). This report proposes screening values based on sediment and elutriate chemistry and acute toxicity characteristics and the potential for leaching of contaminants from dredged material after placement. We also propose the use of fine-grained reference sediments for biological testing. These guidelines are based on the Regional Board's current understanding of the appropriate physical, chemical and biological quality requirements of dredge materials for various beneficial reuse placement options.

This document establishes screening values to be used to make general suitability determinations (that is, not specific to a particular reuse project) for the reuse of dredged material in beneficial environments, in the absence of specific criteria that may be defined as part of the permitting process for beneficial reuse projects. Compliance with the screening values does not by itself indicate that any particular dredged material will be found suitable for reuse. In addition, compliance with the screening values and a general suitability determination do not circumvent the need for site-specific permits for each reuse project. Those permits may have more (or less) stringent "acceptance criteria" depending on the site-specific conditions.

Table 1 summarizes the testing framework and screening guidelines recommended in this document.

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1 Introduction

This document establishes screening values that will be used by San Francisco Bay Regional Water Quality Control Board (Regional Board) staff when evaluating the suitability of dredged material for beneficial reuse projects. It also provides guidance to project proponents on appropriate sediment testing to support suitability determinations. Suitability determinations are based on best professional judgment, using a preponderance of evidence approach. Therefore, compliance with the screening values does not by itself indicate that dredged material will be found suitable for beneficial reuse. In addition, compliance with the screening values does not circumvent the requirement for site-specific permits for each reuse project. Such permits may have more (or less) stringent "acceptance criteria" depending on the site-specific conditions. This document is intended to assist in planning beneficial reuse projects by establishing general screening guidelines and general sediment testing requirements for beneficial reuse projects. Beneficial reuse project proponents are encouraged to coordinate with agency staff and other interested parties early in the project planning process.

This document considers wetland and upland beneficial reuses of dredged material. Wetland reuse is the use of dredged materials to restore appropriate elevations to subsided diked baylands or other areas in order to create tidal wetlands. Upland reuses include levee maintenance, construction fill, and landfill daily cover.

Since 1992, testing of dredged materials for proposed beneficial reuse projects has followed recommendations in Regional Board Resolution No. 92-145, *Sediment Screening Criteria and Testing Requirements for Wetland Creation and Upland Beneficial Reuse* (SFBRWQCB, 1992). Resolution 92-145 was published to establish screening criteria for the beneficial reuse of dredged sediments in the San Francisco Bay area, especially for the creation and restoration of wetland habitats. The recommended screening criteria in Resolution 92-145 were based on 1992 estimates of ambient chemical concentrations in sediments and soils, and on the National Oceanographic and Atmospheric Administration's (NOAA) effects-based sediment concentrations of chemical constituents of concern (Long et. al., 1988; Long and Morgan, 1990; Shacklette and Boerngen, 1984). Since the publication of Resolution 92-145, the Regional Board has published new data on ambient chemical concentrations, and NOAA has revised the effects-based concentrations (Long et. al., 1995). The Regional Board has also published new data on reference sediment toxicity conditions of San Francisco Bay sediments (SFBRWQCB, 1998a and 1998b). Several other organizations have published ambient concentrations

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of metals in California soils (Bradford et. al., 1996; LBNL, 1995). The Regional Board's evolving understanding of ambient concentrations and toxicity, and effects-based guidelines called for a revision of Resolution 92-145. This document presents an update of Resolution 92-145 incorporating the Regional Board's and NOAA's new data.

Other recent documents related to dredging and dredged material disposal in San Francisco Bay include:

- *Evaluation of Dredged Material Proposed for Discharge in Waters of the U.S. - Testing Manual* (USEPA and USACE, 1998) also known as the Inland Testing Manual or ITM
- Dredged Material Management Office (DMMO) Public Notice 01-01, "Guidelines for Implementing the Inland Testing Manual in the San Francisco Region"
- U.S. Army Corps of Engineers Public Notice 99-4, "Proposed Guidance for Sampling and Analysis Plans (Quality Assurance Project Plans) for Dredging Projects within the USACE San Francisco District"
- *Long Term Management Strategy for the Placement of Dredged Material in the San Francisco Bay Region – Final Policy Environmental Impact Statement/Programmatic Environmental Impact Report* (LTMS, 1998)
- *Long Term Management Strategy for the Placement of Dredged Material in the San Francisco Bay Region – Record of Decision* (USEPA and USACE, 1999).

The Long Term Management Strategy EIS/EIR (LTMS, 1998) and Record of Decision (USEPA and USACE, 1999) identified the preferred alternative for long-term management of dredged material disposal to be minimization of dredged material disposal in San Francisco Bay, with increased use of the ocean disposal site and beneficial reuse of dredged material. The goal is to reduce aquatic disposal within San Francisco Bay to 20% of the historical average annual dredging volume and to increase both ocean disposal and beneficial reuse to 40% of the historical average annual dredging volume. Potential beneficial reuses of dredged material are wetland restoration, levee repair and landfill daily cover. Several efforts to increase beneficial reuse of dredged material in the San Francisco Bay area are currently being planned. This document is intended to facilitate those planning efforts by indicating the kinds of information Regional Board staff will typically use in reviewing beneficial reuse projects.

The screening values included in this document are guidelines and may be modified by Regional Board staff on a case-by-case basis. These screening values are not intended as cleanup goals, acceptance

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criteria or screening values for other types of projects, although some of the data and reasoning used in this document may be applicable to other types of projects involving potentially contaminated sediments. This document does not provide information on obtaining permits for upland and wetland reuse projects, but typically information regarding the disposal and reuse of dredged material can be obtained from the Dredged Material Management Office (DMMO)[1] or the Regional Board[2].

The potential routes of exposure to non-human biological receptors considered by the screening guidelines are:

- direct exposure to sediments
- exposure to effluent from sediments during placement of material at reuse site, and
- exposure to leachate after material placement.

These screening guidelines do not address human exposure. While most of the chemical screening values are below levels of concern for human health (e.g., EPA Region IX Preliminary Remediation Goals), some of the constituents can cause adverse impacts to humans with long-term direct contact. If long-term human contact is expected, the screening guidelines presented here may not be appropriate.

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[2] Point of contact is Elizabeth Christian, Regional Board, (510) 622-2335, echristian@waterboards.ca.gov

2 Beneficial Reuse Options

Potential beneficial reuses of dredged material were identified in the LTMS EIS/EIR (LTMS, 1998) as habitat development, levee maintenance and rehabilitation, construction fill, and daily cover at existing sanitary landfills. The most common form of habitat development using dredged material is the creation or restoration of tidal wetlands.

Wetland Creation and Restoration

Wetland projects using dredged material from the San Francisco Bay Region usually involve creation or restoration of wetland habitat in areas that have been previously diked and drained. For such projects, the dredged material is used to restore proper elevations for subsided land, cover unsuitable substrate, or to create favorable drainage patterns.

This document makes a distinction between surface and foundation materials (see below).

Wetland Surface Material

Wetland surface material is dredged material placed in the biotic zone during a wetland creation or restoration project. This material is in contact with wetland flora and fauna. Screening guidelines for surface material are intended to be protective of the most sensitive potential biological receptors in a wetland environment that are exposed to sediments, effluent discharge during material placement, and leachate after material placement.

Wetland Foundation Material

Foundation material is dredged material used in a wetland creation or restoration project that is covered by surface material. This material is not in contact with wetland flora and fauna. Foundation material has a potential for biological effects if directly exposed to organisms, so it must be placed in a manner that will isolate it from biological receptors. The maximum depth of biological activity in wetlands is conservatively estimated at three feet, and thus surface material must be at least three feet thick when overlaying foundation material. Project proponents are encouraged to maximize surface material thickness. Considerations for the placement of foundation materials include: depth of the root zone, burrowing depth of fauna, potential for future erosion of the site, and potential mobility of chemicals of concern in the foundation material. Although biological receptors will not be directly exposed to foundation material, leachate from the material may be mobile and reach the biotic zone.

The screening guidelines placed on foundation material are intended to protect biological receptors that may be exposed to effluent discharge during material placement and leachate after placement, and to minimize adverse environmental effects if the foundation material were to become exposed to the surface environment.

Beneficial Reuse at Upland Sites

Upland reuse of dredged material includes levee maintenance, construction fill, and use as daily cover at sanitary landfills. These options often require a rehandling facility prior to final reuse.

Levee Maintenance and Construction Fill

Dredged material, after drying, may be appropriate for use in levee maintenance projects and as fill for construction projects. Usually material used for these purposes will not be in contact with biological receptors. Screening guidelines for these uses are designed to protect biological receptors that may be exposed to effluent discharge during material placement and leachate after placement.

Landfill Daily Cover

Dredged material may be appropriate for use as daily cover at landfills. Title 23, Chapter 15, and Title 27, Chapter 3 of the California Code of Regulations regulate disposal of materials in landfills. The Regional Board issues permits to each landfill; these permits define testing requirements and acceptability criteria for material. The testing and screening guidelines in this document will aid in planning for reuse of material at landfills, but specific requirements of individual landfills must also be consulted.

Rehandling facilities

In many cases, dredged materials taken to upland locations are dried either at the final placement site or a rehandling facility. Other types of treatment, such as mixing with other soils, sediments or cements can be done at a rehandling facility to improve geotechnical or agricultural properties, or to immobilize contaminants.

Rehandling facilities must be authorized by all appropriate regulatory agencies. Authorization from the SFBRWQCB will include requirements and prohibitions on discharges from such facilities to protect aquatic resources.

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3 Screening Guidelines for Beneficial Reuse of Dredged Material

There are two basic levels of screening guidelines for beneficial reuse of dredged material: screening guidelines for wetland surface material, and screening guidelines for wetland foundation material. Dredged material that meets the screening guidelines for wetland surface material is likely to be found suitable for that use as well as for all the other categories of beneficial reuse discussed in this paper. Dredged material that does not meet the screening guidelines for wetland surface material but does meet the guidelines for wetland foundation material is likely to be found suitable for wetland foundation use, as well as for levee maintenance, construction fill, and landfill daily cover.

The screening guidelines include consideration of sediment and sediment elutriate chemistry, mobility of contaminants, and results of acute toxicity bioassays for sediments and sediment elutriate. Each of these considerations is discussed below.

Sediment Chemistry

Screening values for sediment chemistry are based on ambient levels of contaminants in San Francisco Bay sediments and on sediment concentrations of contaminants that are predicted to cause biological effects. The ambient concentrations for San Francisco Bay sediments were statistically derived from data collected by the Regional Monitoring Program for Trace Substances (San Francisco Estuary Institute, 1999) and the Bay Protection and Toxic Substances Cleanup Program Reference Study (State Water Resources Control Board, 1998), and are listed in Table 2. Several databases have been developed in order to predict the levels of sediment chemistry that have a high or low probability of causing adverse biological effects. Long et al. (1995) used the extensive sediment chemistry and toxicity database of the National Oceanographic and Atmospheric Administration (NOAA) to determine levels of sediment chemistry below which biological effects are unlikely (Effects Range-Low or ER-L) and levels above which biological effects are likely (Effects Range-Median or ER-M). The Florida Department of Environmental Protection (FDEP, 1994) has also developed sediment chemistry values below which biological effects are unlikely (Threshold Effects Levels or TELs) and above which biological effects are likely (Probable Effects Levels or PELs). Table 3 lists these biological effects-based numbers.

For wetland surface material, screening values for sediment chemistry are based primarily on ambient sediment chemistry levels (SFBRWQCB, 1998) for San Francisco Bay. The ambient values are chosen for the upper screening value for Wetland Surface Reuse for two reasons. First, ambient values for San

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Francisco Bay are generally less than ER-L values and so are unlikely to cause adverse biological effects. Where San Francisco Bay ambient values exceed ER-Ls (for nickel and chromium) these values have not been found to be associated with adverse biological effects during local testing of dredged sediments. Second, since any restored tidal wetland will eventually take on the characteristics of the ambient sediments in nearby areas of the open bay, efforts to restore the wetland with sediments that are "cleaner" than ambient conditions, may be a waste of resources.

For wetland foundation material, screening values for sediment chemistry are based on levels of chemicals that are believed to be protective of biological receptors. The values where biological effects are likely are the upper screening levels for Wetland Foundation Reuse, with the ER-Ms (where available) taking precedence over the PELs, since the NOAA values were derived using data from the San Francisco Bay area. The sediment screening values for Wetland Foundation Reuse are based on ER-Ms in most cases, except that PEL values are used for chemicals with no published ER-M value. Sediments with these chemical characteristics would be unlikely to adversely impact organisms of San Francisco Bay, if the foundation material were inadvertently uncovered.

Table 4 summarizes the screening guidelines for sediment chemistry for wetland surface and foundation materials.

Acute Toxicity of Sediments

The acute toxicity screening guideline for benthic bioassays for wetland cover material is no significant toxicity. Benthic tests are interpreted following the guidelines in Public Notice 01-01. For benthic bioassays, mortality in a test sediment that is statistically significant and 10 percentage points greater (20 percentage points for amphipods) than that in the reference is considered to be indicative of acute toxicity.

There are no screening guidelines for acute toxicity in benthic bioassays for wetland foundation material because this material is not expected to be in contact with biological receptors.

Contaminant Mobility

There are no screening levels for contaminant mobility for wetland surface material, because this material will be in direct contact with biological receptors. If levels of contaminants are at or below ambient levels for the Bay, and sediments do not cause toxicity, then mobility of contaminants is not of concern.

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The screening levels for wetland foundation material are based on local Water Quality Objectives found in the Basin Plan (SFBRWQCB, 1995, or current edition). While this material is not expected to be in direct contact with biological receptors, levels of contaminants in effluent discharged during material placement, in leachate produced after material placement (as described in Section 4, measured with the modified Waste Extraction Test, using deionized water or disposal site water as the extractant) must be below levels of concern. When chemicals are shown to be potentially mobile, placement of the dredged material in a subsurface environment may not be suitable depending on the water quality objectives for the receiving water. This will ensure that any chemical constituents mobilized at the disposal site will only be at concentrations below levels of concern.

Elutriate Chemistry and Toxicity

If dewatering will occur at the beneficial reuse site as part of material placement, discharged water must meet screening guidelines for both chemistry and toxicity. The screening guidelines for discharged water chemistry are the Water Quality Objectives listed in the current version of the Basin Plan. The screening guideline for toxicity is no significant toxicity. For the elutriate bioassay, this is met when the survival of organisms in effluent has a median value of not less than 90%, and a 90^{th} percentile value of not less than 70% survival.

Suitability determinations - Wetland Surface Reuse

Dredged materials that meet the screening guidelines described above for wetland surface reuse are likely to be found suitable for this use, as well as for all the other uses described in this paper, subject, of course, to any project-specific limitations.

Suitability determinations - Wetland Foundation Reuse

Dredged materials with statistically significant toxicity in one or more bioassays, may be found suitable for Wetland Foundation Reuse if the material passes the screens for sediment chemistry and contaminant mobility. Reuse of such materials will be limited (by reuse site permitting) to locations that are designed to eliminate the threat of exposure. A wetland restoration design should include at least three feet of material suitable for Wetland Surface Reuse (or equivalent safeguards) and placement of the material in a location that is not threatened by erosion.

Suitability determinations - Other reuses

Material that is suitable for Wetland Foundation Reuse would be suitable for upland reuses where the

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leaching characteristics are not more aggressive than those modeled with the leachability test used and where direct human contact with the material has been evaluated or eliminated. While most of the chemical screening values for Wetland Foundation Reuse are below levels of concern for human health (e.g.EPA Region IX Preliminary Remediation Goals, or PRGs), some of the constituents have ambient concentrations greater than residential PRGs (e.g. arsenic). While this human health exposure is not an issue for sediments placed in wetlands or dispersed in the waters of the Bay, it could be an issue if the sediments are used where humans will have continual contact (e.g. residential property or recreational property). Placement of dredged material in other environments shall be addressed on a site specific basis.

Citrate WET test results need to be screened with soluble threshold limit concentrations (STLC) or other landfill-specific criteria.

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4 Testing Guidelines

In order to facilitate the beneficial reuse of dredged material as much as possible, in accordance with the goals of the LTMS, we have tried to develop a sediment evaluation framework similar to those in place for sediments proposed for ocean and in-Bay disposal. This similarity in testing guidelines should enable project applicants testing sediments for in-Bay or ocean disposal to also generate information necessary to evaluate beneficial reuse as a disposal option without excessive additional testing costs. Dredging project proponents are encouraged to coordinate sediment testing to allow for evaluation of sediments for beneficial reuse options in addition to evaluation for aquatic disposal options, unless beneficial reuse options have been determined to be unavailable or impracticable.

In preparing and implementing sediment sampling plans, project proponents should refer to Public Notices 01-01 and 99-4 for more specific guidance on sampling, analysis and reporting than is contained in this document. Project proponents may also wish to refer to the ITM and the Green Book (USACE/USEPA, 1991) for background information on sediment evaluation frameworks.

The testing guidelines below (summarized in Figure 1) should provide sufficient information to make general suitability determinations for beneficial reuse options, but Regional Board staff may consider other testing programs. For some beneficial reuse projects different or additional testing may be required because of site-specific conditions or concerns.

Wetland Surface Material

As described in Section 3, the screening guidelines for upland surface material are based on sediment chemistry and toxicity, and, in the event of effluent discharge, on effluent chemistry and toxicity. Testing programs intending to evaluate sediments for this use should provide information sufficient to evaluate these characteristics.

Sediment chemistry analyses should include the analytes listed in Table 5. For further information on appropriate methods, detection limits, and QA/QC procedures, see the guidance provided in Public Notice 01-01.

Sediment toxicity assessment may be performed with two 10-day acute toxicity bioassays, using appropriate sensitive organisms representing three benthic life history stages (filter-feeding, burrowing, and deposit feeding). Testing protocol and QA/QC procedures should follow those outlined in Public Notice 01-01.

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If placement of the dredged material at the reuse site will include the discharge of effluent from the placement site, the testing program must provide information to characterize sediment elutriate chemistry and toxicity. Elutriate chemistry may be characterized by measuring the analytes listed in Table 5 for sediment elutriate, using appropriate methods, detection limits, and QA/QC procedures. The biological tests for elutriate toxicity testing recommended in Public Notice 01-01 (including protocols and QA/QC procedures) may be used to characterize effluent toxicity.

Wetland Foundation Material

Screening guidelines for wetland foundation material are based on sediment chemistry and leaching characteristics of the sediments. The testing program for sediments proposed for this disposal option should provide sufficient information to evaluate these characteristics.

Evaluation of sediment chemistry as described above in the section on wetland surface material should provide sufficient information to evaluate this characteristic.

Evaluation of the leaching characteristics of proposed dredged sediments may be performed using a modified Waste Extraction Test (WET), as defined in the Title 23 of the California Code of Regulations, using either de-ionized water or water from the proposed reuse site for the extraction.

If water is to be discharged from the beneficial reuse site during material placement, the chemistry and toxicity of sediment elutriate should be evaluated. See the discussion under "Wetland Surface Material," above, for suggested methods.

Tiered Testing

In order for dredged material to be found suitable for use in a particular beneficial reuse project, compliance with the screening guidelines above should be demonstrated. In many cases, it may be appropriate to approach sediment characterization in a tiered fashion, similar to that promulgated in the federal guidance for evaluating material suitability for in-Bay and ocean disposal. A tiered testing framework is intended to match the level of testing to the degree of uncertainty about the potential environmental impacts of reuse of dredged material in a particular environment. Project proponents may propose a tiered approach to sediment evaluation in sediment Sampling and Analysis Plans. The steps for testing shown in Figure 1, for example, may be the basis of a tiered testing framework.

Use of Previously Collected Data

Data from previous sampling events and site history will be considered when suitability determinations

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are made. These data should be made available to the regulatory agencies, preferably included in the sediment Sampling and Analysis Plan. If sufficient data from previous testing exist to make a suitability determination, further testing may not be required, or a modified testing protocol may be recommended. This is analogous to a “Tier I” exclusion from testing used in some instances for in-Bay and ocean disposal suitability determinations.

Reference Sediments for Benthic Bioassays

Evaluation of acute toxicity bioassays requires comparison of results with results from bioassays run using reference sediment. The reference sediment must have similar physical characteristics as the dredged material, i.e. particle size distribution, organic carbon content and salinity. In-bay disposal has usually required the use of a reference from the Alcatraz “Environs” stations. These sediments are coarse grained, whereas much of the dredged material from the San Francisco Bay is fine grained. As part of the BPTCP, fine-grained reference sediments were investigated (SWRCB, 1998). These reference sediments are more typical of the physical parameters of the majority of dredged material in San Francisco Bay. Based on these studies, two fine-grained reference sites are recommended as sources of reference sediments for biological testing of fine-grained dredged material for beneficial reuse environments. Locations and physical and chemical properties of the fine-grained reference sites are presented in Table 6.

Design of Sampling Plan and Reporting Guidelines

Public Notice 01-01 provides important guidance on sampling program design, including issues such as sample locations, compositing, and frequency. Public Notice 99-4 provides guidance to dredging project proponents on Sampling and Analysis Plans and on reporting test results. Project proponents proposing beneficial reuse of dredged material should consult both these documents when designing a sediment sampling program.

Sampling and Analysis Plans for sediment testing should be submitted to the DMMO for approval prior to commencing sediment sampling. Results reports should also be submitted to the DMMO. The DMMO will make recommendations to the respective member agencies regarding the suitability of the sediments for the proposed placement environment(s), according to the current Memorandum of Understanding signed by the DMMO member agencies.

As with any data acquisition activity, setting data quality objectives prior to dredged material sampling and testing is critical to a successful project.

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The recommended minimum number of sediment samples for dredging projects is presented in Table 7, which is based on Public Notice 01-01. The number of samples collected is based on the volume of each dredging project. Sampling frequency may differ on a site-specific basis, and the rationale for deviation should be clearly stated in the SAP.

A successful dredging and beneficial reuse project requires good documentation. The minimum documentation will include:

- a SAP following DMMO guidance, including appropriate QA/QC protocols (Public Notice 99-4);
- a report of dredged materials testing results following DMMO guidance (Public Notice 99-4); and
- a post-dredging report (which should include the location where the dredged material was reused or disposed and documentation of any restrictions on the use of the material or monitoring requirements).

Disclaimer: The above screening values are used as guidelines only. The weight of evidence of all data may result in different interpretation of the results in case specific projects. This document is for planning uses and the determination of general suitability of dredged material for beneficial reuse. The permits needed to reuse or dispose of dredged material in beneficial reuse projects will be based on site-specific conditions.

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Tables

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Table 1: Summary of Recommended Testing and Screening Guidelines

Beneficial reuse environment	**Potential routes of exposure for non-human biological receptors**	**Recommended chemistry test**	**Recommended bioassays**	**Recommended leachate chemistry**	**Screening guidelines for:** 1) chemistry 2) toxicity 3) leachate chemistry
Wetland surface	Direct exposure to sediments	Sediment chemistry for analytes in Table 5	Two benthic species covering three life history stages, see PN 01-01 DMMO "Guidelines for Implementing the Inland Testing Manual in the San Francisco Region"	None	1) ambient or ER-L concentrations for sediment, WQOs for effluent elutriate 2) no significant toxicity 3) not applicable
Wetland foundation, levees, and construction fill	Potential but unlikely direct exposure to sediments On-site exposure to leachate after placement	Sediment chemistry for analytes in Table 5	None	Modified WET	1) ER-M or PEL 2) not applicable 3) Basin Plan WQO's
Landfill daily cover	No exposure	Testing and acceptability criteria specific to each landfill; contact individual landfills for requirements.			
Any project involving discharges from dewatering dredged material	Receiving waters exposed to effluent discharge during placement	Elutriate chemistry for analytes in Table 5	One species sediment elutriate bioassay	Not Applicable	1) Basin Plan WQO's 2) no significant toxicity 3) not applicable

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Table 2: Ambient Concentrations of Analytes in San Francisco Bay Sediments (Page 1 of 2)

Analyte	S.F. Estuary Sediment Ambient Concentrations	
	<40 % fines	<100 % fines
METALS (mg/kg)		
Arsenic	13.5	15.3
Cadmium	0.25	0.33
Chromium	91.4	112
Copper	31.7	68.1
Lead	20.3	43.2
Mercury	0.25	0.43
Nickel	92.9	112
Selenium	0.59	0.64
Silver	0.31	0.58
Zinc	97.8	158
PESTICIDES AND PCBs (µg/kg)		
Aldrin	0.42	1.1
Chlordane	0.18	0.44
Chlordanes, total	0.42	1.1
Dieldrin	0.18	0.44
Endrin	0.31	0.78
HCH, total	0.31	0.78
DDTS, total of 6 isomers	2.8	7
PCBs, total	5.9	14.8
PCBs, total (SFEI 40 list)	8.6	21.6

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Table 2: Ambient Concentrations of Analytes in San Francisco Bay Sediments (Page 2 of 2)

Analyte	S.F. Estuary Sediment Ambient Concentrations	
	<40 % fines	<100 % fines
POLYCYCLIC AROMATIC HYDROCARBONS (μg/kg)		
PAHs, total	211	3390
High molecular weight PAHs, total	256	3060
Low molecular weight PAHs, total	37.9	434
1-Methylnaphthalene	6.8	12.1
1-Methylphenanthrene	4.5	31.7
2,3,5-Trimethylnaphthalene	3.3	9.8
2,6-Dimethylnaphthalene	5	12.1
2-Methylnaphthalene	9.4	19.4
2-Methylphenanthrene	11.3	26.6
Acenaphthene	2.2	31.7
Acenaphthylene	11.3	26.6
Anthracene	9.3	88
Benz(a)anthracene	15.9	244
Benzo(a)pyrene	18.1	412
Benzo(b)fluoranthene	32.1	371
Benzo(e)pyrene	17.3	294
Benzo(g,h,i)perylene	22.9	310
Benzo(k)fluoranthene	29.2	258
Biphenyl	6.5	12.9
Chrysene	19.4	289
Dibenz(a,h)anthracene	3	32.7
Fluoranthene	78.7	514
Fluorene	4	25.3
Indeno(1,2,3-c,d)pyrene	19	382
Naphthalene	8.8	55.8
Perylene	24	145
Phenanthrene	17.8	237
Pyrene	64.6	665

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Table 3: Selected Biological Effects-Based Concentrations of Analytes in Sediments (Page 1 of 2)

ANALYTE	ER-L 1995	ER-M 1995	TEL	PEL
METALS (mg/kg)				
Arsenic	8.2	70	7.24	41.6
Cadmium	1.2	9.60	0.676	4.21
Chromium, total	81	370	52.3	160
Copper	34	270	18.7	108
Lead	46.7	218	30.2	112
Mercury	0.15	0.71	0.13	0.696
Nickel	20.9	51.6	15.9	42.8
Selenium				
Silver	1	3.7	0.733	1.77
Zinc	150	410	124	271
PESTICIDES AND PCBs (µg/kg)				
Aldrin				
Chlordane			2.26	4.79
Chlordanes, total				
Dieldrin			0.715	4.3
Endrin				
Heptachlor				
Hexachlorocyclohexane-delta				
Hexachlorocyclohexane-gamma (Lindane)			0.32	0.99
HCB, total				
Methoxychlor				
Mirex				
Toxaphene				
p,p'-DDD (or DDD ?)			1.22	7.81
p,p'-DDE (or DDE ?)	2.20	27	2.07	374
p,p'-DDT (or DDT ?)			1.19	4.77
DDTS, total of 6 isomers	1.58	46.1	3.89	51.7
PCBs, total	22.7	180	21.6	189
PCBs, total (SFEI 40 list)				

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Table 3: Selected Biological Effects-Based Concentrations of Analytes in Sediments (Page 2 of 2)

ANALYTE	ER-L 1995	ER-M 1995	TEL	PEL
ACID/BASE NEUTRALS (µg/kg)				
Bis(2-ethylhexyl) phthalate			182	2,647
Dibenzofuran				
Di-n-butyl phthalate				
Hexachlorobenzene (HCB)				
Phthalates, total				
POLYCYCLIC AROMATIC HYDROCARBONS (µg/kg)				
PAHs, total	4,022	44,792	1,684	16,770
High molecular weight PAHs, total	1,700	9,600	655	6,676
Low molecular weight PAHs, total	552	3,160	312	1,442
1-Methylnaphthalene				
1-Methylphenanthrene				
2,3,5-Trimethylnaphthalene				
2,6-Dimethylnaphthalene				
2-Methylnaphthalene	70	670	20.2	201
2-Methylphenanthrene				
3-Methylphenanthrene				
Acenaphthene	16	500	6.71	88.9
Acenaphthylene	44	640	5.87	128
Anthracene	85.3	1,100	46.90	245
Benz(a)anthracene	261	1,600	74.8	693
Benzo(a)pyrene	430	1,600	88.8	763
Benzo(b)fluoranthene				
Benzo(g,h,i)perylene				
Benzo(k)fluoranthene				
Biphenyl				
Chrysene	384	2,800	107.8	846
Dibenz(a,h)anthracene	63.4	260	6.22	135
Fluoranthene	600	5,100	113	1494
Fluorene	19	540	21.2	144
Indeno(1,2,3-c,d)pyrene				
Naphthalene	160	2,100	34.6	391
Perylene				
Phenanthrene	240	1,500	86.7	543.5
Pyrene	665	2,600	153	1,398

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Table 4: Recommended Sediment Chemistry Screening Guidelines for Beneficial Reuse of Dredged Material

ANALY **Table 4:** Recommended Sediment Chemistry Screening Guidelines for Beneficial Reuse of Dredged TE	Wetland Surface Material		Wetland Foundation Material	
	Concentration	**Decision Basis**	**Concentration**	**Decision Basis**
METALS (mg/kg)				
Arsenic	15.3	Ambient Values	70	ER-M
Cadmium	0.33	Ambient Values	9.6	ER-M
Chromium	112	Ambient Values	370	ER-M
Copper	68.1	Ambient Values	270	ER-M
Lead	43.2	Ambient Values	218	ER-M
Mercury	0.43	Ambient Values	0.7	ER-M
Nickel	112	Ambient Values	120	
Selenium	0.64	Ambient Values		
Silver	0.58	Ambient Values	3.7	ER-M
Zinc	158	Ambient Values	410	ER-M
ORGANOCHLORINE PESTICIDES/PCBS (μg/kg)				
DDTS, sum	7.0	Ambient Values	46.1	ER-M
Chlordanes, sum	2.3	TEL	4.8	PEL
Dieldrin	0.72	TEL	4.3	PEL
Hexachlorocyclohexane, sum	0.78	Ambient Values		
Hexachlorobenzene	0.485	Ambient Values		
PCBs, sum	22.7	ER-L	180	ER-M
POLYCYCLIC AROMATIC HYDROCARBONS (μg/kg)				
PAHs, total	3,390	Ambient Values	44,792	ER-M
Low molecular weight PAHs, sum	434	Ambient Values	3,160	ER-M
High molecular weight PAHs, sum	3,060	Ambient Values	9,600	ER-M
1-Methylnaphthalene	12.1	Ambient Values		
1-Methylphenanthrene	31.7	Ambient Values		
2,3,5-Trimethylnaphthalene	9.8	Ambient Values		
2,6-Dimethylnaphthalene	12.1	Ambient Values		
2-Methylnaphthalene	19.4	Ambient Values	670	ER-M
Acenaphthene	26.0	Ambient Values	500	ER-M
Acenaphthylene	88.0	Ambient Values	640	ER-M
Anthracene	88.0	Ambient Values	1,100	ER-M
Benz(a)anthracene	412	Ambient Values	1,600	ER-M
Benzo(a)pyrene	371	Ambient Values	1,600	ER-M
Benzo(e)pyrene	294	Ambient Values		
Benzo(b)fluoranthene	371	Ambient Values		
Benzo(g,h,i)perylene	310	Ambient Values		
Benzo(k)fluoranthene	258	Ambient Values		
Biphenyl	12.9	Ambient Values		
Chrysene	289	Ambient Values	2,800	ER-M
Dibenz(a,h)anthracene	32.7	Ambient Values	260	ER-M
Fluoranthene	514	Ambient Values	5,100	ER-M
Fluorene	25.3	Ambient Values	540	ER-M
Indeno(1,2,3-c,d)pyrene	382	Ambient Values		
Naphthalene	55.8	Ambient Values	2,100	ER-M
Perylene	145	Ambient Values		
Phenanthrene	237	Ambient Values	1,500	ER-M
Pyrene	665	Ambient Values	2,600	ER-M

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Table 5: Routine Parameters and Target Analytes for Evaluation of Dredged Material (Page 1 of 3)

Parameter	Target Reporting Limit (dry wt)
Conventional Parameters	
Grain size (%)	0.1
Total organic carbon [TOC] (%)	0.1
Total solids [TS] (%)	0.1
Metals (mg/kg)	
Arsenic	0.1
Cadmium	0.1
Chromium	0.1
Copper	0.1
Lead	0.1
Mercury	0.02
Nickel	0.1
Selenium	0.1
Silver	0.1
Zinc	1
Organic Compounds (mg/kg)	
PAH Compounds	0.02 each
PCB Arochlors	0.02 each
Pesticides	0.002 each
Butyltins	0.01 each

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Table 5: Routine Parameters and Target Analytes for Evaluation of Dredged Material (Page 2 of 3)

Parameter	Target Reporting Limit[1]
Butyltins (µg/kg)	
Monobutyltin	10
Dibutyltin	10
Tributyltin	10
Tetrabutyltin	10
Total Butyltins	NA
PCBs (µg/kg)	
Aroclor 1242	20
Aroclor 1248	20
Aroclor 1254	20
Aroclor 1260	20
Total Aroclors	NA
Pesticides (µg/kg)	
Aldrin	2
α-BHC	2
β-BHC	2
δ-BHC	2
γ-BHC (Lindane)	2
Chlordane	2
2,4'-DDD	2
4,4'-DDD	2
2,4'-DDE	2
4,4'-DDE	2
2,4'-DDT	2
4,4'-DDT	2
Total DDT	NA
Dieldrin	2
Endosulfan I	2
Endosulfan II	2
Endosulfan sulfate	2
Endrin	2
Endrin aldehyde	2
Heptachlor	2
Heptachlor epoxide	2
Toxaphene	20

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Table 5: Routine Parameters and Target Analytes for Evaluation of Dredged Material (Page 3 of 3)

Parameter	Target Reporting Limit[1]
PAHs (µg/kg)	
1-Methylnaphthalene	20
1-Methylphenanthrene	20
2,3,5-Trimethylnaphthalene	20
2,6-Dimethylnaphthalene	20
2-Methylnaphthalene	20
2-Methylphenanthrene	20
3-Methylphenanthrene	20
Acenaphthene	20
Acenaphthylene	20
Anthracene	20
Benz(a)anthracene	20
Benzo(a)pyrene	20
Benzo(b)fluoranthene	20
Benzo(e)pyrene	20
Benzo(g,h,i)perylene	20
Benzo(k)fluoranthene	20
Biphenyl	20
Chrysene	20
Dibenz(a,h)anthracene	20
Fluoranthene	20
Fluorene	20
Indeno(1,2,3-c,d)pyrene	20
Naphthalene	20
Perylene	20
Phenanthrene	20
Pyrene	20
Low molecular weight PAHs, sum	NA
High molecular weight PAHs, sum	NA
PAHs, total	NA

1) Reported in a dry weight basis

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Table 6: Reference Sediment Sample Locations, Parameters, and Chemistry (Page 1 of 2)

PARAMETERS	San Pablo Bay/Carquinez Reference Sites		
	Paradise Cove	**Tubbs Island**	**Island #1**
Latitude	37°53'95"N	38°06'87"N	38°06'72"N
Longitude	122°27'86"W	122°25'16"W	122°19'71"W
CONVENTIONAL PARAMETERS			
Total Organic Carbon (ppm)	1.12	1.38	0.98
Percent Fines	92.9	99.4	99
METALS (mg/kg)			
Arsenic	11.5	10.3	13.4
Cadmium	0.23	0.24	0.25
Chromium	217	208	192
Copper	51.8	65.8	50.2
Lead	24.4	30.2	23.9
Mercury	0.304	0.35	0.274
Nickel	102.4	129	89
Selenium	0.22	0.199	0.17
Silver	0.304	0.29	0.244
Zinc	146	178	145
ORGANOCHLORINE PESTICIDES/PCBs (μg/kg)			
DDTS, sum	6.7	6.42	38.9
Chlordanes, sum	1.8	ND	ND
Dieldrin	ND	ND	ND
Hexachlorocyclohexane, sum	ND	ND	ND
PCBs, sum of Arochlors	12.1	6.85	3.25
POLYCYCLIC AROMATIC HYDROCARBONS (μg/kg)			
PAHs, total	4280	1477	1101
Low molecular weight PAHs, sum	287	169	113
High molecular weight PAHs, total	3995	1308	968
1-Methylnaphthalene	9.4	6.81	6.35
1-Methylphenanthrene	15.8	10.7	8.66
2,3,5-Trimethylnaphthalene	ND	ND	ND
2,6-Dimethylnaphthalene	ND	ND	ND
2-Methylnaphthalene	17.3	13	11.2
2-Methylphenanthrene	NA	NA	NA
3-Methylphenanthrene	NA	NA	NA
Acenaphthene	10.6	5.2	5.1
Acenaphthylene	20	5.99	5.7
Anthracene	36.2	17.2	12.4
Benz(a)anthracene	220	54	53.4
Benzo(a)pyrene	480	168	138

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Table 6: Reference Sediment Sample Locations, Parameters, and Chemistry (Page 2 of 2)

PARAMETERS	San Pablo Bay/Carquinez Reference Sites		
	Paradise Cove	Tubbs Island	Island #1
POLYCYCLIC AROMATIC HYDROCARBONS (μg/kg) – cont'd			
Benzo(b)fluoranthene	617	148	122
Benzo(g,h,i)perylene	379	138	120
Benzo(k)fluoranthene	253	54.5	45.7
Biphenyl	11.5	8.55	6.98
Chrysene	236	51.7	53.2
Dibenz(a,h)anthracene	83.1	20.8	19
Fluoranthene	352	154	154
Fluorene	12.7	8.04	6.1
Indeno(1,2,3-c,d)pyrene	394	142	118
Naphthalene	35.6	21.4	20.1
Perylene	139	94.9	73.7
Phenanthrene	115	68.6	63.1
Pyrene	544	194	182

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Table 7: Recommended Sampling Frequency for Evaluation of Dredged Material

Dredge Volume (cubic yards)	Total Number of Samples	Number of Samples per Composite	Total Number of Tests
5,000-20,000	4	4	1
20,000-100,000	8	4	2
100,000-200,000	12	4	3
200,000-300,000	16	4	4
300,000-400,000	20	4	5
400,000-500,000	24	4	6

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Figures

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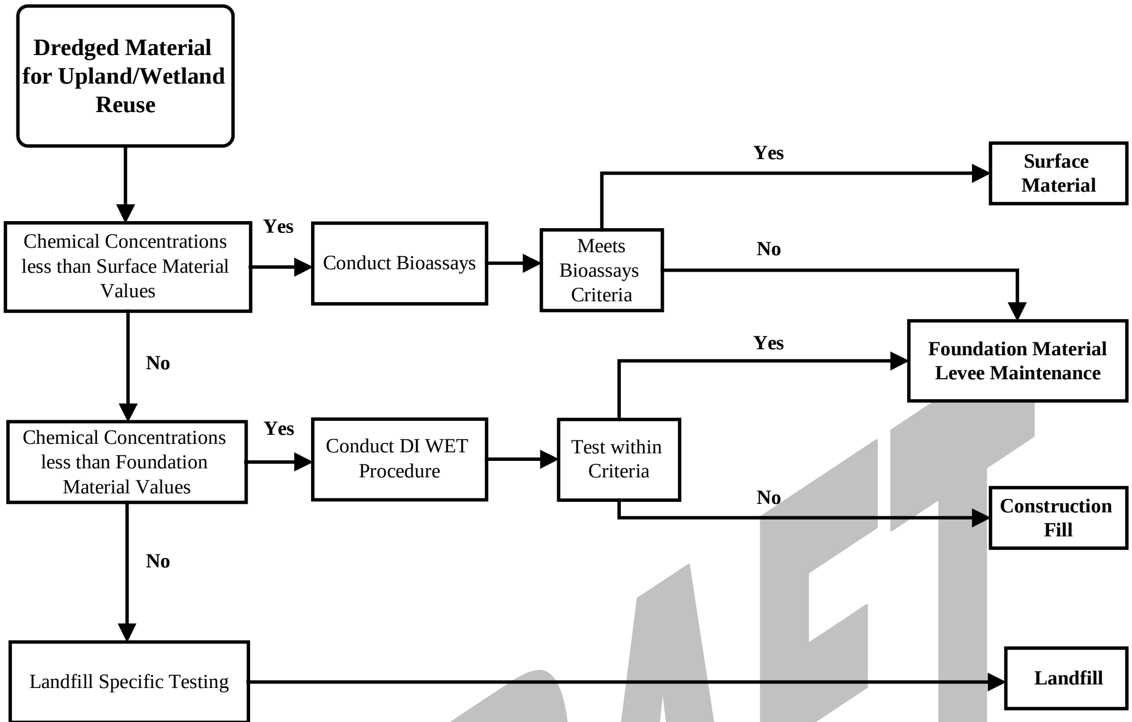

Figure 1. Recommended Testing Protocols for Wetland/Upland Dredged Material Disposal in the San Francisco Bay Region

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Memorandum 5

Sediment Testing Approach

Colma Creek Flood Control Channel Maintenance Project

Memorandum 5

July 1, 2014

Subject: Sediment Testing Approach

1. Background and Purpose

The County of San Mateo Department of Public Works (County) has maintenance responsibility for the Colma Creek flood control channel and plans to periodically remove accumulated sediment from the channel to main flood conveyance capacity.

Potential reuse and disposal options for sediment removed from Colma Creek include: (1) on-site reuse and redistribution in the flood control channel; (2) on-site reuse to create nearshore tidal wetlands and mudflats at the Colma Creek mouth; (3) off-site reuse at other tidal wetland, channel, or floodplain sites around the Bay (including restoration sites); (4) upland reuse, such as commercial fill; (5) landfill disposal; and (6) hazardous waste disposal (if necessary). The County's preference is to select disposal options that are cost effective and environmentally sound.

Sediment disposal activities must be approved by the San Francisco Bay Regional Water Quality Control Board (RWQCB), San Francisco Bay Conservation and Development Commission (BCDC), and other regulatory agencies in accordance with federal and state regulations, including the federal Clean Water Act and the state Porter-Cologne Water Quality Control Act. In general, discharge of sediment containing toxic or hazardous chemicals to land or water is not allowed under these regulations.

Sediment quality is a key driver in selecting the appropriate sediment reuse or disposal option. The RWQCB, along with participating agencies of the Long Term Management Strategy for the Placement of Dredged Material in the San Francisco Bay Region (LTMS) Program, has established sediment testing guidelines and criteria for beneficial sediment reuse in the San Francisco Bay estuary. These established guidelines are discussed below and will determine reuse suitability for sediment dredged from the Colma Creek channel.

The purpose of this memorandum is to provide an overview of sediment testing and evaluation requirements and propose an approach to fulfilling these requirements in a cost effective manner.

2. Overview of Sediment Evaluation Requirements

To understand sediment quality and the potential presence of pollutants, sediment and water testing must be conducted prior to sediment removal and disposal or reuse activities. The procedures for determining the level of analysis required for testing are explained in the *Beneficial Reuse of Dredged Materials: Sediment Screening and Testing Guidelines* (RWQCB 2000). This reference is included with Memorandum 4, *Sediment Reuse and Disposal* as Attachment 4-1. Analytes tested will vary depending on the proposed reuse of the sediment as follows:

- If sediment is reused or redistributed on-site, within the channel, no testing is required because it is assumed the sediment quality would not change from existing conditions.
- If sediment is reused at wetland, marsh, mudflat, or floodplain locations where the newly placed sediment would be in contact with a water body, analysis would be conducted according to the "wetland surface" testing requirements stated in RWQCB (2000). Required analysis includes sediment chemistry and acute toxicity testing which costs approximately $12,000 per sample.
- If sediment is reused for upland agricultural or commercial use where sediment would be permanently removed from the system (i.e., there would be no contact with water bodies), than analytes listed for "wetland foundation, levee, and construction fill" would be evaluated, as stated in RWQCB (2000). This level of testing includes sediment chemistry only and costs about $3,000 per sample.

The list of sediment chemistry analytes to be evaluated is in Table 5 in RWQCB (2000) (see Table 5 in Attachment 4-1).

Required toxicity bioassays include exposure of two benthic species covering three life history stages for sediment and water collected from the project sites. Further guidance on toxicity bioassays is provided in *Guidelines for Implementing the Inland Testing Manual in the San Francisco Region* (DMMO 2001).

Sediment test results should be compared to: Tables 2 through 4 of RWQCB (2000) shown in Attachment 4-1; the recently released RWQCB Environmental Screening Levels (ESLs) for sites with contaminated soil (RWQCB 2013); NOAA Screening Quick Reference Tables (SQuiRT) ecologically-based contamination risk thresholds (NOAA 2008); RWQCB Basin Plan Water Quality Objectives (RWQCB 2010); the *Water Quality Control Plan for Enclosed Bays and Estuaries – Part I Sediment Quality* (SWRCB 2009); California Human Health Screening Levels (CHHSLs) for soil (OEHHA 2010); and DMMO guidelines as prescribed by the regulatory agencies permitting the project.

If chemical contaminants concentrations and toxicity test results from Colma Creek exceed established environmental protection thresholds, the sediment may not be suitable for use as wetland surface or wetland foundation material. Instead, the sediment may go to an upland disposal site, a landfill, or perhaps to an in-bay dredged material disposal site. The RWQCB is responsible for review and approval of proposed upland disposal sites. Sediment quality thresholds for upland disposal are less stringent than in-water disposal.

The DMMO has established sediment chemistry and toxicity thresholds for acceptance at dredged material disposal sites in the Bay. The DMMO also establishes sediment quality criteria for acceptance at an offsite restoration project like the Hamilton/Bel Marin Keys Wetlands Restoration Project and other similar Bay restoration projects. Approval for disposal of Colma Creek sediment to dredged material disposal sites or Bay wetland restoration projects would need to be obtained from the DMMO.

Approval for sediment reuse as landfill cover material would need to demonstrate suitable sediment quality as required by RWQCB permits issued to the landfill, and in compliance with California Department of Toxic Substances Control (DTSC) waste acceptance regulations. It is likely that the sediment chemistry screening evaluation conducted according to RWQCB (2000) would meet the landfill testing requirements.

Sediment exhibiting levels in the hazardous range, as defined by the DTSC, would be taken to a permitted hazardous waste facility. The nearest active hazardous waste facility is in Kettleman City, CA.

3. Recommended Approach

At least two sediment samples should be collected from the Colma Creek channel, and one sample to represent the proposed areas for sediment reuse near the creek mouth (tidal mudflat and marsh areas). Sediment samples can be composited from multiple locations to provide a more general characterization of the total sediment removal area and proposed reuse sites.

Due to the highly urbanized watershed that discharges to the creek, sediments in the channel may exhibit chemical contaminants in concentrations that exceed the environmental protection thresholds for wetland restoration. For example, channel sediment from urban areas often contains high levels of iron and copper from car brake pads. Therefore, the recommended approach is to first test the channel sediment for chemical contaminants according to the beneficial reuse guidelines for “wetland foundation/construction fill” in RWQCB (2000). Testing of three samples for sediment chemical contaminants should cost approximately $9,000 total. Test results commonly take one month to process.

If the sediment chemical contaminant screening shows the sediment would be unsuitable for reuse as wetland foundation material; then the sediment would not be appropriate for reuse as wetland surface material. Such a testing result would most likely prevent the possibility of sediment reuse for marsh restoration purposes at the mouth of Colma Creek.

If the results show the sediment would be acceptable for use as wetland foundation material; then the next step is to determine if the sediment could be used as “wetland cover” material, which is a stricter level of testing than for wetland foundation material. Sediment and water samples would then be collected for this additional toxicity testing. Toxicity testing for 3 samples should cost approximately $36,000 total. Toxicity test results commonly take up to two months to process.

By conducting these tests as a two-phased approach, the County can potentially reduce testing costs. If the results of the first level of testing for wetland foundation potential are non-compliant, then there is no need to conduct the second phase of testing for wetland cover adequacy.

If both phases of sediment toxicity test results are acceptable to the regulatory agencies, discussions for sediment reuse to enhance habitat near the mouth of Colma Creek can then continue. If toxicity test results are not favorable for the proposed restoration at Colma Creek, reuse locations that do not include exposure to aquatic environments will then be considered and discussed with the regulatory agencies (such as wetland foundation or upland disposal).

The County would submit the complete set of laboratory reports to the RWQCB, along with a narrative report interpreting the results in comparison with the approaches described above. The County will submit records of field sampling methods, locations, depths, analysis, and results to the federal and state regulatory agencies for review and discussion of sediment reuse opportunities.

The approach described above was reviewed and approved by Brenda Goeden, Sediment Program Manager at BCDC (via email to Horizon on April 10, 2014). However, this recommended approach should be confirmed with the RWQCB and other regulatory agencies prior to conducting sediment testing and analysis.

The tables included in Attachment 4-1 provide the relevant information for the County to direct a contractor on sediment testing, as well as providing guidance to a laboratory for what analyses to conduct. If desired, Horizon specialists are available to assist the County with this process.

4. References

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Memorandum 6

Tidal Wetland and Habitat Mapping

Colma Creek Flood Control Channel Maintenance Project

Memorandum 6

July 1, 2014

Subject: **Tidal Wetland and Habitat Mapping**

1. Purpose

The County of San Mateo Department of Public Works (County) maintains the Colma Creek flood control channel in northern San Mateo County (Figure 6-1) to provide conveyance capacity according to design flows for the channel. If excessive, the accumulation of sediment and debris can reduce channel conveyance capacity and increase the flood risk. The County is seeking permits to conduct routine maintenance activities, including sediment and vegetation removal, culvert repair, and streambank stabilization and repair in the Colma Creek flood control channel.

In September 2010, representatives from the U.S. Army Corps of Engineers (USACE), San Francisco Bay Regional Water Quality Control Board (RWQCB), and U.S. Fish and Wildlife Service (USFWS) met with the County to review the Colma Creek Flood Control Channel Maintenance Project (maintenance project) and discuss its permitting process. During that meeting, the regulatory agency staff raised concerns regarding how periodic sediment removal could potentially impact tidal wetlands in Colma Creek, some of which may provide habitat for the California Clapper Rail (CCR) (*Rallus longirostris obsoletus*) and salt marsh harvest mouse (SMHM) (*Reithrodontomys raviventris*). Both of these species are listed as endangered under the federal and California Endangered Species Acts, and are classified as Fully Protected under the Fish and Game Code. Regulatory staff requested that the County provide an estimate of the area of tidal wetlands and potential habitat for these species in the maintenance project area (San Mateo County 2010).

The purpose of this memorandum is to document the current extent and distribution of tidal wetlands and CCR and SMHM habitat (collectively referred to as "endangered species") in the maintenance project area. This will establish an inventory (or baseline) prior to conducting maintenance activities. This baseline can be used as a basis to evaluate conditions and measure changes following the onset of maintenance activities.

2. Extent of Tidal Wetlands

Figure 6-2 shows the study area for the tidal wetlands survey. The study area includes tidal portions of the Colma Creek flood control channel that have earthen bed and banks. Sections of the channel that are tidally influenced, but are constructed of concrete (i.e., upstream of Produce Avenue) were not included in the mapping effort as this portion of the channel does not provide potential habitat for endangered species. The study area also includes the large embayment near the mouth of Colma Creek (Figure 6-2). This portion of the study area has the potential to be indirectly impacted by sediment removal in the flood control channel (See Memorandum 1, *Literature Review of Sediment Removal and Tidal Wetlands* and Memorandum 2, *Sediment Processes*).

Tidal wetlands and waters in the study area were classified into various habitat types, including: Bay, channel, mudflat/low marsh, and high marsh. The Bay habitat includes open water portions of the study area. The channel habitat includes Colma Creek, as well as small tidal creeks that drain the marshes in the northeast portion of the study area (Figure 6-2). The mudflat/low marsh habitat includes intertidal areas that are largely devoid of vegetation. Typically, low marsh is distinguished from mudflat by the presence of *Spartina* (cordgrass) species. However, in recent years there has been extensive eradication of invasive *Spartina* in the study area by the San Francisco Estuary Invasive *Spartina* Project (ISP). This makes it difficult to distinguish areas that are at an elevation appropriate for *Spartina* from mudflat habitat, which is too low to support vegetation. Thus, the mud flat and potential low marsh habitats were grouped together. High marsh includes intertidal areas dominated by pickleweed (*Sarcocornia* [=*Salicornia*] *pacifica*). Sea fig (*Carpobrotus* sp.) has invaded some portions of the high marsh and become the dominant plant species. In the study area, high marsh typically transitions abruptly to upland habitat or developed land. The upland areas tend to be dominated by non-native annual grasses and forbs, but some native plant restoration has occurred in habitat mitigation sites.

Habitats in the study area were delineated using an iterative process that involved field-based mapping and desktop analysis of aerial photographs. Horizon biologist Kevin Fisher mapped representative boundaries of habitats using a Trimble GeoXT GPS with sub-meter accuracy. The GPS data was then projected in a Geographical Information System (GIS), with a recent (2011) aerial photograph as a base map. The GIS and aerial photography were used to further delineate habitats based on the field indicators. The map developed in GIS was then field evaluated, and revised to reflect any discrepancies with true field conditions. The area of each habitat type in the study area was then calculated using GIS. Figure 6-2 provides the extents of tidal wetlands mapped in the study area.

3. Endangered Species Habitat

Wetland and upland refugia habitats in the study area were evaluated for their potential to support CCR and SMHM. The habitat evaluation was conducted on July 18, 2013, by Kevin Fisher of Horizon and Jules Evens of Avocet Research Associates. Mr. Fisher has more than 10 years of field experience in the wetlands of the San Francisco Bay. Mr. Evens has over 30 years of experience working in the Bay, including several years of CCR surveys in the wetlands of Colma Creek.

3.1 California Clapper Rail

In the south and central San Francisco Bay, CCR typically inhabit salt marshes dominated by pickleweed and *Spartina* with *Grindelia* (gumplant) present at high marsh elevations and some upland vegetative cover providing refugia on extreme high tides. Habitat requirements of CCR include both dense cover for nesting and access to low marsh (tidal channels) and mudflats for foraging (USFWS 2009) and peripheral upland cover. Historically, when the study area supported large contiguous stands of *Spartina* (predominately the invasive *S. alterniflora*), CCR density in the study area was considered high for the Bay (ISP 2008a). Since invasive *Spartina* control began in 2006 there has been a rapid decline in the number of CCR detected in the study area. Table 6-1 shows the results of CCR surveys conducted in the study area between 2005 and 2013.

Table 6-1. California Clapper Rail (CCR) survey results for monitoring sites in the study area.

ISP Monitoring Site ID[1]	Average Number of CCR[2]			Maximum Number of CCR Detections[3]					
	2005	2006	2007	2008	2009	2010	2011	2012	2013
Colma Creek	NR[4]	9.5	5.0	3-6	0	0	0	0	0
Navigable Slough	NR	3.5	2.0	7-10	0	0	0	0	0
Confluence Marsh	4.5	9.5	12.0	2	4	1-2	2	0	0
San Bruno Marsh	25.0	14.0	13.0	15-20	9-12	0	0	0	0

1. ISP monitoring sites within the study area (see Figure 3).
2. Source: ISP 2008a
3. Sources: ISP 2008b, ISP 2012, Pers. Comm. McBroom
4. NR = Not reported.

There have been two consecutive years of negative findings (2012 and 2013) of protocol-level surveys for CCR. The absence of CCR indicates that the study area does not currently provide habitat for this species. This is largely explained by the lack of low marsh habitat in the studyarea and the eradication of the *Spartina* vegetation which supported the CCR. It is anticipated that the CCR will return to the study area if/when dense stands of *Spartina* become re-established and if source populations are still extant. The ISP is currently using Colma Creek/San Bruno Marsh Complex for a pilot study to reintroduce native *Spartina* to the higher mudflats. Because this site is discrete (relatively isolated), recolonization may take longer than it would at a disturbed site with contiguous marshlands.

3.2 Salt Marsh Harvest Mouse

Salt marsh harvest mice in the central Bay belong to the southern subspecies of SMHM. Few major, resilient, or secure populations persist for the southern subspecies, and all of them are very small and isolated compared with the historical pattern of distribution and abundance of the subspecies (USFWS 2010). The closest known population to the study area is near Foster City, approximately 10 miles south of the study area. To our knowledge, there have been no surveys for SMHM in the study area.

Representative photographs of potential SMHM habitat in the study area are provided in Attachment 6-1. The basic habitat of SMHM is pickleweed-dominated vegetation (Attachment 6-1, Photo 1). Other highly important habitat considerations include high tide/flood refugia at the upper edge of the marsh and within mature marshes (USFWS 2009) (Attachment 6-1, Photo 2). Salt marsh harvest mice frequently utilize terrestrial grassland habitats adjacent to salt marsh and ecotones (USFWS 2010).

From a Bay-wide perspective (meaning how this resource is valued in considering the full extent of the Bay's other SMHM habitat areas), all of the potential SMHM habitat in the Colma Creek study area would be considered low quality because:

- The Colma Creek habitat is isolated (with substantial dispersal barriers) from large contiguous marshes with known populations of SMHM.
- The Colma Creek habitat bands are narrow (Attachment 6-1, Photos 3 and 6). Narrow "fringing marshes" support few SMHM, if any (USFWS 2010).
- The ecotones and upland refugia are generally narrow or abrupt (see Attachment 6-1, Photo 3).
- There is a considerable amount of sea fig encroaching into high marsh habitat in portions of the study area (Attachment 6-1, Photo 4). Sea fig eradication efforts are currently being conducted at this location as part of the Colma Creek Flood Control Channel Improvements Habitat Mitigation Project.
- Predator pressure is high. Feral cats were observed during field visits, and feral cat feeding stations are present in the area (ISP 2008b; Pers. Comm. Foster 2014).

Recognizing that SMHM habitat quality in the study area is generally low from a Bay-wide perspective, the habitat was qualitatively assessed for its site-specific functions and values based on the following factors:

- Vegetation cover: Areas with dense pickleweed cover ranked higher than areas with low or moderate cover (Attachment 6-1, Photos 1 and 5).
- Marsh width: Deeper (or wider) marshes ranked higher than narrow, fringe marsh.
- Upland refugia: The width and quality (plant species composition) of upland refugia was considered. Marsh areas with connectivity to wide, grass-dominated ecotones ranked

higher than short transitions dominated by invasive forbs (Attachment 6-1, Photos 2 and 3).

- Connectivity: Marshes with connectivity for dispersal ranked higher than isolated areas.
- Predation threat: Proximity to developed areas that are likely to harbor domestic predators.

Figure 3 shows the relative quality of SMHM habitat in the study area. In general, most of the habitat was ranked low because it is narrow (less than 100 feet wide), lacks substantial upland refugia, and predator pressure is high.

4. References

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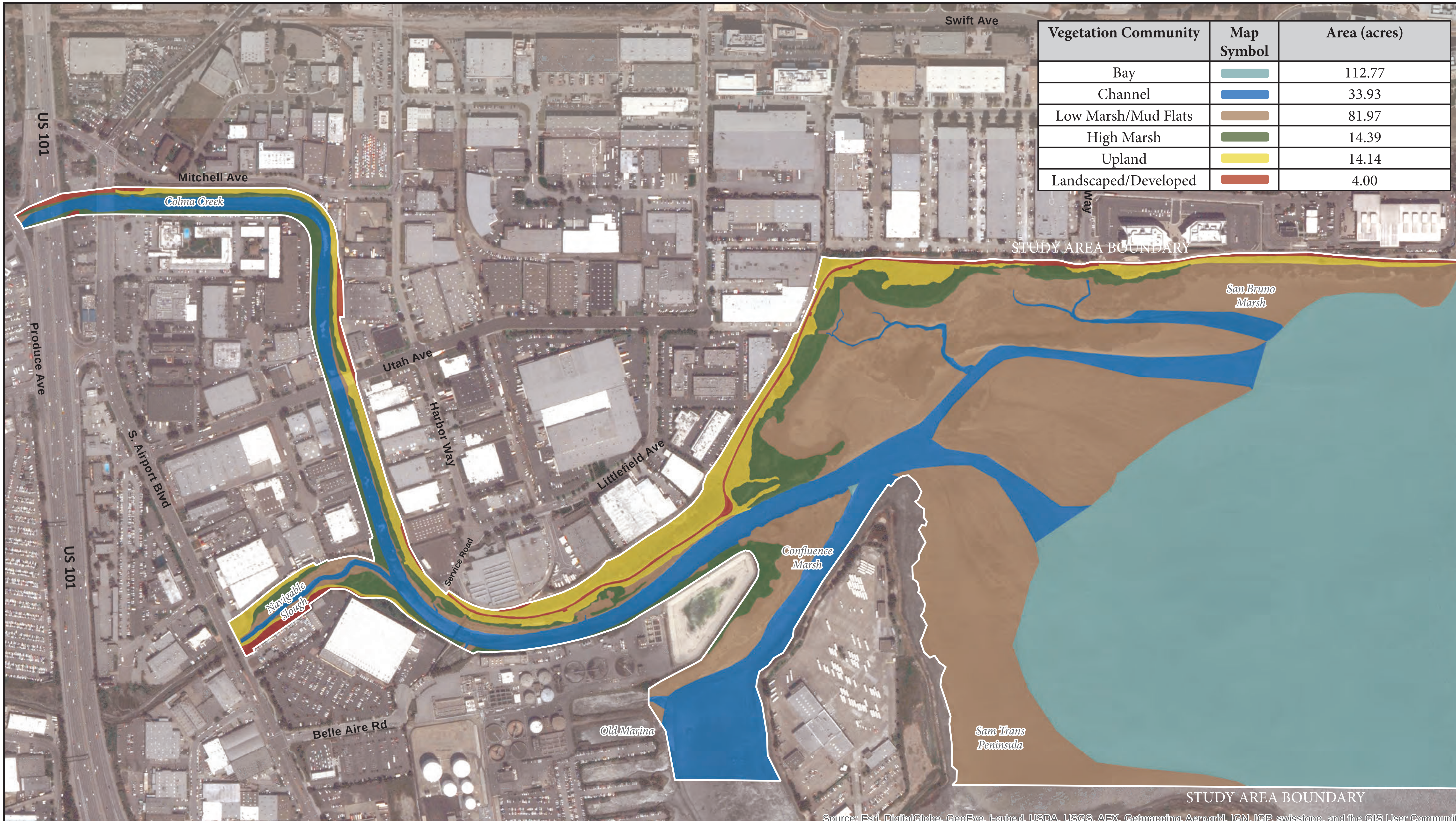
Figure 6-1. Colma Creek watershed.

Colma Creek Flood Control Channel Maintenance Project

Horizon WATER and ENVIRONMENT



Vegetation Community	Map Symbol	Area (acres)
Bay		112.77
Channel		33.93
Low Marsh/Mud Flats		81.97
High Marsh		14.39
Upland		14.14
Landscaped/Developed		4.00

Prepared by:

Horizon WATER and ENVIRONMENT

N

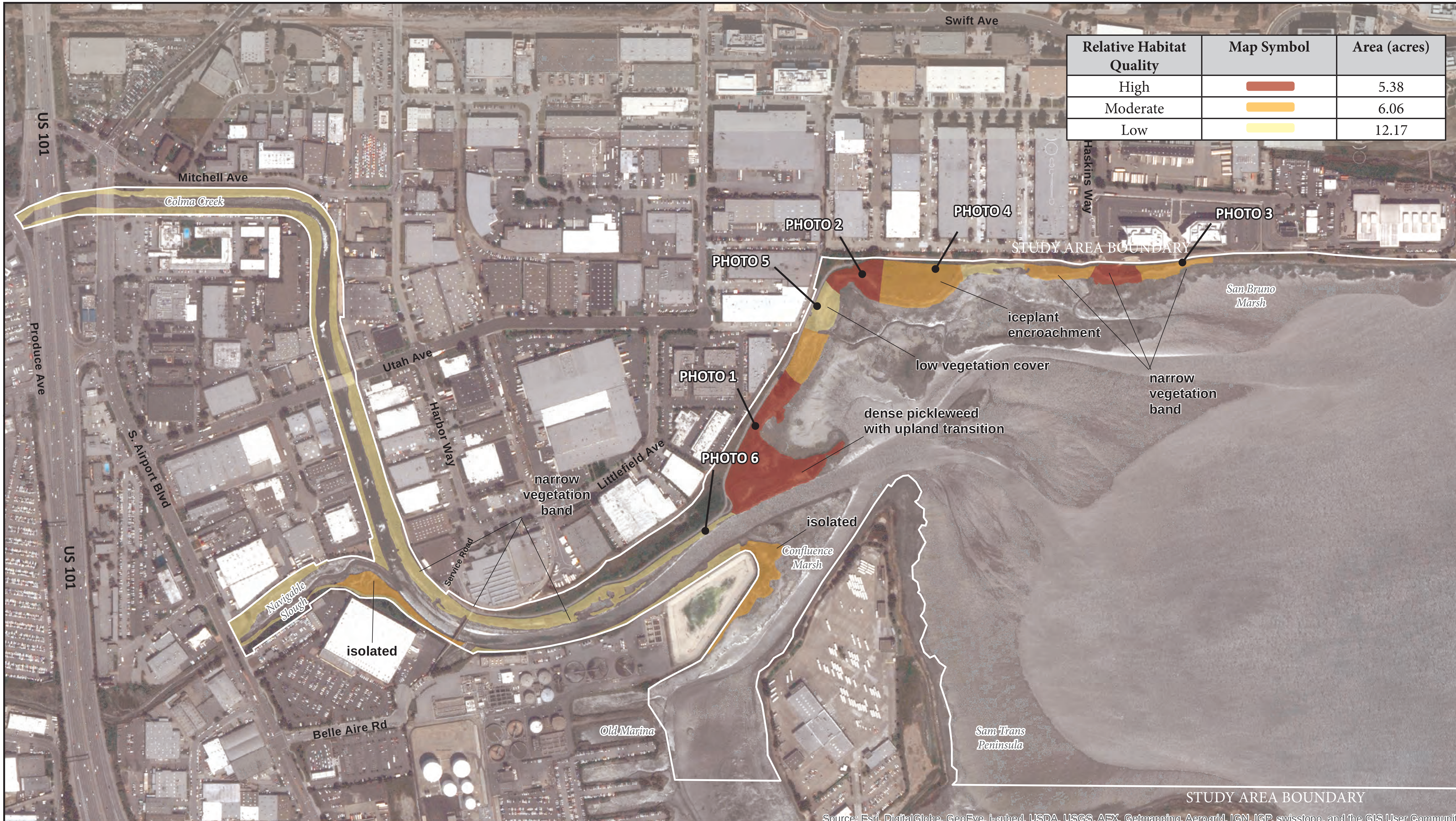
Feet

0 125 250 500

Basemap Source: ESRI

Figure 6-2: Habitat Map

Colma Creek Flood Control Channel Maintenance Project



Relative Habitat Quality	Map Symbol	Area (acres)
High		5.38
Moderate		6.06
Low		12.17

Prepared by:

Horizon WATER and ENVIRONMENT

N

Feet

0 125 250 500

Basemap Source: Google Earth, April 2011

Figure 6-3: Salt Marsh Harvest Mouse Habitat Quality

Colma Creek Flood Control Channel Maintenance Project

Photo No. 1	Date: 5/22/2013	
Description: Example of relatively high quality SMHM habitat. Dense and relatively deep stands of pickleweed marsh with adequate upland refugia (not shown).		
Photo No. 2	**Date:** 7/18/2013	
Description: Example of relatively high quality salt marsh harvest mouse (SMHM) habitat. Note the gradual upland transition in the foreground and the dense pickleweed marsh in the background.		

Photo No. 3	Date: 07/18/2013
Description: Example of moderate quality SMHM habitat. Dense, but narrow stands of pickleweed marsh transition abruptly to relatively low quality upland refugia.	

Photo No. 4	Date: 07/18/2013
Description: Example of relatively moderate quality SMHM habitat. The ecotone in the foreground has been invaded by iceplant, which degrades habitat quality. Note the dense pickleweed marsh in the background.	

Photo No. 5	Date: 07/11/2013	
Description: Example of low quality SMHM habitat. Note the sparse vegetation cover. Predator pressure is also high at this location.		
Photo No. 6	**Date:** 07/11/2013	
Description: Example of low quality SMHM habitat. Isolated, narrow stands of pickleweed marsh transition abruptly to relatively low quality upland refugia. Predator pressure is also high at this location.		

Memorandum 7

CEQA Approach

Colma Creek Flood Control Channel Maintenance Project

Memorandum 7

July 1, 2014

Subject: CEQA Approach

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1. Purpose

The County of San Mateo Department of Public Works (County), as lead agency, filed a California Environmental Quality Act (CEQA) Notice of Exemption (NOE) for the Colma Creek Flood Control Channel Maintenance Project (maintenance project) in 2006. State regulatory agencies, specifically the San Francisco Bay Regional Water Quality Control Board (RWQCB) and California Department of Fish and Wildlife (CDFW), are responsible agencies under CEQA. A responsible agency must actively participate in the lead agency's CEQA process, review the lead agency's CEQA document, and use that document to prepare and issue its own CEQA findings regarding a project that is issued a permit.

At the September 2010 regulatory team meeting (See Attachment Cvr-Ltr-1), questions were raised as to the appropriate level of CEQA compliance that was necessary to support the maintenance project. This memorandum was developed to evaluate potential CEQA approaches for the maintenance project. More specifically, the objectives of this memorandum are to:

1. Summarize maintenance project activities and identify which activities may require additional CEQA analysis or compliance.
2. Describe a range of CEQA approaches that may be suitable for the maintenance project and describe their legal/documentation requirements.
3. Provide a preliminary recommendation for CEQA compliance for the maintenance project.

2. Summary of Proposed Maintenance Activities

The County's proposed channel maintenance activities for Colma Creek are described in the Project Summary of November 30, 2012 (*Colma Creek Flood Control Channel Maintenance Project, Sections A, B, and C Project Summary*). Maintenance activities are organized according to location along the channel, with three Maintenance Segments as follows:

1. Colma Creek mouth upstream to Produce Avenue – this is a tidal reach with endangered species.

2. Produce Avenue to the channel dissipater teeth (upstream of Spruce Avenue) – this is a tidal reach without endangered species.
3. Dissipater teeth (upstream of Spruce Avenue) to A Street/El Camino Real – non tidal reach, upper extent of channel enters into Mission Road box culvert.

Anticipated routine maintenance activities may include:

- Removal of obstructions around structures and facilities, including fallen trees, branches, debris, trash, and shopping carts;
- Installation and maintenance of trash capture devices;
- Removal of sediment and vegetation in channel beds;
- Vegetation control on stream banks;
- Bank and culvert repairs; and
- Removal of invasive vegetation.

Sediment removal activities are conducted from the top of bank or from within the channel if the channel is dry. In the channel reach from the dissipater teeth to Produce Avenue, only sediment that accumulates more than two feet above the channel bottom can be removed. As part of the currently proposed maintenance project, routine sediment removal would occur from Produce Avenue to the dissipater teeth to maintain channel capacity. Sediment removal activities will not be conducted downstream of the Highway 101 crossing. No saltmarsh or upland habitat would be disturbed during sediment removal activities in the concrete channel upstream of Highway 101. All sediment and debris removed from the channel would be disposed at an appropriate disposal facility. Sediment conditions downstream of Highway 101 will continue to be monitored and if the time comes that removal is necessary, then the County would propose an approach at that time. Such removal is not anticipated at this time. However, other maintenance activities described above may be conducted on an as needed basis in the earthen lined portion of the channel downstream of Highway 101.

Proposed restoration activities at the San Bruno Marsh Complex may potentially include the beneficial reuse of sediment removed from the concrete portion of Colma Creek and placed in the marsh to establish “upland mounds” that would support clapper rail habitat. However, this restoration approach is uncertain at this time due to lack of information regarding the quality of sediments to potentially be reused. Once sediment testing is conducted, and if the results are favorable, and a feasibility evaluation indicates how sediments might be relocated to the marsh area; then at that time these restoration activities will be considered further for CEQA compliance. The CEQA evaluation for this memo does not consider what CEQA compliance may be necessary for additional marsh restoration activities.

3. Overview of Potential Environmental Impacts

In California, a government agency is subject to CEQA if it involves the exercise of an agency’s discretionary powers, has the potential to result in a reasonably foreseeable direct or indirect physical change in the environment, and falls within the definition of a "project" as defined by the CEQA Guidelines (CEQA Guidelines Sec. 15060).

Maintenance activities at Colma Creek may potentially cause impacts to traffic, noise, air quality construction emissions, and greenhouse gas emissions. These impacts would be short-term and temporary and would typically not be considered significant according to standard CEQA Guidelines criteria. Maintenance work involving ground disturbance may encounter previously unknown hazardous materials or cultural resources (archaeological resources or human remains), or impact water quality. Maintenance impacts to biological resources could include potential disturbance to salt marsh harvest mouse, California clapper rail, Alameda song sparrow, and other migratory birds. The potential significance of such impacts would likely be avoided or reduced through measures as described below.

Potential indirect effects may include impacts to the San Bruno Marsh Complex resulting from reduced sediment delivery to the marsh and wetlands. The marsh supports salt marsh harvest mouse habitat, pickleweed/gumplant habitat, and potential native *Spartina* habitat. The County is undertaking additional sediment monitoring studies to better understand the relationship between sediment deposition in Colma Creek and the nearshore marsh area. The County is evaluating sediment quality in the flood control channel and the feasibility of relocating sediment from the channel to the marsh area to enhance habitat.

These impact summaries above are based on professional judgment developed from other similar projects, (not specific site assessment) and are offered in this memorandum as a basis to consider appropriate CEQA compliance as described further below.

To address the majority of these maintenance impacts, the County would implement best management practices (BMPs) to avoid these impacts or minimize them to less than significant levels. BMPs include, but are not limited to, avoidance of maintenance work during bird nesting seasons to avoid impacts to biological resources, working during the summer dry season to avoid impacts to water quality, hand removal of trash and invasive vegetation to avoid impacts to salt marsh vegetation, and measures detailed in the County Watershed Protection Program's *Maintenance Standards*[1], such as erosion control BMPs. Successfully using BMPs will avoid or minimize the majority of potential impacts.

4. CEQA Compliance Options

This section describes the range of CEQA compliance options for the County including the categorical exemption, negative declaration, mitigated negative declaration, and the environmental impact report. For each of these CEQA options, first general and relevant background information is provided and then a description of how the specific option applies to the County's maintenance project at Colma Creek.

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[1] County of San Mateo Department of Public Works. 2004. Maintenance Standards, Volume 1. Watershed Protection Program. Available online at:
http://publicworks.smcgov.org/sites/publicworks.smcgov.org/files/documents/files/SMCMaintenanceStandards.doc

4.1 Categorical Exemption

Background

CEQA Guidelines include statutory, categorical, and other general rule exemptions, which exempt certain activities from CEQA jurisdiction (Public Resources Code sec. 21080). Categorical exemption Class 1 includes restoration or rehabilitation of existing facilities to meet current standards of public health and safety, including flooding (Guidelines sec. 15301(d)). Categorical exemption Class 4 includes maintenance dredging where the spoil is deposited in an area authorized by federal and state agencies (Guidelines sec. 15304(g)). Categorical exemption Class 33 covers small restoration projects less than five acres (Guidelines sec. 15333). Projects covered under this category include wetland restoration, stream bank stabilization, culvert replacement, and efforts to restore or enhance habitat with native vegetation. The key requirement to using any of these categorical exemptions is that the proposed project cannot result in any significant impact on the environment, including to special-status species. Categorical exemptions are exempt from California Department of Fish and Wildlife (CDFW) CEQA filing fees.

A notice of exemption (NOE) may be filed, but is not required, after a public agency decides that a project is exempt from CEQA and grants approval of the project. There is no time limit for filing an NOE after approval of the project. But, the advantage of filing an NOE is that it reduces the statute of limitations for a challenge to the County's decision from 180 days (normal period) to 35 days (with NOE). For that reason, and because it provides a further formal demonstration that the County is following the CEQA Guidelines, we recommend to file an NOE following a determination of categorical exemption. Because the County is the lead agency, the NOE is filed locally with the county clerk. A state agency files its NOE with the Governor's Office of Planning and Research (OPR) directly. Per CEQA Guidelines, an NOE must contain the following items:

- a brief project description
- a finding that the project is exempt from CEQA, including a citation to the relevant statute or guidelines section
- a brief statement of reasons to support the findings

Applicability for Colma Creek Maintenance Project

The County filed an NOE under Class 1 exemption for routine maintenance activities in 2006. The NOE was filed with the County Clerk and posted for public review for 30 days. At that time, the maintenance area did not extend to the mouth of Colma Creek; the maintenance area terminated at Utah Avenue. Because the maintenance project area was limited to Utah Avenue, no direct impacts to California clapper rail or other species supported by the baylands marsh habitat were identified at that time.

Since 2006, the County has expanded the area for proposed routine maintenance activities to include the creek reach from Utah Avenue to the creek mouth. This expanded project area supports special-status species and their habitat. Considering that the majority of maintenance activities result in temporary impacts that can be avoided and minimized with implementation of BMPs, Categorical exemption Classes 1, 4, and 33 may still apply to the proposed routine maintenance activities, particularly upstream of Produce Avenue where sensitive species are not encountered. For the project area downstream of Produce Avenue, culvert maintenance and trash capture device installation activities are likely not categorically exempt due to the status of sensitive species. However, the County's other maintenance activities in this downstream reach, including removal of invasive smooth cordgrass and revegetation with native cordgrass, could use the Class 33 categorical exemption as beneficial restoration activities. To proceed with a categorical exemption, the County would need to file a new NOE that identifies the updated project area, maintenance activities, and reasons for exemption.

Based on site conditions, the proposed maintenance activities and project area, and CEQA requirements; our recommendation is that the Colma Creek Flood Control Maintenance Project does not qualify as a categorical exemption.

4.2 Negative Declaration

Background

For projects that do not qualify under categorical exemptions but do not result in any significant environmental impacts, a negative declaration may be made to comply with CEQA requirements. The negative declaration process includes preparing an Initial Study (IS) and providing a required public review period. If there are sensitive resource issues associated with the project, this public review process is valuable because additional background information on the potential effects of the proposed project may be collected or learned. This is in contrast to the categorical exemption process where a limited amount of information on the project and its potential effects are provided to the public.

The IS typically answers the resource assessment questions provided in the CEQA Guidelines, Appendix G *Environmental Checklist Form*. The IS should also consider any additional resource guidelines established by the County. Potential environmental effects are identified as causing "no impact," a "less than significant impact," or being "potentially significant." Direct project impacts, indirect project impacts, and cumulative project impacts are all considered in a negative declaration.

As described above, a project cannot qualify for a negative declaration if a significant environmental impact is identified. However, if a potentially significant impact is identified through the IS process, and that impact can be mitigated to a less than significant level with implementation of mitigation measures, then a mitigated negative declaration may be the appropriate CEQA process (see further discussion below).

The negative declaration includes a brief project description, including the location of the activities, and a finding that the project will not have a significant effect on the environment. The IS is attached to the negative declaration to support the finding. As the lead agency, the County files the negative declaration with the County Clerk along with a Notice of Intent (NOI) by the County to adopt the negative declaration. The County is also responsible to provide the negative declaration and IS to relevant responsible agencies and trustee agencies. The negative declaration is provided for public review for 20 days, or 30 days if submitted to the State Clearinghouse who will distribute the documents to state agencies for review. Details of the filing and noticing procedures for a negative declaration are provided in CEQA Guidelines sec. 15072-15073. Upon the close of the public review period, any comments received must be reviewed and considered. A County decision-making body must review the negative declaration and any comments received prior to adopting the negative declaration and approving the project (Guidelines sec. 15074). Upon project approval, a Notice of Determination (NOD) must be filed within 5 business days, which concludes the CEQA process and begins a 30-day legal challenge period (Guidelines sec 15075). Additionally, a CDFW CEQA filing fee of $2,181.25 is required for a negative declaration.

Applicability for Colma Creek Maintenance Project

Our understanding is that the County has received feedback from regulatory agencies, including the RWQCB, that the level of CEQA compliance previously conducted (2006 categorical exemption) may not be adequate for issuance of its own CEQA findings. Use of the negative declaration process, including preparation of an IS, may satisfy the RWQCB's concerns. The negative declaration approach is similar to the categorical exemption approach, but provides additional explanation and documentation to conclude that the proposed maintenance activities would not result in significant impacts on the environment. The negative declaration process can take 3-4 months to complete, and will require the appropriate County decision-making body to review and adopt the negative declaration and approve the project.

Based on our understanding of maintenance project activities, site conditions, and CEQA requirements, a negative declaration may be a suitable CEQA compliance strategy for the Colma Creek Flood Control Maintenance Project. However, a more conclusive recommendation would be based on actually conducting an IS and evaluating if any resources are significantly impacted and if the negative declaration is appropriate.

4.3 Mitigated Negative Declaration

Background

Mitigated negative declarations (MNDs) are prepared following a similar process as described for the negative declaration. However, MNDs are appropriate when a project may result in a significant impact that can be reduced to a less than significant level with implementation of mitigation measures. The MND involves completing the IS checklist and providing additional information to identify impacts as "less than significant with mitigation." Direct project impacts, indirect project impacts, and cumulative project impacts are all considered in an MND. Mitigation measures are proposed in addition to any measures included in the project description. In other words, the project may result in a significant impact even after BMPs are incorporated. In these cases, additional mitigation measures are implemented to ensure that impacts are less than significant.

The preparation and approval process is the same for an MND as for a negative declaration, with the NOI and MND circulated for public review, and an NOD issued upon project approval. For an MND, CEQA requires preparation of a Mitigation Monitoring and Reporting Program (MMRP) which lists the mitigation measures identified in the MND. The MMRP describes who is responsible for implementing the mitigation measures, who will monitor/verify implementation of the mitigation measures, and the timing for implementing the measures. The MMRP is circulated alongside the MND, and is adopted at the time of project approval. Upon project approval, the NOD must be filed within 5 business days, which concludes the CEQA process and begins a 30-day legal challenge period (Guidelines sec 15075). Additionally, a CDFW CEQA filing fee of $2,181.25 is required for an MND.

Applicability for Colma Creek Maintenance Project

Due to the sensitive marsh and wetland habitat present in the project area downstream from Produce Avenue, mitigation measures will likely be required to ensure the project does not result in significant impacts. Potential mitigation measures may include establishing a no-work buffer zone around marsh habitat to further ensure protection of biological resources, or using electric-powered equipment to reduce air quality emissions. While most, if not all, of these measures could be characterized as BMPs, rendering the project “self-mitigating,” characterizing them as mitigation measures is generally more transparent to the public and more consistent with CEQA objectives. Such measures also work well for regulatory agency review and use during the permitting process. Finally, the use of mitigation measures triggers the requirement for an MMRP, which allows for easy tracking of measures during project implementation. Similar to the negative declaration, the MND process can take 3-4 months to complete, and will require the appropriate County decision-making body to review and adopt the MND and approve the Project.

Based on our understanding of maintenance project activities, site conditions, and CEQA requirements; a mitigated negative declaration may be a suitable CEQA compliance strategy for the Colma Creek Flood Control Maintenance Project. Our recommendation is to conduct an IS and evaluate if any resources are significantly impacted. If not, then the negative declaration is appropriate. If resources are impacted and can be mitigated to a less than significant level, then the MND may be the appropriate CEQA choice for the County.

4.4 Environmental Impact Report

Background

When a project’s impacts cannot be reduced to a less than significant level, even after implementation of mitigation measures, an environmental impact report (EIR) must be prepared. An EIR is the strongest CEQA compliance document from a legal standpoint, and also provides the flexibility to identify significant and unavoidable impacts, if necessary. The EIR includes a description of the existing site conditions (environmental setting) and an in-depth evaluation of direct project impacts, indirect project impacts, and cumulative project impacts. Additionally, an EIR must consider and evaluate alternatives to the proposed project that would reduce the significance of project impacts. Like an MND, the EIR also includes an MMRP which is adopted along with project approval at the conclusion of the CEQA compliance process. There are different types of EIRs that can be prepared, including the: project EIR, program EIR, and master EIR. The project-level EIR provides the most detail on potential impacts, whereas program and master EIRs are best suited for broad, long-term programs such as general plans. Depending on their breadth and scope, routine stream maintenance programs can be evaluated in “project” or “program” EIRs. Recent examples from the Bay Area include the Sonoma County Water Agency Stream Maintenance Program (Program EIR, 2009) and the Santa Clara Valley Water District Stream Maintenance Program (Subsequent Project EIR, 2011).

The EIR process includes multiple opportunities for public input and review. The EIR is initiated with release of a Notice of Preparation (NOP) which includes a brief description of the project and anticipated environmental effects. This initiates the public scoping period. The public is invited to provide comments on the scope and content of the EIR analysis. A public scoping meeting is often held to invite public comments. Next, the Draft EIR is prepared and circulated for least 30-days for public review and comment. A public meeting is often held to receive comments on the Draft EIR. The Final EIR contains responses to all comments received during the Draft EIR review process. Any necessary changes to the Draft EIR document are also disclosed in the Final EIR. The Final EIR is circulated for 30 days, and then the lead agency considers certifying the EIR and approving the project and MMRP. Upon project approval, a NOD must be filed within 5 business days, which concludes the CEQA process and begins a 30-day legal challenge period (Guidelines sec 15094). The EIR process commonly takes 12 months to complete. The current CDFW filing fee for an EIR is $3,029.75.

Applicability for Colma Creek Maintenance Project

An EIR may be appropriate for the Colma Creek Flood Control Maintenance Project if it was reasonably foreseeable that resources would be impacted that could not be adequately avoided or mitigated through measures. Or, if it was very uncertain what potentially significant impacts might occur with the maintenance project and a detailed investigation was necessary to better understand the degree of potential impact, then an EIR may make sense. Finally, if due to the significance of potential environmental impacts, and if there was a lot of public interest and concern surrounding the County’s maintenance activities, and there was a need for a more formal public information process to convey and disclose such potential impacts – then developing an EIR would likely be the right CEQA choice for the County. If the County elected to incorporate restoration of habitat in the San Bruno Marsh Complex as part of the project, or as compensatory mitigation, an EIR would allow the County to better disclose temporary and permanent effects of this action, and incorporate restoration activities as suitable mitigation. Because the maintenance area is relatively small and precisely known and the details of potential maintenance activities are generally understood, the “project” EIR would probably be the better choice than a “program” EIR for the County (if an EIR was pursued at all).

5. Preliminary CEQA Recommendation

At this time, the work area and type of maintenance activities for the Colma Creek Flood Control Maintenance Project are well defined. However, the frequency of maintenance is uncertain and will depend upon future climatic and hydrologic conditions. The relationship between sediment deposition in the Colma Creek flood control channel and sediment delivery to the nearshore marsh area is being monitored. It is believed that a sustainable sediment removal approach is viable that does not result in significant and unavoidable impacts to marsh habitats. Additionally, sediment samples taken from the flood control channel will soon be tested for their quality and potential beneficial reuse at the downstream marsh. If sediment quality is suitable, and sediment relocation is logistically feasible; then the beneficial reuse of sediment removed from the flood control channel and placed at the marsh could provide a very beneficial impact avoidance approach. These baseline conditions are still under evaluation. When these conditions are better understood, then a more final CEQA compliance approach can be formalized.

However, at this time, based on our understanding of the maintenance project area, activities, resources affected, and CEQA requirements; our preliminary recommendation is for the County to develop an Initial Study as a first step to selecting the appropriate level of CEQA compliance for the maintenance project. The County will revisit this recommendation based on the results of the pending resource investigations. Depending upon the results of the investigations, a negative declaration or a mitigated negative declaration may be the most appropriate CEQA compliance approach for the County.

Appendix B
AIR QUALITY AND GREENHOUSE GAS EMISSIONS ESTIMATES

Colma Creek Maintenance

San Mateo County, Annual

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
User Defined Recreational	1.00	User Defined Unit	0.70	30,730.00	0

1.2 Other Project Characteristics

Urbanization	Urban	**Wind Speed (m/s)**	2.2	**Precipitation Freq (Days)**	70
Climate Zone	5			**Operational Year**	2017
Utility Company	Pacific Gas & Electric Company				
CO2 Intensity (lb/MWhr)	641.35	**CH4 Intensity (lb/MWhr)**	0.029	**N2O Intensity (lb/MWhr)**	0.006

1.3 User Entered Comments & Non-Default Data

Project Characteristics -

Land Use - Estimated square feet based on temporary waters impact (8050 sq ft in Reach 2, 8070 sq ft in Reach 3) and temporary wetland impact (14610 sqft in Reach 3).

Construction Phase - Assumed all phases would occur consecutively, not simultaneously. Phase durations based on Project Description. Other maintenance activities' phase duration assumed to be total of approximately 25 days based on debris removal activity (25 times per year).

Off-road Equipment - Assume sediment removal activities require use of 1 excavator, 1 pump for the maintenance area within the silt curtain, and 1 skid steer loader.

Off-road Equipment - Assume culvert repairs would require use of excavator, skid steer loader, and pump.

Off-road Equipment - Assume other maintenance activities require the following 3 pieces of equipment to operate at the same time: excavator, concrete mixer, and a pump.

Trips and VMT - Assume 5 workers during each phase (2 roundtrips per day-10 worker trips). Assume 10 cy-capacity truck used for fill/exported soils quantities.

Grading - Assume maximum area of 5 acres for Other Maintenance Activities (site prep-3 phase).

Vehicle Trips - Trip rate of 5 on Saturday used to represent 5 roundtrips per week, which would be close to 25 days of annual maintenance activities and represent 5 workers coming to the project work areas.

Area Coating - There wouldn't be any architectural coatings for the creek channel maintenance activities; so assumed square footage would be zero. Assume concrete patching activities accounted for in off-road equipment.

Landscape Equipment - Assume other maintenance activities would only occur approximately 75 days per year, which is the in-channel work window (August 1-October 15).

Solid Waste - Assume debris removal from channel would require solid waste disposal (an assumed 1 ton per year).

Operational Off-Road Equipment - Pressure washer may be used for swallow nest hole cleaning. Assume use of excavator, concrete mixer, and pump for debris removal and concrete patching activities. Assume use of 1 haul truck to remove debris.

Table Name	Column Name	Default Value	New Value
tblAreaCoating	Area_Nonresidential_Exterior	15365	0
tblAreaCoating	Area_Nonresidential_Interior	46095	0
tblConstructionPhase	NumDays	1.00	8.00
tblConstructionPhase	NumDays	1.00	12.00
tblConstructionPhase	NumDays	1.00	25.00
tblGrading	AcresOfGrading	0.00	0.18
tblGrading	AcresOfGrading	0.00	0.50
tblGrading	AcresOfGrading	0.00	5.00
tblGrading	MaterialExported	0.00	401.00
tblGrading	MaterialExported	0.00	72.00

tblGrading	MaterialImported	0.00	61.00
tblLandscapeEquipment	NumberSummerDays	180	75
tblLandUse	LandUseSquareFeet	0.00	30,730.00
tblLandUse	LotAcreage	0.00	0.70
tblOffRoadEquipment	HorsePower	64.00	97.00
tblOffRoadEquipment	HorsePower	64.00	97.00
tblOffRoadEquipment	LoadFactor	0.37	0.37
tblOffRoadEquipment	LoadFactor	0.37	0.37
tblOffRoadEquipment	LoadFactor	0.37	0.37
tblOffRoadEquipment	OffRoadEquipmentType	Tractors/Loaders/Backhoes	Skid Steer Loaders
tblOffRoadEquipment	OffRoadEquipmentType	Tractors/Loaders/Backhoes	Skid Steer Loaders
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	0.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	0.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	0.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	0.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	0.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	0.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	0.00	1.00
tblOffRoadEquipment	PhaseName		Site Preparation - 3
tblOffRoadEquipment	PhaseName		Site Preparation
tblOffRoadEquipment	PhaseName		Site Preparation - 2
tblOffRoadEquipment	PhaseName		Site Preparation - 3
tblOffRoadEquipment	PhaseName		Site Preparation
tblOffRoadEquipment	PhaseName		Site Preparation - 2
tblOffRoadEquipment	PhaseName		Site Preparation - 3
tblOffRoadEquipment	UsageHours	8.00	0.00
tblOffRoadEquipment	UsageHours	8.00	0.00
tblOffRoadEquipment	UsageHours	8.00	0.00

tblOffRoadEquipment	UsageHours	8.00	0.00
tblOffRoadEquipment	UsageHours	8.00	0.00
tblOffRoadEquipment	UsageHours	8.00	0.00
tblOperationalOffRoadEquipment	OperDaysPerYear	260.00	25.00
tblOperationalOffRoadEquipment	OperDaysPerYear	260.00	25.00
tblOperationalOffRoadEquipment	OperDaysPerYear	260.00	25.00
tblOperationalOffRoadEquipment	OperDaysPerYear	260.00	25.00
tblOperationalOffRoadEquipment	OperDaysPerYear	260.00	25.00
tblOperationalOffRoadEquipment	OperOffRoadEquipmentNumber	0.00	1.00
tblOperationalOffRoadEquipment	OperOffRoadEquipmentNumber	0.00	1.00
tblOperationalOffRoadEquipment	OperOffRoadEquipmentNumber	0.00	1.00
tblOperationalOffRoadEquipment	OperOffRoadEquipmentNumber	0.00	1.00
tblOperationalOffRoadEquipment	OperOffRoadEquipmentNumber	0.00	1.00
tblProjectCharacteristics	OperationalYear	2014	2017
tblSolidWaste	SolidWasteGenerationRate	0.00	1.00
tblTripsAndVMT	HaulingTripNumber	50.00	40.00
tblTripsAndVMT	HaulingTripNumber	17.00	13.00
tblTripsAndVMT	HaulingTripNumber	17.00	0.00
tblTripsAndVMT	WorkerTripNumber	15.00	10.00
tblTripsAndVMT	WorkerTripNumber	15.00	10.00
tblTripsAndVMT	WorkerTripNumber	13.00	10.00
tblVehicleTrips	ST_TR	0.00	5.00

2.0 Emissions Summary

2.1 Overall Construction

Unmitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	tons/yr										MT/yr					
2016	0.0279	0.2467	0.2135	3.6000e-004	7.0800e-003	0.0145	0.0216	1.3900e-003	0.0140	0.0154	0.0000	31.5020	31.5020	5.6900e-003	0.0000	31.6216
Total	**0.0279**	**0.2467**	**0.2135**	**3.6000e-004**	**7.0800e-003**	**0.0145**	**0.0216**	**1.3900e-003**	**0.0140**	**0.0154**	**0.0000**	**31.5020**	**31.5020**	**5.6900e-003**	**0.0000**	**31.6216**

Mitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	tons/yr										MT/yr					
2016	0.0279	0.2243	0.2135	3.6000e-004	7.0800e-003	0.0145	0.0216	1.3900e-003	0.0140	0.0154	0.0000	31.5020	31.5020	5.6900e-003	0.0000	31.6215
Total	**0.0279**	**0.2243**	**0.2135**	**3.6000e-004**	**7.0800e-003**	**0.0145**	**0.0216**	**1.3900e-003**	**0.0140**	**0.0154**	**0.0000**	**31.5020**	**31.5020**	**5.6900e-003**	**0.0000**	**31.6215**

	ROG	**NOx**	**CO**	**SO2**	**Fugitive PM10**	**Exhaust PM10**	**PM10 Total**	**Fugitive PM2.5**	**Exhaust PM2.5**	**PM2.5 Total**	**Bio- CO2**	**NBio-CO2**	**Total CO2**	**CH4**	**N20**	**CO2e**
Percent Reduction	**0.00**	**9.07**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

2.2 Overall Operational

Unmitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Area	0.1200	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	1.0000e-005	1.0000e-005	0.0000	0.0000	1.0000e-005
Energy	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Mobile	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Offroad	0.0243	0.2386	0.1562	3.3000e-004		0.0114	0.0114		0.0108	0.0108	0.0000	29.4627	29.4627	7.2700e-003	0.0000	29.6154
Waste						0.0000	0.0000		0.0000	0.0000	0.2030	0.0000	0.2030	0.0120	0.0000	0.4549
Water						0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.1443**	**0.2386**	**0.1562**	**3.3000e-004**	**0.0000**	**0.0114**	**0.0114**	**0.0000**	**0.0108**	**0.0108**	**0.2030**	**29.4627**	**29.6657**	**0.0193**	**0.0000**	**30.0703**

2.2 Overall Operational

Mitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Area	0.1200	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	1.0000e-005	1.0000e-005	0.0000	0.0000	1.0000e-005
Energy	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Mobile	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Offroad	0.0243	0.2386	0.1562	3.3000e-004		0.0114	0.0114		0.0108	0.0108	0.0000	29.4627	29.4627	7.2700e-003	0.0000	29.6154
Waste						0.0000	0.0000		0.0000	0.0000	0.2030	0.0000	0.2030	0.0120	0.0000	0.4549
Water						0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.1443**	**0.2386**	**0.1562**	**3.3000e-004**	**0.0000**	**0.0114**	**0.0114**	**0.0000**	**0.0108**	**0.0108**	**0.2030**	**29.4627**	**29.6657**	**0.0193**	**0.0000**	**30.0703**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	**16.81**	**100.00**	**100.00**	**100.00**	**0.00**	**100.00**	**100.00**	**0.00**	**100.00**	**100.00**	**0.00**	**100.00**	**99.32**	**37.73**	**0.00**	**98.49**

3.0 Construction Detail

Construction Phase

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description
1	Site Preparation	Site Preparation	8/1/2016	8/10/2016	5	8	Sediment Removal
2	Site Preparation - 2	Site Preparation	8/11/2016	8/26/2016	5	12	Culvert Repairs
3	Site Preparation - 3	Site Preparation	8/27/2016	9/30/2016	5	25	Other maintenance activities

Acres of Grading (Site Preparation Phase): 0.18

Acres of Grading (Grading Phase): 0

Acres of Paving: 0

Residential Indoor: 0; Residential Outdoor: 0; Non-Residential Indoor: 0; Non-Residential Outdoor: 0 (Architectural Coating – sqft)

OffRoad Equipment

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Site Preparation	Excavators	1	8.00	162	0.38
Site Preparation	Graders	1	0.00	174	0.41
Site Preparation	Pumps	1	8.00	84	0.74
Site Preparation	Skid Steer Loaders	1	8.00	97	0.37
Site Preparation - 2	Excavators	1	8.00	162	0.38
Site Preparation - 2	Graders	1	0.00	174	0.41
Site Preparation - 2	Graders	1	0.00	174	0.41
Site Preparation - 2	Pumps	1	8.00	84	0.74
Site Preparation - 2	Skid Steer Loaders	1	8.00	97	0.37
Site Preparation - 2	Tractors/Loaders/Backhoes	1	0.00	97	0.37
Site Preparation - 3	Cement and Mortar Mixers	1	8.00	9	0.56
Site Preparation - 3	Excavators	1	8.00	162	0.38
Site Preparation - 3	Graders	1	0.00	174	0.41
Site Preparation - 3	Pumps	1	8.00	84	0.74
Site Preparation - 3	Tractors/Loaders/Backhoes	1	0.00	97	0.37

Trips and VMT

Phase Name	Offroad Equipment Count	Worker Trip Number	Vendor Trip Number	Hauling Trip Number	Worker Trip Length	Vendor Trip Length	Hauling Trip Length	Worker Vehicle Class	Vendor Vehicle Class	Hauling Vehicle Class
Site Preparation	4	10.00	0.00	40.00	12.40	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Site Preparation - 2	6	10.00	0.00	13.00	12.40	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Site Preparation - 2	6	10.00	0.00	0.00	12.40	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Site Preparation - 3	5	10.00	0.00	0.00	12.40	7.30	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

3.2 Site Preparation - 2016

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					1.2000e-004	0.0000	1.2000e-004	1.0000e-005	0.0000	1.0000e-005	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	4.9200e-003	0.0463	0.0376	6.0000e-005		2.8000e-003	2.8000e-003		2.6900e-003	2.6900e-003	0.0000	5.4193	5.4193	1.1700e-003	0.0000	5.4439
Total	**4.9200e-003**	**0.0463**	**0.0376**	**6.0000e-005**	**1.2000e-004**	**2.8000e-003**	**2.9200e-003**	**1.0000e-005**	**2.6900e-003**	**2.7000e-003**	**0.0000**	**5.4193**	**5.4193**	**1.1700e-003**	**0.0000**	**5.4439**

3.2 Site Preparation - 2016

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	5.1000e-004	6.0200e-003	7.1300e-003	1.0000e-005	3.3000e-004	7.0000e-005	4.1000e-004	9.0000e-005	7.0000e-005	1.6000e-004	0.0000	1.3260	1.3260	1.0000e-005	0.0000	1.3262
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	1.4000e-004	2.2000e-004	2.1200e-003	0.0000	3.6000e-004	0.0000	3.6000e-004	1.0000e-004	0.0000	1.0000e-004	0.0000	0.3260	0.3260	2.0000e-005	0.0000	0.3264
Total	**6.5000e-004**	**6.2400e-003**	**9.2500e-003**	**1.0000e-005**	**6.9000e-004**	**7.0000e-005**	**7.7000e-004**	**1.9000e-004**	**7.0000e-005**	**2.6000e-004**	**0.0000**	**1.6520**	**1.6520**	**3.0000e-005**	**0.0000**	**1.6526**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					1.2000e-004	0.0000	1.2000e-004	1.0000e-005	0.0000	1.0000e-005	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	4.9200e-003	0.0374	0.0376	6.0000e-005		2.8000e-003	2.8000e-003		2.6900e-003	2.6900e-003	0.0000	5.4193	5.4193	1.1700e-003	0.0000	5.4439
Total	**4.9200e-003**	**0.0374**	**0.0376**	**6.0000e-005**	**1.2000e-004**	**2.8000e-003**	**2.9200e-003**	**1.0000e-005**	**2.6900e-003**	**2.7000e-003**	**0.0000**	**5.4193**	**5.4193**	**1.1700e-003**	**0.0000**	**5.4439**

3.2 Site Preparation - 2016

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	5.1000e-004	6.0200e-003	7.1300e-003	1.0000e-005	3.3000e-004	7.0000e-005	4.1000e-004	9.0000e-005	7.0000e-005	1.6000e-004	0.0000	1.3260	1.3260	1.0000e-005	0.0000	1.3262
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	1.4000e-004	2.2000e-004	2.1200e-003	0.0000	3.6000e-004	0.0000	3.6000e-004	1.0000e-004	0.0000	1.0000e-004	0.0000	0.3260	0.3260	2.0000e-005	0.0000	0.3264
Total	**6.5000e-004**	**6.2400e-003**	**9.2500e-003**	**1.0000e-005**	**6.9000e-004**	**7.0000e-005**	**7.7000e-004**	**1.9000e-004**	**7.0000e-005**	**2.6000e-004**	**0.0000**	**1.6520**	**1.6520**	**3.0000e-005**	**0.0000**	**1.6526**

3.3 Site Preparation - 2 - 2016

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					2.7000e-004	0.0000	2.7000e-004	3.0000e-005	0.0000	3.0000e-005	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	7.3800e-003	0.0695	0.0564	9.0000e-005		4.2000e-003	4.2000e-003		4.0300e-003	4.0300e-003	0.0000	8.1289	8.1289	1.7600e-003	0.0000	8.1658
Total	**7.3800e-003**	**0.0695**	**0.0564**	**9.0000e-005**	**2.7000e-004**	**4.2000e-003**	**4.4700e-003**	**3.0000e-005**	**4.0300e-003**	**4.0600e-003**	**0.0000**	**8.1289**	**8.1289**	**1.7600e-003**	**0.0000**	**8.1658**

3.3 Site Preparation - 2 - 2016

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	1.7000e-004	1.9600e-003	2.3200e-003	0.0000	1.9000e-004	2.0000e-005	2.1000e-004	5.0000e-005	2.0000e-005	7.0000e-005	0.0000	0.4309	0.4309	0.0000	0.0000	0.4310
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	4.3000e-004	6.7000e-004	6.3500e-003	1.0000e-005	2.0200e-003	1.0000e-005	2.0300e-003	5.2000e-004	1.0000e-005	5.3000e-004	0.0000	0.9781	0.9781	5.0000e-005	0.0000	0.9792
Total	**6.0000e-004**	**2.6300e-003**	**8.6700e-003**	**1.0000e-005**	**2.2100e-003**	**3.0000e-005**	**2.2400e-003**	**5.7000e-004**	**3.0000e-005**	**6.0000e-004**	**0.0000**	**1.4091**	**1.4091**	**5.0000e-005**	**0.0000**	**1.4102**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					2.7000e-004	0.0000	2.7000e-004	3.0000e-005	0.0000	3.0000e-005	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	7.3800e-003	0.0560	0.0564	9.0000e-005		4.2000e-003	4.2000e-003		4.0300e-003	4.0300e-003	0.0000	8.1289	8.1289	1.7600e-003	0.0000	8.1658
Total	**7.3800e-003**	**0.0560**	**0.0564**	**9.0000e-005**	**2.7000e-004**	**4.2000e-003**	**4.4700e-003**	**3.0000e-005**	**4.0300e-003**	**4.0600e-003**	**0.0000**	**8.1289**	**8.1289**	**1.7600e-003**	**0.0000**	**8.1658**

3.3 Site Preparation - 2 - 2016

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	1.7000e-004	1.9600e-003	2.3200e-003	0.0000	1.9000e-004	2.0000e-005	2.1000e-004	5.0000e-005	2.0000e-005	7.0000e-005	0.0000	0.4309	0.4309	0.0000	0.0000	0.4310
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	4.3000e-004	6.7000e-004	6.3500e-003	1.0000e-005	2.0200e-003	1.0000e-005	2.0300e-003	5.2000e-004	1.0000e-005	5.3000e-004	0.0000	0.9781	0.9781	5.0000e-005	0.0000	0.9792
Total	**6.0000e-004**	**2.6300e-003**	**8.6700e-003**	**1.0000e-005**	**2.2100e-003**	**3.0000e-005**	**2.2400e-003**	**5.7000e-004**	**3.0000e-005**	**6.0000e-004**	**0.0000**	**1.4091**	**1.4091**	**5.0000e-005**	**0.0000**	**1.4102**

3.4 Site Preparation - 3 - 2016

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					2.6500e-003	0.0000	2.6500e-003	2.9000e-004	0.0000	2.9000e-004	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0140	0.1214	0.0950	1.6000e-004		7.3600e-003	7.3600e-003		7.1500e-003	7.1500e-003	0.0000	13.8739	13.8739	2.6200e-003	0.0000	13.9290
Total	**0.0140**	**0.1214**	**0.0950**	**1.6000e-004**	**2.6500e-003**	**7.3600e-003**	**0.0100**	**2.9000e-004**	**7.1500e-003**	**7.4400e-003**	**0.0000**	**13.8739**	**13.8739**	**2.6200e-003**	**0.0000**	**13.9290**

3.4 Site Preparation - 3 - 2016

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	4.5000e-004	7.0000e-004	6.6200e-003	1.0000e-005	1.1300e-003	1.0000e-005	1.1400e-003	3.0000e-004	1.0000e-005	3.1000e-004	0.0000	1.0189	1.0189	6.0000e-005	0.0000	1.0200
Total	**4.5000e-004**	**7.0000e-004**	**6.6200e-003**	**1.0000e-005**	**1.1300e-003**	**1.0000e-005**	**1.1400e-003**	**3.0000e-004**	**1.0000e-005**	**3.1000e-004**	**0.0000**	**1.0189**	**1.0189**	**6.0000e-005**	**0.0000**	**1.0200**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					2.6500e-003	0.0000	2.6500e-003	2.9000e-004	0.0000	2.9000e-004	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0140	0.1214	0.0950	1.6000e-004		7.3600e-003	7.3600e-003		7.1500e-003	7.1500e-003	0.0000	13.8739	13.8739	2.6200e-003	0.0000	13.9290
Total	**0.0140**	**0.1214**	**0.0950**	**1.6000e-004**	**2.6500e-003**	**7.3600e-003**	**0.0100**	**2.9000e-004**	**7.1500e-003**	**7.4400e-003**	**0.0000**	**13.8739**	**13.8739**	**2.6200e-003**	**0.0000**	**13.9290**

3.4 Site Preparation - 3 - 2016

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	4.5000e-004	7.0000e-004	6.6200e-003	1.0000e-005	1.1300e-003	1.0000e-005	1.1400e-003	3.0000e-004	1.0000e-005	3.1000e-004	0.0000	1.0189	1.0189	6.0000e-005	0.0000	1.0200
Total	**4.5000e-004**	**7.0000e-004**	**6.6200e-003**	**1.0000e-005**	**1.1300e-003**	**1.0000e-005**	**1.1400e-003**	**3.0000e-004**	**1.0000e-005**	**3.1000e-004**	**0.0000**	**1.0189**	**1.0189**	**6.0000e-005**	**0.0000**	**1.0200**

4.0 Operational Detail - Mobile

4.1 Mitigation Measures Mobile

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Mitigated	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Unmitigated	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

4.2 Trip Summary Information

	Average Daily Trip Rate			Unmitigated	Mitigated
Land Use	Weekday	Saturday	Sunday	Annual VMT	Annual VMT
User Defined Recreational	0.00	0.00	0.00		
Total	0.00	0.00	0.00		

4.3 Trip Type Information

	Miles			Trip %			Trip Purpose %		
Land Use	H-W or C-W	H-S or C-C	H-O or C-NW	H-W or C-W	H-S or C-C	H-O or C-NW	Primary	Diverted	Pass-by
User Defined Recreational	9.50	7.30	7.30	0.00	0.00	0.00	0	0	0

4.4 Fleet Mix

LDA	LDT1	LDT2	MDV	LHD1	LHD2	MHD	HHD	OBUS	UBUS	MCY	SBUS	MH
0.579131	0.062714	0.176356	0.114004	0.029626	0.004163	0.015785	0.004086	0.002626	0.003692	0.006605	0.000229	0.000983

5.0 Energy Detail

Historical Energy Use: N

5.1 Mitigation Measures Energy

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Electricity Mitigated						0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Electricity Unmitigated						0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
NaturalGas Mitigated	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
NaturalGas Unmitigated	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

5.2 Energy by Land Use - NaturalGas

Unmitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	tons/yr										MT/yr					
User Defined Recreational	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

5.2 Energy by Land Use - NaturalGas

Mitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	tons/yr										MT/yr					
User Defined Recreational	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

5.3 Energy by Land Use - Electricity

Unmitigated

	Electricity Use	Total CO2	CH4	N2O	CO2e
Land Use	kWh/yr	MT/yr			
User Defined Recreational	0	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**

5.3 Energy by Land Use - Electricity

Mitigated

	Electricity Use	Total CO2	CH4	N2O	CO2e
Land Use	kWh/yr	MT/yr			
User Defined Recreational	0	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**

6.0 Area Detail

6.1 Mitigation Measures Area

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Mitigated	0.1200	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	1.0000e-005	1.0000e-005	0.0000	0.0000	1.0000e-005
Unmitigated	0.1200	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	1.0000e-005	1.0000e-005	0.0000	0.0000	1.0000e-005

6.2 Area by SubCategory

Unmitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	tons/yr										MT/yr					
Architectural Coating	0.0000					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Consumer Products	0.1200					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Landscaping	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	1.0000e-005	1.0000e-005	0.0000	0.0000	1.0000e-005
Total	**0.1200**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**1.0000e-005**	**1.0000e-005**	**0.0000**	**0.0000**	**1.0000e-005**

Mitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	tons/yr										MT/yr					
Architectural Coating	0.0000					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Consumer Products	0.1200					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Landscaping	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	1.0000e-005	1.0000e-005	0.0000	0.0000	1.0000e-005
Total	**0.1200**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**1.0000e-005**	**1.0000e-005**	**0.0000**	**0.0000**	**1.0000e-005**

7.0 Water Detail

7.1 Mitigation Measures Water

	Total CO2	CH4	N2O	CO2e
Category	MT/yr			
Mitigated	0.0000	0.0000	0.0000	0.0000
Unmitigated	0.0000	0.0000	0.0000	0.0000

7.2 Water by Land Use

<u>Unmitigated</u>

	Indoor/Outdoor Use	Total CO2	CH4	N2O	CO2e
Land Use	Mgal	MT/yr			
User Defined Recreational	0 / 0	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**

7.2 Water by Land Use

Mitigated

	Indoor/Outdoor Use	Total CO2	CH4	N2O	CO2e
Land Use	Mgal	MT/yr			
User Defined Recreational	0 / 0	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**

8.0 Waste Detail

8.1 Mitigation Measures Waste

Category/Year

	Total CO2	CH4	N2O	CO2e
	MT/yr			
Mitigated	0.2030	0.0120	0.0000	0.4549
Unmitigated	0.2030	0.0120	0.0000	0.4549

8.2 Waste by Land Use

Unmitigated

	Waste Disposed	Total CO2	CH4	N2O	CO2e
Land Use	tons	MT/yr			
User Defined Recreational	1	0.2030	0.0120	0.0000	0.4549
Total		**0.2030**	**0.0120**	**0.0000**	**0.4549**

Mitigated

	Waste Disposed	Total CO2	CH4	N2O	CO2e
Land Use	tons	MT/yr			
User Defined Recreational	1	0.2030	0.0120	0.0000	0.4549
Total		**0.2030**	**0.0120**	**0.0000**	**0.4549**

9.0 Operational Offroad

Equipment Type	Number	Hours/Day	Days/Year	Horse Power	Load Factor	Fuel Type
Cement and Mortar Mixers	1	8.00	25	9	0.56	Diesel
Excavators	1	8.00	25	162	0.38	Diesel
Off-Highway Trucks	1	8.00	25	400	0.38	Diesel
Pressure Washers	1	8.00	25	13	0.30	Diesel
Pumps	1	8.00	25	84	0.74	Diesel

UnMitigated/Mitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Equipment Type	tons/yr										MT/yr					
Pressure Washers	6.0000e-004	4.1700e-003	3.0900e-003	1.0000e-005		2.1000e-004	2.1000e-004		2.1000e-004	2.1000e-004	0.0000	0.4433	0.4433	5.0000e-005	0.0000	0.4443
Pumps	7.4800e-003	0.0567	0.0479	8.0000e-005		3.9300e-003	3.9300e-003		3.9300e-003	3.9300e-003	0.0000	7.0651	7.0651	6.1000e-004	0.0000	7.0779
Cement and Mortar Mixers	7.3000e-004	4.6100e-003	3.8500e-003	1.0000e-005		1.8000e-004	1.8000e-004		1.8000e-004	1.8000e-004	0.0000	0.5729	0.5729	6.0000e-005	0.0000	0.5741
Excavators	4.5300e-003	0.0502	0.0428	7.0000e-005		2.4700e-003	2.4700e-003		2.2700e-003	2.2700e-003	0.0000	6.1378	6.1378	1.8800e-003	0.0000	6.1773
Off-Highway Trucks	0.0109	0.1229	0.0586	1.6000e-004		4.5600e-003	4.5600e-003		4.2000e-003	4.2000e-003	0.0000	15.2437	15.2437	4.6700e-003	0.0000	15.3418
Total	**0.0242**	**0.2386**	**0.1562**	**3.3000e-004**		**0.0114**	**0.0114**		**0.0108**	**0.0108**	**0.0000**	**29.4627**	**29.4627**	**7.2700e-003**	**0.0000**	**29.6154**

10.0 Vegetation

Colma Creek Maintenance

San Mateo County, Summer

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
User Defined Recreational	1.00	User Defined Unit	0.70	30,730.00	0

1.2 Other Project Characteristics

Urbanization Urban **Wind Speed (m/s)** 2.2 **Precipitation Freq (Days)** 70

Climate Zone 5 **Operational Year** 2017

Utility Company Pacific Gas & Electric Company

CO2 Intensity (lb/MWhr) 641.35 **CH4 Intensity (lb/MWhr)** 0.029 **N2O Intensity (lb/MWhr)** 0.006

1.3 User Entered Comments & Non-Default Data

Project Characteristics -

Land Use - Estimated square feet based on temporary waters impact (8050 sq ft in Reach 2, 8070 sq ft in Reach 3) and temporary wetland impact (14610 sqft in Reach 3).

Construction Phase - Assumed all phases would occur consecutively, not simultaneously. Phase durations based on Project Description. Other maintenance activities' phase duration assumed to be total of approximately 25 days based on debris removal activity (25 times per year).

Off-road Equipment - Assume sediment removal activities require use of 1 excavator, 1 pump for the maintenance area within the silt curtain, and 1 skid steer loader.

Off-road Equipment - Assume culvert repairs would require use of excavator, skid steer loader, and pump.

Off-road Equipment - Assume other maintenance activities require the following 3 pieces of equipment to operate at the same time: excavator, concrete mixer, and a pump.

Trips and VMT - Assume 5 workers during each phase (2 roundtrips per day-10 worker trips). Assume 10 cy-capacity truck used for fill/exported soils quantities.

Grading - Assume maximum area of 5 acres for Other Maintenance Activities (site prep-3 phase).

Vehicle Trips - Trip rate of 5 on Saturday used to represent 5 roundtrips per week, which would be close to 25 days of annual maintenance activities and represent 5 workers coming to the project work areas.

Area Coating - There wouldn't be any architectural coatings for the creek channel maintenance activities; so assumed square footage would be zero. Assume concrete patching activities accounted for in off-road equipment.

Landscape Equipment - Assume other maintenance activities would only occur approximately 75 days per year, which is the in-channel work window (August 1-October 15).

Solid Waste - Assume debris removal from channel would require solid waste disposal (an assumed 1 ton per year).

Operational Off-Road Equipment - Pressure washer may be used for swallow nest hole cleaning. Assume use of excavator, concrete mixer, and pump for debris removal and concrete patching activities. Assume use of 1 haul truck to remove debris.

Table Name	Column Name	Default Value	New Value
tblAreaCoating	Area_Nonresidential_Exterior	15365	0
tblAreaCoating	Area_Nonresidential_Interior	46095	0
tblConstructionPhase	NumDays	1.00	8.00
tblConstructionPhase	NumDays	1.00	12.00
tblConstructionPhase	NumDays	1.00	25.00
tblGrading	AcresOfGrading	0.00	0.18
tblGrading	AcresOfGrading	0.00	0.50
tblGrading	AcresOfGrading	0.00	5.00
tblGrading	MaterialExported	0.00	401.00
tblGrading	MaterialExported	0.00	72.00

tblGrading	MaterialImported	0.00	61.00
tblLandscapeEquipment	NumberSummerDays	180	75
tblLandUse	LandUseSquareFeet	0.00	30,730.00
tblLandUse	LotAcreage	0.00	0.70
tblOffRoadEquipment	HorsePower	64.00	97.00
tblOffRoadEquipment	HorsePower	64.00	97.00
tblOffRoadEquipment	LoadFactor	0.37	0.37
tblOffRoadEquipment	LoadFactor	0.37	0.37
tblOffRoadEquipment	LoadFactor	0.37	0.37
tblOffRoadEquipment	OffRoadEquipmentType	Tractors/Loaders/Backhoes	Skid Steer Loaders
tblOffRoadEquipment	OffRoadEquipmentType	Tractors/Loaders/Backhoes	Skid Steer Loaders
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	0.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	0.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	0.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	0.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	0.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	0.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	0.00	1.00
tblOffRoadEquipment	PhaseName		Site Preparation - 3
tblOffRoadEquipment	PhaseName		Site Preparation
tblOffRoadEquipment	PhaseName		Site Preparation - 2
tblOffRoadEquipment	PhaseName		Site Preparation - 3
tblOffRoadEquipment	PhaseName		Site Preparation
tblOffRoadEquipment	PhaseName		Site Preparation - 2
tblOffRoadEquipment	PhaseName		Site Preparation - 3
tblOffRoadEquipment	UsageHours	8.00	0.00
tblOffRoadEquipment	UsageHours	8.00	0.00
tblOffRoadEquipment	UsageHours	8.00	0.00

tblOffRoadEquipment	UsageHours	8.00	0.00
tblOffRoadEquipment	UsageHours	8.00	0.00
tblOffRoadEquipment	UsageHours	8.00	0.00
tblOperationalOffRoadEquipment	OperDaysPerYear	260.00	25.00
tblOperationalOffRoadEquipment	OperDaysPerYear	260.00	25.00
tblOperationalOffRoadEquipment	OperDaysPerYear	260.00	25.00
tblOperationalOffRoadEquipment	OperDaysPerYear	260.00	25.00
tblOperationalOffRoadEquipment	OperDaysPerYear	260.00	25.00
tblOperationalOffRoadEquipment	OperOffRoadEquipmentNumber	0.00	1.00
tblOperationalOffRoadEquipment	OperOffRoadEquipmentNumber	0.00	1.00
tblOperationalOffRoadEquipment	OperOffRoadEquipmentNumber	0.00	1.00
tblOperationalOffRoadEquipment	OperOffRoadEquipmentNumber	0.00	1.00
tblOperationalOffRoadEquipment	OperOffRoadEquipmentNumber	0.00	1.00
tblProjectCharacteristics	OperationalYear	2014	2017
tblSolidWaste	SolidWasteGenerationRate	0.00	1.00
tblTripsAndVMT	HaulingTripNumber	50.00	40.00
tblTripsAndVMT	HaulingTripNumber	17.00	13.00
tblTripsAndVMT	HaulingTripNumber	17.00	0.00
tblTripsAndVMT	WorkerTripNumber	15.00	10.00
tblTripsAndVMT	WorkerTripNumber	15.00	10.00
tblTripsAndVMT	WorkerTripNumber	13.00	10.00
tblVehicleTrips	ST_TR	0.00	5.00

2.0 Emissions Summary

2.1 Overall Construction (Maximum Daily Emission)

Unmitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	lb/day										lb/day					
2016	1.3842	13.0708	11.4817	0.0197	0.4311	0.7185	1.1358	0.1039	0.6895	0.7807	0.0000	1,954.4426	1,954.4426	0.3332	0.0000	1,961.4407
Total	**1.3842**	**13.0708**	**11.4817**	**0.0197**	**0.4311**	**0.7185**	**1.1358**	**0.1039**	**0.6895**	**0.7807**	**0.0000**	**1,954.4426**	**1,954.4426**	**0.3332**	**0.0000**	**1,961.4407**

Mitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	lb/day										lb/day					
2016	1.3842	10.8335	11.4817	0.0197	0.4311	0.7185	1.1358	0.1039	0.6895	0.7807	0.0000	1,954.4426	1,954.4426	0.3332	0.0000	1,961.4407
Total	**1.3842**	**10.8335**	**11.4817**	**0.0197**	**0.4311**	**0.7185**	**1.1358**	**0.1039**	**0.6895**	**0.7807**	**0.0000**	**1,954.4426**	**1,954.4426**	**0.3332**	**0.0000**	**1,961.4407**

	ROG	**NOx**	**CO**	**SO2**	**Fugitive PM10**	**Exhaust PM10**	**PM10 Total**	**Fugitive PM2.5**	**Exhaust PM2.5**	**PM2.5 Total**	**Bio- CO2**	**NBio-CO2**	**Total CO2**	**CH4**	**N20**	**CO2e**
Percent Reduction	**0.00**	**17.12**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

2.2 Overall Operational

Unmitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Area	0.6576	0.0000	1.0000e-004	0.0000		0.0000	0.0000		0.0000	0.0000		2.2000e-004	2.2000e-004	0.0000		2.3000e-004
Energy	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Mobile	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Offroad	1.9396	19.0852	12.4939	0.0263		0.9092	0.9092		0.8642	0.8642		2,598.1651	2,598.1651	0.6410		2,611.6265
Total	**2.5973**	**19.0852**	**12.4940**	**0.0263**	**0.0000**	**0.9092**	**0.9092**	**0.0000**	**0.8642**	**0.8642**		**2,598.1653**	**2,598.1653**	**0.6410**	**0.0000**	**2,611.6267**

2.2 Overall Operational

Mitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Area	0.6576	0.0000	1.0000e-004	0.0000		0.0000	0.0000		0.0000	0.0000		2.2000e-004	2.2000e-004	0.0000		2.3000e-004
Energy	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Mobile	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Offroad	1.9396	19.0852	12.4939	0.0263		0.9092	0.9092		0.8642	0.8642		2,598.1651	2,598.1651	0.6410		2,611.6265
Total	**2.5973**	**19.0852**	**12.4940**	**0.0263**	**0.0000**	**0.9092**	**0.9092**	**0.0000**	**0.8642**	**0.8642**		**2,598.1653**	**2,598.1653**	**0.6410**	**0.0000**	**2,611.6267**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	**74.68**	**100.00**	**100.00**	**100.00**	**0.00**	**100.00**	**100.00**	**0.00**	**100.00**	**100.00**	**0.00**	**100.00**	**100.00**	**100.00**	**0.00**	**100.00**

3.0 Construction Detail

Construction Phase

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description
1	Site Preparation	Site Preparation	8/1/2016	8/10/2016	5	8	Sediment Removal
2	Site Preparation - 2	Site Preparation	8/11/2016	8/26/2016	5	12	Culvert Repairs
3	Site Preparation - 3	Site Preparation	8/27/2016	9/30/2016	5	25	Other maintenance activities

Acres of Grading (Site Preparation Phase): 0.18

Acres of Grading (Grading Phase): 0

Acres of Paving: 0

Residential Indoor: 0; Residential Outdoor: 0; Non-Residential Indoor: 0; Non-Residential Outdoor: 0 (Architectural Coating – sqft)

OffRoad Equipment

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Site Preparation	Excavators	1	8.00	162	0.38
Site Preparation	Graders	1	0.00	174	0.41
Site Preparation	Pumps	1	8.00	84	0.74
Site Preparation	Skid Steer Loaders	1	8.00	97	0.37
Site Preparation - 2	Excavators	1	8.00	162	0.38
Site Preparation - 2	Graders	1	0.00	174	0.41
Site Preparation - 2	Graders	1	0.00	174	0.41
Site Preparation - 2	Pumps	1	8.00	84	0.74
Site Preparation - 2	Skid Steer Loaders	1	8.00	97	0.37
Site Preparation - 2	Tractors/Loaders/Backhoes	1	0.00	97	0.37
Site Preparation - 3	Cement and Mortar Mixers	1	8.00	9	0.56
Site Preparation - 3	Excavators	1	8.00	162	0.38
Site Preparation - 3	Graders	1	0.00	174	0.41
Site Preparation - 3	Pumps	1	8.00	84	0.74
Site Preparation - 3	Tractors/Loaders/Backhoes	1	0.00	97	0.37

Trips and VMT

Phase Name	Offroad Equipment Count	Worker Trip Number	Vendor Trip Number	Hauling Trip Number	Worker Trip Length	Vendor Trip Length	Hauling Trip Length	Worker Vehicle Class	Vendor Vehicle Class	Hauling Vehicle Class
Site Preparation	4	10.00	0.00	40.00	12.40	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Site Preparation - 2	6	10.00	0.00	13.00	12.40	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Site Preparation - 2	6	10.00	0.00	0.00	12.40	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Site Preparation - 3	5	10.00	0.00	0.00	12.40	7.30	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

3.2 Site Preparation - 2016

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					0.0295	0.0000	0.0295	3.4300e-003	0.0000	3.4300e-003			0.0000			0.0000
Off-Road	1.2298	11.5774	9.3971	0.0150		0.6993	0.6993		0.6718	0.6718		1,493.4343	1,493.4343	0.3228		1,500.2140
Total	**1.2298**	**11.5774**	**9.3971**	**0.0150**	**0.0295**	**0.6993**	**0.7288**	**3.4300e-003**	**0.6718**	**0.6753**		**1,493.4343**	**1,493.4343**	**0.3228**		**1,500.2140**

3.2 Site Preparation - 2016

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.1175	1.4445	1.5353	3.6400e-003	0.0866	0.0185	0.1050	0.0237	0.0170	0.0406		365.7749	365.7749	2.6600e-003		365.8308
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0369	0.0489	0.5493	1.1200e-003	0.0943	7.3000e-004	0.0950	0.0250	6.7000e-004	0.0257		95.2334	95.2334	4.9100e-003		95.3366
Total	**0.1544**	**1.4934**	**2.0846**	**4.7600e-003**	**0.1809**	**0.0192**	**0.2000**	**0.0487**	**0.0177**	**0.0663**		**461.0083**	**461.0083**	**7.5700e-003**		**461.1673**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					0.0295	0.0000	0.0295	3.4300e-003	0.0000	3.4300e-003			0.0000			0.0000
Off-Road	1.2298	9.3401	9.3971	0.0150		0.6993	0.6993		0.6718	0.6718	0.0000	1,493.4343	1,493.4343	0.3228		1,500.2140
Total	**1.2298**	**9.3401**	**9.3971**	**0.0150**	**0.0295**	**0.6993**	**0.7288**	**3.4300e-003**	**0.6718**	**0.6753**	**0.0000**	**1,493.4343**	**1,493.4343**	**0.3228**		**1,500.2140**

3.2 Site Preparation - 2016

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.1175	1.4445	1.5353	3.6400e-003	0.0866	0.0185	0.1050	0.0237	0.0170	0.0406		365.7749	365.7749	2.6600e-003		365.8308
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0369	0.0489	0.5493	1.1200e-003	0.0943	7.3000e-004	0.0950	0.0250	6.7000e-004	0.0257		95.2334	95.2334	4.9100e-003		95.3366
Total	**0.1544**	**1.4934**	**2.0846**	**4.7600e-003**	**0.1809**	**0.0192**	**0.2000**	**0.0487**	**0.0177**	**0.0663**		**461.0083**	**461.0083**	**7.5700e-003**		**461.1673**

3.3 Site Preparation - 2 - 2016

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					0.0454	0.0000	0.0454	4.9600e-003	0.0000	4.9600e-003			0.0000			0.0000
Off-Road	1.2298	11.5774	9.3971	0.0150		0.6993	0.6993		0.6718	0.6718		1,493.4343	1,493.4343	0.3228		1,500.2140
Total	**1.2298**	**11.5774**	**9.3971**	**0.0150**	**0.0454**	**0.6993**	**0.7447**	**4.9600e-003**	**0.6718**	**0.6768**		**1,493.4343**	**1,493.4343**	**0.3228**		**1,500.2140**

3.3 Site Preparation - 2 - 2016

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0255	0.3130	0.3327	7.9000e-004	0.0331	4.0000e-003	0.0371	8.6400e-003	3.6800e-003	0.0123		79.2512	79.2512	5.8000e-004		79.2633
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0738	0.0978	1.0985	2.2400e-003	0.3526	1.4600e-003	0.3540	0.0903	1.3400e-003	0.0916		190.4668	190.4668	9.8300e-003		190.6731
Total	**0.0993**	**0.4108**	**1.4312**	**3.0300e-003**	**0.3856**	**5.4600e-003**	**0.3911**	**0.0989**	**5.0200e-003**	**0.1039**		**269.7180**	**269.7180**	**0.0104**		**269.9365**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					0.0454	0.0000	0.0454	4.9600e-003	0.0000	4.9600e-003			0.0000			0.0000
Off-Road	1.2298	9.3401	9.3971	0.0150		0.6993	0.6993		0.6718	0.6718	0.0000	1,493.4343	1,493.4343	0.3228		1,500.2140
Total	**1.2298**	**9.3401**	**9.3971**	**0.0150**	**0.0454**	**0.6993**	**0.7447**	**4.9600e-003**	**0.6718**	**0.6768**	**0.0000**	**1,493.4343**	**1,493.4343**	**0.3228**		**1,500.2140**

3.3 Site Preparation - 2 - 2016

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0255	0.3130	0.3327	7.9000e-004	0.0331	4.0000e-003	0.0371	8.6400e-003	3.6800e-003	0.0123		79.2512	79.2512	5.8000e-004		79.2633
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0738	0.0978	1.0985	2.2400e-003	0.3526	1.4600e-003	0.3540	0.0903	1.3400e-003	0.0916		190.4668	190.4668	9.8300e-003		190.6731
Total	**0.0993**	**0.4108**	**1.4312**	**3.0300e-003**	**0.3856**	**5.4600e-003**	**0.3911**	**0.0989**	**5.0200e-003**	**0.1039**		**269.7180**	**269.7180**	**0.0104**		**269.9365**

3.4 Site Preparation - 3 - 2016

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					0.2121	0.0000	0.2121	0.0229	0.0000	0.0229			0.0000			0.0000
Off-Road	1.1158	9.7093	7.5991	0.0126		0.5892	0.5892		0.5717	0.5717		1,223.4691	1,223.4691	0.2314		1,228.3288
Total	**1.1158**	**9.7093**	**7.5991**	**0.0126**	**0.2121**	**0.5892**	**0.8013**	**0.0229**	**0.5717**	**0.5946**		**1,223.4691**	**1,223.4691**	**0.2314**		**1,228.3288**

3.4 Site Preparation - 3 - 2016

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0369	0.0489	0.5493	1.1200e-003	0.0943	7.3000e-004	0.0950	0.0250	6.7000e-004	0.0257		95.2334	95.2334	4.9100e-003		95.3366
Total	**0.0369**	**0.0489**	**0.5493**	**1.1200e-003**	**0.0943**	**7.3000e-004**	**0.0950**	**0.0250**	**6.7000e-004**	**0.0257**		**95.2334**	**95.2334**	**4.9100e-003**		**95.3366**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					0.2121	0.0000	0.2121	0.0229	0.0000	0.0229			0.0000			0.0000
Off-Road	1.1158	9.7093	7.5991	0.0126		0.5892	0.5892		0.5717	0.5717	0.0000	1,223.4691	1,223.4691	0.2314		1,228.3288
Total	**1.1158**	**9.7093**	**7.5991**	**0.0126**	**0.2121**	**0.5892**	**0.8013**	**0.0229**	**0.5717**	**0.5946**	**0.0000**	**1,223.4691**	**1,223.4691**	**0.2314**		**1,228.3288**

3.4 Site Preparation - 3 - 2016

Mitigated Construction Off-Site

Category	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0369	0.0489	0.5493	1.1200e-003	0.0943	7.3000e-004	0.0950	0.0250	6.7000e-004	0.0257		95.2334	95.2334	4.9100e-003		95.3366
Total	**0.0369**	**0.0489**	**0.5493**	**1.1200e-003**	**0.0943**	**7.3000e-004**	**0.0950**	**0.0250**	**6.7000e-004**	**0.0257**		**95.2334**	**95.2334**	**4.9100e-003**		**95.3366**

4.0 Operational Detail - Mobile

4.1 Mitigation Measures Mobile

Category	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
	lb/day										lb/day					
Mitigated	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Unmitigated	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000

4.2 Trip Summary Information

	Average Daily Trip Rate			Unmitigated	Mitigated
Land Use	Weekday	Saturday	Sunday	Annual VMT	Annual VMT
User Defined Recreational	0.00	0.00	0.00		
Total	0.00	0.00	0.00		

4.3 Trip Type Information

	Miles			Trip %			Trip Purpose %		
Land Use	H-W or C-W	H-S or C-C	H-O or C-NW	H-W or C-W	H-S or C-C	H-O or C-NW	Primary	Diverted	Pass-by
User Defined Recreational	9.50	7.30	7.30	0.00	0.00	0.00	0	0	0

4.4 Fleet Mix

LDA	LDT1	LDT2	MDV	LHD1	LHD2	MHD	HHD	OBUS	UBUS	MCY	SBUS	MH
0.579131	0.062714	0.176356	0.114004	0.029626	0.004163	0.015785	0.004086	0.002626	0.003692	0.006605	0.000229	0.000983

5.0 Energy Detail

Historical Energy Use: N

5.1 Mitigation Measures Energy

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
NaturalGas Mitigated	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
NaturalGas Unmitigated	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000

5.2 Energy by Land Use - NaturalGas

Unmitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	lb/day										lb/day					
User Defined Recreational	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

Mitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	lb/day										lb/day					
User Defined Recreational	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

6.0 Area Detail

6.1 Mitigation Measures Area

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Mitigated	0.6576	0.0000	1.0000e-004	0.0000		0.0000	0.0000		0.0000	0.0000		2.2000e-004	2.2000e-004	0.0000		2.3000e-004
Unmitigated	0.6576	0.0000	1.0000e-004	0.0000		0.0000	0.0000		0.0000	0.0000		2.2000e-004	2.2000e-004	0.0000		2.3000e-004

6.2 Area by SubCategory

Unmitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	lb/day										lb/day					
Architectural Coating	0.0000					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Consumer Products	0.6576					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Landscaping	1.0000e-005	0.0000	1.0000e-004	0.0000		0.0000	0.0000		0.0000	0.0000		2.2000e-004	2.2000e-004	0.0000		2.3000e-004
Total	**0.6576**	**0.0000**	**1.0000e-004**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**		**2.2000e-004**	**2.2000e-004**	**0.0000**		**2.3000e-004**

6.2 Area by SubCategory

Mitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	lb/day										lb/day					
Architectural Coating	0.0000					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Consumer Products	0.6576					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Landscaping	1.0000e-005	0.0000	1.0000e-004	0.0000		0.0000	0.0000		0.0000	0.0000		2.2000e-004	2.2000e-004	0.0000		2.3000e-004
Total	**0.6576**	**0.0000**	**1.0000e-004**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**		**2.2000e-004**	**2.2000e-004**	**0.0000**		**2.3000e-004**

7.0 Water Detail

7.1 Mitigation Measures Water

8.0 Waste Detail

8.1 Mitigation Measures Waste

9.0 Operational Offroad

Equipment Type	Number	Hours/Day	Days/Year	Horse Power	Load Factor	Fuel Type
Cement and Mortar Mixers	1	8.00	25	9	0.56	Diesel
Excavators	1	8.00	25	162	0.38	Diesel
Off-Highway Trucks	1	8.00	25	400	0.38	Diesel
Pressure Washers	1	8.00	25	13	0.30	Diesel
Pumps	1	8.00	25	84	0.74	Diesel

UnMitigated/Mitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Equipment Type	lb/day										lb/day					
Pumps	0.5986	4.5322	3.8316	6.5800e-003		0.3146	0.3146		0.3146	0.3146		623.0346	623.0346	0.0537		624.1627
Cement and Mortar Mixers	0.0588	0.3685	0.3084	7.1000e-004		0.0147	0.0147		0.0147	0.0147		50.5163	50.5163	5.2400e-003		50.6265
Excavators	0.3622	4.0169	3.4211	5.2900e-003		0.1976	0.1976		0.1818	0.1818		541.2618	541.2618	0.1658		544.7444
Off-Highway Trucks	0.8720	9.8344	4.6854	0.0132		0.3651	0.3651		0.3359	0.3359		1,344.2625	1,344.2625	0.4119		1,352.9119
Pressure Washers	0.0481	0.3334	0.2476	5.5000e-004		0.0172	0.0172		0.0172	0.0172		39.0900	39.0900	4.3300e-003		39.1810
Total	**1.9396**	**19.0852**	**12.4939**	**0.0263**		**0.9092**	**0.9092**		**0.8642**	**0.8642**		**2,598.1651**	**2,598.1651**	**0.6410**		**2,611.6265**

10.0 Vegetation

Colma Creek Maintenance

San Mateo County, Winter

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
User Defined Recreational	1.00	User Defined Unit	0.70	30,730.00	0

1.2 Other Project Characteristics

Urbanization	Urban	**Wind Speed (m/s)**	2.2	**Precipitation Freq (Days)**	70
Climate Zone	5			**Operational Year**	2017
Utility Company	Pacific Gas & Electric Company				
CO2 Intensity (lb/MWhr)	641.35	**CH4 Intensity (lb/MWhr)**	0.029	**N2O Intensity (lb/MWhr)**	0.006

1.3 User Entered Comments & Non-Default Data

Project Characteristics -

Land Use - Estimated square feet based on temporary waters impact (8050 sq ft in Reach 2, 8070 sq ft in Reach 3) and temporary wetland impact (14610 sqft in Reach 3).

Construction Phase - Assumed all phases would occur consecutively, not simultaneously. Phase durations based on Project Description. Other maintenance activities' phase duration assumed to be total of approximately 25 days based on debris removal activity (25 times per year).

Off-road Equipment - Assume sediment removal activities require use of 1 excavator, 1 pump for the maintenance area within the silt curtain, and 1 skid steer loader.

Off-road Equipment - Assume culvert repairs would require use of excavator, skid steer loader, and pump.

Off-road Equipment - Assume other maintenance activities require the following 3 pieces of equipment to operate at the same time: excavator, concrete mixer, and a pump.

Trips and VMT - Assume 5 workers during each phase (2 roundtrips per day-10 worker trips). Assume 10 cy-capacity truck used for fill/exported soils quantities.

Grading - Assume maximum area of 5 acres for Other Maintenance Activities (site prep-3 phase).

Vehicle Trips - Trip rate of 5 on Saturday used to represent 5 roundtrips per week, which would be close to 25 days of annual maintenance activities and represent 5 workers coming to the project work areas.

Area Coating - There wouldn't be any architectural coatings for the creek channel maintenance activities; so assumed square footage would be zero. Assume concrete patching activities accounted for in off-road equipment.

Landscape Equipment - Assume other maintenance activities would only occur approximately 75 days per year, which is the in-channel work window (August 1-October 15).

Solid Waste - Assume debris removal from channel would require solid waste disposal (an assumed 1 ton per year).

Operational Off-Road Equipment - Pressure washer may be used for swallow nest hole cleaning. Assume use of excavator, concrete mixer, and pump for debris removal and concrete patching activities. Assume use of 1 haul truck to remove debris.

Table Name	Column Name	Default Value	New Value
tblAreaCoating	Area_Nonresidential_Exterior	15365	0
tblAreaCoating	Area_Nonresidential_Interior	46095	0
tblConstructionPhase	NumDays	1.00	8.00
tblConstructionPhase	NumDays	1.00	12.00
tblConstructionPhase	NumDays	1.00	25.00
tblGrading	AcresOfGrading	0.00	0.18
tblGrading	AcresOfGrading	0.00	0.50
tblGrading	AcresOfGrading	0.00	5.00
tblGrading	MaterialExported	0.00	401.00
tblGrading	MaterialExported	0.00	72.00

tblGrading	MaterialImported	0.00	61.00
tblLandscapeEquipment	NumberSummerDays	180	75
tblLandUse	LandUseSquareFeet	0.00	30,730.00
tblLandUse	LotAcreage	0.00	0.70
tblOffRoadEquipment	HorsePower	64.00	97.00
tblOffRoadEquipment	HorsePower	64.00	97.00
tblOffRoadEquipment	LoadFactor	0.37	0.37
tblOffRoadEquipment	LoadFactor	0.37	0.37
tblOffRoadEquipment	LoadFactor	0.37	0.37
tblOffRoadEquipment	OffRoadEquipmentType	Tractors/Loaders/Backhoes	Skid Steer Loaders
tblOffRoadEquipment	OffRoadEquipmentType	Tractors/Loaders/Backhoes	Skid Steer Loaders
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	0.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	0.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	0.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	0.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	0.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	0.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	0.00	1.00
tblOffRoadEquipment	PhaseName		Site Preparation - 3
tblOffRoadEquipment	PhaseName		Site Preparation
tblOffRoadEquipment	PhaseName		Site Preparation - 2
tblOffRoadEquipment	PhaseName		Site Preparation - 3
tblOffRoadEquipment	PhaseName		Site Preparation
tblOffRoadEquipment	PhaseName		Site Preparation - 2
tblOffRoadEquipment	PhaseName		Site Preparation - 3
tblOffRoadEquipment	UsageHours	8.00	0.00
tblOffRoadEquipment	UsageHours	8.00	0.00
tblOffRoadEquipment	UsageHours	8.00	0.00

tblOffRoadEquipment	UsageHours	8.00	0.00
tblOffRoadEquipment	UsageHours	8.00	0.00
tblOffRoadEquipment	UsageHours	8.00	0.00
tblOperationalOffRoadEquipment	OperDaysPerYear	260.00	25.00
tblOperationalOffRoadEquipment	OperDaysPerYear	260.00	25.00
tblOperationalOffRoadEquipment	OperDaysPerYear	260.00	25.00
tblOperationalOffRoadEquipment	OperDaysPerYear	260.00	25.00
tblOperationalOffRoadEquipment	OperDaysPerYear	260.00	25.00
tblOperationalOffRoadEquipment	OperOffRoadEquipmentNumber	0.00	1.00
tblOperationalOffRoadEquipment	OperOffRoadEquipmentNumber	0.00	1.00
tblOperationalOffRoadEquipment	OperOffRoadEquipmentNumber	0.00	1.00
tblOperationalOffRoadEquipment	OperOffRoadEquipmentNumber	0.00	1.00
tblOperationalOffRoadEquipment	OperOffRoadEquipmentNumber	0.00	1.00
tblProjectCharacteristics	OperationalYear	2014	2017
tblSolidWaste	SolidWasteGenerationRate	0.00	1.00
tblTripsAndVMT	HaulingTripNumber	50.00	40.00
tblTripsAndVMT	HaulingTripNumber	17.00	13.00
tblTripsAndVMT	HaulingTripNumber	17.00	0.00
tblTripsAndVMT	WorkerTripNumber	15.00	10.00
tblTripsAndVMT	WorkerTripNumber	15.00	10.00
tblTripsAndVMT	WorkerTripNumber	13.00	10.00
tblVehicleTrips	ST_TR	0.00	5.00

2.0 Emissions Summary

2.1 Overall Construction (Maximum Daily Emission)

Unmitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	lb/day										lb/day					
2016	1.4057	13.1683	11.9483	0.0197	0.4311	0.7185	1.1358	0.1039	0.6895	0.7807	0.0000	1,947.8427	1,947.8427	0.3333	0.0000	1,954.8410
Total	**1.4057**	**13.1683**	**11.9483**	**0.0197**	**0.4311**	**0.7185**	**1.1358**	**0.1039**	**0.6895**	**0.7807**	**0.0000**	**1,947.8427**	**1,947.8427**	**0.3333**	**0.0000**	**1,954.8410**

Mitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	lb/day										lb/day					
2016	1.4057	10.9311	11.9483	0.0197	0.4311	0.7185	1.1358	0.1039	0.6895	0.7807	0.0000	1,947.8427	1,947.8427	0.3333	0.0000	1,954.8410
Total	**1.4057**	**10.9311**	**11.9483**	**0.0197**	**0.4311**	**0.7185**	**1.1358**	**0.1039**	**0.6895**	**0.7807**	**0.0000**	**1,947.8427**	**1,947.8427**	**0.3333**	**0.0000**	**1,954.8410**

	ROG	**NOx**	**CO**	**SO2**	**Fugitive PM10**	**Exhaust PM10**	**PM10 Total**	**Fugitive PM2.5**	**Exhaust PM2.5**	**PM2.5 Total**	**Bio- CO2**	**NBio-CO2**	**Total CO2**	**CH4**	**N20**	**CO2e**
Percent Reduction	**0.00**	**16.99**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

2.2 Overall Operational

Unmitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Area	0.6576	0.0000	1.0000e-004	0.0000		0.0000	0.0000		0.0000	0.0000		2.2000e-004	2.2000e-004	0.0000		2.3000e-004
Energy	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Mobile	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Offroad	1.9396	19.0852	12.4939	0.0263		0.9092	0.9092		0.8642	0.8642		2,598.1651	2,598.1651	0.6410		2,611.6265
Total	**2.5973**	**19.0852**	**12.4940**	**0.0263**	**0.0000**	**0.9092**	**0.9092**	**0.0000**	**0.8642**	**0.8642**		**2,598.1653**	**2,598.1653**	**0.6410**	**0.0000**	**2,611.6267**

2.2 Overall Operational

Mitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Area	0.6576	0.0000	1.0000e-004	0.0000		0.0000	0.0000		0.0000	0.0000		2.2000e-004	2.2000e-004	0.0000		2.3000e-004
Energy	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Mobile	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Offroad	1.9396	19.0852	12.4939	0.0263		0.9092	0.9092		0.8642	0.8642		2,598.1651	2,598.1651	0.6410		2,611.6265
Total	**2.5973**	**19.0852**	**12.4940**	**0.0263**	**0.0000**	**0.9092**	**0.9092**	**0.0000**	**0.8642**	**0.8642**		**2,598.1653**	**2,598.1653**	**0.6410**	**0.0000**	**2,611.6267**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	**74.68**	**100.00**	**100.00**	**100.00**	**0.00**	**100.00**	**100.00**	**0.00**	**100.00**	**100.00**	**0.00**	**100.00**	**100.00**	**100.00**	**0.00**	**100.00**

3.0 Construction Detail

Construction Phase

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description
1	Site Preparation	Site Preparation	8/1/2016	8/10/2016	5	8	Sediment Removal
2	Site Preparation - 2	Site Preparation	8/11/2016	8/26/2016	5	12	Culvert Repairs
3	Site Preparation - 3	Site Preparation	8/27/2016	9/30/2016	5	25	Other maintenance activities

Acres of Grading (Site Preparation Phase): 0.18

Acres of Grading (Grading Phase): 0

Acres of Paving: 0

Residential Indoor: 0; Residential Outdoor: 0; Non-Residential Indoor: 0; Non-Residential Outdoor: 0 (Architectural Coating – sqft)

OffRoad Equipment

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Site Preparation	Excavators	1	8.00	162	0.38
Site Preparation	Graders	1	0.00	174	0.41
Site Preparation	Pumps	1	8.00	84	0.74
Site Preparation	Skid Steer Loaders	1	8.00	97	0.37
Site Preparation - 2	Excavators	1	8.00	162	0.38
Site Preparation - 2	Graders	1	0.00	174	0.41
Site Preparation - 2	Graders	1	0.00	174	0.41
Site Preparation - 2	Pumps	1	8.00	84	0.74
Site Preparation - 2	Skid Steer Loaders	1	8.00	97	0.37
Site Preparation - 2	Tractors/Loaders/Backhoes	1	0.00	97	0.37
Site Preparation - 3	Cement and Mortar Mixers	1	8.00	9	0.56
Site Preparation - 3	Excavators	1	8.00	162	0.38
Site Preparation - 3	Graders	1	0.00	174	0.41
Site Preparation - 3	Pumps	1	8.00	84	0.74
Site Preparation - 3	Tractors/Loaders/Backhoes	1	0.00	97	0.37

Trips and VMT

Phase Name	Offroad Equipment Count	Worker Trip Number	Vendor Trip Number	Hauling Trip Number	Worker Trip Length	Vendor Trip Length	Hauling Trip Length	Worker Vehicle Class	Vendor Vehicle Class	Hauling Vehicle Class
Site Preparation	4	10.00	0.00	40.00	12.40	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Site Preparation - 2	6	10.00	0.00	13.00	12.40	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Site Preparation - 2	6	10.00	0.00	0.00	12.40	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Site Preparation - 3	5	10.00	0.00	0.00	12.40	7.30	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

3.2 Site Preparation - 2016

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					0.0295	0.0000	0.0295	3.4300e-003	0.0000	3.4300e-003			0.0000			0.0000
Off-Road	1.2298	11.5774	9.3971	0.0150		0.6993	0.6993		0.6718	0.6718		1,493.4343	1,493.4343	0.3228		1,500.2140
Total	**1.2298**	**11.5774**	**9.3971**	**0.0150**	**0.0295**	**0.6993**	**0.7288**	**3.4300e-003**	**0.6718**	**0.6753**		**1,493.4343**	**1,493.4343**	**0.3228**		**1,500.2140**

3.2 Site Preparation - 2016

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.1372	1.5305	1.9997	3.6400e-003	0.0866	0.0185	0.1051	0.0237	0.0170	0.0407		364.8912	364.8912	2.7000e-003		364.9478
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0387	0.0605	0.5515	1.0500e-003	0.0943	7.3000e-004	0.0950	0.0250	6.7000e-004	0.0257		89.5172	89.5172	4.9100e-003		89.6204
Total	**0.1758**	**1.5910**	**2.5511**	**4.6900e-003**	**0.1809**	**0.0193**	**0.2001**	**0.0487**	**0.0177**	**0.0664**		**454.4084**	**454.4084**	**7.6100e-003**		**454.5682**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					0.0295	0.0000	0.0295	3.4300e-003	0.0000	3.4300e-003			0.0000			0.0000
Off-Road	1.2298	9.3401	9.3971	0.0150		0.6993	0.6993		0.6718	0.6718	0.0000	1,493.4343	1,493.4343	0.3228		1,500.2140
Total	**1.2298**	**9.3401**	**9.3971**	**0.0150**	**0.0295**	**0.6993**	**0.7288**	**3.4300e-003**	**0.6718**	**0.6753**	**0.0000**	**1,493.4343**	**1,493.4343**	**0.3228**		**1,500.2140**

3.2 Site Preparation - 2016

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.1372	1.5305	1.9997	3.6400e-003	0.0866	0.0185	0.1051	0.0237	0.0170	0.0407		364.8912	364.8912	2.7000e-003		364.9478
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0387	0.0605	0.5515	1.0500e-003	0.0943	7.3000e-004	0.0950	0.0250	6.7000e-004	0.0257		89.5172	89.5172	4.9100e-003		89.6204
Total	**0.1758**	**1.5910**	**2.5511**	**4.6900e-003**	**0.1809**	**0.0193**	**0.2001**	**0.0487**	**0.0177**	**0.0664**		**454.4084**	**454.4084**	**7.6100e-003**		**454.5682**

3.3 Site Preparation - 2 - 2016

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					0.0454	0.0000	0.0454	4.9600e-003	0.0000	4.9600e-003			0.0000			0.0000
Off-Road	1.2298	11.5774	9.3971	0.0150		0.6993	0.6993		0.6718	0.6718		1,493.4343	1,493.4343	0.3228		1,500.2140
Total	**1.2298**	**11.5774**	**9.3971**	**0.0150**	**0.0454**	**0.6993**	**0.7447**	**4.9600e-003**	**0.6718**	**0.6768**		**1,493.4343**	**1,493.4343**	**0.3228**		**1,500.2140**

3.3 Site Preparation - 2 - 2016

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0297	0.3316	0.4333	7.9000e-004	0.0331	4.0100e-003	0.0371	8.6400e-003	3.6900e-003	0.0123		79.0598	79.0598	5.8000e-004		79.0720
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0773	0.1209	1.1029	2.1100e-003	0.3526	1.4600e-003	0.3540	0.0903	1.3400e-003	0.0916		179.0345	179.0345	9.8300e-003		179.2408
Total	**0.1070**	**0.4525**	**1.5362**	**2.9000e-003**	**0.3856**	**5.4700e-003**	**0.3911**	**0.0989**	**5.0300e-003**	**0.1039**		**258.0942**	**258.0942**	**0.0104**		**258.3129**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					0.0454	0.0000	0.0454	4.9600e-003	0.0000	4.9600e-003			0.0000			0.0000
Off-Road	1.2298	9.3401	9.3971	0.0150		0.6993	0.6993		0.6718	0.6718	0.0000	1,493.4343	1,493.4343	0.3228		1,500.2140
Total	**1.2298**	**9.3401**	**9.3971**	**0.0150**	**0.0454**	**0.6993**	**0.7447**	**4.9600e-003**	**0.6718**	**0.6768**	**0.0000**	**1,493.4343**	**1,493.4343**	**0.3228**		**1,500.2140**

3.3 Site Preparation - 2 - 2016

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0297	0.3316	0.4333	7.9000e-004	0.0331	4.0100e-003	0.0371	8.6400e-003	3.6900e-003	0.0123		79.0598	79.0598	5.8000e-004		79.0720
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0773	0.1209	1.1029	2.1100e-003	0.3526	1.4600e-003	0.3540	0.0903	1.3400e-003	0.0916		179.0345	179.0345	9.8300e-003		179.2408
Total	**0.1070**	**0.4525**	**1.5362**	**2.9000e-003**	**0.3856**	**5.4700e-003**	**0.3911**	**0.0989**	**5.0300e-003**	**0.1039**		**258.0942**	**258.0942**	**0.0104**		**258.3129**

3.4 Site Preparation - 3 - 2016

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					0.2121	0.0000	0.2121	0.0229	0.0000	0.0229			0.0000			0.0000
Off-Road	1.1158	9.7093	7.5991	0.0126		0.5892	0.5892		0.5717	0.5717		1,223.4691	1,223.4691	0.2314		1,228.3288
Total	**1.1158**	**9.7093**	**7.5991**	**0.0126**	**0.2121**	**0.5892**	**0.8013**	**0.0229**	**0.5717**	**0.5946**		**1,223.4691**	**1,223.4691**	**0.2314**		**1,228.3288**

3.4 Site Preparation - 3 - 2016

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0387	0.0605	0.5515	1.0500e-003	0.0943	7.3000e-004	0.0950	0.0250	6.7000e-004	0.0257		89.5172	89.5172	4.9100e-003		89.6204
Total	**0.0387**	**0.0605**	**0.5515**	**1.0500e-003**	**0.0943**	**7.3000e-004**	**0.0950**	**0.0250**	**6.7000e-004**	**0.0257**		**89.5172**	**89.5172**	**4.9100e-003**		**89.6204**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					0.2121	0.0000	0.2121	0.0229	0.0000	0.0229			0.0000			0.0000
Off-Road	1.1158	9.7093	7.5991	0.0126		0.5892	0.5892		0.5717	0.5717	0.0000	1,223.4691	1,223.4691	0.2314		1,228.3288
Total	**1.1158**	**9.7093**	**7.5991**	**0.0126**	**0.2121**	**0.5892**	**0.8013**	**0.0229**	**0.5717**	**0.5946**	**0.0000**	**1,223.4691**	**1,223.4691**	**0.2314**		**1,228.3288**

3.4 Site Preparation - 3 - 2016

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0387	0.0605	0.5515	1.0500e-003	0.0943	7.3000e-004	0.0950	0.0250	6.7000e-004	0.0257		89.5172	89.5172	4.9100e-003		89.6204
Total	**0.0387**	**0.0605**	**0.5515**	**1.0500e-003**	**0.0943**	**7.3000e-004**	**0.0950**	**0.0250**	**6.7000e-004**	**0.0257**		**89.5172**	**89.5172**	**4.9100e-003**		**89.6204**

4.0 Operational Detail - Mobile

4.1 Mitigation Measures Mobile

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Mitigated	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Unmitigated	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000

4.2 Trip Summary Information

	Average Daily Trip Rate			Unmitigated	Mitigated
Land Use	Weekday	Saturday	Sunday	Annual VMT	Annual VMT
User Defined Recreational	0.00	0.00	0.00		
Total	0.00	0.00	0.00		

4.3 Trip Type Information

	Miles			Trip %			Trip Purpose %		
Land Use	H-W or C-W	H-S or C-C	H-O or C-NW	H-W or C-W	H-S or C-C	H-O or C-NW	Primary	Diverted	Pass-by
User Defined Recreational	9.50	7.30	7.30	0.00	0.00	0.00	0	0	0

4.4 Fleet Mix

LDA	LDT1	LDT2	MDV	LHD1	LHD2	MHD	HHD	OBUS	UBUS	MCY	SBUS	MH
0.579131	0.062714	0.176356	0.114004	0.029626	0.004163	0.015785	0.004086	0.002626	0.003692	0.006605	0.000229	0.000983

5.0 Energy Detail

Historical Energy Use: N

5.1 Mitigation Measures Energy

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
NaturalGas Mitigated	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
NaturalGas Unmitigated	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000

5.2 Energy by Land Use - NaturalGas

Unmitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	lb/day										lb/day					
User Defined Recreational	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

Mitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	lb/day										lb/day					
User Defined Recreational	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

6.0 Area Detail

6.1 Mitigation Measures Area

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Mitigated	0.6576	0.0000	1.0000e-004	0.0000		0.0000	0.0000		0.0000	0.0000		2.2000e-004	2.2000e-004	0.0000		2.3000e-004
Unmitigated	0.6576	0.0000	1.0000e-004	0.0000		0.0000	0.0000		0.0000	0.0000		2.2000e-004	2.2000e-004	0.0000		2.3000e-004

6.2 Area by SubCategory

Unmitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	lb/day										lb/day					
Architectural Coating	0.0000					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Consumer Products	0.6576					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Landscaping	1.0000e-005	0.0000	1.0000e-004	0.0000		0.0000	0.0000		0.0000	0.0000		2.2000e-004	2.2000e-004	0.0000		2.3000e-004
Total	**0.6576**	**0.0000**	**1.0000e-004**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**		**2.2000e-004**	**2.2000e-004**	**0.0000**		**2.3000e-004**

6.2 Area by SubCategory

Mitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	lb/day										lb/day					
Architectural Coating	0.0000					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Consumer Products	0.6576					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Landscaping	1.0000e-005	0.0000	1.0000e-004	0.0000		0.0000	0.0000		0.0000	0.0000		2.2000e-004	2.2000e-004	0.0000		2.3000e-004
Total	**0.6576**	**0.0000**	**1.0000e-004**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**		**2.2000e-004**	**2.2000e-004**	**0.0000**		**2.3000e-004**

7.0 Water Detail

7.1 Mitigation Measures Water

8.0 Waste Detail

8.1 Mitigation Measures Waste

9.0 Operational Offroad

Equipment Type	Number	Hours/Day	Days/Year	Horse Power	Load Factor	Fuel Type
Cement and Mortar Mixers	1	8.00	25	9	0.56	Diesel
Excavators	1	8.00	25	162	0.38	Diesel
Off-Highway Trucks	1	8.00	25	400	0.38	Diesel
Pressure Washers	1	8.00	25	13	0.30	Diesel
Pumps	1	8.00	25	84	0.74	Diesel

UnMitigated/Mitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Equipment Type	lb/day										lb/day					
Pumps	0.5986	4.5322	3.8316	6.5800e-003		0.3146	0.3146		0.3146	0.3146		623.0346	623.0346	0.0537		624.1627
Cement and Mortar Mixers	0.0588	0.3685	0.3084	7.1000e-004		0.0147	0.0147		0.0147	0.0147		50.5163	50.5163	5.2400e-003		50.6265
Excavators	0.3622	4.0169	3.4211	5.2900e-003		0.1976	0.1976		0.1818	0.1818		541.2618	541.2618	0.1658		544.7444
Off-Highway Trucks	0.8720	9.8344	4.6854	0.0132		0.3651	0.3651		0.3359	0.3359		1,344.2625	1,344.2625	0.4119		1,352.9119
Pressure Washers	0.0481	0.3334	0.2476	5.5000e-004		0.0172	0.0172		0.0172	0.0172		39.0900	39.0900	4.3300e-003		39.1810
Total	**1.9396**	**19.0852**	**12.4939**	**0.0263**		**0.9092**	**0.9092**		**0.8642**	**0.8642**		**2,598.1651**	**2,598.1651**	**0.6410**		**2,611.6265**

10.0 Vegetation

Appendix C
LISTS OF SPECIAL-STATUS SPECIES KNOWN TO OCCUR IN THE PROJECT AREA

Selected Elements by Common Name

California Department of Fish and Wildlife

California Natural Diversity Database

Query Criteria: Quad is (Hunters Point (3712263) or Montara Mountain (3712254) or Oakland West (3712273) or Point Bonita (3712275) or San Francisco North (3712274) or San Francisco South (3712264) or San Mateo (3712253))

Species	Element Code	Federal Status	State Status	Global Rank	State Rank	Rare Plant Rank/CDFW SSC or FP
adobe sanicle *Sanicula maritima*	PDAPI1Z0D0	None	Rare	G2	S2	1B.1
Alameda Island mole *Scapanus latimanus parvus*	AMABB02031	None	None	G5T1Q	S1	SSC
Alameda song sparrow *Melospiza melodia pusillula*	ABPBXA301S	None	None	G5T2?	S2?	SSC
alkali milk-vetch *Astragalus tener var. tener*	PDFAB0F8R1	None	None	G2T2	S2	1B.2
American badger *Taxidea taxus*	AMAJF04010	None	None	G5	S3	SSC
American peregrine falcon *Falco peregrinus anatum*	ABNKD06071	Delisted	Delisted	G4T4	S3S4	FP
Angel Island mole *Scapanus latimanus insularis*	AMABB02032	None	None	G5T1	S1	
arcuate bush-mallow *Malacothamnus arcuatus*	PDMAL0Q0E0	None	None	G2Q	S2	1B.2
bank swallow *Riparia riparia*	ABPAU08010	None	Threatened	G5	S2	
Bay checkerspot butterfly *Euphydryas editha bayensis*	IILEPK4055	Threatened	None	G5T1	S1	
beach layia *Layia carnosa*	PDAST5N010	Endangered	Endangered	G2	S2	1B.1
bent-flowered fiddleneck *Amsinckia lunaris*	PDBOR01070	None	None	G2?	S2?	1B.2
big free-tailed bat *Nyctinomops macrotis*	AMACD04020	None	None	G5	S3	SSC
blue coast gilia *Gilia capitata ssp. chamissonis*	PDPLM040B3	None	None	G5T2	S2	1B.1
bristly sedge *Carex comosa*	PMCYP032Y0	None	None	G5	S2	2B.1
bumblebee scarab beetle *Lichnanthe ursina*	IICOL67020	None	None	G2	S2	
burrowing owl *Athene cunicularia*	ABNSB10010	None	None	G4	S3	SSC
California black rail *Laterallus jamaicensis coturniculus*	ABNME03041	None	Threatened	G3G4T1	S1	FP
California clapper rail *Rallus longirostris obsoletus*	ABNME05016	Endangered	Endangered	G5T1	S1	FP

Species	Element Code	Federal Status	State Status	Global Rank	State Rank	Rare Plant Rank/CDFW SSC or FP
California giant salamander *Dicamptodon ensatus*	AAAAH01020	None	None	G3	S2S3	
California least tern *Sternula antillarum browni*	ABNNM08103	Endangered	Endangered	G4T2T3Q	S2	FP
California red-legged frog *Rana draytonii*	AAABH01022	Threatened	None	G2G3	S2S3	SSC
California seablite *Suaeda californica*	PDCHE0P020	Endangered	None	G1	S1	1B.1
California tiger salamander *Ambystoma californiense*	AAAAA01180	Threatened	Threatened	G2G3	S2S3	SSC
callippe silverspot butterfly *Speyeria callippe callippe*	IILEPJ6091	Endangered	None	G5T1	S1	
Choris' popcornflower *Plagiobothrys chorisianus var. chorisianus*	PDBOR0V061	None	None	G3T2Q	S2	1B.2
coast yellow leptosiphon *Leptosiphon croceus*	PDPLM09170	None	None	G1	S1	1B.1
coastal marsh milk-vetch *Astragalus pycnostachyus var. pycnostachyus*	PDFAB0F7B2	None	None	G2T2	S2	1B.2
coastal triquetrella *Triquetrella californica*	NBMUS7S010	None	None	G2	S2	1B.2
coho salmon - central California coast ESU *Oncorhynchus kisutch*	AFCHA02034	Endangered	Endangered	G4	S2?	
compact cobwebby thistle *Cirsium occidentale var. compactum*	PDAST2E1Z1	None	None	G3G4T1	S1	1B.2
congested-headed hayfield tarplant *Hemizonia congesta ssp. congesta*	PDAST4R065	None	None	G5T1T2	S1S2	1B.2
Cooper's hawk *Accipiter cooperii*	ABNKC12040	None	None	G5	S4	WL
Crystal Springs fountain thistle *Cirsium fontinale var. fontinale*	PDAST2E161	Endangered	Endangered	G2T1	S1	1B.1
Crystal Springs lessingia *Lessingia arachnoidea*	PDAST5S0C0	None	None	G1	S1	1B.2
dark-eyed gilia *Gilia millefoliata*	PDPLM04130	None	None	G2	S2	1B.2
Diablo helianthella *Helianthella castanea*	PDAST4M020	None	None	G2	S2	1B.2
double-crested cormorant *Phalacrocorax auritus*	ABNFD01020	None	None	G5	S4	WL
Edgewood blind harvestman *Calicina minor*	ILARA13020	None	None	G1	S1	
fragrant fritillary *Fritillaria liliacea*	PMLIL0V0C0	None	None	G2	S2	1B.2

Species	Element Code	Federal Status	State Status	Global Rank	State Rank	Rare Plant Rank/CDFW SSC or FP
Franciscan manzanita *Arctostaphylos franciscana*	PDERI040J3	Endangered	None	G1	S1	1B.1
Franciscan onion *Allium peninsulare var. franciscanum*	PMLIL021R1	None	None	G5T1	S1	1B.2
Franciscan thistle *Cirsium andrewsii*	PDAST2E050	None	None	G3	S3	1B.2
fringed myotis *Myotis thysanodes*	AMACC01090	None	None	G4	S3	
hairless popcornflower *Plagiobothrys glaber*	PDBOR0V0B0	None	None	GH	SH	1A
hardhead *Mylopharodon conocephalus*	AFCJB25010	None	None	G3	S3	SSC
Hickman's cinquefoil *Potentilla hickmanii*	PDROS1B0U0	Endangered	Endangered	G1	S1	1B.1
Hillsborough chocolate lily *Fritillaria biflora var. ineziana*	PMLIL0V031	None	None	G3G4T1	S1	1B.1
hoary bat *Lasiurus cinereus*	AMACC05030	None	None	G5	S4	
incredible harvestman *Banksula incredula*	ILARA14100	None	None	G1	S1	
Kellogg's horkelia *Horkelia cuneata var. sericea*	PDROS0W043	None	None	G4T2	S2?	1B.1
Kings Mountain manzanita *Arctostaphylos regismontana*	PDERI041C0	None	None	G2	S2	1B.2
Leech's skyline diving beetle *Hydroporus leechi*	IICOL55040	None	None	G1?	S1?	
longfin smelt *Spirinchus thaleichthys*	AFCHB03010	Candidate	Threatened	G5	S1	SSC
marbled murrelet *Brachyramphus marmoratus*	ABNNN06010	Threatened	Endangered	G3G4	S1	
Marin hesperian *Vespericola marinensis*	IMGASA4140	None	None	G2	S2	
Marin knotweed *Polygonum marinense*	PDPGN0L1C0	None	None	G2Q	S2	3.1
Marin western flax *Hesperolinon congestum*	PDLIN01060	Threatened	Threatened	G1	S1	1B.1
marsh microseris *Microseris paludosa*	PDAST6E0D0	None	None	G2	S2	1B.2
marsh sandwort *Arenaria paludicola*	PDCAR040L0	Endangered	Endangered	G1	S1	1B.1
merlin *Falco columbarius*	ABNKD06030	None	None	G5	S3S4	WL

Species	Element Code	Federal Status	State Status	Global Rank	State Rank	Rare Plant Rank/CDFW SSC or FP
mimic tryonia (=California brackishwater snail) *Tryonia imitator*	IMGASJ7040	None	None	G2	S2	
Mission blue butterfly *Plebejus icarioides missionensis*	IILEPG801A	Endangered	None	G5T1	S1	
monarch - California overwintering population *Danaus plexippus pop. 1*	IILEPP2012	None	None	G4T2T3	S2S3	
Montara manzanita *Arctostaphylos montaraensis*	PDERI042W0	None	None	G1	S1	1B.2
Myrtle's silverspot butterfly *Speyeria zerene myrtleae*	IILEPJ608C	Endangered	None	G5T1	S1	
Northern Coastal Salt Marsh *Northern Coastal Salt Marsh*	CTT52110CA	None	None	G3	S3.2	
northern curly-leaved monardella *Monardella sinuata ssp. nigrescens*	PDLAM18162	None	None	G3T2	S2	1B.2
northern harrier *Circus cyaneus*	ABNKC11010	None	None	G5	S3	SSC
Northern Maritime Chaparral *Northern Maritime Chaparral*	CTT37C10CA	None	None	G1	S1.2	
northern meadow sedge *Carex praticola*	PMCYP03B20	None	None	G5	S2	2B.2
obscure bumble bee *Bombus caliginosus*	IIHYM24380	None	None	G4?	S1S2	
Opler's longhorn moth *Adela oplerella*	IILEE0G040	None	None	G2	S2	
Oregon polemonium *Polemonium carneum*	PDPLM0E050	None	None	G3G4	S2	2B.2
Ornduff's meadowfoam *Limnanthes douglasii ssp. ornduffii*	PDLIM02039	None	None	G4T1	S1	1B.1
oval-leaved viburnum *Viburnum ellipticum*	PDCPR07080	None	None	G4G5	S3?	2B.3
Pacific manzanita *Arctostaphylos pacifica*	PDERI040Z0	None	Endangered	G1	S1	1B.2
pallid bat *Antrozous pallidus*	AMACC10010	None	None	G5	S3	SSC
pappose tarplant *Centromadia parryi ssp. parryi*	PDAST4R0P2	None	None	G3T2	S2	1B.2
Point Reyes horkelia *Horkelia marinensis*	PDROS0W0B0	None	None	G2	S2	1B.2
Point Reyes jumping mouse *Zapus trinotatus orarius*	AMAFH01031	None	None	G5T1T3Q	S1S3	SSC
Point Reyes salty bird's-beak *Chloropyron maritimum ssp. palustre*	PDSCR0J0C3	None	None	G4?T2	S2	1B.2

Species	Element Code	Federal Status	State Status	Global Rank	State Rank	Rare Plant Rank/CDFW SSC or FP
Presidio clarkia *Clarkia franciscana*	PDONA050H0	Endangered	Endangered	G1	S1	1B.1
Presidio manzanita *Arctostaphylos montana ssp. ravenii*	PDERI040J2	Endangered	Endangered	G3T1	S1	1B.1
Ricksecker's water scavenger beetle *Hydrochara rickseckeri*	IICOL5V010	None	None	G2?	S2?	
robust spineflower *Chorizanthe robusta var. robusta*	PDPGN040Q2	Endangered	None	G2T1	S1	1B.1
rose leptosiphon *Leptosiphon rosaceus*	PDPLM09180	None	None	G1	S1	1B.1
round-headed Chinese-houses *Collinsia corymbosa*	PDSCR0H060	None	None	G1	S1	1B.2
round-leaved filaree *California macrophylla*	PDGER01070	None	None	G3?	S3?	1B.2
saline clover *Trifolium hydrophilum*	PDFAB400R5	None	None	G2	S2	1B.2
saltmarsh common yellowthroat *Geothlypis trichas sinuosa*	ABPBX1201A	None	None	G5T3	S3	SSC
salt-marsh harvest mouse *Reithrodontomys raviventris*	AMAFF02040	Endangered	Endangered	G1G2	S1S2	FP
San Bruno elfin butterfly *Callophrys mossii bayensis*	IILEPE2202	Endangered	None	G4T1	S1	
San Bruno Mountain manzanita *Arctostaphylos imbricata*	PDERI040L0	None	Endangered	G1	S1	1B.1
San Francisco Bay Area leaf-cutter bee *Trachusa gummifera*	IIHYM80010	None	None	G1	S1	
San Francisco Bay spineflower *Chorizanthe cuspidata var. cuspidata*	PDPGN04081	None	None	G2T1	S1	1B.2
San Francisco campion *Silene verecunda ssp. verecunda*	PDCAR0U213	None	None	G5T2	S2	1B.2
San Francisco collinsia *Collinsia multicolor*	PDSCR0H0B0	None	None	G2	S2	1B.2
San Francisco dusky-footed woodrat *Neotoma fuscipes annectens*	AMAFF08082	None	None	G5T2T3	S2S3	SSC
San Francisco forktail damselfly *Ischnura gemina*	IIODO72010	None	None	G2	S2	
San Francisco garter snake *Thamnophis sirtalis tetrataenia*	ARADB3613B	Endangered	Endangered	G5T2Q	S2	FP
San Francisco gumplant *Grindelia hirsutula var. maritima*	PDAST470D3	None	None	G5T1Q	S1	3.2
San Francisco lessingia *Lessingia germanorum*	PDAST5S010	Endangered	Endangered	G1	S1	1B.1

Species	Element Code	Federal Status	State Status	Global Rank	State Rank	Rare Plant Rank/CDFW SSC or FP
San Francisco owl's-clover *Triphysaria floribunda*	PDSCR2T010	None	None	G2	S2	1B.2
San Francisco popcornflower *Plagiobothrys diffusus*	PDBOR0V080	None	Endangered	G1Q	S1	1B.1
San Joaquin spearscale *Extriplex joaquinana*	PDCHE041F3	None	None	G2	S2	1B.2
San Mateo thorn-mint *Acanthomintha duttonii*	PDLAM01040	Endangered	Endangered	G1	S1	1B.1
San Mateo woolly sunflower *Eriophyllum latilobum*	PDAST3N060	Endangered	Endangered	G1	S1	1B.1
San Pablo song sparrow *Melospiza melodia samuelis*	ABPBXA301W	None	None	G5T2?	S2?	SSC
sandy beach tiger beetle *Cicindela hirticollis gravida*	IICOL02101	None	None	G5T2	S1	
Santa Cruz kangaroo rat *Dipodomys venustus venustus*	AMAFD03042	None	None	G4T1	S1	
Santa Cruz microseris *Stebbinsoseris decipiens*	PDAST6E050	None	None	G2	S2	1B.2
Santa Cruz tarplant *Holocarpha macradenia*	PDAST4X020	Threatened	Endangered	G1	S1	1B.1
Serpentine Bunchgrass *Serpentine Bunchgrass*	CTT42130CA	None	None	G2	S2.2	
short-leaved evax *Hesperevax sparsiflora var. brevifolia*	PDASTE5011	None	None	G4T3	S2	1B.2
southern sea otter *Enhydra lutris nereis*	AMAJF09012	Threatened	None	G4T2	S2	FP
Stage's dufourine bee *Dufourea stagei*	IIHYM22010	None	None	G1G2	S1?	
steelhead - central California coast DPS *Oncorhynchus mykiss irideus*	AFCHA0209G	Threatened	None	G5T2T3Q	S2S3	
tidewater goby *Eucyclogobius newberryi*	AFCQN04010	Endangered	None	G3	S3	SSC
Tomales isopod *Caecidotea tomalensis*	ICMAL01220	None	None	G2	S2	
Townsend's big-eared bat *Corynorhinus townsendii*	AMACC08010	None	Candidate Threatened	G3G4	S2	SSC
two-fork clover *Trifolium amoenum*	PDFAB40040	Endangered	None	G1	S1	1B.1
Valley Needlegrass Grassland *Valley Needlegrass Grassland*	CTT42110CA	None	None	G3	S3.1	
water star-grass *Heteranthera dubia*	PMPON03010	None	None	G5	S1	2B.2

Species	Element Code	Federal Status	State Status	Global Rank	State Rank	Rare Plant Rank/CDFW SSC or FP
western leatherwood *Dirca occidentalis*	PDTHY03010	None	None	G2	S2	1B.2
western pond turtle *Emys marmorata*	ARAAD02030	None	None	G3G4	S3	SSC
western red bat *Lasiurus blossevillii*	AMACC05060	None	None	G5	S3	SSC
western snowy plover *Charadrius alexandrinus nivosus*	ABNNB03031	Threatened	None	G3T3	S2	SSC
white-rayed pentachaeta *Pentachaeta bellidiflora*	PDAST6X030	Endangered	Endangered	G1	S1	1B.1
white-tailed kite *Elanus leucurus*	ABNKC06010	None	None	G5	S3S4	FP
woodland woollythreads *Monolopia gracilens*	PDAST6G010	None	None	G3	S3	1B.2

Record Count: 131

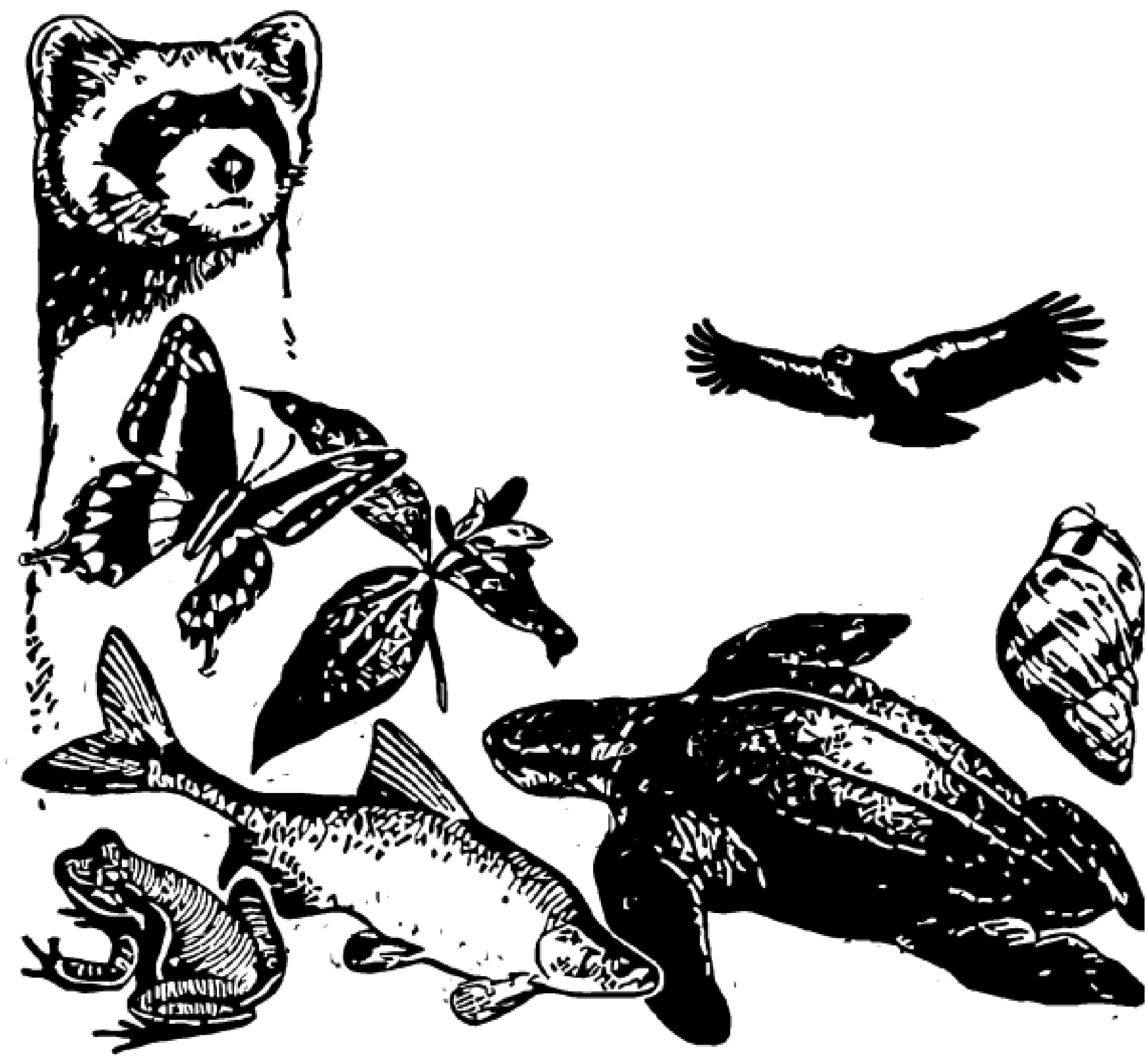
U.S. Fish & Wildlife Service

Colma Creek Flood Control Channel Maintenance Project

IPaC Trust Resource Report

Generated January 07, 2016 06:37 PM MST, IPaC v2.3.2

This report is for informational purposes only and should not be used for planning or analyzing project level impacts. For project reviews that require U.S. Fish & Wildlife Service review or concurrence, please return to the IPaC website and request an official species list from the Regulatory Documents page.



IPaC - Information for Planning and Conservation (http://ecos.fws.gov/ipac/): A project planning tool to help streamline the U.S. Fish & Wildlife Service environmental review process.

US Fish & Wildlife Service

IPaC Trust Resource Report

NAME

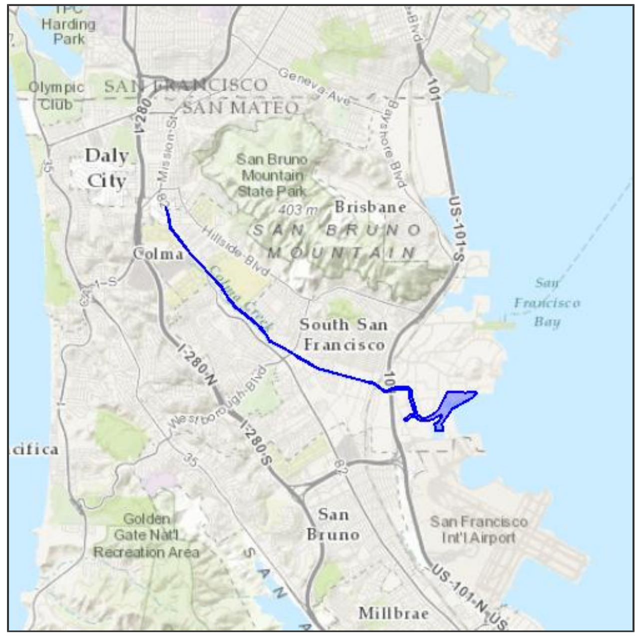
Colma Creek Flood Control Channel Maintenance Project

LOCATION

San Mateo County, California

IPAC LINK

http://ecos.fws.gov/ipac/project/GQ2Q4-U3EL5-AABGF-LVTFC-52LTTE



U.S. Fish & Wildlife Contact Information

Trust resources in this location are managed by:

San Francisco Bay-delta Fish And Wildlife
650 Capitol Mall
Suite 8-300
Sacramento, CA 95814
(916) 930-5603

Sacramento Fish And Wildlife Office
Federal Building
2800 Cottage Way, Room W-2605
Sacramento, CA 95825-1846
(916) 414-6600

Endangered Species

Proposed, candidate, threatened, and endangered species are managed by the Endangered Species Program of the U.S. Fish & Wildlife Service.

This USFWS trust resource report is for informational purposes only and should not be used for planning or analyzing project level impacts.

For project evaluations that require FWS concurrence/review, please return to the IPaC website and request an official species list from the Regulatory Documents section.

Section 7 of the Endangered Species Act **requires** Federal agencies to "request of the Secretary information whether any species which is listed or proposed to be listed may be present in the area of such proposed action" for any project that is conducted, permitted, funded, or licensed by any Federal agency.

A letter from the local office and a species list which fulfills this requirement can only be obtained by requesting an official species list from the Regulatory Documents section in IPaC.

The list of species below are those that may occur or could potentially be affected by activities in this location:

Amphibians

California Red-legged Frog Rana draytonii Threatened

MANAGED BY
Sacramento Fish And Wildlife Office

CRITICAL HABITAT
There is **final** critical habitat designated for this species.

https://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=D02D

Birds

California Clapper Rail Rallus longirostris obsoletus — Endangered

MANAGED BY
Sacramento Fish And Wildlife Office

CRITICAL HABITAT
No critical habitat has been designated for this species.

https://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=B04A

California Least Tern Sterna antillarum browni — Endangered

MANAGED BY
Sacramento Fish And Wildlife Office

CRITICAL HABITAT
No critical habitat has been designated for this species.

https://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=B03X

Marbled Murrelet Brachyramphus marmoratus — Threatened

MANAGED BY
Sacramento Fish And Wildlife Office

CRITICAL HABITAT
There is **final** critical habitat designated for this species.

https://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=B08C

Short-tailed Albatross Phoebastria (=Diomedea) albatrus — Endangered

MANAGED BY
Sacramento Fish And Wildlife Office

CRITICAL HABITAT
No critical habitat has been designated for this species.

https://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=B00Y

Western Snowy Plover Charadrius alexandrinus nivosus — Threatened

MANAGED BY
Sacramento Fish And Wildlife Office

CRITICAL HABITAT
There is **final** critical habitat designated for this species.

https://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=B07C

Fishes

Delta Smelt Hypomesus transpacificus — Threatened

MANAGED BY
Sacramento Fish And Wildlife Office

CRITICAL HABITAT
There is **final** critical habitat designated for this species.

https://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=E070

Steelhead Oncorhynchus (=Salmo) mykiss — Threatened

MANAGED BY
Sacramento Fish And Wildlife Office

CRITICAL HABITAT
There is **final** critical habitat designated for this species.

https://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=E08D

Tidewater Goby Eucyclogobius newberryi — Endangered

MANAGED BY
Sacramento Fish And Wildlife Office

CRITICAL HABITAT
There is **final** critical habitat designated for this species.

https://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=E071

Flowering Plants

Presidio Manzanita Arctostaphylos hookeri var. ravenii — Endangered

MANAGED BY
Sacramento Fish And Wildlife Office

CRITICAL HABITAT
No critical habitat has been designated for this species.

https://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=Q1T0

Robust Spineflower Chorizanthe robusta var. robusta — Endangered

MANAGED BY
Sacramento Fish And Wildlife Office

CRITICAL HABITAT
There is **final** critical habitat designated for this species.

https://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=Q3O7

San Francisco Lessingia Lessingia germanorum (=L.g. var. germanorum) — Endangered

MANAGED BY
Sacramento Fish And Wildlife Office

CRITICAL HABITAT
No critical habitat has been designated for this species.

https://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=Q3AI

San Francisco Manzanita Arctostaphylos franciscana — Endangered

MANAGED BY
Sacramento Fish And Wildlife Office

CRITICAL HABITAT
There is **final** critical habitat designated for this species.

https://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=Q25C

Showy Indian Clover Trifolium amoenum — Endangered

MANAGED BY
Sacramento Fish And Wildlife Office

CRITICAL HABITAT
No critical habitat has been designated for this species.

https://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=Q238

White-rayed Pentachaeta Pentachaeta bellidiflora — Endangered

MANAGED BY
Sacramento Fish And Wildlife Office

CRITICAL HABITAT
No critical habitat has been designated for this species.

https://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=Q2F3

Insects

Bay Checkerspot Butterfly Euphydryas editha bayensis — Threatened

MANAGED BY
Sacramento Fish And Wildlife Office

CRITICAL HABITAT
There is **final** critical habitat designated for this species.

https://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=I021

Callippe Silverspot Butterfly Speyeria callippe callippe — Endangered

MANAGED BY
Sacramento Fish And Wildlife Office

CRITICAL HABITAT
No critical habitat has been designated for this species.

https://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=I019

Mission Blue Butterfly Icaricia icarioides missionensis — Endangered

MANAGED BY
Sacramento Fish And Wildlife Office

CRITICAL HABITAT
No critical habitat has been designated for this species.

https://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=I00J

Myrtle's Silverspot Butterfly Speyeria zerene myrtleae — Endangered

MANAGED BY
Sacramento Fish And Wildlife Office

CRITICAL HABITAT
No critical habitat has been designated for this species.

https://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=I00N

San Bruno Elfin Butterfly Callophrys mossii bayensis — Endangered

MANAGED BY
Sacramento Fish And Wildlife Office

CRITICAL HABITAT
No critical habitat has been designated for this species.

https://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=I00Q

Mammals

Salt Marsh Harvest Mouse Reithrodontomys raviventris

Endangered

MANAGED BY
Sacramento Fish And Wildlife Office

CRITICAL HABITAT
No critical habitat has been designated for this species.

https://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=A03Y

Southern Sea Otter Enhydra lutris nereis

Threatened

MANAGED BY
Sacramento Fish And Wildlife Office

CRITICAL HABITAT
No critical habitat has been designated for this species.

https://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=A0A7

Reptiles

San Francisco Garter Snake Thamnophis sirtalis tetrataenia

Endangered

MANAGED BY
Sacramento Fish And Wildlife Office

CRITICAL HABITAT
No critical habitat has been designated for this species.

https://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=C002

Critical Habitats

There are no critical habitats in this location

Migratory Birds

Birds are protected by the Migratory Bird Treaty Act and the Bald and Golden Eagle Protection Act.

Any activity which results in the take of migratory birds or eagles is prohibited unless authorized by the U.S. Fish and Wildlife Service (1). There are no provisions for allowing the take of migratory birds that are unintentionally killed or injured.

Any person or organization who plans or conducts activities that may result in the take of migratory birds is responsible for complying with the appropriate regulations and implementing appropriate conservation measures.

Additional information can be found using the following links:

- Birds of Conservation Concern
  http://www.fws.gov/birds/management/managed-species/birds-of-conservation-concern.php
- Conservation measures for birds
  http://www.fws.gov/birds/management/project-assessment-tools-and-guidance/conservation-measures.php
- Year-round bird occurrence data
  http://www.fws.gov/birds/management/project-assessment-tools-and-guidance/akn-histogram-tools.php

The following species of migratory birds could potentially be affected by activities in this location:

Allen's Hummingbird Selasphorus sasin — Bird of conservation concern
Season: Breeding
https://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=B0LI

Ashy Storm-petrel Oceanodroma homochroa — Bird of conservation concern
Season: Breeding
https://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=B0AV

Bald Eagle Haliaeetus leucocephalus — Bird of conservation concern
Year-round
https://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=B008

Bell's Sparrow Amphispiza belli — Bird of conservation concern
Year-round
https://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=B0HE

Black Oystercatcher Haematopus bachmani — Bird of conservation concern
Year-round
https://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=B0KJ

Black Rail Laterallus jamaicensis — Bird of conservation concern
Season: Breeding
https://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=B09A

Black Skimmer Rynchops niger — Bird of conservation concern
Season: Breeding
https://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=B0EO

Black-vented Shearwater Puffinus opisthomelas — Bird of conservation concern
Season: Wintering

Burrowing Owl Athene cunicularia — Bird of conservation concern
Year-round
https://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=B0NC

Common Yellowthroat Geothlypis trichas sinuosa — Bird of conservation concern
Season: Breeding
https://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=B080

Costa's Hummingbird Calypte costae — Bird of conservation concern
Season: Breeding
https://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=B0JE

Fox Sparrow Passerella iliaca — Bird of conservation concern
Season: Wintering

Lawrence's Goldfinch Carduelis lawrencei — Bird of conservation concern
Season: Breeding
https://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=B0J8

Lesser Yellowlegs Tringa flavipes — Bird of conservation concern
Season: Wintering
https://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=B0MD

Lewis's Woodpecker Melanerpes lewis — Bird of conservation concern
Season: Wintering
https://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=B0HQ

Long-billed Curlew Numenius americanus — Bird of conservation concern
Season: Wintering
https://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=B06S

Marbled Godwit Limosa fedoa — Bird of conservation concern
Season: Wintering
https://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=B0JL

Nuttall's Woodpecker Picoides nuttallii — Bird of conservation concern
Year-round
https://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=B0HT

Oak Titmouse Baeolophus inornatus — Bird of conservation concern
Year-round
https://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=B0MJ

Olive-sided Flycatcher Contopus cooperi — Bird of conservation concern
Season: Breeding
https://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=B0AN

Peregrine Falcon Falco peregrinus — Bird of conservation concern
Year-round
https://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=B0FU

Pink-footed Shearwater Puffinus creatopus — Bird of conservation concern
Year-round

Rufous-crowned Sparrow Aimophila ruficeps — Bird of conservation concern
Year-round
https://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=B0MX

Short-billed Dowitcher Limnodromus griseus — Bird of conservation concern
Season: Wintering
https://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=B0JK

Short-eared Owl Asio flammeus — Bird of conservation concern
Season: Wintering
https://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=B0HD

Snowy Plover Charadrius alexandrinus — Bird of conservation concern
Season: Breeding

Tricolored Blackbird Agelaius tricolor — Bird of conservation concern
Year-round
https://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=B06P

Western Grebe aechmophorus occidentalis — Bird of conservation concern
Season: Wintering
https://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=B0EA

Whimbrel Numenius phaeopus — Bird of conservation concern
Season: Wintering
https://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=B0JN

Yellow Warbler dendroica petechia ssp. brewsteri — Bird of conservation concern
Season: Breeding
https://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=B0EN

Red Knot Calidris canutus ssp. roselaari — Bird of conservation concern
Season: Wintering
https://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=B0G6

Refuges

Any activity proposed on National Wildlife Refuge lands must undergo a 'Compatibility Determination' conducted by the Refuge. Please contact the individual Refuges to discuss any questions or concerns.

There are no refuges in this location

Wetlands in the National Wetlands Inventory

Impacts to NWI wetlands and other aquatic habitats may be subject to regulation under Section 404 of the Clean Water Act, or other State/Federal Statutes.

For more information please contact the Regulatory Program of the local U.S. Army Corps of Engineers District.

DATA LIMITATIONS

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

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

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

DATA EXCLUSIONS

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

DATA PRECAUTIONS

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

This location overlaps all or part of the following wetlands:

Estuarine And Marine Wetland

E2USN	205.0 acres
E2EM1N	22.6 acres
E2SBN	0.829 acre

Riverine

R2UBHx	7.64 acres
R4SBCx	3.96 acres
R4SBAx	0.681 acre

A full description for each wetland code can be found at the National Wetlands

Inventory website: http://107.20.228.18/decoders/wetlands.aspx

Table C-1. Special Status Species Known to Occur in the Vicinity of the Project Area

Name	Federal/ State/ CRPR Status	Habitat	Potential for Occurrence in the Project Area
Plants			
San Mateo thornmint (*Acanthomintha duttonii*)	FE/SE/1B.1	Chaparral, valley and foothill grassland, and coastal scrub. Extant populations only known from very uncommon serpentinite vertisol clays, in relatively open areas. 50-200 meters.	**None.** Suitable habitat is not present in the Project area.
Franciscan onion (*Allium peninsulare var. franciscanum*)	-/-/1B.2	Cismontane woodland, valley and foothill grassland. Clay soils; often on serpentine. Dry hillsides. 50-300 meters.	**None.** Suitable habitat is not present in the Project area.
bent-flowered fiddleneck (*Amsinckia lunaris)*	-/-/1B.2	Cismontane woodland, valley and foothill grassland. 50-500 meters.	**None.** Suitable habitat is not present in the Project area.
Franciscan manzanita (*Arctostaphylos franciscana*)	FE/-/1B.1	Serpentine outcrops in chaparral. 60-300 meters.	**None.** Suitable habitat is not present in the Project area.
Presidio (Raven's) manzanita (*Arctostaphylos hookeri* ssp. *ravenii*) (*A. montana* ssp. *ravenii)*	FE/SE/1B.1	Chaparral, coastal prairie, and coastal scrub on open, rocky serpentine slopes. 20-215 meters.	**None.** Suitable habitat is not present in the Project area.
San Bruno Mountain manzanita (*Arctostaphylos imbricata*)	-/SE/1B.1	Chaparral, coastal scrub. Mostly known from a few sandstone outcrops in chaparral. 275-370 meters.	**None.** Suitable habitat is not present in the Project area.
Montara manzanita (*Arctostaphylos montaraensis*)	-/-/1B.2	Chaparral, coastal scrub. Slopes and ridges. 150-500 meters.	**None.** Suitable habitat is not present in the Project area.

Table C-1. Special Status Species Known to Occur in the Vicinity of the Project Area

Name	Federal/ State/ CRPR Status	Habitat	Potential for Occurrence in the Project Area
Pacific manzanita (*Arctostaphylos pacifica*)	-/SE/1B.2	Coastal scrub, chaparral.	**None.** Suitable habitat is not present in the Project area.
Kings Mountain manzanita (*Arctostaphylos regismontana*)	-/-/1B.2	Broadleaved upland forest, chaparral, north coast coniferous forest. Granitic or sandstone outcrops. 305-730 meters.	**None.** Suitable habitat is not present in the Project area.
marsh sandwort (*Arenaria paludicola)*	FE/SE/1B.1	Marshes and swamps. Growing up through dense mats of *Typha*, *Juncus*, *Scirpus*, etc. in freshwater marsh. Sandy soil. 3-170 meters.	**None.** Suitable habitat is not present in the Project area.
coastal marsh milk-vetch (*Astragalus pycnostachyus var. pycnostachyus*)	-/-/1B.2	Coastal dunes, coastal salt marshes, coastal scrub. Mesic sites in dunes or along streams or coastal salt marshes. 0-30 meters.	**Not expected.** Salt marsh habitat in the Project area is not expected to support rare plant species. Species has not been observed during several reconnaissance surveys in the Project area. There are no CBDDB occurrences from San Francisco Bay marshes.
alkali milk-vetch (*Astragalus tener var. tener*)	-/-/1B.2	Alkali playa, valley and foothill grassland, vernal pools. Low ground, alkali flats, and flooded lands; in annual grassland or in playas or vernal pools. 0-168 meters.	**None.** Suitable habitat is not present in the Project area.
round-leaved filaree (*California macrophylla*)	-/-/1B.2	Cismontane woodland, valley and foothill grassland. Clay soils. 15-1200 meters.	**None.** Suitable habitat is not present in the Project area.
bristly sedge (*Carex comosa*)	-/-/2B.1	Marshes and swamps, coastal prairie, valley and foothill grassland. Lake margins, wet places; site below sea level is on a Delta island. -5-1620 meters.	**None.** Suitable habitat is not present in the Project area.
northern meadow sedge (Carex praticola)	-/-/2B.2	Meadows and seeps. Moist to wet meadows. 15-3140 meters.	**None.** Suitable habitat is not present in the Project area.

Table C-1. Special Status Species Known to Occur in the Vicinity of the Project Area

Name	Federal/ State/ CRPR Status	Habitat	Potential for Occurrence in the Project Area
Pappose tarplant (*Centromadia parryi ssp. parryi*)	-/-/1B.2	Chaparral, coastal prairie, meadows and seeps, coastal salt marsh, valley and foothill grassland. Vernally mesic, often alkaline sites. 2-420 meters.	**Not expected.** Salt marsh habitat in the Project area is not expected to support rare plant species. Species has not been observed during several reconnaissance surveys in the Project area. The only San Mateo County CNDDB occurrence is along the Pacific coast. Not known from central San Francisco Bay marshes.
Point Reyes bird's-beak (*Chloropyron maritimum ssp. palustre*)	-/-/1B.2	Coastal salt marsh. Usually in coastal salt marsh with *Salicornia*, *Distichlis*, *Jaumea*, *Spartina*, etc. 0-10 meters.	**Not expected.** Salt marsh habitat in the Project area is not expected to support rare plant species. Species has not been observed during several reconnaissance surveys in the Project area. All CNDDB occurrences in the central San Francisco Bay are considered extirpated or possibly extirpated, with the exception of the population at Crissy Field wetland in the Presidio of San Francisco. With the exception of the restored population in Crissy field, the last time this species was seen in the central San Francisco Bay was 1921.
San Francisco Bay spineflower (*Chorizanthe cuspidata var. cuspidata*)	-/-/1B.2	Coastal bluff scrub, coastal dunes, coastal prairie, coastal scrub. Closely related to *C. pungens*. Sandy soil on terraces and slopes. 3-215 meters.	**None.** Suitable habitat is not present in the Project area.
Robust spineflower (*Chorizanthe robusta* var. *robusta*)	FE/-/1B.1	Cismontane woodland, coastal dunes, and coastal scrub on sandy terraces and bluffs or in loose sand. 3-120 meters.	**None.** Suitable habitat is not present in the Project area.
Franciscan thistle (*Cirsium andrewsii*)	-/-/1B.2	Coastal bluff scrub, broadleaved upland forest, coastal scrub, coastal prairie. Sometimes serpentine seeps. 0-150 meters.	**None.** Suitable habitat is not present in the Project area.

Table C-1. Special Status Species Known to Occur in the Vicinity of the Project Area

Name	Federal/ State/ CRPR Status	Habitat	Potential for Occurrence in the Project Area
Fountain thistle (*Cirsium fontinale* var. *fontinale*)	FE/SE/1B.1	Serpentine seeps in grasslands, cismontane woodlands, and in openings in chaparral. 90-180 meters.	**None.** Suitable habitat is not present in the Project area.
compact cobwebby thistle (*Cirsium occidentale var. compactum*)	-/-/1B.2	Chaparral, coastal dunes, coastal prairie, coastal scrub. On dunes and on clay in chaparral; also in grassland. 5-150 meters.	**None.** Suitable habitat is not present in the Project area.
Presidio clarkia (*Clarkia franciscana*)	FE/SE/1B.1	Coastal scrub, valley and foothill grassland. Serpentine outcrops in grassland or scrub. 20-305 meters.	**None.** Suitable habitat is not present in the Project area.
round-headed Chinese-houses (*Collinsia corymbosa*)	-/-/1B.2	Coastal dunes. 10-30 meters.	**None.** Suitable habitat is not present in the Project area.
San Francisco collinsia (*Collinsia multicolor*)	-/-/1B.2	Closed-cone coniferous forest, coastal scrub. On decomposed shale (mudstone) mixed with humus; sometimes on serpentine. 30-250 meters.	**None.** Suitable habitat is not present in the Project area.
western leatherwood (*Dirca occidentalis*)	-/-/1B.2	Broadleafed upland forest, chaparral, closed-cone coniferous forest, cismontane woodland, north coast coniferous forest, riparian forest, riparian woodland. On brushy slopes, mesic sites; mostly in mixed evergreen & foothill woodland communities. 25-425 meters.	**None.** Suitable habitat is not present in the Project area.
San Mateo woolly sunflower (*Eriophyllum latilobum*)	FE/SE/1B.1	Cismontane woodland, sometimes on serpentinite. Often on roadcuts. 45-150 meters.	**None.** Suitable habitat is not present in the Project area.
San Joaquin spearscale (*Extriplex joaquinana*)	-/-/1B.2	Chenopod scrub, alkali meadow, playas, valley and foothill grassland. In seasonal alkali wetlands or alkali sink scrub with *Distichlis spicata*, *Frankenia*, etc. 1-835 meters.	**None.** Suitable habitat is not present in the Project area.

Table C-1. Special Status Species Known to Occur in the Vicinity of the Project Area

Name	Federal/ State/ CRPR Status	Habitat	Potential for Occurrence in the Project Area
Hillsborough chocolate lily (*Fritillaria biflora var. ineziana*)	-/-/1B.1	Cismontane woodland, valley and foothill grassland. Probably only on serpentine; most recent site is in serpentine grassland. 90-160 meters.	**None.** Suitable habitat is not present in the Project area.
fragrant fritillary (*Fritillaria liliacea*)	-/-/1B.2	Coastal scrub, valley and foothill grassland, coastal prairie, cismontane woodland. Often on serpentine; various soils reported though usually clay, in grassland. 3-400 meters.	**None.** Suitable habitat is not present in the Project area.
blue coast gilia (*Gilia capitata ssp. chamissonis*)	-/-/1B.1	Coastal dunes, coastal scrub. 3-200 meters.	**None.** Suitable habitat is not present in the Project area.
dark-eyed gilia (Gilia millefoliata)	-/-/1B.2	Coastal dunes. 2-30 meters.	**None.** Suitable habitat is not present in the Project area.
Diablo helianthella (*Helianthella castanea*)	-/-/1B.2	Broadleaved upland forest, chaparral, cismontane woodland, coastal scrub, riparian woodland, valley & foothill grassland. Usually in chaparral/oak woodland interface in rocky, azonal soils. Often in partial shade. 25-1150m.	**None.** Suitable habitat is not present in the Project area.
congested-headed hayfield tarplant (*Hemizonia congesta ssp. congesta*)	-/-/1B.2	Valley and foothill grassland. Grassy valleys and hills, often in fallow fields; sometimes along roadsides. 20-560 meters.	**None.** Suitable habitat is not present in the Project area.
short-leaved evax (*Hesperevax sparsiflora var. brevifolia*)	-/-/1B.2	Coastal bluff scrub, coastal dunes, coastal prairie. Sandy bluffs and flats. 0-215 meters.	**None.** Suitable habitat is not present in the Project area.

Table C-1. Special Status Species Known to Occur in the Vicinity of the Project Area

Name	Federal/ State/ CRPR Status	Habitat	Potential for Occurrence in the Project Area
Marin dwarf-flax (western flax) (*Hesperolinon congestum*)	FT/ST/1B.1	Chaparral and valley and foothill grassland in serpentine. 30-370 meters.	**None.** Suitable habitat is not present in the Project area.
water star-grass (*Heteranthera dubia*)	-/-/2B.2	Marshes and swamps. Alkaline, still or slow-moving water. Requires a pH of 7 or higher, usually in slightly eutrophic waters. 30-1495 meters.	**None.** Suitable habitat is not present in the Project area.
Santa Cruz tarplant (*Holocarpha macradenia*)	FT/SE/1B.1	Coastal prairie, coastal scrub, valley and foothill grassland. Light, sandy soil or sandy clay; often with nonnatives. 10-220 meters.	**None.** Suitable habitat is not present in the Project area.
Kellogg's horkelia (*Horkelia cuneata var. sericea*)	-/-/1B.1	Closed-cone coniferous forest, coastal scrub, coastal dunes, chaparral. Old dunes, coastal sandhills; openings. 10-200 meters.	**None.** Suitable habitat is not present in the Project area.
Point Reyes horkelia (Horkelia marinensis)	-/-/1B.2	Coastal dunes, coastal prairie, coastal scrub. Sandy flats and dunes near coast; in grassland or scrub plant communities. 5-30 meters.	**None.** Suitable habitat is not present in the Project area.
Beach layia (*Layia carnosa*)	FE/SE/1B.1	Coastal dunes and coastal scrub. On sparsely vegetated, semi-stabilized dunes, usually behind foredunes. 0-60 meters.	**None.** Suitable habitat is not present in the Project area.
coast yellow leptosiphon (*Leptosiphon croceus*)	-/-/1B.1	Coastal bluff scrub, coastal prairie. 10-150 meters.	**None.** Suitable habitat is not present in the Project area.
rose leptosiphon (*Leptosiphon rosaceus*)	-/-/1B.1	Coastal bluff scrub. 0-100 meters.	**None.** Suitable habitat is not present in the Project area.
Crystal Springs lessingia (*Lessingia arachnoidea*)	-/-/1B.2	Coastal sage scrub, valley and foothill grassland, cismontane woodland. Grassy slopes on serpentine; sometimes on roadsides. 60-200 meters.	**None.** Suitable habitat is not present in the Project area.

Table C-1. Special Status Species Known to Occur in the Vicinity of the Project Area

Name	Federal/ State/ CRPR Status	Habitat	Potential for Occurrence in the Project Area
San Francisco lessingia (*Lessingia germanorum*)	FE/SE/1B.1	Coastal scrub on remnant dunes in sparsely vegetated areas. 20-110 meters.	**None.** Suitable habitat is not present in the Project area.
Ornduff's meadowfoam (*Limnanthes douglasii ssp. ornduffii*)	-/-/1B.1	Meadows and seeps, agricultural fields. 10-20 meters.	**None.** Suitable habitat is not present in the Project area.
arcuate bush-mallow (*Malacothamnus arcuatus*)	-/-/1B.2	Chaparral, cismontane woodland. Gravelly alluvium. 1-735 meters.	**None.** Suitable habitat is not present in the Project area.
marsh microseris (*Microseris paludosa*)	-/-/1B.2	Closed-cone coniferous forest, cismontane woodland, coastal scrub, valley and foothill grassland. 5-300 meters.	**None.** Suitable habitat is not present in the Project area.
northern curly-leaved monardella (Monardella sinuata ssp. nigrescens)	-/-/1B.2	Coastal dunes, coastal scrub, chaparral, lower montane coniferous forest. Sandy soils. 0-300 meters.	**None.** Suitable habitat is not present in the Project area.
woodland woollythreads (*Monolopia gracilens*)	-/-/1B.2	Chaparral, valley and foothill grassland, cismontane woodland, broadleafed upland forest, north coast coniferous forest. Grassy sites, in openings; sandy to rocky soils. Often seen on serpentine after burns but may have only weak affinity to serpentine. 100-1200 meters.	**None.** Suitable habitat is not present in the Project area.
White-rayed pentachaeta (*Pentachaeta bellidiflora*)	FE/SE	Valley and foothill grassland and cismontane woodland in open, dry rocky slopes and grassy areas. Often on serpentinite soils. 35-620 meters.	**None.** Suitable habitat is not present in the Project area.
Choris' popcornflower (*Plagiobothrys chorisianus var. chorisianus*)	-/-/1B.2	Chaparral, coastal scrub, coastal prairie. Mesic sites. 15-160 meters.	**None.** Suitable habitat is not present in the Project area.

Table C-1. Special Status Species Known to Occur in the Vicinity of the Project Area

Name	Federal/ State/ CRPR Status	Habitat	Potential for Occurrence in the Project Area
San Francisco popcornflower (*Plagiobothrys diffusus*)	-/SE/1B.2	Valley and foothill grassland, coastal prairie. Historically from grassy slopes with marine influence. 60-485m.	**None.** Suitable habitat is not present in the Project area.
hairless popcornflower (*Plagiobothrys glaber*)	-/-/1A	Meadows and seeps, marshes and swamps. Coastal salt marshes and alkaline meadows. 5-180 meters.	**None.** This plant is considered extirpated in California.
Oregon polemonium (*Polemonium carneum*)	-/-/2.B2	Coastal prairie, coastal scrub, lower montane coniferous forest. 0-1830 meters.	**None.** Suitable habitat is not present in the Project area.
Hickman's potentilla (*Potentilla hickmanii*)	FE/SE/1B.1	Freshwater marshes, seeps, and small streams in coastal bluff scrub, closed-cone coniferous forest, and meadows. 10-150 meters.	**None.** Suitable habitat is not present in the Project area.
adobe sanicle (*Sanicula maritima*)	-/SR/1B.1	Meadows and seeps, valley and foothill grassland, chaparral, coastal prairie. Moist clay or ultramafic soils. 30-240 meters.	**None.** Suitable habitat is not present in the Project area.
San Francisco campion (*Silene verecunda ssp. verecunda*)	-/-/1B.2	Coastal scrub, valley and foothill grassland, coastal bluff scrub, chaparral, coastal prairie. Often on mudstone or shale; one site on serpentine. 30-645 meters.	**None.** Suitable habitat is not present in the Project area.
Santa Cruz microseris (*Stebbinsoseris decipiens*)	-/-/1B.2	Broadleafed upland forest, closed-cone coniferous forest, chaparral, coastal prairie, coastal scrub, valley and foothill grassland. Open areas in loose or disturbed soil, usually derived from sandstone, shale or serpentine, on seaward slopes. 10-500 meters.	**None.** Suitable habitat is not present in the Project area.
California sea blite (*Suaeda californica)*	FE/-/1B.1	Upper tidal salt marshes of Morro Bay and estuarine creek mouths near Cayucos, California. 0-15 meters.	**None.** Suitable habitat is not present in the Project area.

Table C-1. Special Status Species Known to Occur in the Vicinity of the Project Area

Name	Federal/ State/ CRPR Status	Habitat	Potential for Occurrence in the Project Area
Showy Indian clover (*Trifolium amoenum*)	FE/-/1B.1	Valley and foothill grassland and coastal bluff scrub. Sometimes on serpentine soil, 5-415 meters.	**None.** Suitable habitat is not present in the Project area.
saline clover (*Trifolium hydrophilum*)	-/-/1B.2	Marshes and swamps, valley and foothill grassland, vernal pools. Mesic, alkaline sites. 0-300 meters.	**Not expected.** Salt marsh habitat in the Project area is not expected to support rare plant species. Species has not been observed during several reconnaissance surveys in the Project area. The only CNDDB occurrence in San Mateo County is from a specimen collected in 1886, in Belmont, approximately 10 miles from the Project area. This species is generally found in alkaline habitats, which are not found in the Project area.
San Francisco owl's-clover (*Triphysaria floribunda*)	-/-/1B.2	Coastal prairie, coastal scrub, valley and foothill grassland. On serpentine and nonserpentine substrate (such as at Pt. Reyes). 10-160 meters.	**None.** Suitable habitat is not present in the Project area.
oval-leaved viburnum (*Viburnum ellipticum*)	-/-/2B.3	Chaparral, cismontane woodland, lower montane coniferous forest. 215-1400 meters.	**None.** Suitable habitat is not present in the Project area.
		Invertebrates	
Vernal pool fairy shrimp (*Branchinecta lynchi*)	FT/-	Inhabits vernal pools and swales in the Central Valley, Central Coast Mountains, and South Coast Mountains.	**None.** Suitable habitat is not present in the Project area.
San Bruno elfin butterfly (*Callophrys mossii bayensis*)	FE/-	Grasslands, chaparral, and rock outcrops in coastal areas, mainly in the vicinity of San Bruno Mountain, San Mateo County. Colonies are located on steep, north-facing slopes. Larval host plant is *Sedum spathulifolium*.	**None.** Suitable habitat is not present in the Project area.

Table C-1. Special Status Species Known to Occur in the Vicinity of the Project Area

Name	Federal/ State/ CRPR Status	Habitat	Potential for Occurrence in the Project Area
Bay checkerspot butterfly (*Euphydryas editha bayensis*)	FT/-	Serpentine outcrops in Santa Clara and San Mateo counties that harbor serpentine grasslands.	**None.** Suitable habitat is not present in the Project area.
Mission blue butterfly (*Icaricia icarioides missionensis*) (*Plebejus icarioides missionensis*)	FE/-	Inhabits coastal prairies at the San Francisco peninsula. Larval host plants are *Lupinus albifrons*, *L. variicolor,* and *L. formosus*.	**None.** Suitable habitat is not present in the Project area.
Vernal pool tadpole shrimp (*Lepidurus packardi)*	FE/-	Inhabits vernal pools and swales in the Sacramento Valley containing clear to highly turbid water.	**None.** Suitable habitat is not present in the Project area.
Callippe silverspot butterfly (*Speyeria callippe callippe*)	FE/-	Restricted to northern coastal scrub at the San Francisco peninsula. Host plant is *Viola pedunculata*.	**None.** Suitable habitat is not present in the Project area.
Myrtle's silverspot butterfly (*Speyeria zerene myrtleae*)	FE/-	Restricted to the foggy, coastal dunes/hills of the Point Reyes peninsula; extirpated from coastal San Mateo County. Larval food plant thought to be *Viola adunca*.	**None.** Suitable habitat is not present in the Project area.
		Fish	
Green sturgeon (*Acipenser medirostris*)	FT/SSC	Spawns in large river systems such as the Sacramento River; forages in nearshore oceanic waters, bays, and estuaries.	**Possible.** Reaches 1 and 2 of the Project area are generally unsuitable for green sturgeon. Reach 3 of the Project area provides potentially suitable non-reproductive habitat.

Table C-1. Special Status Species Known to Occur in the Vicinity of the Project Area

Name	Federal/ State/ CRPR Status	Habitat	Potential for Occurrence in the Project Area
Tidewater goby (*Eucyclogobius newberryi*)	FE/SSC	Brackish water in shallow lagoons and lower stream reaches along the California coast from Agua Hedionda Lagoon, San Diego County to the mouth of the Smith River.	**None.** Suitable habitat is not present in the Project area.
Delta smelt (*Hypomesus transpacificus)*	FT/SE	Sacramento-San Joaquin Delta. Seasonally in Suisun Bay, Carquinez Strait & San Pablo Bay.	**None.** The Project area is out of the range of this species.
Coho salmon (Central California Coast) (*Oncorhynchus kisutch*)	FE/SE	Populations between Punta Gorda and San Lorenzo River (Federal listing). Populations south of Punta Gorda (State listing).	**None.** Suitable habitat is not present in the Project area.
Central California Coast steelhead (*Oncorhynchus mykiss*)	FT/-	Cool streams with suitable spawning habitat and conditions allowing migration between spawning and marine habitats.	**Not expected.** The Project area is generally unsuitable for salmonids. Individual steelhead could stray into the Project area during winter storm events.
Central Valley steelhead (*Oncorhynchus mykiss*)	FT/-	Populations spawning in the Sacramento and San Joaquin rivers and their tributaries.	**None.** The Project area is out of the range of this species.
Chinook salmon (Central Valley spring-run ESU) (*Oncorhynchus tshawytscha*)	FT/ST	Populations spawning in the Sacramento and San Joaquin rivers and their tributaries.	**None.** The Project area is out of the range of this species.
Chinook salmon (Sacramento River winter-run ESU) (*Oncorhynchus tshawytscha*)	FE/SE	Populations spawning in the Sacramento and San Joaquin rivers and their tributaries.	**None.** The Project area is out of the range of this species.

Table C-1. Special Status Species Known to Occur in the Vicinity of the Project Area

Name	Federal/ State/ CRPR Status	Habitat	Potential for Occurrence in the Project Area
Hardhead (*Mylopharodon conocephalus*)	-/SSC	Low to mid-elevation streams in the Sacramento-San Joaquin drainage. Also present in the Russian River. Clear, deep pools with sand-gravel-boulder bottoms & slow water velocity. Not found where exotic centrarchids predominate.	**None.** The Project area is out of the range of this species.
Longfin smelt (Bay-Delta DPS) (*Spirinchus thaleichthys*)	FC/ST	Spawns in fresh or slightly brackish water on sandy or gravel substrate. Juveniles and sub-adults use brackish to saline open water habitats for foraging.	**Possible.** Reaches 2 and 3 of the Project area provides potentially suitable non-reproductive habitat.
		Amphibians and Reptiles	
California tiger salamander (*Ambystoma californiense*)	FT/ST/SSC	Vernal or temporary pools in annual grasslands or open woodlands.	**None.** Suitable habitat is not present in the Project area.
Western pond turtle (*Emys marmorata*)	-/SSC	A thoroughly aquatic turtle of ponds, marshes, rivers, streams & irrigation ditches, usually with aquatic vegetation, below 6000 feet elevation. Need basking sites and suitable (sandy banks or grassy open fields) upland habitat up to 0.5 km from water for egg-laying.	**Not expected.** The concrete channels in Reaches 1 and 2 do not provide suitable habitat for this species. Water in Reach 3 is likely too saline for this species.
California red-legged frog (*Rana draytonii*)	FT/SSC	Streams, freshwater pools, and ponds with emergent or overhanging vegetation.	**None.** Suitable habitat is not present in the Project area. A 2002 survey of Colma Creek determined that this species is not present and cannot occur under current conditions in Colma Creek (McGinnis 2002).
Alameda whipsnake [striped racer] (*Masticophis lateralis euryxanthus*)	FT/ST	Typically found in chaparral and scrub habitats but will also use adjacent grassland, oak savanna and woodland habitats.	**None.** Suitable habitat is not present in the Project area.

Table C-1. Special Status Species Known to Occur in the Vicinity of the Project Area

Name	Federal/ State/ CRPR Status	Habitat	Potential for Occurrence in the Project Area
San Francisco garter snake (*Thamnophis sirtalis tetrataenia*)	FE/SE/SP	Freshwater marshes, ponds slow-moving streams, and adjacent uplands in San Mateo County and extreme northern Santa Cruz County.	**None.** Suitable habitat is not present in the Project area. A 2002 survey of Colma Creek determined that this species is not present and cannot occur under current conditions in Colma Creek (McGinnis 2002).
		Birds	
Burrowing Owl (*Athene cunicularia*)	-/SSC	Yearlong resident of open, dry grassland and desert habitats, as well as in grass, forb and open shrub stages of pinyon-juniper and ponderosa pine habitats. Open, dry annual or perennial grasslands, deserts & scrublands characterized by low-growing vegetation. Subterranean nester, dependent upon burrowing mammals, most notably, the California ground squirrel (*Spermophilus beecheyi*).	**None.** Suitable habitat is not present in the Project area.
Marbled Murrelet (*Brachyramphus marmoratus*)	FT/SE	Nests inland along coast from Eureka to Oregon border and from Half Moon Bay to Santa Cruz in old-growth redwood forests, often in Douglas-fir. Feeds near-shore.	**None.** Suitable habitat is not present in the Project area.
Western Snowy Plover (*Charadrius alexandrinus nivosus*)	FT/SSC	Sandy beaches on marine and estuarine shores and salt pans in San Francisco Bay saline managed ponds.	**Not expected.** Preferred habitat is not present in the Project area.
Northern Harrier (*Circus cyaneus*)	-/SCC	Rolling foothills and valley margins with scattered oaks and river bottomlands or marshes next to deciduous woodland. Open grasslands, meadows, or marshes for foraging close to isolated, dense-topped trees for nesting and perching.	**Not expected.** Marginal habitat is present. Nesting is not expected in the Project area.

Table C-1. Special Status Species Known to Occur in the Vicinity of the Project Area

Name	Federal/ State/ CRPR Status	Habitat	Potential for Occurrence in the Project Area
White-Tailed Kite (*Elanus leucurus*)	-/SP	Nests in rolling foothills/valley margins with scattered oaks and river bottomlands or marshes next to deciduous woodland. Open grasslands, meadows, or marshes for foraging close to isolated, dense-topped trees for nesting and perching.	**Not expected.** Marginal habitat is present. Nesting is not expected in the Project area.
American Peregrine Falcon (*Falco peregrinus anatum*)	FD/SD/SP	Near wetlands, lakes, rivers, or other water; on cliffs, banks, dunes, mounds; also, human-made structures. Nest consists of a scrape or a depression or ledge in an open site.	**Possible**. Species has been observed nesting in close proximity to the Project area (eBrid.org 2016).
Saltmarsh Common Yellowthroat (*Geothlypis trichas sinuosa*)	-/SSC	Resident of the San Francisco Bay region, in fresh and salt water marshes. Requires thick, continuous cover down to water surface for foraging; tall grasses, tule patches, willows for nesting.	**Possible.** Species has been observed in close proximity to the Project area (eBrid.org 2016).
California black rail (*Laterallus jamaicensis coturniculus*)	-/ST/SP	Inhabits freshwater marshes, wetland meadows, and the shallow margins of saltwater marshes bordering larger bays. Needs water depths of about 1 inch that do not fluctuate during the year & dense vegetation for nesting habitat.	**None.** Suitable habitat is not present in the Project area.
Alameda Song Sparrow (*Melospiza melodia pusillula*)	-/SSC	Resident of salt marshes bordering south arm of San Francisco Bay. Inhabits *Salicornia* marshes; nests low in *Grindelia* bushes (high enough to escape high tides) and in Salicornia.	**Possible.** Reach 3 of the Project area provides potentially suitable breeding habitat.
San Pablo Song Sparrow (*Melospiza melodia samuelis*)	-/SSC	Resident of salt marshes along the north side of San Francisco and San Pablo bays. Inhabits tidal sloughs in the Salicornia marshes; nests in Grindelia bordering slough channels.	**None.** The Project area is out of the range of this species.

Table C-1. Special Status Species Known to Occur in the Vicinity of the Project Area

Name	Federal/ State/ CRPR Status	Habitat	Potential for Occurrence in the Project Area
California Brown Pelican (*Pelecanus occidentalis californicus*)	FD/SD/SP	Colonial nester on coastal islands just outside the surf line. Roosts communally.	**Absent as Breeder.** Open water habitat at the downstream end of Reach 3 provides non-breeding habitat. Suitable nesting habitat is not present in the Project area.
California Clapper Rail (*Rallus longirostris obsoletus*)	FE/SE/SP	Salt marsh habitat dominated by pickleweed and cordgrass.	**Not expected**. In the 1990s, California Clapper Rails (CLRA) began breeding in the marshes near the mouth of Colma Creek. The breeding population grew steadily, likely due to the increasing invasive Spartina infestation. Prior to the onset of the invasive Spartina control program CLRA were consistently breeding along the lower portions of Colma Creek and in the marshes near the mouth of the channel. Since invasive Spartina control began in 2006 there has been a rapid decline in the number of rails detected in the area. Recent surveys (2012-2013) have failed to detect CLRA, and currently there is no suitable habitat present in the Project area.
Bank Swallow (*Riparia riparia*)	-/ST	Colonial nester; nests primarily in riparian and other lowland habitats west of the desert. Requires vertical banks/cliffs with fine-textured/sandy soils near streams, rivers, lakes, ocean to dig nesting hole.	**None.** Suitable habitat is not present in the Project area.
California Least Tern (*Sterna antillarum browni*)	FE/SE/SP	Nests along the coast on bare or sparsely vegetated, flat substrates. In the South Bay, nests in salt pannes and on an old airport runway. Forages for fish in open waters.	**Not expected.** Suitable nesting habitat is not present in the Project area. The closest active least tern breeding site is Alameda Point, approximately 10 miles east of the Project area. Most birds of this species forage within 5 miles of nest colonies (HTH 2012). Post-breeding roosting and foraging is not expected in the Project area.

Table C-1. Special Status Species Known to Occur in the Vicinity of the Project Area

Name	Federal/ State/ CRPR Status	Habitat	Potential for Occurrence in the Project Area
		Mammals	
pallid bat (*Antrozous pallidus*)	-/SSC	Deserts, grasslands, shrublands, woodlands & forests. Most common in open, dry habitats with rocky areas for roosting. Roosts must protect bats from high temperatures. Very sensitive to disturbance of roosting sites.	**None.** Suitable habitat is not present in the Project area.
Townsend's big-eared bat (*Corynorhinus townsendii*)	-/SSC/SC	Found throughout California in a wide variety of habitats, including woodlands, forests, chaparral, scrubs, and grasslands. Most common in mesic sites. Roosts on open surfaces in caves, abandoned mines, and buildings. Also uses bridges, rock crevices and hollow trees as roost sites. Roosting sites are limiting. This species is extremely sensitive to human disturbance.	**None.** Suitable habitat is not present in the Project area.
southern sea otter (*Enhydra lutris nereis*)	FT/SP	Nearshore marine environments from about Ano Nuevo, San Mateo co. to Point Sal, Santa Barbara Co. Needs canopies of giant kelp & bull kelp for rafting & feeding. Prefers rocky substrates with abundant invertebrates.	**None.** Suitable habitat is not present in the Project area.
Western red bat (*Lasiurus blossevillii*)	-/SSC	Cismontane woodland, lower montane coniferous forest, riparian forest and woodlands. Roosts primarily in trees, 2-40 feet above ground, from sea level up through mixed conifer forests. Prefers habitat edges and mosaics with trees that are protected from above and open below with open areas for foraging.	**None.** Suitable habitat is not present in the Project area.

Table C-1. Special Status Species Known to Occur in the Vicinity of the Project Area

Name	Federal/ State/ CRPR Status	Habitat	Potential for Occurrence in the Project Area
San Francisco dusky-footed woodrat (*Neotoma fuscipes annectens*)	-/SSC	Forest habitats of moderate canopy & moderate to dense understory. May prefer chaparral & redwood habitats. Constructs nests of shredded grass, leaves & other material. May be limited by availability of nest-building materials.	**None.** Suitable habitat is not present in the Project area.
big free-tailed bat (*Nyctinomops macrotis*)	-/SSC	Low-lying arid areas in Southern California. Need high cliffs or rocky outcrops for roosting sites. Feeds principally on large moths.	**None.** Suitable habitat is not present in the Project area.
Salt marsh harvest mouse (*Reithrodontomys raviventris*)	FE/SE/SP	Salt marsh habitat dominated by common pickleweed.	**Not expected**. Tidal marsh habitat in the Project area is unlikely to support salt marsh harvest mice because it: is isolated (with substantial dispersal barriers) from large contiguous marshes with known populations; is narrow; and has very high predator pressure. The closest known population is approximately 10 miles south of the Project area near Foster City. Maintenance activities would not affect potential habitat for this species.
Alameda Island mole (*Scapanus latimanus parvus*)	-/SSC	Only known from Alameda Island. Found in a variety of habitats, especially annual & perennial grasslands. Prefers moist, friable soils and avoids flooded soils.	**None.** The Project area is out of the range of this species.

Table C-1. Special Status Species Known to Occur in the Vicinity of the Project Area

Name	Federal/ State/ CRPR Status	Habitat	Potential for Occurrence in the Project Area
American badger (*Taxidea taxus*)	-/SSC	Most abundant in drier open stages of most shrub, forest, and herbaceous habitats, with friable soils. Needs sufficient food, friable soils and open, uncultivated ground. Preys on burrowing rodents. Digs burrows.	**None.** Suitable habitat is not present in the Project area.
Point Reyes jumping mouse (*Zapus trinotatus orarius*)	-/SSC	Primarily in bunch grass marshes on the uplands of Point Reyes. Also present in coastal scrub, grassland, and meadows. Eats mainly grass seeds w/ some insects & fruit taken. Builds grassy nests on ground under vegetation, burrows in winter. This species is restricted to the Point Reyes peninsula.	**None.** The Project area is out of the range of this species.

Key to Status Abbreviations**:**
Federally Endangered (FE); Federally Threatened (FT); Federal Candidate (FC); Federally Delisted (FD); State Endangered (SE); State Threatened (ST); State Delisted (SD); State Rare (SR); State Fully Protected (SP); California Species of Special Concern (SSC)

The potential for special status species to occur in the vicinity of the site was evaluated according to the following criteria:

None: the area contains a complete lack of suitable habitat, the local range for the species is restricted, and/or the species is extirpated in this region.

Not expected: suitable habitat or key habitat elements might be present but might be of poor quality or isolated from the nearest extant occurrences, and/or the species is not known to occur in the area.

Possible: presence of suitable habitat or key habitat elements that potentially support the species.

Present: the species was either observed directly or its presence was confirmed by field investigations or in previous studies in the area.

Appendix D
BIOLOGICAL ASSESSMENT

BIOLOGICAL ASSESSMENT

FOR THE

Colma Creek Flood Control Channel Maintenance Project

Covering the longfin smelt, Bay-Delta DPS; steelhead, Central California Coast DPS; green sturgeon, southern DPS; and California clapper rail

San Mateo County, CA

Prepared for:

County of San Mateo, Department of Public Works

December 2015

Horizon
WATER and ENVIRONMENT

Summary of Findings, Conclusions, and Determinations

This document presents a Biological Assessment (BA) for the Colma Creek Flood Control Channel Maintenance Project (Project or Proposed Project) located in San Mateo County, California (Figure 1). Project activities will include removal of accumulated sediment, repair or replacement of damaged culverts, and other minor maintenance. Project activities in tidally influenced portions of Colma Creek (Reaches 2 and 3) may affect Endangered Species Act (ESA) listed species. This BA presents technical information about the Proposed Project and assesses potential effects to threatened, endangered, or proposed threatened or endangered species and their habitats in accordance with legal requirements found in section 7(a)(2) of the ESA (16 U.S. Code 1536[c]). This BA addresses ESA-listed species managed under the jurisdiction of the U.S. Fish and Wildlife Service (USFWS) and the National Oceanic and Atmospheric Administration's National Marine Fisheries Service (NMFS). An assessment of the potential effects of the Proposed Project to Essential Fish Habitat (EFH) as defined under the Magnuson-Stevens Fishery Conservation and Management Act (MSA) is also presented.

The following ESA-listed and candidate species are considered in this BA:

Fish:

- Longfin smelt (*Spirinchus thaleichthys*), Bay-Delta Distinct Population Segment (DPS); candidate
- Steelhead (*Oncorhynchus mykiss*), Central California Coastal (CCC) DPS; threatened
- Green sturgeon (*Acipenser medirostris*), Southern DPS; threatened

Birds

- California clapper rail (*Rallus longirostris obsoletus*); endangered

ESA-listed and Candidate Fish Species

The action area does not currently support spawning, rearing, or migration habitat for CCC steelhead. Though not expected, individual steelhead could stray into the action area but are not expected to be present in the action area during the proposed maintenance work window of August 1 to October 15. Thus, the Proposed Project would have ***no effect*** on the CCC steelhead.

Reaches 1 and 2 of the action area are generally unsuitable for green sturgeon. Reach 3 of the action area provides potentially suitable non-reproductive habitat for green sturgeon. Maintenance would occur in Reach 3, but these activities would not result in direct harm to green surgeon or measurably affect their spawning, rearing, or migration habitat. Thus, the Proposed Project ***may affect, but is not likely to adversely affect*** the southern DPS of green sturgeon.

Reach 3 of the action area, and possibly Reach 2, provide potentially suitable non-reproductive habitat for longfin smelt. Sediment removal would occur in Reach 2 and culvert maintenance activities would be conducted in Reach 3. Proposed avoidance and minimization measures would reduce the potential for individuals to be harmed. However, individual longfin smelt could be present in work areas and may be handled during fish relocation activities. Thus, the Proposed Project may affect the Bay-Delta DPS of longfin smelt. The County requests conference with USFWS to identify measures to minimize adverse effects on longfin smelt.

California clapper rail (CLRA)

CLRA are currently absent from the action area. Thus, implementation of maintenance activities would have no direct effects on CLRA. The County proposes to periodically remove small amounts of sediment from Colma Creek. Sediment in the channel may contribute to sustaining wetland habitats in the downstream portion of the action area. It is expected that the magnitude of sediment removal would have insignificant effects on extent or quality of mudflat and wetland habitats that may be utilized by CLRA in the future. Therefore, the Proposed Project ***may affect, but is not likely to adversely affect*** the California clapper rail.

Critical Habitat and EFH

Reaches 2 and 3 of the action area are designated critical habitat for the CCC steelhead and southern DPS green sturgeon and EFH for Pacific Coast Salmon, as these reaches are tidal portions of the San Francisco Estuary. The action area does not provide the primary constituent elements of critical habitat for steelhead (i.e., estuarine areas 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 (FR 69 71880)). The action area also does not support spawning, rearing, or migration habitat for salmonids. The Proposed Project would have insignificant effects on water quality and the benthic community within designated critical habitat for green sturgeon. These impacts would not measurably affect the primary constituent elements of the critical habitat or functions of EFH. Therefore, the Proposed Project ***is not likely to adversely modify*** critical habitat and EFH.

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Acronyms

BA	Biological Assessment
BO	Biological Opinion
CCC	Central California Coastal
CDFW	California Department of Fish and Wildlife
CFR	Code of Federal Regulations
CLRA	California Clapper Rail
CNDDB	California Natural Diversity Database
CWA	Clean Water Act
DPS	Distinct Population Segment
EFH	Essential Fish Habitat
ESA	Endangered Species Act
ESU	Evolutionary Significant Unit
FMP	Fishery Management Plan
MSA	Magnuson-Stevens Fishery Conservation and Management Act
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
RWQCB	Regional Water Quality Control Board
TSS	total suspended solids
USACE	U.S. Army Corps of Engineers
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey

1 Introduction

1.1 Purpose of the Biological Assessment

This document presents a Biological Assessment (BA) for the Colma Creek Flood Control Channel Maintenance Project (Project or Proposed Project) located in San Mateo County, California (Figure 1). The San Mateo County Flood Control District (District) is a Countywide Special District that was created in 1964 with the goal of providing flood protection for area residents. The District is the Project sponsor and operates within the Public Works Department of the County of San Mateo (County). The District and County are seeking regulatory approval to conduct routine maintenance activities within Colma Creek flood control channel.

This BA presents technical information about the Proposed Project and assesses potential effects to threatened, endangered, or proposed threatened or endangered species and their habitats in accordance with legal requirements found in section 7(a)(2) of the Endangered Species Act (ESA) (16 U.S. Code 1536[c]). This BA addresses ESA-listed species managed under the jurisdiction of the U.S. Fish and Wildlife Service (USFWS) and the National Oceanic and Atmospheric Administration's National Marine Fisheries Service (NMFS). An assessment of the potential effects of the Proposed Project to Essential Fish Habitat (EFH) as defined under the Magnuson-Stevens Fishery Conservation and Management Act (MSA) is also presented.

The Proposed Project will affect waters of the U.S. that are regulated under the Clean Water Act (CWA). The County intends to submit an application to the U.S. Army Corps of Engineers (USACE) for authorization of the Project under a CWA Section 404 permit. This BA will support USACE's ESA section 7 consultations with USFWS and NMFS for potential effects related to the Proposed Project.

1.2 Organization of the Biological Assessment

This BA is organized as follows:

- **Section 1** includes an introduction to the Proposed Project and identifies listed species and critical habitat that may be affected;
- **Section 2** defines the action area[1], describes the Proposed Project including its features and anticipated construction means and methods, and details conservation measures to avoid and minimize effects to listed species and their habitats;
- **Section 3** presents a description of the affected environment including baseline environmental and biological conditions;
- **Section 4** provides study methods and descriptions of listed species with the potential to occupy the action area;

[1] The "action area" includes the project footprint as well as all areas surrounding the project footprint that may be directly or indirectly affected by the Proposed Project (Figure 3). See Section 2.2 for a discussion on the delineation of the action area.

- **Section 5** provides a description of EFH;
- **Section 6** provides an analysis of the Proposed Project including the potential effects (direct, indirect, and cumulative) on the listed species and their critical habitat that may be present within the action area;
- **Section 7** describes avoidance and minimizations measures and compensatory mitigation for effects to listed species;
- **Section 8** provides determinations and conclusions on the effects of the Proposed Project;
- **Section 9** lists references cited in this BA; and
- **Section 10** lists the preparers of this BA.

Appendices to this report provide supporting information, including:

- **Appendix A** USFWS species list for federally listed species that potentially occur in the vicinity of the action area and an assessment of the potential for these species to be affected by the Proposed Project
- **Appendix B** Resource Investigations for the Colma Creek Flood Control Maintenance Project (Horizon 2014); and
- **Appendix C** Sediment testing results for Colma Creek (Pacific EcoRisk 2014).

1.3 Threatened and Endangered Species

The following resources were consulted to identify ESA-listed species with the potential to occur in the vicinity of the Proposed Project:

- USFWS Information for Planning and Conservation (IPaC) Trust Resources Report for the Action Area (USFWS 2015).
- A CNDDB query of species that occur within a 5-mile radius of the Project Area (CDFW 2014).

These data sources were reviewed to determine the species that have the potential to occur in the Project Area/action area. A complete list of ESA-listed species known to occur in the vicinity of the action area is provided in Appendix A. Species which are not expected in the action area, or have no likelihood of occurrence are not addressed in this BA. Justification for the no effect determination is provided in Appendix A. Species considered in this BA are listed below and addressed further in this document.

Endangered, Threatened, or Proposed Threatened or Endangered Species Considered in this BA:

Fish:

- Longfin smelt (*Spirinchus thaleichthys*), Bay-Delta Distinct Population Segment (DPS); candidate
- Steelhead (*Oncorhynchus mykiss*), Central California Coastal (CCC) DPS; threatened
- Green sturgeon (*Acipenser medirostris*), Southern DPS; threatened

Birds

- California clapper rail (*Rallus longirostris obsoletus*) [=Ridgway's Rail]; endangered

1.4 Critical Habitat

Portions of the Project Area are designated critical habitat for CCC steelhead (70 FR 52488) and Southern DPS green sturgeon (74 FR 52300). Critical habitat for Bay checkerspot butterfly (*Euphydryas editha bayensis*) is located on San Bruno Mountain approximately 1.2 miles north of the Project Area (Figure 2). Critical habitat for California red-legged frog (*Rana draytonii*) is located approximately 2.6 miles southwest of the Project Area. Critical habitat for San Francisco manzanita (*Arctostaphylos franciscana*) is located approximately 4.1 miles north of the Project Area. Critical habitat for Bay checkerspot butterfly, California red-legged frog, and San Francisco manzanita would not be affected by the Proposed Project.

1.5 Consultation History

September 8, 2010	Representatives from the County met with regulatory agencies to discuss maintenance of the Colma Creek flood control channel. Joseph Terry of USFWS attended the meeting on behalf of USFWS. Minutes from the meeting area provided in Appendix B (See Attachment Cvr-Ltr-1).
March 5, 2014	Representatives from the County met with regulatory agencies to discuss maintenance of the Colma Creek flood control channel. Joseph Terry of USFWS attended the meeting on behalf of USFWS. Minutes from the meeting area provided in Appendix B (See Attachment Cvr-Ltr-2)

1.6 Previous Consultations in the Action Area

August 13, 2002	NMFS provided a concurrence letter for the replacement of the Caltrain bridge over Colma Creek (15L422 SWRO2SR8264:ES). NMFS concurred with the USACE conclusion that this project was not likely to adversely affect CCC steelhead.
March 27, 2003	USFWS provided a biological opinion (BO) for the Colma Creek Flood Control Project constructing one-half mile of U-shaped concrete channel in Colma Creek between Spruce and San Mateo Avenues (1-1-02-F-0337).
April 5, 2011	USFWS amended the March 27, 2003 BO to extend the salt marsh enhancement mitigation activities for two more years (81420-2011-F-0419-1).
April 26, 2011	USFWS made a second amendment the March 27, 2003 BO to allow minor salt-marsh enhancement activities year-round, as well as adding site 2B to the list of sites (81420-2011-F-0419-2)

2 Description of the Proposed Action

2.1 Project Location

The Colma Creek flood control channel provides drainage for approximately 16.6 square miles of the northern San Francisco Peninsula, including portions of Daly City, Colma, South San Francisco and San Bruno (Figure 1). The approximately 5.4 mile-long Colma Creek flood control channel presented in Figure 3 has varied forms along its length. For the purpose of considering and evaluating potential effects of the Proposed Project, the Project Area in this BA is organized into three primary reaches:

- **Reach 1**: The upper maintenance reach includes the channel upstream from A Street/El Camino Real downstream to Spruce Avenue.
- **Reach 2**: The middle maintenance reach is from Spruce Avenue downstream to Produce Avenue (tidal).
- **Reach 3**: The lower maintenance reach is from Produce Avenue downstream to the mouth of Colma Creek at San Francisco Bay (tidal).

2.2 Action Area

For the purposes of this BA, the "Project Area" refers to the locations where work activities would occur, including all maintenance areas, staging areas, and access points. The "action area" refers to the geographic extent of environmental changes (i.e., the physical, chemical and biotic effects) that will result directly and indirectly from the action.

Direct effects of the Proposed Project which determine the spatial extent the action area include elevated terrestrial noise levels, changes in water quality (e.g., generation of turbidity), and temporary visual modifications or distractions. Construction-related terrestrial noise is considered to have the largest potential zone of influence of these direct effects. However, the Proposed Project is situated in an urbanized area with significant sources of ambient noise such as US 101, Caltrain, and San Francisco International Airport (SFO) (Figures 1 and 3). Thus, the direct effects of maintenance activities are not anticipated to extend beyond the Project Area.

In September 2010, representatives from the County met with regulatory agencies to discuss maintenance of the flood control channel. At this meeting, USFWS staff expressed concerns that periodic removal of sediment from Colma Creek could result in loss of mudflats and wetlands at the mouth of Colma Creek due to the lack of deposition. This would be considered an indirect effect of the Project. To account for this potential indirect effect, the action area has been extended downstream of the Project Area to include mudflat and marsh habitats near the mouth of Colma Creek (Figure 3).

2.2.1 Existing Land Use and Cover

The action area is predominately comprised of modified riverine and estuarine habitats associated with Colma Creek. Land uses adjacent to the action area include residential, commercial and light industrial facilities, transportation infrastructure (US 101, Caltrain, South San Francisco BART station, SFO, etc.), El

Camino High School, and recreational uses at Orange Memorial Park. Existing conditions in the action area are further described in Section 3, *Affected Environment*.

2.3 Proposed Project

2.3.1 Purpose and Objective

The objective of the Proposed Project is to conduct maintenance activities as necessary along the approximately 5.4 miles of the Colma Creek flood control channel to provide design flood conveyance capacity in the channel. The Colma Creek flood control channel provides flood control protection for residents and businesses in the communities near the channel in South San Francisco, Colma, and Daly City.

2.3.2 Project Description

The Project's primary activities are to remove localized accumulated sediment along the channel bed in Reach 2 and repair or replace degraded culverts and clearing blocked culvert outfalls in Reach 3. Other routine maintenance activities that may occur in the Project Area on an as-needed basis include:

- Vegetation management on channel banks and bed (including removal of invasive vegetation);
- Repair or maintenance of concrete/hardened channel banks and bed;
- Installing and maintaining trash capture devices;
- Removing debris that could accumulate and become flow obstructions (e.g., fallen trees, branches, debris, trash, or shopping carts);
- Installing and repairing fences on channel banks; and
- Graffiti abatement.

Table 1 below summarizes maintenance activities proposed within each reach of the Project Area. Proposed project elements are described in the following subsections.

Table 1: Proposed Maintenance Activities

Maintenance Activities	Colma Creek Flood Control Segment		
	Reach 1: A St./El Camino Real downstream to Spruce Ave.	Reach 2: Spruce Ave. downstream to Produce Ave.	Reach 3: Produce Ave. downstream to creek mouth at SF Bay
Sediment removal on channel bed		X	
Repair or replacement of culverts; Clearing blocked culvert outfalls			X[†]
Vegetation management on channel banks and bed	X	X	X
Repair or maintenance of concrete/hardened channel banks and bed	X	X	X
Installing and maintaining trash capture devices	X	X	X
As needed general removal of obstructions (debris)	X	X	X

Installing and maintaining fences on channel banks	X	X	X
Repair of access roads	X	X	X
As needed graffiti abatement	X	X	X

† Culvert maintenance activities would be limited to the area between Highway 101 and Navigable Slough.

Sediment Removal in Reach 2

A primary objective of the Project is to remove sediment within Reach 2 and to ensure adequate conveyance capacity within the Colma Creek flood control channel. Due to the relatively wider channel and lower channel gradient compared to Reach 1 upstream, sediment deposition and accumulation is an ongoing issue in Reach 2 (Figure 4).

Sediment removal activities would be conducted using equipment from the top of bank. Within Reach 2, removal would occur only when sediment accumulates more than two feet above the channel bottom. Within this reach, the channel is designed to maintain two feet of sediment along the bed. As currently observed in Reach 2, due to hydraulic conditions sediment has deposited more deeply along the right bank (south bank) in the area immediately downstream of the Caltrain railroad crossing and along the left bank (north bank) in the area upstream of Produce Avenue.

Sediment removal would be conducted during the summer months when flow is minimal or absent (August/September) and during low tide. Sediment removal activities are anticipated to occur on a routine basis (every 3-4 years), or as needed if deeper sediment deposits develop around structures. To avoid working near the low-flow channel, sediment near the outer walls or structures would be removed first and a sediment berm would be left between the excavated area and the active channel. After the sediment is removed, the berm would be breached to allow the incoming tide to enter the excavated area. Per existing RWQCB permit terms, up to two feet of sediment depth would be preserved along the channel bed.

For all sediment removal work, a silt curtain would be installed around the work site to trap suspended sediment generated by maintenance work and prevent increases in turbidity in adjacent creek areas. The silt curtain would be removed upon completion of the sediment removal work. Mechanized equipment such as loaders, excavators, and dump trucks would be employed from the top of bank. It is anticipated that approximately 400 cubic yards of sediment may be removed in a given year, though sediment removal would not likely occur every year. The material would be hauled off-site for disposal at an appropriate facility.

Sediment removal work would be conducted when flows are expected to be low or absent, and is not anticipated to require dewatering. However, temporary cofferdams may be installed around the work area during low tide if the County or contractor believes it would facilitate the work. All temporary dewatering equipment would be removed once the work is completed.

Culvert Maintenance in Reach 3

There are 14 culverts in Reach 3 between Highway 101 and the Utah Avenue Bridge that require maintenance. These culverts range from 15- to 36-inch diameter, 20 to 50 feet long, and are constructed of reinforced concrete pipe (RCP) or corrugated metal pipe (CMP). The locations of these culverts are shown in **Figure 3**. Some culvert outfalls include existing sack concrete structures for energy dissipation and slope protection. Several of these culverts and associated outfall structures are broken or degraded, and require repair or replacement.

The condition of the culverts was evaluated by WRECO in September 2015, and repair recommendations were developed for each culvert (WRECO 2015). Two (2) culverts will be replaced with RCP or high-density polyethylene (HDPE) pipe of the same diameter; 12 culverts will have rock slope protection (RSP) added to the outlet or will have existing sack concrete replaced with RSP; and all 14 culverts will have duckbill check valves added to their outlets. The duckbill check valves will prevent water from entering the culverts at high tides, thereby limiting sedimentation in the culvert.

Habitats in the footprint of the culvert maintenance sites include upland, intertidal marsh, and earthen channel. The compacted upper bank is upland habitat dominated by non-native annual grasses and forbs. Intertidal marsh areas are dominated by pickleweed interspersed with marsh gumplant (*Grindelia stricta*), alkali heath (*Frankenia salina*), and jaumea (*Jaumea carnosa*). The channel habitat includes intertidal areas at the culvert outlets that are largely devoid of vegetation. Where feasible, equipment will operate from the top of bank on the landward side of the existing concrete flood wall. However, culvert maintenance and replacement will require equipment to operate within wetland areas.

Culvert maintenance will require the use of heavy equipment including an excavator, skip loader, mechanical compactor, and haul trucks. Equipment operating in soft sediments or wetlands will operate on mats or will be specialized low ground pressure equipment. A silt curtain will be placed around the work area at low tide. Temporary cofferdams may be needed to isolate construction areas from tidal inundation. For culvert replacement and RSP installation, temporary construction access will be established to allow equipment access to the repair site. Environmentally Sensitive Area fencing will be used to mark the limits of the work area. The degraded pipe will be excavated and disposed of at an appropriate facility. After the replacement culvert is installed or repaired, the trench will then be backfilled, compacted, and restored to match surrounding surfaces. Should the assessment of the existing culvert determine that the condition of the pipe is not severely deteriorated, a rehabilitation of the pipe, such as slip-lining, may be proposed and performed. Duckbill check valves will likely be installed with hand tools and labor, but may require the assistance of heavy equipment such as a small lift.

<u>Clearing Blocked Culverts and General Removal of Debris and Obstructions</u>

Removal of sediment and debris that is blocking culverts or otherwise obstructing structures and facilities may be necessary to maintain flood control capacity. Facilities that may require clearing include culvert and storm drain outlets, and the dissipater teeth upstream of Spruce Avenue. As needed, the District would remove such obstructions by excavating localized portions of the channel during dry or low-tide conditions from the top of bank. This activity also includes routine removal of fallen trees, branches, piping, and garbage immediately adjacent to flood control structures and trash capture facilities.

Vegetation Management

Sections of the channel which consist of a trapezoidal concrete channel with joints in the channel walls or joints between the walls and channel bottom, are often colonized by wetland or weedy vegetation in the joints. Vegetation such as cattails would be hand pulled or hand cut from the joints. Vegetation removal from the channel banks and adjacent access roads is often necessary to maintain access to the channel and preserve the integrity of the structures. Herbicides approved for use in aquatic environments (Roundup Custom™, Habitat®) may be used on to control vegetation on upper banks and access roads. No pickleweed or other native saltmarsh vegetation would be removed or disturbed. Invasive upland species such as pampas grass, ice plant, and fennel would be removed from all channel segments as necessary. Removal of non-native *Spartina* downstream of Spruce Avenue would be coordinated with the San Francisco Estuary Invasive *Spartina* Project.

Repairs at Hardened Channel Banks and Bed

This activity includes repairing damaged or failed sections of concrete wall revetments, riprap, or sacked concrete bank revetments. Minor damage to concrete channel walls or bed, such as crumbling or chipping, would be repaired using grout. Larger-scale repair work may require concrete patching or reforming of the channel wall. Such work would be conducted when the channel is at its lowest or completely dry, and when rain is not in the 72-hour forecast. In addition, periodic cleaning of weep holes (small holes in the concrete channel walls that drain excess water) may be necessary to prevent blockage and allow for water to drain. Because swallows or other migratory birds frequently nest in these holes, to avoid impacts on migratory birds, weep hole cleaning within 50 feet of active nests would occur between August 15 and February 1, outside of the typical breeding season for birds.

Other Maintenance Activities

Other routine maintenance activities proposed may include removal of debris, abatement of graffiti, installation and maintenance of trash capture devices, and installation or repair of fencing. Such activities would generally occur between June and October.

Construction Staging and Access

Staging of equipment and materials used for maintenance activities would occur within maintenance access roads adjacent to the channel.

Potential staging of equipment and materials could occur adjacent to Reaches 2b and 2 on the County's right-of-way along the north side of Colma Creek between South Linden Avenue and Produce Avenue.

Reach 2 would be accessed via Highway 101 and local access would occur via Produce Avenue, San Mateo Avenue, Linden Avenue, and Spruce Street. Within Reach 2a (between the dissipater teeth and

Linden Avenue), a long reach excavator would need to operate from the top of bank on North and South Canal Street. Within Reaches 2b and 2c, the site would be accessible from an existing maintenance road just north of the channel.

2.3.3 Avoidance and Minimization Measures

The County strives to protect public health and safety and natural resources to the maximum extent feasible. The County seeks to avoid environmental impacts by implementing best management practices (BMPs) to avoid or minimize potential adverse effects related to Colma Creek maintenance activities. Project-specific measures are presented in Table 2. Project maintenance activities will also be conducted in accordance with countywide maintenance standards and BMPs as detailed in the County of San Mateo Watershed Protection Program's Maintenance Standards (County of San Mateo 2004) and San Mateo Countywide Water Pollution Prevention Program Construction BMPs (County of San Mateo 2012). Additional construction-related avoidance, minimization, and mitigation measures will be identified in the CEQA compliance document for the project (under development).

Table 2. Avoidance, Minimization, and Best Management Practices		
BMP Number	**BMP Title**	**BMP Description**
BMP-1	Timing of Work	A. Maintenance activities occurring below the High Tide Line or Ordinary High Water will take place during the low-flow period and between August 1 and October 15. Exceptions may be made for this project with advance approval of RWQCB, CDFW, NMFS, and/or USFWS as appropriate. B. Minor maintenance activities that may occur year-round include trash removal, fence maintenance, graffiti abatement, and removal of obstructions that create potential hazardous conditions.
BMP-2	Environmental Awareness Training	For each activity, all Project personnel will participate in a worker environmental awareness program. Under this program, Project personnel will be informed about the presence of listed species and habitats associated with the species and that unlawful take of the animal or destruction of its habitat is a violation of the Federal ESA. Prior to Project activities, a qualified biologist approved by USFWS and NMFS will instruct all Project personnel about (1) the description and status of the species; (2) the importance of their associated habitats; and (3) a list of measures being taken to reduce impacts on these species during Project implementation. A fact sheet conveying this information will be prepared for distribution to the Project crew and anyone else who enters the Project site. A member of the Project crew will be designated as the point of contact for any employee or contractor who might encounter a listed species. The representative's name and telephone number will be provided to USFWS and NMFS prior to the initiation of any activities.
BMP-3	Biological Resource Protection Impact Avoidance and Minimization During Dewatering	A. For work that requires dewatering or fish exclusion, cofferdams or exclusion structures (e.g., silt curtain or nets) shall be installed at the lowest possible tides to minimize the potential for fish to be in the work area. B. Exclusion structures shall be constructed of woven mesh or netting with a maximum mesh opening of 3/32 inch. The structures shall remain in place during instream construction activities and shall be monitored daily during instream construction to ensure that they are effectively excluding fish. Any pumps used for dewatering shall be screened with 3/32-inch (or finer) mesh material. C. Once the fish exclusion structure is constructed, qualified fisheries biologists shall survey the exclosure by making a minimum of three passes with dipnets, seines, or by electrofishing, using the protocols established by NMFS (2000). All fish captured, including special-status species, will be placed into a suitable holding container of cool, aerated stream water and then relocated at least 150 feet down-current of the construction area. D. If the fisheries biologist determines that the exclosure has been compromised, instream construction would be halted until the biologist has repeated the fish relocation and the exclosure has been repaired.

Table 2. Avoidance, Minimization, and Best Management Practices		
BMP Number	**BMP Title**	**BMP Description**
		E. Cofferdams shall only be built from materials such as sandbags, clean gravel, or water bags (rubber bladders) which will cause little siltation or turbidity. Visqueen shall be placed over sandbags to minimize water seepage into the maintenance areas. The visqueen shall be firmly anchored to the streambed to minimize water seepage. If necessary, the footing of the dam shall be keyed into the channel bed at an appropriate depth to capture the majority of subsurface flow needed to dewater the streambed. F. If necessary, discharged water shall pass over an energy dissipater to keep erosion to a minimum. When construction is completed, the dewatering structure shall be removed as soon as possible. Impounded water shall be released at a reduced velocity to minimize erosion, turbidity, or harm to fish. The area disturbed by dewatering mechanisms shall be restored upon completion of the project.
BMP-4	Work in Wetlands	A. For work occurring in wetland, the construction footprint area shall be minimized to the extent feasible. Limits of work shall be clearly marked with brightly colored fencing or flagging. B. All equipment operating in wetlands or on soft sediments shall operate on mats or will be specialized low ground pressure equipment.
BMP-5	Breeding Bird Survey	A. For maintenance activities involving heavy equipment, ground disturbance, or vegetation removal that are scheduled during the nesting season (February 15 to August 15), a focused survey for active bird nests shall be conducted by a qualified biologist within 15 days prior to the beginning to project activities. If active nests are found, the County shall consult with CDFW and the U.S. Fish & Wildlife Service regarding appropriate action to comply with the Migratory Bird Treaty Act of 1918 and the Fish & Game Code, section 3503. B. Presence/absence of California Clapper Rail in the project area will be based on data collected by Invasive Spartina Project, which conducts annual protocol-level breeding season surveys in the project area. C. In the absence of data available from the Invasive Spartina Project, the County will conduct protocol-level surveys for California Clapper Rail prior to conducting maintenance activities involving heavy equipment, ground disturbance, or vegetation removal that are scheduled during the California Clapper

Table 2. Avoidance, Minimization, and Best Management Practices		
BMP Number	**BMP Title**	**BMP Description**
		Rail nesting season (February 1 to August 31) and would occur within 750-ft of suitable habitat for California Clapper Rail.
BMP-6	Spill Prevention and Control	A. The construction Contractor will be required to develop and submit a *Spill Prevention and Response Plan* for approval by the County. B. 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 guidelines stated in the *Spill Prevention and Response Plan*. C. Spill response 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. D. County staff will routinely inspect the work site to verify that spill prevention and response measures are properly implemented and maintained. E. 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. F. As required by law, all significant releases of hazardous materials, including oil will be reported immediately to the Governor's Office of Emergency Services Warning Center, (800) 852-7550.
BMP-7	Equipment Maintenance & Fueling	Proper equipment maintenance and fueling procedures will ensure that no fluids are discharged into watercourses, and that any spills are promptly cleaned up, reported (if necessary) and properly disposed of. A separate area shall be designated for equipment maintenance and fueling, away from any slopes, watercourses or drainage facilities. Where equipment is expected to be stored for more than a few days, cleanup materials and tools shall be kept nearby and available for immediate use. Equipment shall not be stored in areas that will potentially drain to watercourses or drainage facilities. If equipment must be stored in areas with the potential to generate runoff, drip pans, berms, sandbags or absorbent booms should be employed to contain any leaks or spills. All equipment will be maintained free of petroleum leaks. All vehicles operated within 250 ft of the Colma Creek flood control channel will be inspected daily for leaks and, if necessary, repaired before leaving the staging area. Inspections will be documented in a record that is available for review on request.
BMP-8	Sand Bags/Rock Socks	Sandbags may be used during construction to form dewatered areas such as cofferdams clean water bypasses. Sandbags placed around drainage inlets divert flow away from the inlet. Rock socks may be used to protect inlets by providing filtration of runoff while allowing flow to enter the storm drain system.

Table 2. Avoidance, Minimization, and Best Management Practices		
BMP Number	**BMP Title**	**BMP Description**
		Construction Guidelines: ▪ When used in the Colma Creek channel, this BMP must be used in accordance with permit conditions. ▪ Secure ends of sandbags to ensure material does not scatter. ▪ When used as a barrier, stack bags tightly together and in alternative (brick-layer) fashion. BMP Maintenance: ▪ During construction, inspect daily during the workweek. Schedule additional inspections during storm events. Make any required repairs. ▪ Replace damaged sandbags/rock socks. ▪ Remove sediment when deposits reach ½ the height of the sandbag barrier. ▪ Replace rock socks when ½ full of sediment, or when water no longer flows through rock sock or when water is not clean after flowing through rock sock.
BMP-9	Non-Hazardous Materials	▪ Berm and cover stockpiles of sand, dirt or other construction material with tarps when rain is forecast or if not actively being used within 14 days. ▪ Use (but don't overuse) reclaimed water for dust control.
BMP-10	Hazardous Materials	▪ Label all hazardous materials and hazardous wastes (such as pesticides, paints, thinners, solvents, fuel, oil, and antifreeze) in accordance with city, county, state and federal regulations. ▪ Store hazardous materials and wastes in water tight containers, store in appropriate secondary containment, and cover them at the end of every work day or during wet weather or when rain is forecast. ▪ Follow manufacturer's application instructions for hazardous materials and be careful not to use more than necessary. Do not apply chemicals outdoors when rain is forecast within 24 hours. ▪ Arrange for appropriate disposal of all hazardous wastes.
BMP-11	Waste Management	▪ Cover waste disposal containers securely with tarps at the end of every work day and during wet weather. ▪ Check waste disposal containers frequently for leaks and to make sure they are not overfilled. Never hose down a dumpster on the construction site. ▪ Clean or replace portable toilets, and inspect them frequently for leaks and spills. ▪ Dispose of all wastes and debris properly. Recycle materials and wastes that can be recycled (such as asphalt, concrete, aggregate base materials, wood, gyp board, pipe, etc.)

Table 2. Avoidance, Minimization, and Best Management Practices		
BMP Number	**BMP Title**	**BMP Description**
		▪ Dispose of liquid residues from paints, thinners, solvents, glues, and cleaning fluids as hazardous waste.
BMP-12	Construction Entrances and Perimeter	▪ Establish and maintain effective perimeter controls and stabilize all construction entrances and exits to sufficiently control erosion and sediment discharges from site and tracking off site. ▪ Sweep or vacuum any street tracking immediately and secure sediment source to prevent further tracking. Never hose down streets to clean up tracking.
BMP-13	Maintenance and Parking	▪ Designate an area, fitted with appropriate BMPs, for vehicle and equipment parking and storage. ▪ Perform major maintenance, repair jobs, and vehicle and equipment washing off site. ▪ If vehicle maintenance must be done onsite, work away from storm drains and over a drip pan big enough to collect fluids. ▪ Recycle or dispose of fluids as hazardous waste. ▪ No vehicle or equipment cleaning will be done onsite.
BMP-14	Sediment Control	▪ Protect storm drain inlets, gutters, ditches, and drainage courses with appropriate ▪ BMPs, such as gravel bags, fiber rolls, berms, etc. ▪ Prevent sediment from migrating offsite by installing and maintaining sediment controls, such as fiber rolls, silt fences, or sediment basins. ▪ Keep excavated soil on the site where it will not collect into the street. ▪ Transfer excavated materials to dump trucks on the site, not in the street, as feasible.
BMP-15	Concrete, Grout & Mortar Application	▪ Store concrete, grout and mortar under cover, on pallets and away from drainage areas. These materials must never reach a storm drain. ▪ Wash out concrete equipment/trucks offsite or in a contained area, so there is no discharge into the underlying soil or onto surrounding areas. Let concrete harden and dispose of as garbage. ▪ Collect the wash water from washing exposed aggregate concrete and remove it for appropriate disposal offsite.
BMP-16	Dewatering	▪ Effectively manage all run-on, all runoff within the site, and all runoff that discharges from the site. Divert run-on water from offsite away from all disturbed areas or otherwise ensure compliance. ▪ When dewatering, notify and obtain approval from the local municipality before discharging water to a street gutter or storm drain. Filtration or diversion through a basin, tank, or sediment trap may be required.

Table 2. Avoidance, Minimization, and Best Management Practices		
BMP Number	**BMP Title**	**BMP Description**
		▪ In areas of known contamination, testing is required prior to reuse or discharge of groundwater. Consult with the Engineer to determine whether testing is required and how to interpret results. Contaminated groundwater must be treated or hauled off-site for proper disposal.
BMP-17	Staging and Access	▪ Staging, access, and parking areas will be located outside of sensitive habitats to the extent feasible.

3 Affected Environment

3.1 Baseline Environmental Conditions

This section describes the baseline environmental conditions of the action area, including its climate, hydrology, and soil. These physical characteristics provide context for the biological conditions and the species descriptions that follow.

3.1.1 Climate

The action area is located in the San Francisco Bay Area, which has a Mediterranean-type climate characterized by moist, mild winters and dry summers. In South San Francisco, the average annual rainfall is 20.25 inches. The majority of precipitation occurs between October and April. Average annual daily maximum air temperature at San Francisco International Airport is 65.3 degrees Fahrenheit (°F), and average annual low temperature is 49.1°F (WRCC 2014).

3.1.2 Hydrology

The action area experiences both fluvial and tidal hydrologic regimes. In Reach 1, channel hydrology is dictated by fluvial processes (i.e., streamflow generated by wet season storm events). Reach 2 is a transitional zone that is influenced by fluvial and tidal hydrologic regimes. Downstream of Highway 101, channel hydrology is primarily influenced by the tidal regime, but flooding may occur during winter storm events.

3.1.3 Soils

The majority of the action area is situated on historic baylands that have been reclaimed for industrial development. Soils mapped in the action area include: Urban Land-Orthents, reclaimed complex/cut and fill complexes; urban land; and Novato clay.

3.2 Biological Conditions

Habitats in the action area include: constructed and earthen channel, mudflat, tidal marsh, and ruderal and developed areas. General descriptions of these habitats follow.

3.2.1 Constructed Channel

In Reach 1, Colma Creek flows through a constructed, concrete channel. Biological activity in Reach 1 of the channel is generally limited to seasonal growth of algae, aquatic macrophytes, and ruderal vegetation in the joints of the concrete channel (Figure 4, Photo 1). This portion of the channel may occasionally be used as habitat by urban-adapted wildlife.

The Colma Creek channel in Reach 2 is also concrete. Approximately six inches to one foot of sediment is generally accumulated across the channel bed, though in some locations deposition is greater (Figure 4, Photos 2 through 4). There is little, if any, vegetation in the channel. This portion of the channel is occasionally used by waterfowl such as Mallard (*Anas platyrhynchos*) and Canada Goose (*Branta canadensis*), as well as gulls and some shorebirds. Some fishes may use this portion of the channel during high tides. During channel dewatering for a previous project in Colma Creek at Spruce Avenue, staghorn sculpin (*Leptocottus armatus*), inland silverside (*Menidia beryllina*), and three-spined stickleback (*Gasterosteus aculeatus*) were encountered and relocated (Pers. Comm. Casagrande, 2015).

3.2.2 Earthen Channel

At the Produce Avenue crossing, Colma Creek transitions to an earthen channel. The channel is approximately 70 to 80 feet wide and the bed is comprised of soft sediments (Figure 4, Photo 5). The banks have a narrow band (~15 t0 20 feet wide) of emergent marsh dominated by pickleweed (*Sarcocornia [=Salicornia] pacifica*), which transitions to an upland community dominated by ruderal species.

Aquatic habitat in this portion of the channel supports fishes such as threespined stickleback (*Gasterosteus aculeatus*), staghorn scuplin (*Leptocottus armatus*), western mosquitofish (*Gambusia affinis*), rainwater killifish (*Lucania parva*) and yellowfin goby (*Acanthogobius flavimanus*) (Leidy 2007). The margins of the channel are used as foraging areas by wading birds (e.g., egrets and herons). Waterfowl also commonly forage along this portion of Colma Creek.

3.2.3 Mudflat and Tidal Marsh

The channel widens as Colma Creek flows toward the Bay (Figure 4, Photo 6). At the mouth of the creek, there is a wetland complex characterized by broad expanses of mudflat habitat with narrow bands of intertidal marsh along the shoreline-Bay ecotone (Figure 5). The mudflats serve as important foraging habitat for many shorebirds. Up until the mid-2000s, this marsh complex supported large contiguous stands (~50 acres) of *Spartina alterniflora* (ISP 2013), which provided habitat for California Clapper Rail (CLRA). Since invasive *Spartina* control began in 2006 there has been a rapid decline in the number of rails detected in the area (See Section 4.2.4).

The mudflat habitat transitions to emergent marsh dominated by pickleweed. Iceplant (*Carpobrotus* sp.) has invaded some portions of the marsh and become the dominant plant species. In most areas the marsh transitions abruptly to upland habitat or developed land (Figure 4, Photo 7). The upland areas tend to be dominated by non-native annual grasses and forbs. There are many feral cats (*Felis catus*) in the downstream portion of the action area. The cats are supported by feed station (Figure 4, Photo 8). The presence of domestic predators diminishes the habitat values for sensitive species such as CLRA.

3.2.4 Developed and Ruderal

The vast majority of the action area is surrounded by developed land with limited habitat available for wildlife. Ornamental trees and landscaping in developed areas provide foraging and/or nesting habitat for some urban-adapted passerines species such as dark-eyed junco (*Junco hyemalis*), house sparrow (*Passer domesticus*), and American robin *(Turdus migratorius)*. Larger trees may provide suitable roost and nest sites for urban-adapted raptors such as Cooper's hawk (*Accipiter cooperii*) and red-tailed hawk (*Buteo jamaicensis*).

A ruderal plant community dominates lands that have been disturbed but not permanently developed. Herbaceous species common in this habitat include wild oats (*Avena fatua*), sweet fennel (*Foeniculum vulgare*), and pampas grass (*Cortaderia jubata*); coyote brush (*Baccharis pilularis*) is the dominant shrub. The ruderal habitat in the action area is linear and fragmented, thus it provides relatively low habitat value for wildlife. Wildlife species utilizing this habitat are likely to be urban-adapted species such as raccoon (*Procyon lotor*) and striped skunk (*Mephitis mephitis*).

4 Methods, Species Accounts, and Status in the Action Area

4.1 Methods and Surveys

Methods to assess the potential for ESA-listed species to be adversely affected by the Proposed Project included site-specific habitat assessments, as well as review of existing documentation for biological resources in the action area. These methods are described further in the following sections.

4.1.1 Reconnaissance Surveys

Kevin Fisher of Horizon Water and Environment (Horizon) has conducted numerous reconnaissance-level biological surveys in the Project Area between 2012 and 2014. Mr. Fisher has more than 12 years of field experience in the wetlands of the San Francisco Bay. A habitat evaluation for CLRA and salt marsh harvest mouse was conducted on July 18, 2013 by Mr. Fisher and Jules Evens of Avocet Research Associates. Mr. Evens has over 30 years of experience working in the Bay, including several years of CLRA surveys in the wetlands of Colma Creek. The results of the CLRA and salt marsh harvest mouse habitat assessment are provided in Appendix B, Memorandum 6.

4.1.2 Review of Existing Documentation

Background studies and information considered during the development of this BA include:

- Resource investigations conducted by Horizon to evaluate the potential effects of maintenance activities (Horizon 2014)
- Invasive Spartina Project California Clapper Rail Survey Reports (2008-2014)
- Leidy, R. A. 2007. Ecology, Assemblage Structure, Distribution, and Status of Fishes in Streams Tributary to the San Francisco Estuary, California. SFEI Contribution No. 530. April.
- Biological Opinions for previous projects in the action area (see Section 1.6)

4.2 Species Accounts

4.2.1 Green Sturgeon (*Acipenser medirostris*)

Legal Status

The southern DPS of green sturgeon was listed as federally threatened on April 6, 2006 by NMFS. This DPS of green sturgeon consists of all coastal and Central Valley populations south of the Eel River, with the only known spawning population in the Sacramento River (62 CFR 43937). NMFS is in the process of drafting a recovery plan for this species. Recommendations for the restoration of green sturgeon habitat are included in the USFWS (1996) Recovery Plan for the Sacramento-San Joaquin Delta Native Fishes, which is outdated.

NMFS issued the final designation of critical habitat for the southern DPS of green sturgeon on October 9, 2009 (74 CFR 52300), including the designation of specific rivers, estuaries, and coastal areas. The San Francisco Bay up to the elevation of mean higher high water is designated as critical habitat for this DPS. Thus, the tidal portions of the action area are designed critical habitat for the southern DPS of green sturgeon.

Species Description and Biology

The green sturgeon is a long-lived anadromous fish and is the most marine species of sturgeon. The green sturgeon ranges from Mexico to at least Alaska, and is found in bays and estuaries along the west coast of North America (Moyle et al. 1995, Moyle 2002). Non-spawning adult green sturgeon are believed to spend the majority of their lives in nearshore oceanic waters, bays, and estuaries. In California, the northern DPS spawns in the Klamath River and the southern DPS spawns primarily in the Sacramento River. During migration, adults are found in the San Francisco Bay, Suisun Bay, and the Delta (Israel and Klimey 2008). Green sturgeon migrate in late February to March and spawn in the Sacramento River between March and July, with a peak spawning period from April through June (Heublein et al. 2009, Moyle et al. 1995). Juveniles rear for up to 2 years in fresh or estuarine waters before emigrating to the ocean (NOAA 2014).

Green sturgeon are thought to spawn in deep pools with turbulent water velocities and cobble. They live for 60 to 70 years and reach sexual maturity at an age of approximately 15 to 20 years (Miller and Kaplan 2001, Van Eenennaam et al. 2005). They are believed to spawn every 3 to 5 years, but can potentially spawn every 2 years (NMFS 2005). They prefer cobble substrates but can use substrates ranging from clean sand to bedrock. Females produce 60,000 to 140,000 eggs that are broadcast to settle into the spaces between cobbles (Moyle et al. 1992). Cold, clean water is important for proper embryonic development.

The primary factor limiting growth of this species is exclusion from or modification of historic breeding grounds primarily due to dams (NMFS 2009, NOAA 2014). Green sturgeon are also extremely susceptible to overfishing, as sexual maturity is not reached until 15 to 20 years of age (Miller and Kaplan 2001). Other factors that may be limiting growth include the introduction of non-native estuarine species, alterations in water quality and flow regimes due to water diversions, and recreational fishing takes (NMFS 2009). Currently, good population data is lacking, even though tagging has been conducted since 1954 and since 1990 has been conducted on a regular basis (NOAA 2014). Over 500 green sturgeon have been captured and over 200 have been tagged (NOAA 2014).

Status and Conditions within the Action Area

The action area does not support spawning habitat for green sturgeon. Juvenile, sub-adult, and adult fish use San Francisco Bay for feeding and other non-reproductive purposes (Heublein et al. 2009, Lindley et al. 2011). Green sturgeon may be present in Reach 3 of the action area and open water portions of the Bay near the mouth of Colma Creek.

4.2.2 Steelhead (*Oncorhynchus mykiss*)

Listing Status

The CCC steelhead DPS was listed as threatened under the ESA on August 18, 1997 (62 FR 43937). Critical habitat for CCC steelhead in San Francisco Bay is defined by the perimeter of the water body as displayed on standard 1:24,000 scale topographic maps or the elevation of extreme high water, whichever is greater (70 FR 52571). Thus, the tidal portions of the action area are designed critical habitat for this DPS of steelhead. A final recovery plan has not yet been completed for this DPS, although a draft recovery plan was published in October 2015 (NMFS 2015).

Distribution

The CCC steelhead DPS ranges from the Soquel River in Santa Cruz County to the Russian River, Sonoma County (inclusive), and the drainages of San Francisco and San Pablo Bays; excluded is the Sacramento-San Joaquin River Basin of the Central Valley of California. All CCC steelhead DPS are "winter run" steelhead, and the timing of upstream migration is correlated with higher flow events, such as freshets or sand bar breaches, and associated lower water temperatures. Steelhead found in the tributaries to the San Francisco Bay typically migrate upstream between November and April, peaking in January and February (Fukushima and Lesh 1998).

Habitat Requirements and Life Ecology

Steelhead are the anadromous form of rainbow trout (*O. mykiss*). The two forms of this species can interbreed and are genetically indistinguishable; they are separated primarily by their life history. While resident rainbow trout remain in the river throughout their life, steelhead migrate to the ocean to rear and return to their natal stream to spawn. Steelhead may spawn more than one season before dying (i.e., they are iteroparous), in contrast to other species of the *Oncorhynchus* genus. Steelhead spawn in river mainstems, tributaries, and intermittent streams (Everest 1973; Barnhart 1986). Reiser and Bjornn (1979) found that gravels from 0.5-4.5 inches in diameter and flows of approximately 4 ft^3/s were preferred by spawning steelhead. The survival of embryos is reduced when fine substrates with a diameter smaller than 0.5 inches comprises more than 20-25 percent of the total substrate by volume. The number of days required for steelhead eggs to hatch is inversely proportional to water temperature and varies from about 19 days at 60°Farenheit (F) to about 80 days at 42°F. Fry typically emerge from the gravel two to three weeks after hatching (Barnhart 1986).

Upon emerging from the gravel, fry rear in stream margin habitats and move gradually into pools and riffles as they grow larger. Older fry establish territories which they defend. Cover is an important habitat component for juvenile steelhead both as velocity refuge and as a means of avoiding predation (Shirvell

1990; Meehan and Bjornn 1991). Steelhead, however, tend to use riffles and other habitats not strongly associated with cover during summer rearing more than other salmonids. Young steelhead feed on a wide variety of aquatic and terrestrial insects, and emerging fry are sometimes preyed upon by older juveniles. In winter, they become inactive and hide in any available cover, including gravel or woody debris.

Rearing juvenile steelhead may reside in freshwater all year. Adequate flow and water temperature conditions are important factors for juvenile survival and growth (CDFG 1997). Generally, throughout their range in California, steelhead that are successful in surviving to adulthood spend at least two years in freshwater before emigrating downstream. Emigration appears to be more closely associated with size than age. Juveniles typically migrate downstream from March through June, peaking in April and May (Fukushima and Lesh 1998).

During rearing, suspended and deposited fine sediments can directly affect salmonids by abrading and clogging gills, and indirectly cause reduced feeding, avoidance reactions, destruction of food supplies, reduced egg and alevin survival, and changed rearing habitat (Reiser and Bjornn 1979). Bell (1973) found that silt loads of less than 25 milligrams per liter (mg/l) permit good rearing conditions for juvenile salmonids.

Status and Conditions within the Action Area

Analyses of steelhead abundance across the DPS indicate that naturally reproducing stocks are suffering severe and long term declines, range-wide, within the San Francisco Estuary. These precipitous population declines have been attributed to longstanding human induced factors that exacerbate the adverse effects of natural environmental variability (NMFS 1996). Important factors in this decline include destruction and degradation of habitat, overutilization, and natural and human made factors (62 FR 43937). Within the DPS region, significant destruction and degradation of freshwater spawning and rearing habitat has occurred.

Two Colma Creek sites were sampled in September 1981 as part of a fish distribution study. No *O. mykiss* were collected, and field notes state the creek was very disturbed (Leidy 1984). In May 2002, Leidy surveyed Colma Creek between the mouth and headwaters. No *O. mykiss* were observed, nor was suitable habitat present (Leidy 2002). Leidy et al. (2005) concluded that the Colma Creek watershed currently does not contain suitable habitat to support salmonids. Individual steelhead may occasionally stray into the action area during seasonal migration periods.

4.2.3 Longfin Smelt (*Spirinchus thaleichthys*)

Legal Status

Longfin smelt were listed as threatened under California Endangered Species Act (CESA) on April 9, 2010. In 2012, the USFWS determined that the Bay-Delta DPS of longfin smelt warranted listing under the federal ESA, but listing was precluded by higher priority actions (USFWS 2012). Currently, the federal status of the Bay-Delta DPS of longfin smelt is candidate species. There is no designated critical habitat for longfin smelt.

Species Description and Biology

Longfin smelt are a small (approximately 9 to 11 cm or 3.5-4.5 in standard length at maturity), euryhaline fish that are native within the San Francisco Estuary, including the Delta, Suisun Marsh, and the San Francisco Bay to the Golden Gate (USFWS 2012). In the Bay-Delta, most longfin smelt spend their first year in the Suisun Bay and Marsh, and the remainder of their life is spent in the San Francisco Bay or the Gulf of Farallones (USFWS 2012). Adult fish aggregate in Suisun Bay and the western Delta in late fall, then spawn in freshwater areas immediately upstream during winter and early spring (The Bay Institute et al. 2007). The population found within the San Francisco Bay represents the largest known longfin smelt population in California (Rosenfield and Baxter 2007). In addition, this population is located within the southernmost known range for the longfin smelt (Rosenfield and Baxter 2007, USFWS 2012).

Longfin smelt spawning typically occurs between January and April in areas with low salinity; however, spawning can occur between early-November to late-June (Moyle 2002, USFWS 2009). Although there are no current data on specific spawning locations within the San Francisco Bay, recently published reports indicate spawning probably occurs near the mixing zones between fresh and brackish water (Rosenfield and Baxter 2007). Moyle (2002) indicated spawning in the San Francisco Bay Estuary probably occurs downstream of Medford Island (San Joaquin River) and Rio Vista (Sacramento River). Additionally, spawning may occur in the portion of Suisun Bay near Pittsburgh and Montezuma Slough (Suisun Marsh) (Moyle 2002).

Longfin smelt spawn in fresh or slightly brackish water on sandy or gravel substrates at temperatures ranging from 7°C to 14.5°C (44.6°F to 58.1°F) (Moyle 2002). Females lay 5,000 to 24,000 adhesive eggs (Moyle 2002; USFWS 2012). Buoyant larval longfin smelt hatch within 40 days and are transported downstream into brackish estuarine waters (Moyle 2002; USFWS 2012). Depending on water temperature, larval longfin smelt metamorph into their juvenile form 30-60 days post-hatch (Moyle 2002; USFWS 2012). Juveniles and sub-adult longfin smelt use deep water habitats often foraging on opossum shrimp (USFWS 2012).

Longfin smelt undergo two distinct growth periods during their two year life span. During the first 9 to 10 months, longfin smelt reach 6 to 7 cm (2.4-2.8 in) standard length. Growth rates decrease until the “second summer and fall, when they reach 9 to11 cm (3.5-4.3 in) standard length” (Moyle 2002). This second growth spurt could be attributed to gonad production. Typically, after two years longfin smelt become mature and die shortly after spawning.

Status and Conditions within the Action Area

Larval, juvenile, and adult longfin smelt may be present in the action area, but spawning does not occur in this portion of the estuary (Robinson and Greenfield 2011). Larvae are more likely to occur in the Central

Bay in wet years. Juvenile and adults are commonly collected in the Central Bay during spring and summer surveys (Merz et al. 2013). Leidy (2007) did not find longfin smelt when sampling Colma Creek.

4.2.4 California Clapper Rail (CLRA)

Legal Status

The CLRA was listed as endangered on October 13, 1970 (35 FR 13519). Critical habitat has not been designated. In 2014, the species was reclassified and renamed by the American Ornithologists' Union as Ridgway's rail (AOU 2014). The species' ESA listing status has not been changed.

Species Description and Biology

The CLRA belongs to the order Gruiformes, in the family Rallidae, which includes rails, gallinules, and coots. The genus *Rallus* consists primarily of marsh-dwelling birds with short rounded wings, large feet, and long toes. The CLRA is one of the largest species of the genus Rallus, measuring 32-47 centimeters (13-19 inches) from bill to tail.

CLRA were historically abundant in all tidal salt and brackish marshes in the San Francisco Bay vicinity (Cohen 1895), as well as in all of the larger tidal estuaries from Marin to San Luis Obispo counties. CLRA generally inhabit coastal salt or brackish marshes. CLRA nest where cordgrass or pickleweed is tall and abundant and they need sufficient pickleweed, gumweed, bulrush, or cattail to create a dense natural cover of vegetation. Their breeding season starts in mid-March and continues through July. Breeding tends to peak between early May and late June. They forage for crabs, mussels, clams, snails, insects, spiders, worms, mice, and dead fish in mudflat and marsh vegetation. Large areas of suitable habitat are necessary for dense populations of CLRA (Solano County Water Agency 2009).

Status and Conditions within the Action Area

In the 1990s, CLRA began breeding in the marshes near the mouth of Colma Creek. The breeding population grew steadily, likely due to the increasing invasive *Spartina* infestation (Appendix B, Attachment Cvr-Ltr-2). Prior to the onset of the invasive *Spartina* control program CLRA were consistently breeding along the lower portions of Colma Creek and in the marshes near the mouth of the channel (Figure 6). CLRA density in the vicinity of the action area was considered high for the Bay (0.5 to 3 birds per acre) (ISP 2008).

Since invasive *Spartina* control began in 2006 there has been a rapid decline in the number of rails detected in the area (Table 3). Recent surveys (2012-2013) have failed to detect CLRA (ISP 2013), and currently there is no suitable habitat present in the action area. It is anticipated that CLRA could return if/when dense stands of *Spartina* become re-established and if source populations are still extant. Because this site is discrete (relatively isolated), recolonization may take longer than it would at a disturbed site with contiguous marshlands.

Table 3. California Clapper Rail (CLRA) Survey Results for Monitoring Sites in the Action Area										
ISP Monitoring Site ID	Average Number of CLRA[1]			Maximum Number of CLRA Detections[2]						
	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Colma Creek	NR[3]	NR	NR	3-6	0	0	0	0	0	0
Navigable Slough	NR	NR	NR	7-10	0	0	0	0	0	0
Confluence Marsh	8	9.5	9	2	4	1-2	2	0	0	0
San Bruno Marsh	25	14	18	15-20	9-12	0	0	0	0	0

1. Source: ISP 2008
2. Sources: ISP 2008, ISP 2014
3. NR = Not reported.

5 Essential Fish Habitat

5.1 Essential Fish Habitat in the Action Area

EFH is the aquatic habitat (water and substrate) necessary for fish to spawn, breed, feed, or grow to maturity (50 FR Part 227) that will allow a level of production needed to support a long-term, sustainable commercial fishery and contribute to a healthy ecosystem. Components of EFH that must be adequate for spawning, rearing, and migration include: substrate composition; water quality, quantity, depth, and velocity; channel gradient and stability; food; cover and habitat complexity; space access and passage; and habitat connectivity.

The tidal portion of Colma Creek is classified as EFH under the MSA. The Pacific Coast Salmon Fishery Management Plan (FMP) is applicable to tidal portions of Colma Creek. The Pacific Salmon FMP is designed to protect habitat for commercially important salmonid species. The effects of the Proposed Project on EFH are addressed in Section 6.

6 Analysis of Effects of the Proposed Action

This section discusses the potential for the Proposed Project to affect ESA-listed species, their habitats, designated critical habitat, and EFH. Both direct and indirect effects are considered. Direct effects are those that are caused by or will result from, and occur contemporaneously with the proposed action. Indirect effects are those that are caused by or will result from the proposed action and are later in time, but are still reasonably certain to occur [50 CFR §402.02].

6.1 Effects of Sediment Removal on ESA-Listed Fishes

Sediment removal work would be conducted between August 1 and October 15 and during low tides. For sediment removal, a silt curtain would be placed around the work area during low tide to exclude fish from the work area. Two feet of sediment depth would be preserved along the channel bed in locations where sediment removal occurs. Temporary and permanent impacts to aquatic and wetland habitats are summarized in Table 4.

6.1.1 Direct Effects

Aquatic habitat in Reach 2 of the Colma Creek channel is generally unsuitable for green sturgeon and steelhead. It is possible that individual green sturgeon or steelhead could stray into this portion of the channel during high flows or high tides, but these species would not be present during the times and conditions proposed for sediment removal. Therefore, sediment removal is not likely to directly affect these species.

Reach 2 of the Colma Creek channel provides marginally suitable non-reproductive habitat for longfin smelt. Entrainment of longfin smelt during sediment removal would not occur because fish would be excluded from the work area. Sediment removal may result in temporary changes in water quality when tides are allowed to re-enter the work areas. The most likely changes in water quality would be increased turbidity as a result of resuspension of sediment. Increases in turbidity in the work areas are expected to be minor because sediment removal would occur during low tide and the sites would be contained with silt curtains. Generation of turbidity would be temporary and localized and is anticipated to have insignificant effects on longfin smelt. In fact, smelt are adapted to turbid waters and their ability to identify prey and evade predators may be enhanced by turbidity (Baskerville-Bridges et al. 2004, Robinson and Greenfield 2011).

Sediment removal may also result in mobilization of contaminants in sediments. Pacific EcoRisk, under contract to Horizon, conducted sampling and testing of sediment in the Colma Creek flood control channel, as well in the mudflats near the mouth of Colma Creek. The results of the testing are provided in Appendix C. Concentrations of several contaminants of concern (COCs) in the samples exceeded criteria established for the San Francisco Bay wetland cover and fill material (SFRWQCB 2000); Bioaccumulation Trigger Levels (SFEI 2014); and Total Maximum Daily Load (TMDL) thresholds (SFEI 2014).

Table 4. Summary of Impacts to Waters and Wetlands									
Reach	Maintenance Site	Existing Type and Diameter	Activity	Temporary Waters Impact (ft^2)	Temporary Wetland Impact (ft^2)	Permanent Waters Impact (ft^2)	Permanent Wetland Impact (ft^2)	Estimate Dredge Volume[1] (CY)	Estimate Net Fill Volume[2] (CY)
2	Bar 1	Channel	Sediment Removal	0	0	0	0	0	0
	Bar 2	Channel	Sediment Removal	50	0	0	0	1	0
	Bar 3	Channel	Sediment Removal	4000	0	0	0	150	0
	Bar 4	Channel	Sediment Removal	4000	0	0	0	250	0
	Total	**Channel**	**Sediment Removal**	**8050**	**0**	**0**	**0**	**401**	**0**
3	Culvert 1n	24", Concrete	Add duckbill check valve[3]	0	1460	0	5	0.5	0.5
	Culvert 1s	36", Concrete	Add RSP and duckbill check valve	825	665	180	0	13.5	15.0
	Culvert 2n	(2) 66", Concrete	None	0	0	0	0	0.0	0.0
	Culvert 2s	12", Concrete	Replace 25 LF of existing culvert, add RSP, and add duckbill check valve	210	525	55	0	4.0	4.0
	Culvert 3n	24", CMP	Replace 60 LF of existing culvert, add RSP, and add duckbill check valve	1300	3120	85	0	6.0	7.0
	Culvert 3s	15", Concrete	Add RSP and duckbill check valve	780	660	55	0	4.0	4.0
	Culvert 4n	36", CMP	Replace sack concrete with RSP and add duckbill check valve	825	665	90	0	13.5	8.0
	Culvert 4s	12", Concrete	Replace 20 LF of existing culvert, add RSP, and add duckbill check valve	210	210	55	0	4.0	4.0
	Culvert 5n	15", CMP	Replace sack concrete with RSP and add duckbill check valve	780	660	30	0	4.0	2.0
	Culvert 5s	15", CMP	Replace culvert, add RSP, and add duckbill check valve	0	2565	0	55	4.0	4.0
	Culvert 6n	24", Concrete	Replace sack concrete with RSP and duckbill check valve	800	660	50	0	6.0	4.0
	Culvert 6s	15", RCP	Add duckbill check valve	780	660	5	0	0.5	0.5
	Culvert 7n	15", RCP	Replace sack concrete with RSP and add duckbill check valve	780	660	30	0	4.0	2.0
	Culvert 8n	15", RCP	Add RSP and duckbill check valve	780	660	30	0	4.0	2.0
	Culvert 9n	15", RCP	Add RSP and duckbill check valve	0	1440	0	55	4.0	4.0
	Total	**NA**	**Culvert Maintenance**	**8,070**	**14,610**	**665**	**115**	**72.0**	**61.0**

Notes:

1. This dredging is for removal of sediment for RSP and duckbill check valve installation.
2. Where existing sack concrete is being replaced with new RSP, it is assumed that only 50% of the RSP will be considered new fill.
3. For duckbill check valve installation and RSP placement the temporary construction easement is assumed to be 5ft on one side of the culvert, 25ft on the other side, and 25ft into the channel.

Although the concentrations of some COCs exceed criteria for protection of water quality and wetland habitats, the mobilization of these contaminants by sediment removal would be small in magnitude and would not reach levels that would result in acute toxicity to longfin smelt or contribute substantially to their exposure to these contaminants. Thus, mobilization of contaminants is anticipated to have insignificant effects on longfin smelt.

6.1.2 Indirect Effects

Sediment removal would temporarily alter the benthic community in work areas. The macroinvertabrate community in the work areas likely includes various mollusks, amphipods, oligochaetes, and polychaetes (Nichols and Pamatmat 1988). While longfin smelt are pelagic feeders, the productivity and composition of the benthos can affect their prey base. Work areas where sediment removal would occur are relatively small (approximately 8,000 ft^2, Table 4) and represent a very small fraction of the available benthic habitat. Furthermore, these areas would likely be rapidly recolonized by infauna (McCauley et al. 1977). Thus, temporary impacts to the benthic community are anticipated to have insignificant effects on longfin smelt.

As mentioned above, sediment in the Colma Creek flood control channel contains some COCs that exceed criteria for protection of water quality and wetland habitats. Sediment removed from the channel would be disposed of in a suitable upland location. Thus, the Proposed Project would remove a small fraction of the existing contaminant load present in the Bay. This action would have beneficial, yet likely insignificant, effects on ESA-listed fish species.

6.2 Effects of Culvert Maintenance on ESA-Listed Fishes

As described in Section 2.3.2, culvert maintenance would be conducted between August 1 and October 15 and during low tides. Two (2) culverts will be replaced with RCP or HDPE pipe of the same diameter; 12 culverts will have RSP added to the outlet or will have existing sack concrete replaced with RSP; and all 14 culverts will have duckbill check valves added to their outlets (Table 4).

6.2.1 Direct Effects

Aquatic habitat in Reach 3 of the Colma Creek channel is not likely to be utilized by steelhead. It is possible that individual steelhead could stray into this portion of the channel during high flows or high tides, but this species is not likely to be present during the times and conditions when culvert maintenance would occur. Therefore, culvert maintenance would have no effect on this species.

Reach 3 of the Colma Creek channel provides potentially suitable non-reproductive habitat for longfin smelt and green sturgeon. Table 2 describes measures that would be implemented to avoid and minimize effects to these species during maintenance work. These measures include placing a silt curtain or other type of exclusion barrier around the work area. The exclusion barrier would be placed at low tide, but there remains the possibility that longfin smelt could be detained in the exclusion zone if the work area is not completely dewatered prior to placing the barrier. A qualified fisheries biologist would survey the exclosure and relocate any captured fish. Longfin smelt could be harmed in this process, or their behavior could be altered during the installation of the barrier or culvert. Green sturgeon are unlikely to be directly harmed in this process because they are large-bodied fish and would not likely be present in shallow work areas when the exclosure is installed.

Culvert maintenance would increase turbidity as a result of resuspension of sediment. Increases in turbidity in the work areas are expected to be minor. Generation of turbidity would be temporary and localized and is anticipated to have insignificant effects on longfin smelt and green sturgeon.

Similar to sediment removal, culvert maintenance may also result in mobilization of contaminants in sediments. Mobilization of contaminants by culvert maintenance would be small in magnitude and would not reach levels that would result in toxicity to ESA-listed fishes or contribute substantially to their exposure to these contaminants. Thus, mobilization of contaminants is anticipated to have insignificant effects on longfin smelt and green sturgeon.

6.2.2 Indirect Effects

Culvert maintenance would result in approximately 8,070 ft^2 of temporary impact to aquatic habitat (waters) and approximately 665 ft^2 of permanent impact. The County proposes to mitigate the temporary and permanent impacts of culvert maintenance by re-establishing intertidal wetlands on a floodplain bench in Reach 3. A total of 0.1 acre of tidal wetlands would be re-established to offset temporary and permanent impacts of culvert maintenance. The complete mitigation plan is provided in Appendix D. The wetland mitigation site would be predominately intertidal marsh, but is expected to develop a network of shallow channels which would be similar to the habitat impacted by the culvert maintenance activities.

6.3 Effects of Sediment Removal and Culvert Maintenance on California Clapper Rail

6.3.1 Direct Effects

Reaches 2 and 3 of the Colma Creek channel do not currently provide suitable habitat for CLRA. The action area currently lacks key habitat elements including both dense vegetation cover for nesting and access to low marsh habitat for foraging (Appendix B, Memorandum 6). When CLRA where present in the Colma Creek channel (prior to 2012) , the closest observation proposed work areas was approximately 750 feet downstream of the Utah Street Bridge (Figure 6). Because suitable habitat is not present, no direct effects are anticipated.

6.3.2 Indirect Effects

In September 2010, representatives from the County met with regulatory agencies to discuss maintenance of the flood control channel. At this meeting, USFWS staff expressed concerns that periodic removal of sediment from Colma Creek could result in wetland and mudflat loss over time (due to the lack of deposition), and this loss could be accelerated by sea level rise. Theoretically, mudflat or wetland loss caused by sediment removal could indirectly affect CLRA habitat, although wetlands in the vicinity of Colma Creek do not currently support CLRA habitat (Appendix B, Memorandum 6).

Horizon evaluated sediment conditions in the flood control channel and mapped the distribution of wetland and mudflat habitats in the vicinity of Colma Creek (Appendix B, Memoranda 2 and 6). Using data published by the USGS (1973), the annual sediment yield from the Colma Creek watershed was estimated at 8,900 CY. The County proposes to remove approximately 400 CY of sediment from Reach 2 on an annual basis, but potentially larger amounts following wet years. It is expected that this magnitude of sediment removal would not substantially affect mudflat or wetland habitats that may be utilized by CLRA. Thus, indirect effects on CLRA are considered to be insignificant. As mentioned above, sediment in the channel contains some COCs, including polychlorinated biphenyls (PCBs), which may be related to depressed reproductive success in CLRA (Schwarzbach et al. 2003). The Proposed Project would remove a small fraction of the existing contaminant load present in the Bay. This action would have beneficial, yet likely insignificant, effects on CLRA.

6.4 Effects of Other Routine Maintenance Activities

As described in Section 2.3.2, other routine maintenance activities that would be conducted throughout the Project Area on an as-needed basis include general debris and obstruction removal, vegetation management, repairs at hardened streambanks, and installation and maintenance of trash collection devices. The direct and indirect effects of these activities are discussed in the following sections.

6.4.1 Vegetation Management

This activity would involve vegetation removal in walls and joints of the concrete channel. Work would be conducted using hand tools. Invasive species may also be managed in upland areas. This activity would have no effect on ESA-listed species or their habitat.

6.4.2 Repairs of Hardened Streambanks

This activity would involve repairing damaged or failed sections of concrete wall revetments, riprap, or sacked concrete bank revetments. Work would be conducted at during dry conditions or at low tide. This activity would have no effect on ESA-listed species or their habitat.

6.4.3 Other Maintenance Activities

Other routine maintenance activities proposed may include removal of debris, abatement of graffiti, installation and maintenance of trash capture devices, and installation or repair of fencing. These activities would have no effect on ESA-listed species or their habitat.

6.5 Effects on EFH and Critical Habitat

Reaches 2 and 3 of the action area are designated EFH for Pacific Coast Salmon and critical habitat for the southern DPS of green sturgeon and the CCC DPS of steelhead. As mention previously, aquatic habitat in Reach 2 of the Colma Creek channel is generally unsuitable for green sturgeon and steelhead. It is also unsuitable for salmonids managed under the Pacific Salmon FMP. Maintenance activities in the action area would have no effect on spawning, rearing, or migration habitat for these species. The Proposed Project would have insignificant effects on water quality and the benthic community within designated critical habitat and EFH. These impacts are not likely to measurably affect the primary constituent elements of critical habitat or the functions of EFH, and are therefore consider insignificant.

6.6 Interdependent and Interrelated Actions

Interdependent actions are "those that have no independent utility apart from the action under consideration" (50 CFR 402.02). Interrelated actions are "those that are dependent upon the Proposed Project for their justification" (50 CFR 402.02). There are no interdependent or interrelated actions as a result of the Proposed Project.

6.7 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" (50 CFR 402.02). Known projects that are likely to occur in the action area include implementation of the Invasive *Spartina* Project and floodwall improvements along Reach 3 of Colma Creek.

Under the baseline condition, the Bay-Delta DPS of longfin smelt has been adversely affected by reductions in freshwater flows, degradation of habitat conditions, increased occurrence of invasive aquatic vegetation and non-native predatory fish, unscreened water diversions, reduction of floodplain, water quality degradation, among other stressors. The recovery of longfin smelt, along with other fish species dependent on the Bay-Delta, will be determined by current and future conservation and restoration efforts such as the Bay-Delta Conservation Plan. Future activities conducted in the action area, including the Proposed Project, are unlikely to contribute substantially to the recovery or decline of longfin smelt or ESA-listed fish species.

Under the baseline condition, CLRA are threatened by habitat loss and fragmentation, habitat degradation and disturbance, invasive non-native species, predation, and sea level rise associated with climate change (USFWS 2013). The effects of the Invasive Spartina Project on CLRA and other ESA-listed species have been evaluated by USFWS and NMFS, and continue to be monitored by the Services. Floodwall improvements along Reach 3 of Colma Creek are in the early stages of planning, but are not likely to substantially affect CLRA. The Proposed Project may have indirect effects to wetland habitats that in the past supported CLRA, but is unlikely to contribute substantially to the recovery or decline of CLRA.

7 Avoidance and Minimization Measures

Avoidance and minimization measures have been incorporated into the Proposed Project. Refer to Table 2 for a list of measures that will be implemented to reduce the potential for adverse effects to ESA-listed species, critical habitat, and EFH. To compensate for impacts to wetland and waters, the County wil re-establish 0.1 acres of intertidal wetland habitat in Reach 3 of Colma Creek.

8 Conclusions and Determinations

ESA-listed and Candidate Fish Species

The action area is generally unsuitable for steelhead. Individual steelhead could stray into the action area during winter storm events. Maintenance activities would not be conducted during these times and conditions. Thus, the Proposed Project would have ***no effect*** on CCC steelhead.

Reaches 1 and 2 of the action area are generally unsuitable for green sturgeon. Reach 3 of the action area provides potentially suitable non-reproductive habitat for green sturgeon. Maintenance activities in Reach 3 would not result in direct harm to green surgeon or measurably affect their spawning, rearing, or migration habitat. Thus, the Proposed Project ***may affect, but is not likely to adversely affect*** the southern DPS of green sturgeon.

Reaches 2 and 3 of the action area provide potentially suitable non-reproductive habitat for longfin smelt. Sediment removal would occur in Reach 2 and culvert maintenance would be conducted in Reach 3. Sediment removal may result in temporary changes in water quality and alteration of the benthic community in Reach 2. These changes would have insignificant effects on longfin smelt. For culvert maintenance in Reach 3, an exclusion barrier would be placed at low tide, but there remains the possibility that longfin smelt could be detained in the work area. A qualified fisheries biologist would survey the exclosure and relocate any captured fish. Longfin smelt could be harmed in this process, or their behavior could be altered during the installation of the barrier or culvert. The Proposed Project would also result in small temporary and permanent impacts to aquatic habitat which may be utilized by longfin smelt. Therefore, the Proposed Project may affect the Bay-Delta DPS of longfin smelt. The County requests a conference with USFWS to identify measures to minimize adverse effects on longfin smelt.

California clapper rail

CLRA are currently absent from the action area. Thus, implementation of maintenance activities would have no direct effects on CLRA. The County proposes to periodically remove small amounts of sediment from Colma Creek. Sediment in the channel may contribute to sustaining wetland habitats in the downstream portion of the action area. The volume of sediment removed for the Project would represent a small fraction of the annual watershed sediment yield (Appendix B, Memorandum 2). Sediment removal at this scale would have insignificant effects on the extent of mudflat and wetland habitats that could be utilized by CLRA in the future. Therefore, the Proposed Project ***may affect, but is not likely to adversely affect*** the California clapper rail.

Critical Habitat and EFH

Reaches 2 and 3 of the action area are designated critical habitat for the CCC DPS of steelhead and southern DPS of green sturgeon and EFH for Pacific Coast Salmon. The action area does not provide the primary constituent elements of critical habitat for steelhead, and does not support spawning, rearing, or migration habitat for salmonids. The Proposed Project would have insignificant effects on water quality and the benthic community within designated critical habitat for green sturgeon. These impacts would not measurably affect the primary constituent elements of the critical habitat or functions of EFH. Therefore, the Proposed Project ***is not likely to adversely modify*** critical habitat and EFH.

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Appendix A U.S. Fish and Wildlife Service Species List and Assessment of Species that May Be Affected by the Proposed Project

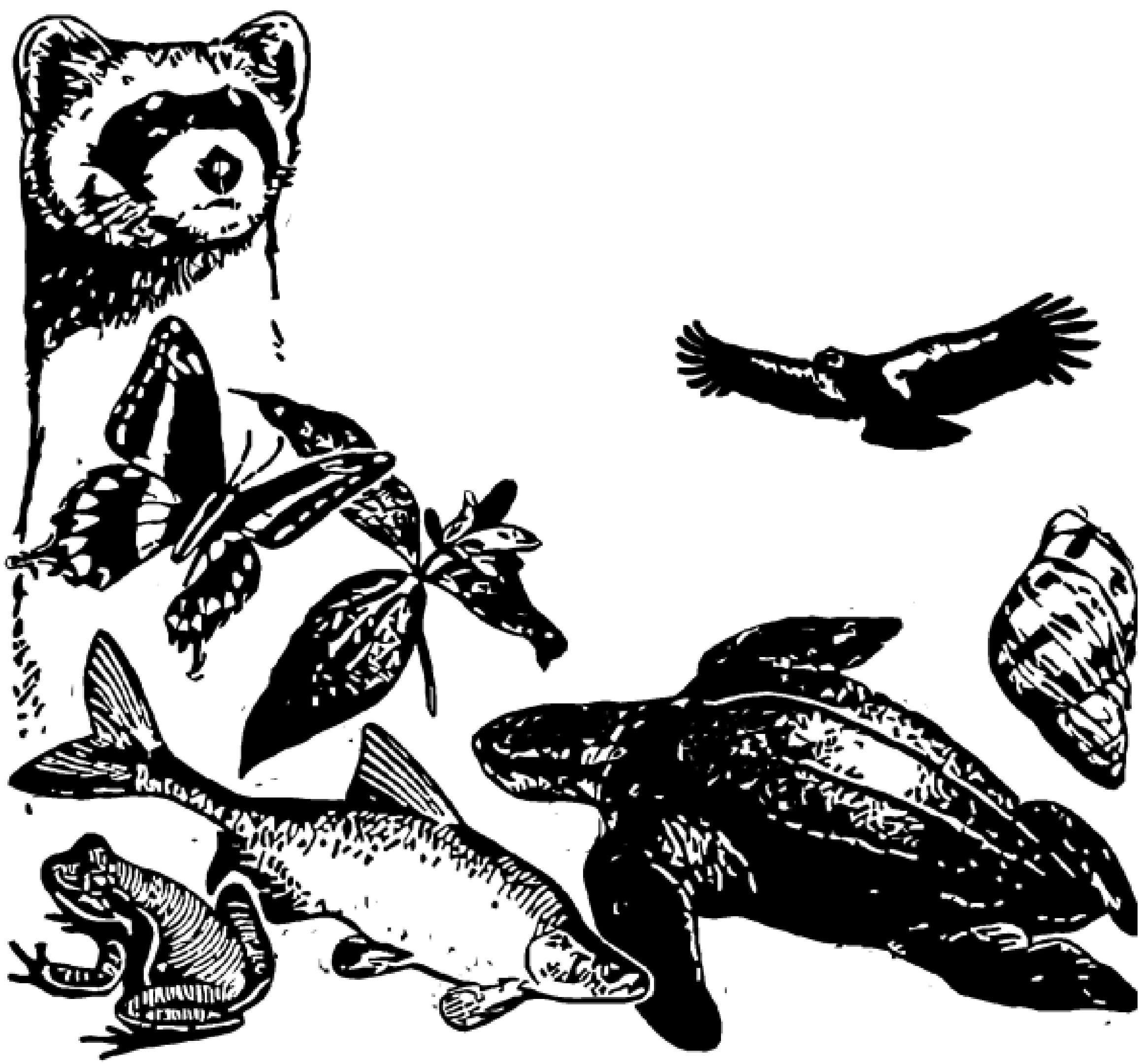
U.S. Fish & Wildlife Service

Colma Creek Flood Control Channel Maintenance Project

IPaC Trust Resource Report

Generated September 30, 2015 10:51 AM MDT

This report is for informational purposes only and should not be used for planning or analyzing project-level impacts. For projects that require FWS review, please return to this project on the IPaC website and request an official species list from the Regulatory Documents page.



US Fish & Wildlife Service

IPaC Trust Resource Report

Project Description

NAME

Colma Creek Flood Control Channel Maintenance Project

PROJECT CODE

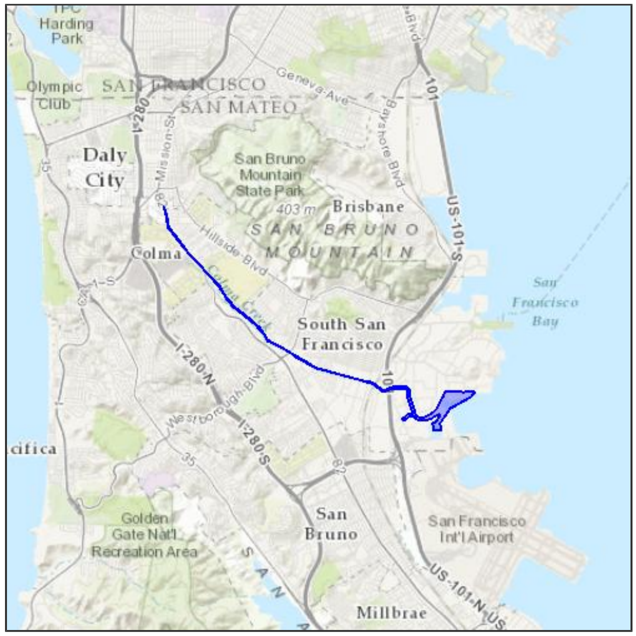
Q3MGB-TMB7N-B77JT-FPCHO-YU45DQ

LOCATION

San Mateo County, California

DESCRIPTION

No description provided



U.S. Fish & Wildlife Contact Information

Species in this report are managed by:

Sacramento Fish And Wildlife Office
Federal Building
2800 COTTAGE WAY, ROOM W-2605
Sacramento, CA 95825-1846
(916) 414-6600

Endangered Species

Proposed, candidate, threatened, and endangered species that are managed by the Endangered Species Program and should be considered as part of an effect analysis for this project.

This unofficial species list is for informational purposes only and does not fulfill the requirements under Section 7 of the Endangered Species Act, which states that Federal agencies are required to "request of the Secretary of Interior information whether any species which is listed or proposed to be listed may be present in the area of a proposed action." This requirement applies to projects which are conducted, permitted or licensed by any Federal agency.

A letter from the local office and a species list which fulfills this requirement can be obtained by returning to this project on the IPaC website and requesting an official species list on the Regulatory Documents page.

Amphibians

California Red-legged Frog Rana draytonii — Threatened

CRITICAL HABITAT

There is **final** critical habitat designated for this species.

https://ecos.fws.gov/speciesProfile/profile/speciesProfile.action?spcode=D02D

Birds

California Clapper Rail Rallus longirostris obsoletus Endangered

CRITICAL HABITAT
No critical habitat has been designated for this species.

https://ecos.fws.gov/speciesProfile/profile/speciesProfile.action?spcode=B04A

California Least Tern Sterna antillarum browni Endangered

CRITICAL HABITAT
No critical habitat has been designated for this species.

https://ecos.fws.gov/speciesProfile/profile/speciesProfile.action?spcode=B03X

Marbled Murrelet Brachyramphus marmoratus Threatened

CRITICAL HABITAT
There is **final** critical habitat designated for this species.

https://ecos.fws.gov/speciesProfile/profile/speciesProfile.action?spcode=B08C

Short-tailed Albatross Phoebastria (=Diomedea) albatrus Endangered

CRITICAL HABITAT
No critical habitat has been designated for this species.

https://ecos.fws.gov/speciesProfile/profile/speciesProfile.action?spcode=B00Y

Western Snowy Plover Charadrius alexandrinus nivosus Threatened

CRITICAL HABITAT
There is **final** critical habitat designated for this species.

https://ecos.fws.gov/speciesProfile/profile/speciesProfile.action?spcode=B07C

Fishes

Delta Smelt Hypomesus transpacificus Threatened

CRITICAL HABITAT
There is **final** critical habitat designated for this species.

https://ecos.fws.gov/speciesProfile/profile/speciesProfile.action?spcode=E070

Steelhead Oncorhynchus (=Salmo) mykiss Threatened

CRITICAL HABITAT
There is **final** critical habitat designated for this species.

https://ecos.fws.gov/speciesProfile/profile/speciesProfile.action?spcode=E08D

Tidewater Goby Eucyclogobius newberryi Endangered

CRITICAL HABITAT
There is **final** critical habitat designated for this species.

https://ecos.fws.gov/speciesProfile/profile/speciesProfile.action?spcode=E071

Flowering Plants

Presidio Manzanita Arctostaphylos hookeri var. ravenii **Endangered**

CRITICAL HABITAT
No critical habitat has been designated for this species.

https://ecos.fws.gov/speciesProfile/profile/speciesProfile.action?spcode=Q1T0

San Francisco Lessingia Lessingia germanorum (=L.g. var. germanorum) **Endangered**

CRITICAL HABITAT
No critical habitat has been designated for this species.

https://ecos.fws.gov/speciesProfile/profile/speciesProfile.action?spcode=Q3AI

San Francisco Manzanita Arctostaphylos franciscana **Endangered**

CRITICAL HABITAT
There is **final** critical habitat designated for this species.

https://ecos.fws.gov/speciesProfile/profile/speciesProfile.action?spcode=Q25C

Showy Indian Clover Trifolium amoenum **Endangered**

CRITICAL HABITAT
No critical habitat has been designated for this species.

https://ecos.fws.gov/speciesProfile/profile/speciesProfile.action?spcode=Q238

White-rayed Pentachaeta Pentachaeta bellidiflora **Endangered**

CRITICAL HABITAT
No critical habitat has been designated for this species.

https://ecos.fws.gov/speciesProfile/profile/speciesProfile.action?spcode=Q2F3

Insects

Callippe Silverspot Butterfly Speyeria callippe callippe **Endangered**

CRITICAL HABITAT
No critical habitat has been designated for this species.

https://ecos.fws.gov/speciesProfile/profile/speciesProfile.action?spcode=I019

Mission Blue Butterfly Icaricia icarioides missionensis **Endangered**

CRITICAL HABITAT
No critical habitat has been designated for this species.

https://ecos.fws.gov/speciesProfile/profile/speciesProfile.action?spcode=I00J

Myrtle's Silverspot Butterfly Speyeria zerene myrtleae **Endangered**

CRITICAL HABITAT
No critical habitat has been designated for this species.

https://ecos.fws.gov/speciesProfile/profile/speciesProfile.action?spcode=I00N

San Bruno Elfin Butterfly Callophrys mossii bayensis **Endangered**

CRITICAL HABITAT
No critical habitat has been designated for this species.

https://ecos.fws.gov/speciesProfile/profile/speciesProfile.action?spcode=I00Q

Mammals

Salt Marsh Harvest Mouse Reithrodontomys raviventris
Endangered

CRITICAL HABITAT
No critical habitat has been designated for this species.

https://ecos.fws.gov/speciesProfile/profile/speciesProfile.action?spcode=A03Y

Southern Sea Otter Enhydra lutris nereis
Threatened

CRITICAL HABITAT
No critical habitat has been designated for this species.

https://ecos.fws.gov/speciesProfile/profile/speciesProfile.action?spcode=A0A7

Reptiles

San Francisco Garter Snake Thamnophis sirtalis tetrataenia
Endangered

CRITICAL HABITAT
No critical habitat has been designated for this species.

https://ecos.fws.gov/speciesProfile/profile/speciesProfile.action?spcode=C002

Critical Habitats

Potential effects to critical habitat(s) within the project area must be analyzed along with the endangered species themselves.

There is no critical habitat within this project area

Migratory Birds

Birds are protected by the Migratory Bird Treaty Act and the Bald and Golden Eagle Protection Act.

Any activity which results in the take of migratory birds or eagles is prohibited unless authorized by the U.S. Fish and Wildlife Service (1). There are no provisions for allowing the take of migratory birds that are unintentionally killed or injured.

You are responsible for complying with the appropriate regulations for the protection of birds as part of this project. This involves analyzing potential impacts and implementing appropriate conservation measures for all project activities.

Allen's Hummingbird Selasphorus sasin — Bird of conservation concern
Season: Breeding

Ashy Storm-petrel Oceanodroma homochroa — Bird of conservation concern
Season: Breeding
https://ecos.fws.gov/speciesProfile/profile/speciesProfile.action?spcode=B0AV

Bald Eagle Haliaeetus leucocephalus — Bird of conservation concern
Year-round
https://ecos.fws.gov/speciesProfile/profile/speciesProfile.action?spcode=B008

Bell's Sparrow Amphispiza belli — Bird of conservation concern
Year-round
https://ecos.fws.gov/speciesProfile/profile/speciesProfile.action?spcode=B0HE

Black Oystercatcher Haematopus bachmani — Bird of conservation concern
Year-round
https://ecos.fws.gov/speciesProfile/profile/speciesProfile.action?spcode=B0KJ

Black Rail Laterallus jamaicensis — Bird of conservation concern
Season: Breeding
https://ecos.fws.gov/speciesProfile/profile/speciesProfile.action?spcode=B09A

Black-vented Shearwater Puffinus opisthomelas — Bird of conservation concern
Season: Wintering

Burrowing Owl Athene cunicularia — Bird of conservation concern
Year-round

Common Yellowthroat Geothlypis trichas sinuosa — Bird of conservation concern
Season: Breeding
https://ecos.fws.gov/speciesProfile/profile/speciesProfile.action?spcode=B080

Costa's Hummingbird Calypte costae — Bird of conservation concern
Season: Breeding

Fox Sparrow Passerella iliaca — Bird of conservation concern
Season: Wintering

Lawrence's Goldfinch Carduelis lawrencei — Bird of conservation concern
Season: Breeding
https://ecos.fws.gov/speciesProfile/profile/speciesProfile.action?spcode=B0J8

Lesser Yellowlegs Tringa flavipes — Bird of conservation concern
Season: Wintering

Loggerhead Shrike Lanius ludovicianus — Bird of conservation concern
Season: Wintering
https://ecos.fws.gov/speciesProfile/profile/speciesProfile.action?spcode=B0FY

Long-billed Curlew Numenius americanus — Bird of conservation concern
Season: Wintering
https://ecos.fws.gov/speciesProfile/profile/speciesProfile.action?spcode=B06S

Marbled Godwit Limosa fedoa — Bird of conservation concern
Season: Wintering
https://ecos.fws.gov/speciesProfile/profile/speciesProfile.action?spcode=B0JL

Nuttall's Woodpecker Picoides nuttallii — Bird of conservation concern
Year-round

Oak Titmouse Baeolophus inornatus — Bird of conservation concern
Year-round

Olive-sided Flycatcher Contopus cooperi — Bird of conservation concern
Season: Breeding
https://ecos.fws.gov/speciesProfile/profile/speciesProfile.action?spcode=B0AN

Peregrine Falcon Falco peregrinus — Bird of conservation concern
Year-round
https://ecos.fws.gov/speciesProfile/profile/speciesProfile.action?spcode=B0FU

Pink-footed Shearwater Puffinus creatopus — Bird of conservation concern
Year-round

Short-billed Dowitcher Limnodromus griseus — Bird of conservation concern
Season: Wintering

Short-eared Owl Asio flammeus — Bird of conservation concern
Season: Wintering
https://ecos.fws.gov/speciesProfile/profile/speciesProfile.action?spcode=B0HD

Whimbrel Numenius phaeopus — Bird of conservation concern
Season: Wintering
https://ecos.fws.gov/speciesProfile/profile/speciesProfile.action?spcode=B0JN

Yellow Warbler dendroica petechia ssp. brewsteri — Bird of conservation concern
Season: Breeding
https://ecos.fws.gov/speciesProfile/profile/speciesProfile.action?spcode=B0EN

Red Knot Calidris canutus ssp. roselaari — Bird of conservation concern
Season: Wintering
https://ecos.fws.gov/speciesProfile/profile/speciesProfile.action?spcode=B0G6

Refuges

Any activity proposed on National Wildlife Refuge lands must undergo a 'Compatibility Determination' conducted by the Refuge. If your project overlaps or otherwise impacts a Refuge, please contact that Refuge to discuss the authorization process.

There are no refuges within this project area

Wetlands

Impacts to NWI wetlands and other aquatic habitats from your project may be subject to regulation under Section 404 of the Clean Water Act, or other State/Federal Statutes.

Project proponents should discuss the relationship of these requirements to their project with the Regulatory Program of the appropriate U.S. Army Corps of Engineers District.

DATA LIMITATIONS

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

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

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

DATA EXCLUSIONS

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

DATA PRECAUTIONS

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

Estuarine And Marine Wetland

E2USN	205.0 acres
E2EM1N	22.6 acres
E2SBN	0.829 acre

Riverine

R2UBHx	7.64 acres
R4SBCx	3.96 acres
R4SBAx	0.681 acre

Appendix B Resource Investigations

Included in Permit Application Submittal (Attachment 6)

Appendix C Sediment Testing Results

Included in Permit Application Submittal (Attachment 7)

Appendix D Multi –Agency Compensatory Mitigation & Monitoring Plan

Included in Permit Application Submittal (Attachment 5)

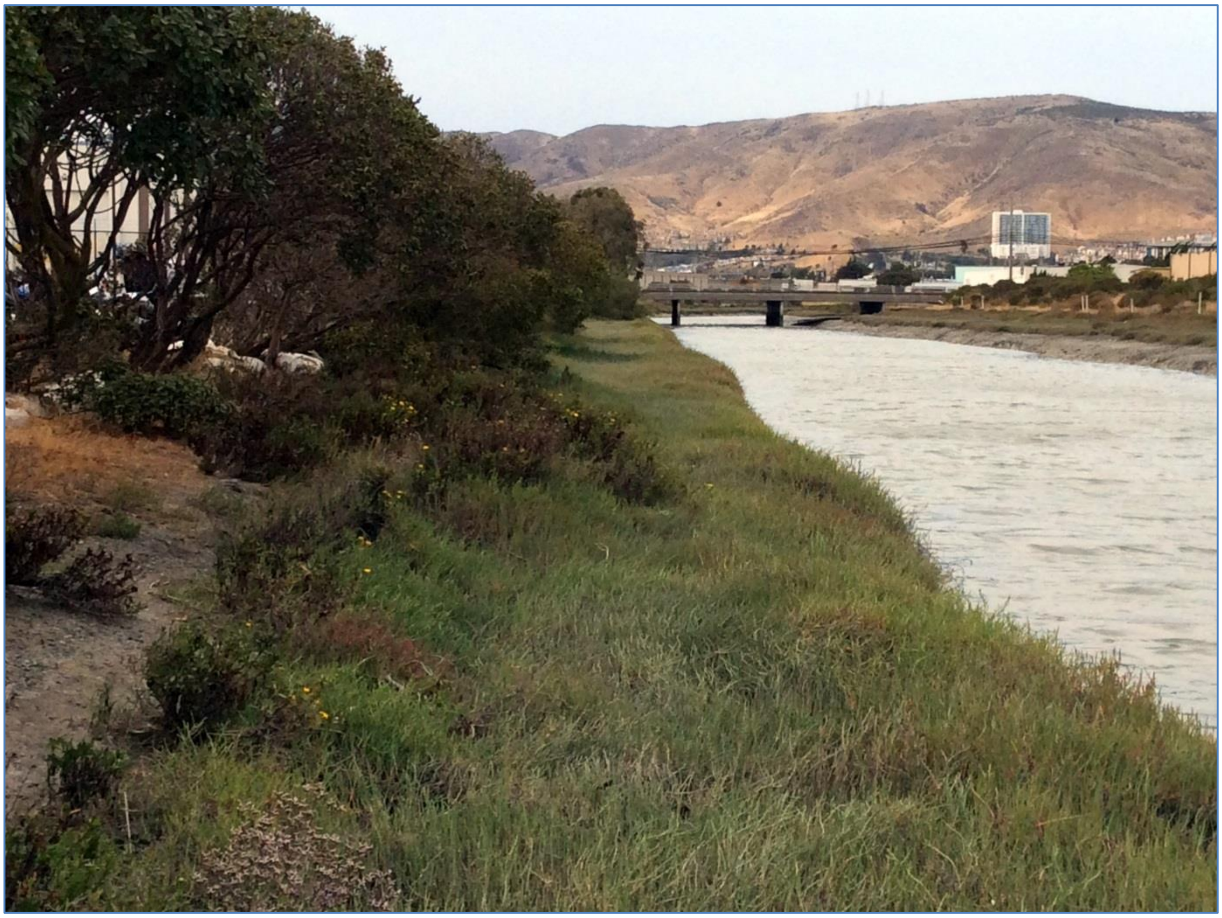
Appendix E
WETLAND DELINEATION REPORT

Wetland Delineation

for the

Colma Creek Flood Control Channel Maintenance Project

San Mateo County, CA



Prepared for:

County of San Mateo Department of Public Works

December 2015

Horizon
WATER and ENVIRONMENT

Wetland Delineation
for the
Colma Creek Flood Control Channel Maintenance Project

San Mateo County, California

December 2015

Prepared By: ______________________________ Date: 09/24/2015

Kevin Fisher, Wetland Delineation Practitioner (Professional Wetland Scientist #2107)
(510) 986-5420
Horizon Water and Environment
180 Grand Avenue, Suite 1405
Oakland, CA 94612

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Acronyms and Abbreviations

C	channel
CWA	Clean Water Act
DPS	Distinct Population Segment
EFH	Essential Fish Habitat
FAC	Facultative Plants
FACU	Facultative Upland Plants
FACW	Facultative Wetland Plants
GIS	Geographical Information System
GPS	Global Positioning System
HTL	high tide line
IM	intertidal marsh
NL	not listed
MC	modified channel
MHHW	mean higher high water
NRCS	National Resource Conservation Service
NWI	National Wetlands Inventory
OBL	Obligate Wetland Plants
OHWM	ordinary high water mark
OW	open water
RI	Rocky intertidal
TNW	Traditional Navigable Waters
TNWW	Wetlands adjacent to Traditional Navigable Waters
USACE	U.S. Army Corps of Engineers
USFWS	U.S. Fish and Wildlife Service

1.0 INTRODUCTION

This report presents the methods and results of a wetland delineation conducted for a 135.9-acre study area for the Colma Creek Flood Control Maintenance Project in San Mateo County, California (Figures 1 and 2). The County of San Mateo Department of Public Works (County) is planning to conduct maintenance of the Colma Creek flood control channel, including targeted sediment removal and culvert maintenance. The purpose of this investigation was to determine the presence and extent of lands within the study area which may be considered waters of the U.S., and therefore subject to regulation under Section 404 of the Clean Water Act (CWA) and/or Section 10 of the Rivers and Harbors Act.

1.1 DESCRIPTION OF THE STUDY AREA

1.1.1 Location & Setting

The study area encompasses the tidally influenced reaches of Colma Creek, along with intertidal marsh, mudflat, and estuarine waters near the mouth of the creek. Colma Creek is a perennial stream that flows for approximately 8 miles from its headwaters in San Bruno Mountain State and County Park, through the Cities of Daly City, Colma, and South San Francisco, eventually discharging into San Francisco Bay (Bay). The entirety of the Bay is considered navigable waters of the U.S. up to mean higher high water (MHHW).

1.1.2 Driving Directions

From the U.S. Army Corps of Engineers (USACE) San Francisco District office, follow US 101 southbound and continue for approximately 8.4 miles. Take exit 425a to Grand Avenue. Merge onto Miller Avenue. Turn left onto Spruce Avenue and continue approximately 0.4 miles until reaching North Canal Street. The study area extends from the Colma Creek channel box culvert at Spruce Avenue and North Canal Street to the confluence with the Bay.

1.1.3 Land Use

Land use in the western portion of the study area is predominately mixed industrial and commercial. Land uses in the central portion of the study area include transportation (Highway 101 and rail), commercial, and mixed industrial. The eastern portion of the study area has commercial and mixed industrial development, as well as recreation and open space around the Bay (Figure 2).

1.1.4 Biotic Habitats

Biotic habitats in the study area include: channels, mudflats, rocky intertidal, emergent wetlands, open water, and ruderal/developed areas.

In the upstream portion of the study area (Spruce Ave to Produce Ave), Colma Creek flows through a U-shaped concrete-line channel. Approximately one foot of sediment has deposited across the channel bed, though in some locations deposition is greater. Within the study area, the existing channel is currently designed to accommodate up to 2 feet of sediment across the channel bed. This section of Colma Creek is tidally influenced, but is only inundated from bank to bank during high tides. This portion of the channel is used by waterfowl such as Mallard (*Anas platyrhynchos*) and Canada Goose (*Branta canadensis*), as well as gulls and other shorebirds.

At the Produce Ave crossing, Colma Creek transitions to an earthen channel. The channel is approximately 70 to 80 feet wide and the bed is comprised of soft sediments. The banks have a narrow band of emergent marsh dominated by pickleweed (*Sarcocornia* [=*Salicornia*] *pacifica*), which transitions to an upland community dominated by ruderal species.

The channel widens as Colma Creek flows toward the Bay. At the mouth of the creek, there is a wetland complex characterized by broad expanses of mudflat habitat with narrow bands of intertidal marsh, rocky intertidal, and upland habitats along the shoreline-Bay ecotone. The mudflats serve as important foraging habitat for many shorebirds. Up until the mid-2000s, this portion of the study area supported large contiguous stands (~50 acres) of non-native, invasive *Spartina alterniflora* (ISP 2014), which provided habitat for California Clapper Rail [Ridgway's rail] (*Rallus obsoletus*). Clapper Rail density in the study area was considered high for the Bay (0.5 to 3 birds per acre (ISP 2008). Since invasive *Spartina* control began in 2006, there has been a rapid decline in the number of rails detected in the study area. Recent surveys (2012-2013) have failed to detect Clapper Rails (ISP 2013), and there is no longer suitable habitat present.

Portions of Colma Creek are within designated Essential Fish Habitat (EFH) for Pacific salmonids. EFH includes areas that were historically accessible to Pacific salmon. Colma Creek does not currently provide spawning or feeding habitat for Pacific salmonids. Although unlikely, salmon could be present in open water portions of the study area near the confluence with the Bay. The lower portions of Colma Creek could potentially provide suitable non-reproductive habitat for longfin smelt and the southern Distinct Population Segment (DPS) of green sturgeon.

2.0 METHODS

A routine wetland delineation was conducted in accordance with the *1987 Corps of Engineers Wetland Delineation Manual* (USACE 1987) and the *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Arid West Region* (Version 2.0) (USACE 2008).

2.1 BACKGROUND INFORMATION

The following information was reviewed prior to conducting the delineation:

- National Resource Conservation Service (NRCS) Soil Survey Data (NRCS 2014a);
- NRCS National Hydric Soils List (NRCS 2014b);
- U.S. Fish and Wildlife Service National Wetlands Inventory (NWI) Data (USFWS 2014); and
- Tidal Data from the Oyster Point Marina, San Francisco, CA (Station ID# 9414392) and rainfall records from San Francisco WB AP station.

2.1.1 Approach

The entire study area was thoroughly searched by foot for presence of potential wetlands. Wetland boundaries were delineated by employing iterative sampling for wetland indicators (i.e., vegetation, soils, hydrology) across topographic gradients. Representative wetland delineation sample points were established within and up-gradient of the wetland boundary.

2.1.2 Data Collection

The field portion of the wetland delineation was conducted August 5, 2014. The data collection procedures followed the methods prescribed in the Arid West Supplement. Vegetation species within the general vicinity (approximately 1 to 3 meter radius) of each sample point were identified by stratum. The wetland indicator status of plant species was determined using the 2014 Regional Wetland Plant List (Lichvar e.t. al. 2014). The soil profile was examined to a depth of approximately 14 inches. Soils were characterized by evaluating texture and color within each distinct layer of the profile. Soil color was described using a Munsell Soil Color Chart. Redoximorphic features were noted and characterized, where present. Each sampling location was examined for evidence of wetland hydrology. Indicators of wetland hydrology include saturation, high water table, debris deposits, etc. Depth to saturation and standing water in soil pits were noted, where present. The locations of sample points were mapped using a Trimble GeoXT Global Positioning System (GPS) receiver.

Wetland boundaries were delineated using an iterative process that involved field-based mapping and desktop analysis of aerial photographs. Representative wetland boundaries were mapped in the field using a Trimble GeoXT GPS. The GPS data were then projected in Geographical Information System (GIS) with a recent (2013) aerial photograph as a base map. The GIS and aerial photography were used to further delineate wetland boundaries based on the field indicators. The map developed in GIS was then field evaluated and revised to reflect any discrepancies with field conditions.

3.0 RESULTS

3.1 REVIEW OF BACKGROUND INFORMATION

3.1.1 Soils

Figure 3 shows the soils mapped in the study area from the National Resources Conservation Service (NRCS) (NRCS 2014a). Soils mapped in the study area include:

- Urban land-Orthents, reclaimed complex/cut and fill complex
- Novato clay
- Urban land
- Water

Novato clay is included on the NRCS National Hydric Soils List (NRCS 2014b). Soils in test pits were predominately fill material, which resulted in some atypical conditions such as color and stratification (See Attachment A).

3.1.2 National Wetlands Inventory (NWI)

Figure 4 provides a map showing wetland areas identified by the NWI (USFWS 2014). Waters and wetlands mapped in the study area by the NWI include estuarine intertidal unconsolidated shore (E2US), estuarine intertidal stream bed (E2SB), and estuarine intertidal emergent (E2EM1) along the shoreline.

3.1.3 Hydrology

The study area experiences both tidal and fluvial hydrologic regimes. The extent of waters of the U.S. upstream of Produce Ave (in the concrete channel) is dictated by fluvial processes i.e., the ordinary high water mark (OHWM) caused by winter season runoff and streamflow is above the High Tide Line (HTL) (See Attachment B, Photo 2). Downstream of Highway 101, the extents of waters of the U.S. is dictated by the tidal regime i.e., there is no evidence of an OHWM above the HTL. It is important to note that this delineation was conducted during a very dry period, following 3 consecutive years of below average rainfall. Because the limits of waters of the U.S. in most of the study area are dictated by the tidal regime, current drought conditions are not considered to have a significant effect on the boundaries of the wetlands and waters in the study area.

3.2 DELINEATION OF WATERS OF THE U.S.

The results of the delineation are discussed in the following sections. Figures 5a through 5f provide detailed maps of potential waters of the U.S. in the study area. Wetland delineation data forms are included in Appendix A and representative photographs are included in Appendix B.

3.2.1 Non-wetland Waters

Modified Channel (MC)

Modified channel includes the concrete portion of Colma Creek. 5.44 acres of non-wetland waters of the U.S. were delineated within the modified channel (Figures 5a and 5b). This portion of the channel has vertical banks and the OHWM is approximately 5 feet above the bed (Attachment B, Photo 2). Although a fluvial (riverine) hydrologic regime dictates the limit of waters of U.S., ocean-derived salts in the water likely exceed 0.5% (5 parts per thousand) during the low flow period because of tidal inundation. Therefore, the Cowardin classification assigned to this area is Estuarine, Intertidal, Streambed (E2SB).

Channel (C)

Channels in the study area include Colma Creek downstream of Produce Ave, Navigable Slough (Figure 5d), and other small tidal drainage features near the mouth of Colma Creek (Figure 5e and 5f). 22.05 acres of potential non-wetland waters of the U.S. were delineated within the channel areas. The Cowardin classification assigned to these features is Estuarine, Subtidal, Unconsolidated Bottom (E1UB).

Intertidal Mudflat (IM)

Intertidal mudflat includes non-vegetated or sparsely vegetated (< 25% cover) areas between MLLW and approximately 2 feet above MLLW. 51.60 acres of intertidal mudflat were delineated in the study area (Figures 5b through 5f). The Cowardin classification assigned to these features is Estuarine, Intertidal, Unconsolidated Shore, Mud (E2US3).

Rocky Intertidal (RI)

Rocky intertidal includes rock slope protection placed along the shoreline in the eastern portion of the study area (Figure 5f). 0.50 acres of rocky intertidal habitat were delineated in the study area. The Cowardin classification assigned to this area is Estuarine, Intertidal, Rocky Shore, Rubble (E2RS2).

Open Water (OW)

Open water includes deepwater habitat (greater than 2 meters [6.6 ft.] depth) within the study area. A total of 25.38 acres of non-wetland waters of the U.S. were delineated within the study area (Figure 5f). The Cowardin classification assigned to this area is Estuarine, Subtidal, Open Water (E1OW). Note that the boundary between intertidal mudflat and open water was interpreted through remote sensing of aerial photos, not bathymetric data.

3.2.2 Wetlands

Intertidal Marsh (IM)

Wetlands in the study area include areas of intertidal marsh on the margins of Colma Creek and in the marsh complex near the mouth of the creek. 13.03 acres of intertidal marsh were delineated in the study area (Figures 5b through 5f). The Cowardin classification assigned to these wetlands is Estuarine, Intertidal, Emergent, Persistent (E2EM1). The delineation of these wetlands is discussed below:

> **Point 1a** is located on the Colma Creek north (left) embankment, approximately 1,000 feet downstream of Highway 101 (Figure 5c). Vegetation included fennel (*Foeniculum vulgare,* NL), wild oats (*Avena fatua,* NL), and ripgut brome (*Bromus diandrus,* NL). The prevalence index for the sample area indicated that hydrophytic species were not dominant. Soils appeared to be comprised of fill material. This sample point is not considered to be within a wetland due to the dominance of upland plants, lack of hydric soils (dominance of fill), and lack of hydrologic indicators.
>
> **Point 1b** is located approximately 2 feet down-gradient of point 1a (Figure 5c). Dominant plant species in the vicinity of the sample point included fleshy jaumea (*Jaumea carnosa,* OBL) and pickleweed (OBL). Hydric indicators observed in the soil profile included a layer of reduced clay

from a depth of 5.5 to 14 inches. Hydrologic indicators observed included water marks (B1) and drift deposits (B3). This point was determined to be within a wetland.

Point 2a is located along the shoreline in the eastern portion of the study area. (Figure 5e). Dominant vegetation in the herbaceous stratum included wild oats, saltgrass (*Distichlis spicata*, FAC), and ripgut brome. Species present in the shrub stratum included coyote brush (*Baccharis pilularis,* NL), gumweed (*Grindelia stricta,* FACW), and California sagebrush (*Artemisia californica,* NL). Soils had some redoximorphic features along the pore lining, but the criteria for hydric soils were not met. This sample point is not considered to be within a wetland due to the dominance of upland plants, lack of hydric soils, and lack of hydrologic indicators.

Point 2b is located on along the shoreline, approximately 2 feet down-gradient of sample point 2a (Figure 5e). Dominant plant species in the vicinity of the sample point included pickleweed and saltgrass. Hydric indicators observed in the soil profile included a 1 cm layer of muck and a redox dark surface matrix (F6). A restrictive layer of fill material was encountered at 10 inches. Saturation (A3) was observed at 8 inches, along with surface water marks (B1). This point was determined to be within a wetland.

Point 3a is located on the west (right) bank of Colma Creek, approximately 850 feet downstream of the Utah Ave. bridge (Figure 5d). Vegetation included ripgut brome, bull mallow (*Malva nicaeensis,* NL), and soft brome (*Bromus hordeaceus,* FACU). Narrowleaf plantain (*Plantago lanceolata*, FAC), horseweed (*Erigeron canadensis*, FACU), fringed willow herb (*Epilobium ciliatum*, FACW), and gumweed were also present. Soils at this location were characterized by a consistent profile to a depth of 12 inches that lacked redoximorphic features or other hydric soil indicators. This sample point also lacked evidence of wetland hydrology and was therefore not considered to be within a wetland.

Point 3b is located approximately 3 feet down-gradient of sample point 3a (Figure 5d). Dominant plant species in the vicinity of the sample point included pickleweed saltgrass, and gumweed. Hydric indicators observed in the soil profile included a loamy gleyed matrix (F2) and a redox dark surface (F6). Saturation (A3) was observed at 8 inches below the surface with the water table present at 12 inches. This point was determined to be within a wetland.

4.0 SUMMARY

A wetland delineation was conducted for a 135.9-acre study area within and adjacent to Colma Creek in San Mateo County, California. A total of 118.00 acres of potential waters of the U.S., including 13.03 acres of wetland, were delineated within the study area (Table 1). Aquatic resources mapped in the study area are listed in Table 1 and provided in the Electronic Appendix.

Table 1. Summary of Non-Wetland Waters and Wetland Areas and Jurisdictional Determinations

Description	Wetland ID	Type	Cowardin Classification	Area (acres)	Type
Modified Channel	MC-1	Waters	E2SB	5.44	Traditional Navigable Waters (TNW)
Channel	C-1 to C-4	Waters	E1UB	22.05	Traditional Navigable Waters (TNW)
Intertidal Mudflat	MF-1 to MF-12	Waters	E2US3	51.60	Traditional Navigable Waters (TNW)
Rocky Intertidal	RI-1	Waters	E2US3	0.50	Traditional Navigable Waters (TNW)
Open Water	OW-1	Waters	E1OW	25.38	Traditional Navigable Waters (TNW)
Intertidal Marsh	IM-1 to IM-10	Wetland	E2EM1	13.03	Wetlands adjacent to TNW (TNWW)
			Total	118.00	

Wetlands and non-wetland waters of the U.S. mapped in the study area may be subject to regulation under Section 404 of the Clean Water Act (CWA) and/or Section 10 of the Rivers and Harbors Act. The County requests a Preliminary Jurisdictional Determination based on the information contained in this report.

5.0 REFERENCES

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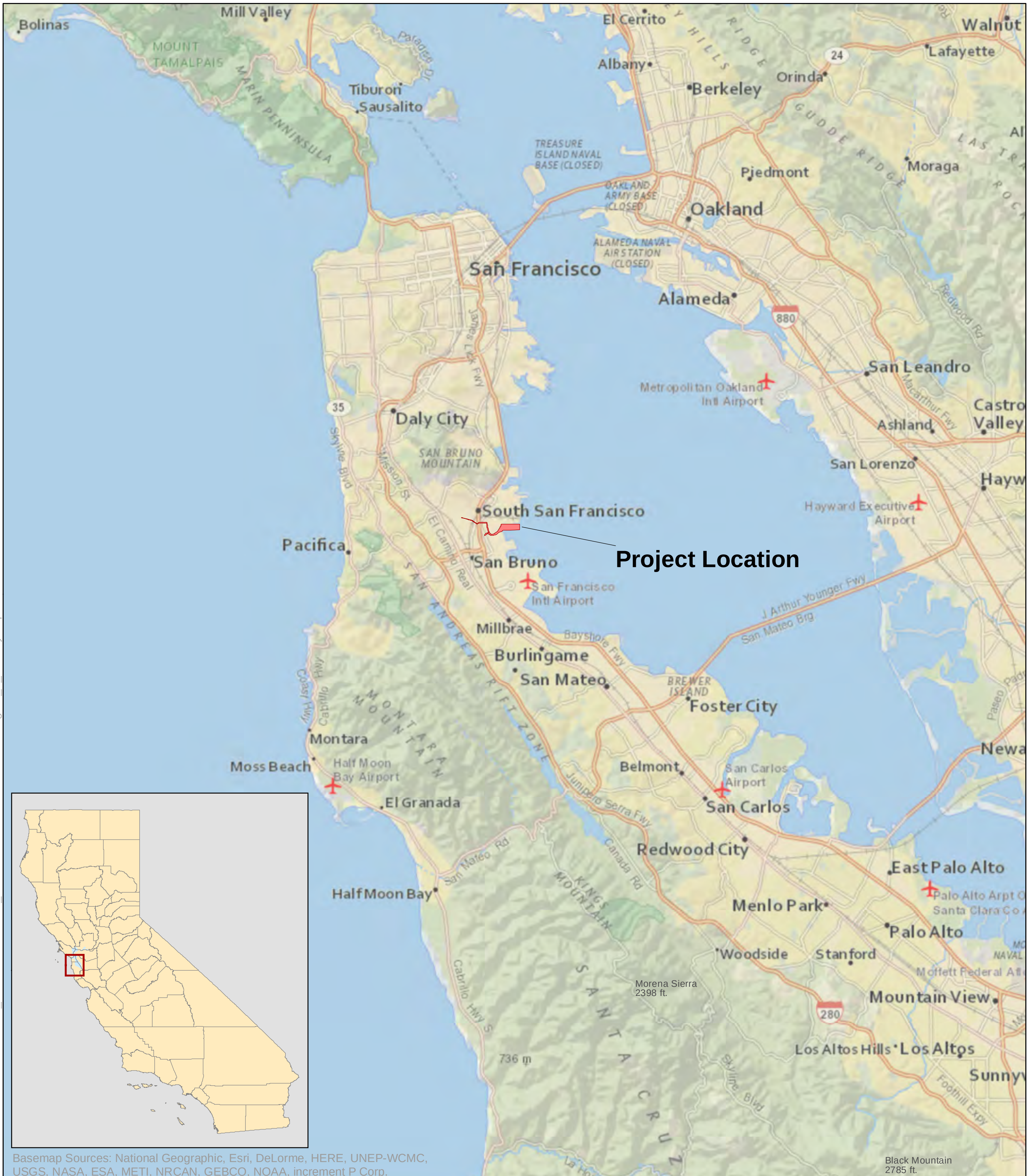
Figures



N

0 5 10
Miles

Horizon WATER and ENVIRONMENT

Colma Creek
Flood Control Maintenance Project

Figure 1
Locality Map

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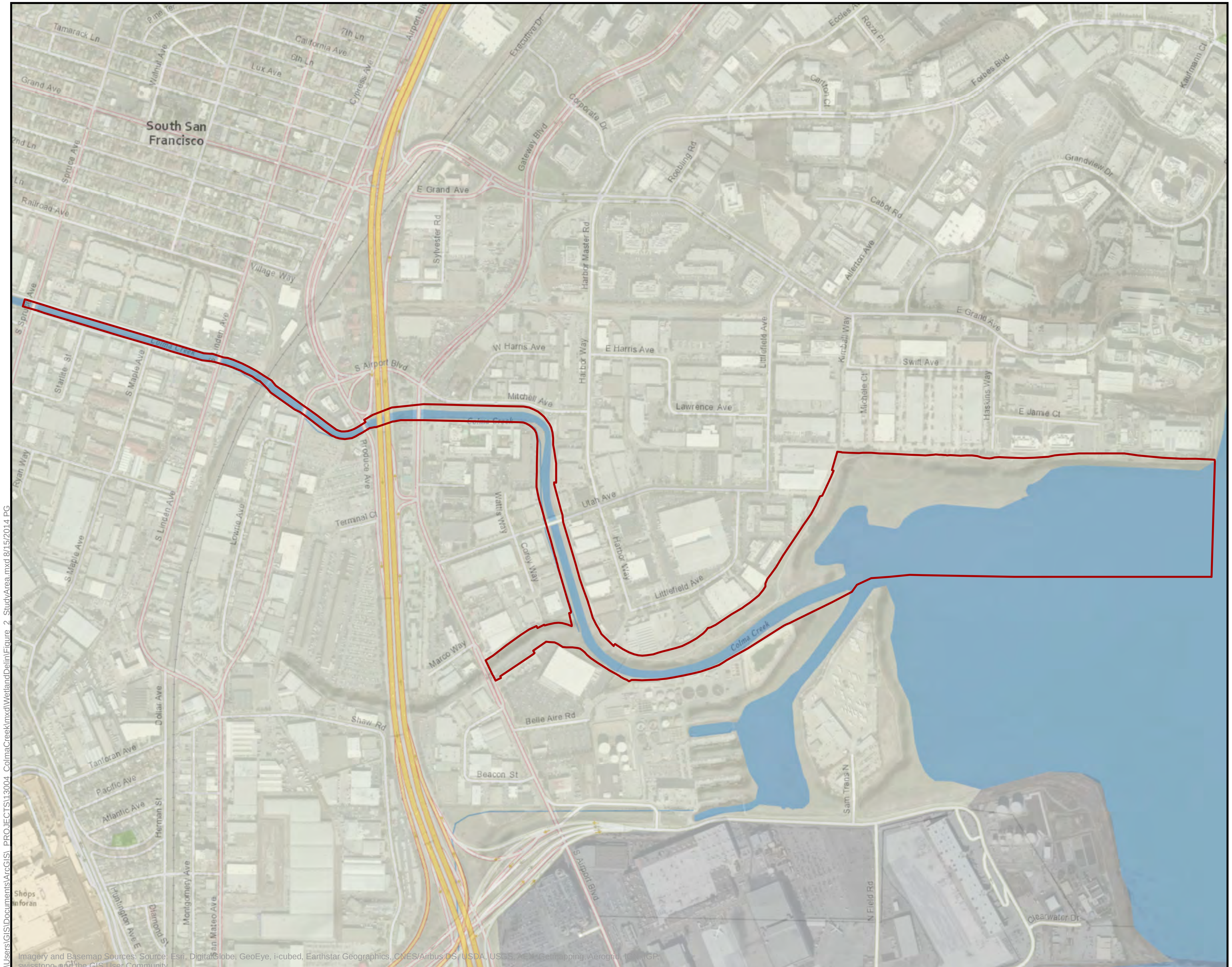

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Study Area

0 500 1,000
Feet

N

PREPARED BY: Horizon Water and Environment, 180 Grand Ave, Ste 1405, Oakland CA 94612, 510-986-1850	PREPARED FOR: County of San Mateo Dept. of Public Works, 555 County Center, 5th Floor, Redwood City, CA 94063, (650) 363-4100
DRAWN BY: P. Glendening DELINEATION BY: K. Fisher DATE OF FIELD WORK: August 8, 2014	USACE REGULATORY FILE: VERIFIED BY: DATE OF VERIFICATION:

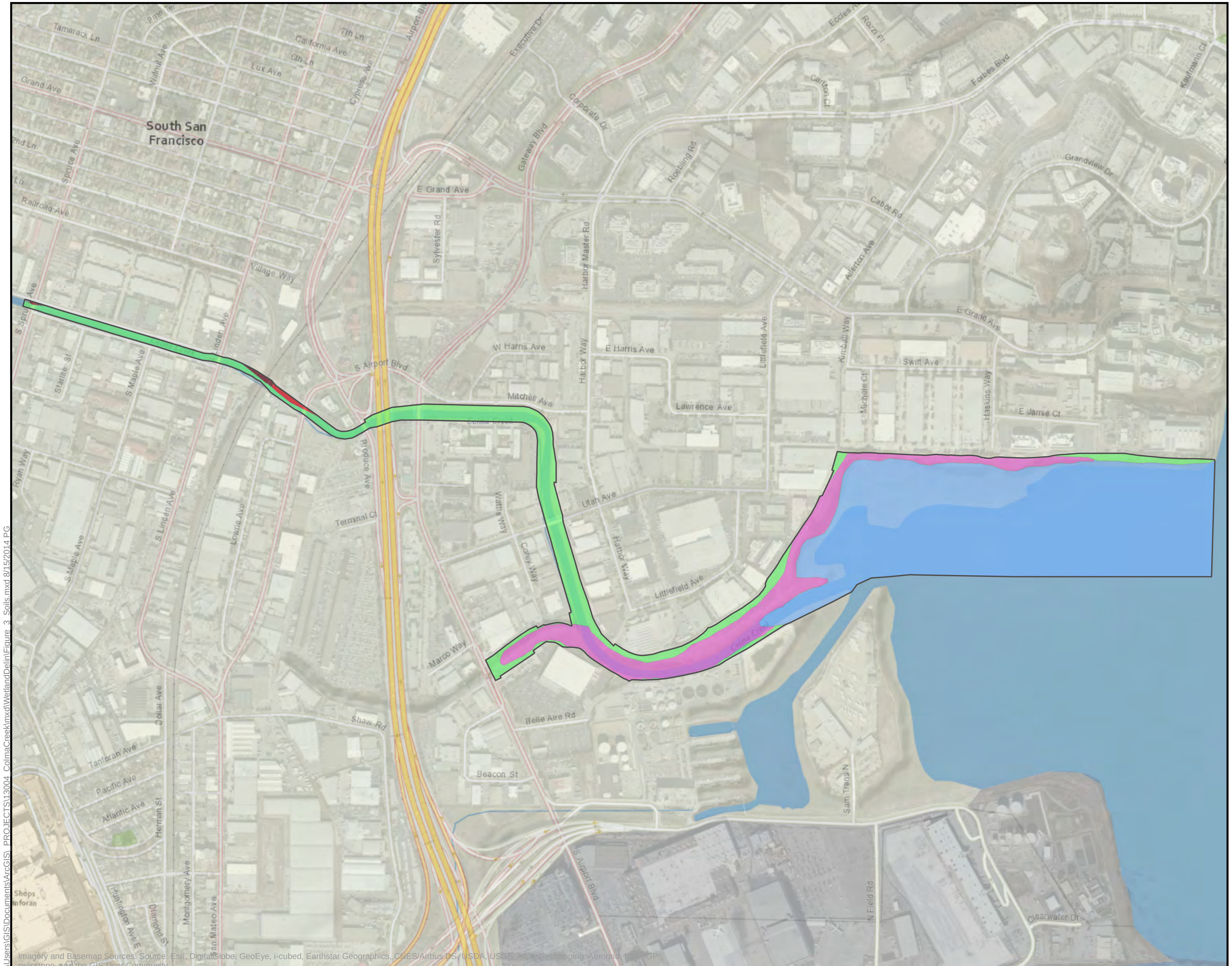
REVISIONS

DATE	DESCRIPTION	BY

Colma Creek
Flood Control Maintenance Project

Figure 2

Study Area Map



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SSURGO Soils Type

- Novato clay, 0 to 1 percent slopes
- Urban land
- Urban land-Orthents, cut and fill complex
- Urban land-Orthents, reclaimed complex
- Water
- Study Area

Source: USDA SSURGO Soils

0 500 1,000
Feet
N

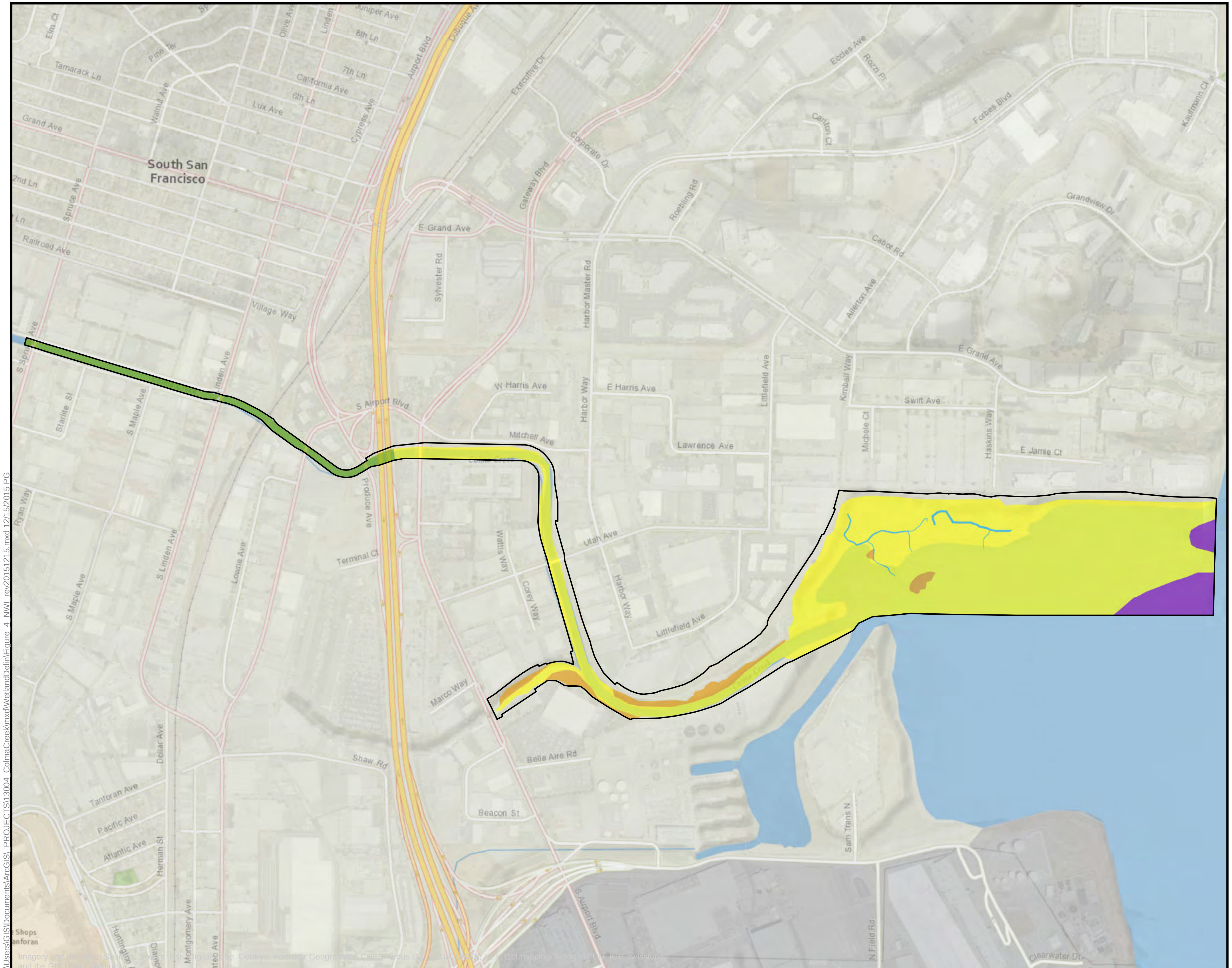
PREPARED BY: Horizon Water and Environment, 180 Grand Ave, Ste 1405, Oakland CA 94612, 510-986-1850	PREPARED FOR: County of San Mateo Dept. of Public Works, 555 County Center, 5th Floor, Redwood City, CA 94063, (650) 363-4100
DRAWN BY: P. Glendening DELINEATION BY: K. Fisher DATE OF FIELD WORK: August 8, 2014	USACE REGULATORY FILE: VERIFIED BY: DATE OF VERIFICATION:

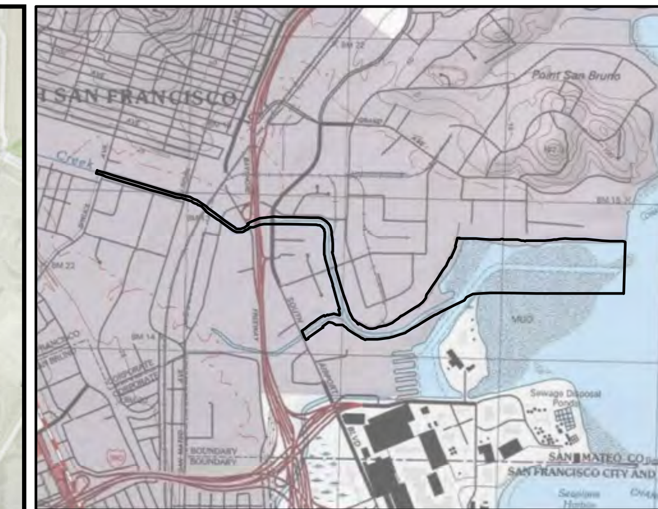
REVISIONS		
DATE	DESCRIPTION	BY

Colma Creek
Flood Control Maintenance Project

Figure 3

Soils Map





NWI Wetland Classification

- Estuarine Intertidal Emergent Persistent
- Estuarine Intertidal Streambed
- Estuarine Intertidal Unconsolidated Shore
- Estuarinne Subtital Unconsolidated Bottom
- Riverine Lower Perennial Unconsolidated Bottom, excavated
- Study Area

Source: US Fish & Wildlife Service National Wetlands Inventory, October 2015.

0 500 1,000
Feet
N

PREPARED BY: Horizon Water and Environment, 180 Grand Ave Ste 1405, Oakland CA 94612, 510-986-1850	PREPARED FOR: County of San Mateo Dept. of Public Works, 555 County Center, 5th Floor, Redwood City, CA 94063, (650) 363-4100
DRAWN BY: P. Glendening DELINEATION BY: K. Fisher DATE OF FIELD WORK: August 8, 2014	USACE REGULATORY FILE: VERIFIED BY: DATE OF VERIFICATION:

REVISIONS		
DATE	DESCRIPTION	BY

Colma Creek
Flood Control Maintenance Project

Figure 4

National Wetland Inventory Map

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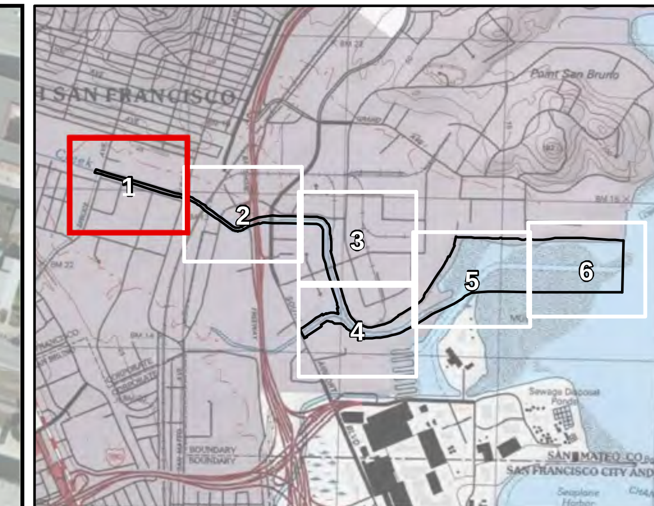
Summary of Wetlands and Non-wetland Waters of the U.S.			
Description	Wetland ID	Type	Area (acres)
Modified Channel	MC-1	Waters	5.44
Total			5.44



Sheet 1 of 6

Waters
- Modified Channel
- Channel
- Mud Flat
- Rocky Intertidal
- Bay

Wetlands
- Intertidal Marsh

Wetland Data Points
- Wetland
- Upland

Wetland Delineation Study Area

Control Point (California State Plane, Zone 3, feet)

0 100 200 Feet

N

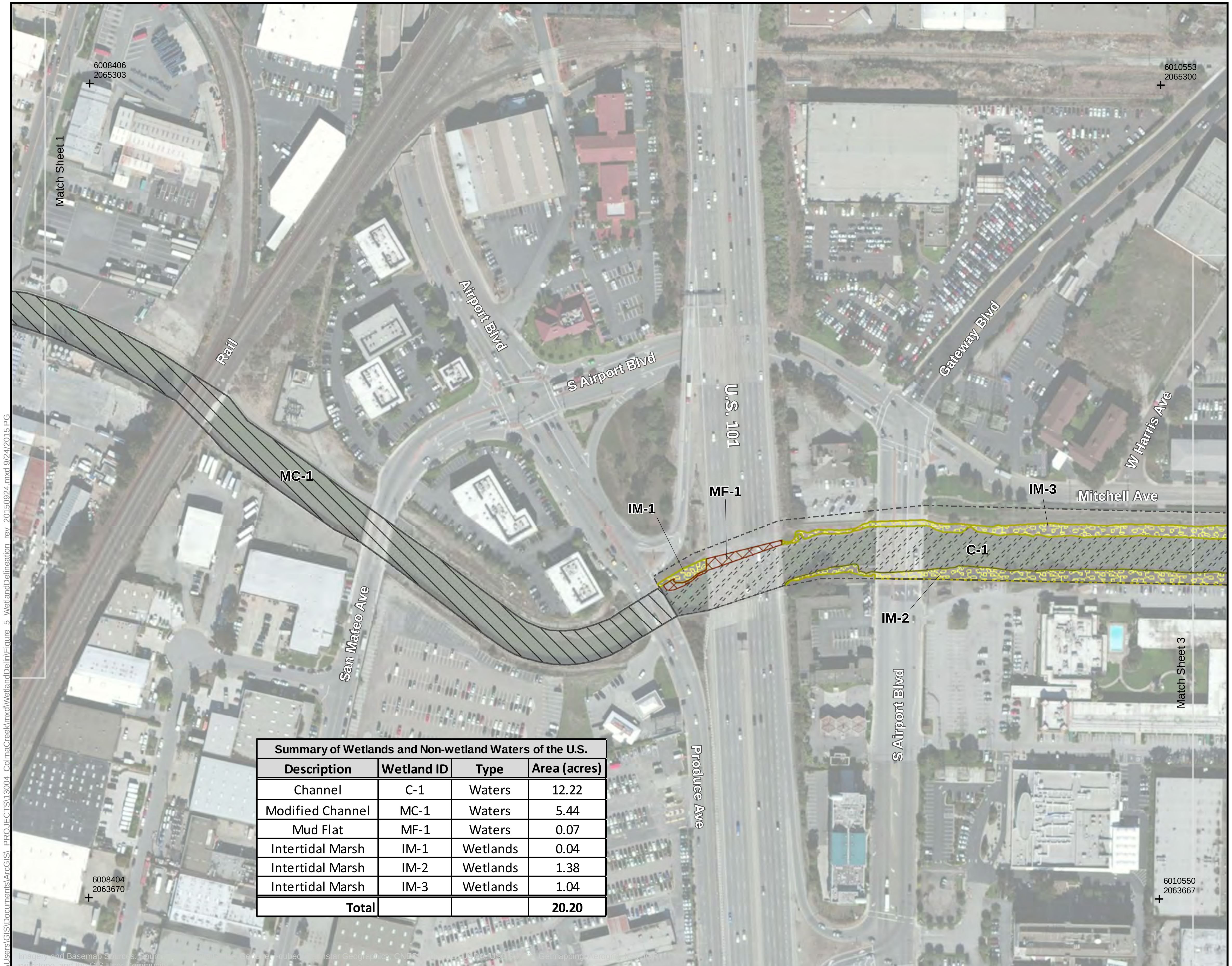
PREPARED BY: Horizon Water and Environment, 180 Grand Ave, Ste 1405, Oakland CA 94612, 510-986-1850	PREPARED FOR: County of San Mateo Dept. of Public Works, 555 County Center, 5th Floor, Redwood City, CA 94063, (650) 363-4100
DRAWN BY: P. Glendening DELINEATION BY: K. Fisher DATE OF FIELD WORK: August 8, 2014	USACE REGULATORY FILE: VERIFIED BY: DATE OF VERIFICATION:

REVISIONS		
DATE	DESCRIPTION	BY
25 Sept., 2015	Removed "Seasonally Ponded Depression". Expanded C-1	P. Glendening

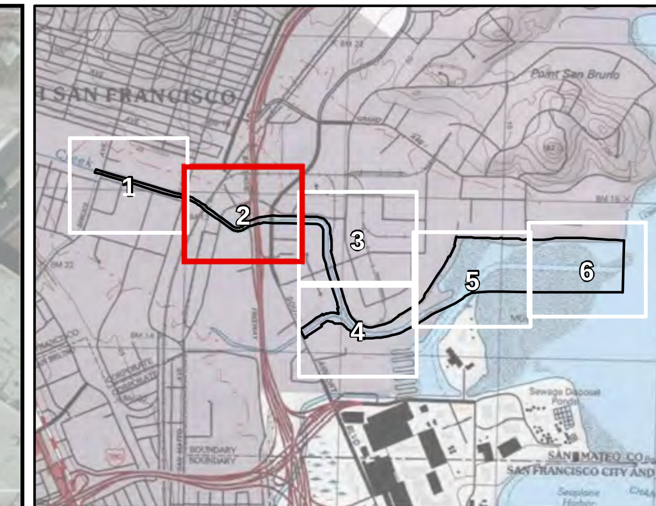
Colma Creek
Flood Control Maintenance Project

Figure 5a

Wetland Delineation Map



Summary of Wetlands and Non-wetland Waters of the U.S.			
Description	**Wetland ID**	**Type**	**Area (acres)**
Channel	C-1	Waters	12.22
Modified Channel	MC-1	Waters	5.44
Mud Flat	MF-1	Waters	0.07
Intertidal Marsh	IM-1	Wetlands	0.04
Intertidal Marsh	IM-2	Wetlands	1.38
Intertidal Marsh	IM-3	Wetlands	1.04
Total			**20.20**



Sheet 2 of 6

Waters
- Modified Channel
- Channel
- Mud Flat
- Rocky Intertidal
- Bay

Wetlands
- Intertidal Marsh

Wetland Data Points
- Wetland
- Upland
- Wetland Delineation Study Area
- Control Point (California State Plane, Zone 3, feet)

0 100 200
Feet
N

PREPARED BY:	PREPARED FOR:
Horizon Water and Environment, 180 Grand Ave Ste 1405 Oakland CA 94612 510-986-1850	County of San Mateo Dept. of Public Works 555 County Center, 5th Floor Redwood City, CA 94063 (650) 363-4100
DRAWN BY: P. Glendening DELINEATION BY: K. Fisher DATE OF FIELD WORK: August 8, 2014	USACE REGULATORY FILE: VERIFIED BY: DATE OF VERIFICATION:

	REVISIONS	
DATE	DESCRIPTION	BY
25 Sept., 2015	Removed "Seasonally Ponded Depression". Expanded C-1	P. Glendening

Colma Creek
Flood Control Maintenance Project

Figure 5b

Wetland Delineation Map

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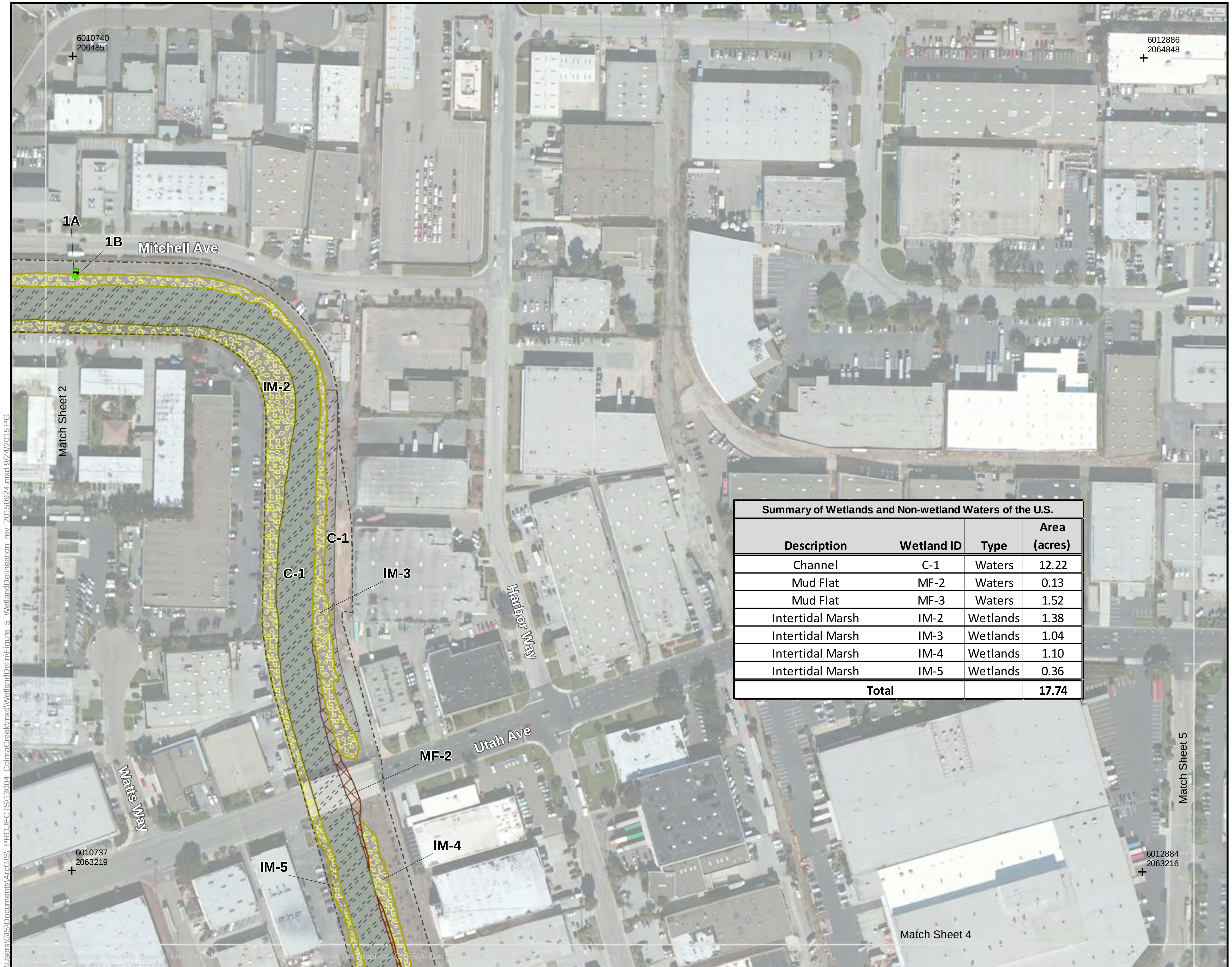
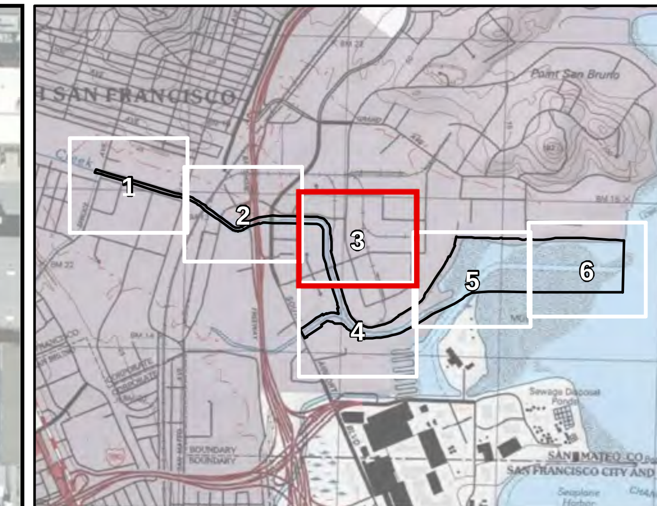


Summary of Wetlands and Non-wetland Waters of the U.S.

Description	Wetland ID	Type	Area (acres)
Channel	C-1	Waters	12.22
Mud Flat	MF-2	Waters	0.13
Mud Flat	MF-3	Waters	1.52
Intertidal Marsh	IM-2	Wetlands	1.38
Intertidal Marsh	IM-3	Wetlands	1.04
Intertidal Marsh	IM-4	Wetlands	1.10
Intertidal Marsh	IM-5	Wetlands	0.36
Total			**17.74**



Sheet 3 of 6

Waters
- Modified Channel
- Channel
- Mud Flat
- Rocky Intertidal
- Bay

Wetlands
- Intertidal Marsh

Wetland Data Points
- Wetland
- Upland
- Wetland Delineation Study Area
- Control Point (California State Plane, Zone 3, feet)

0 100 200
Feet
N

PREPARED BY:	PREPARED FOR:
Horizon Water and Environment, 180 Grand Ave, Ste 1405, Oakland CA 94612, 510-986-1850	County of San Mateo Dept. of Public Works, 555 County Center, 5th Floor, Redwood City, CA 94063, (650) 363-4100
DRAWN BY: P. Glendening DELINEATION BY: K. Fisher DATE OF FIELD WORK: August 8, 2014	USACE REGULATORY FILE: VERIFIED BY: DATE OF VERIFICATION:

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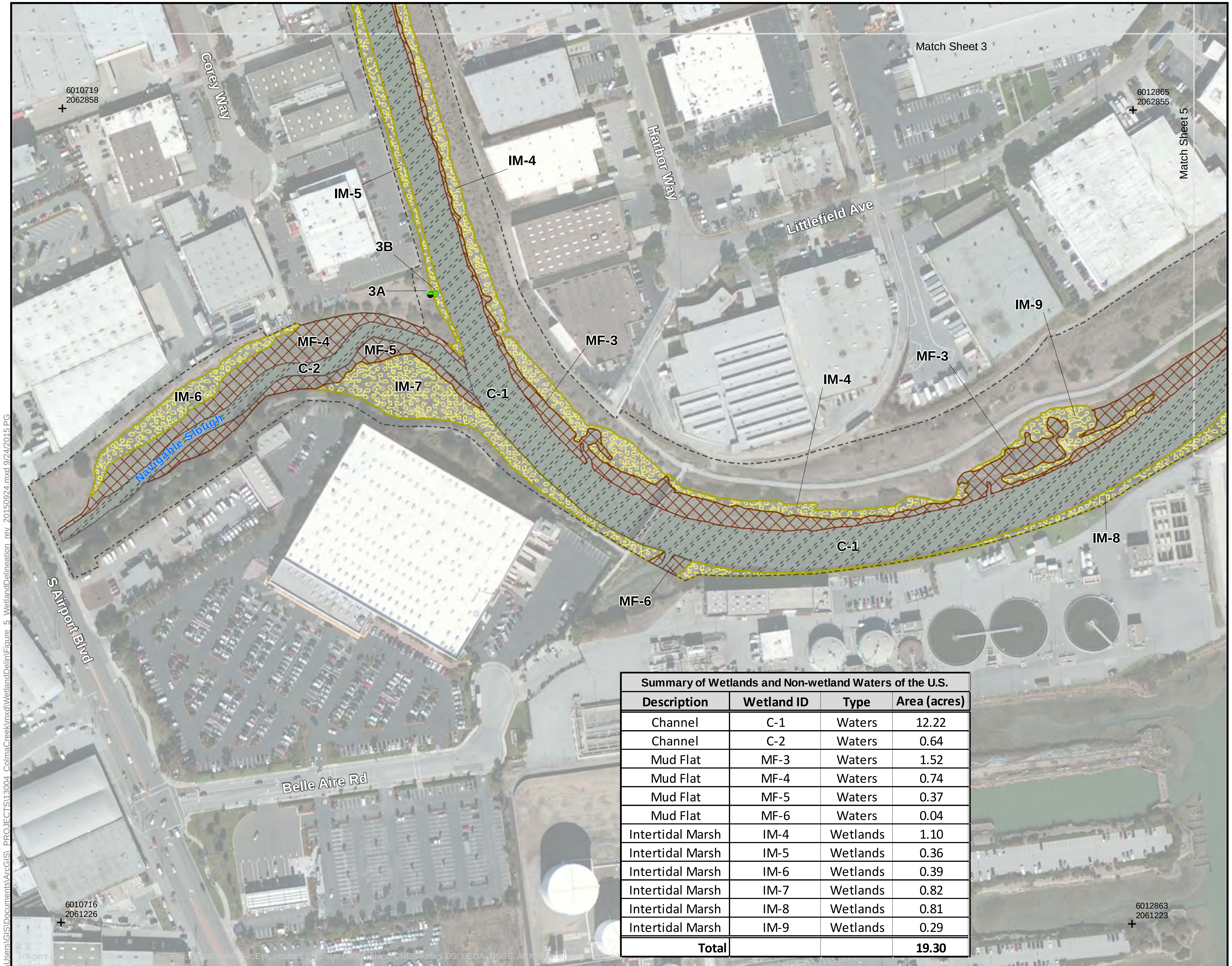
DATE	DESCRIPTION	BY
25 Sept., 2015	Removed "Seasonally Ponded Depression". Expanded C-1	P. Glendening

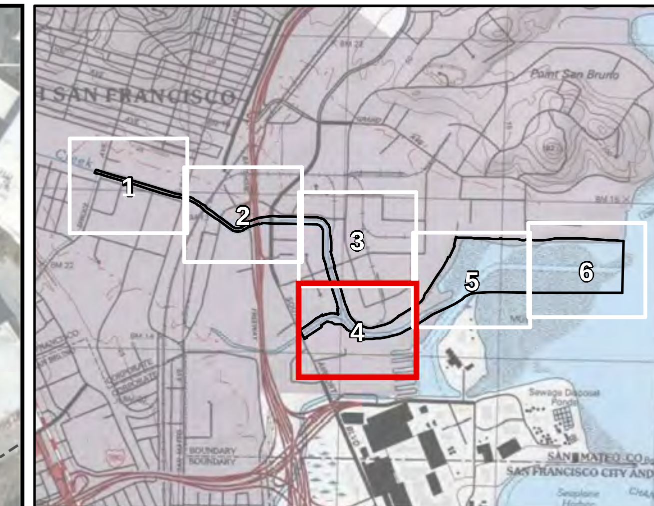
Colma Creek
Flood Control Maintenance Project

Figure 5c

Wetland Delineation Map



Summary of Wetlands and Non-wetland Waters of the U.S.			
Description	Wetland ID	Type	Area (acres)
Channel	C-1	Waters	12.22
Channel	C-2	Waters	0.64
Mud Flat	MF-3	Waters	1.52
Mud Flat	MF-4	Waters	0.74
Mud Flat	MF-5	Waters	0.37
Mud Flat	MF-6	Waters	0.04
Intertidal Marsh	IM-4	Wetlands	1.10
Intertidal Marsh	IM-5	Wetlands	0.36
Intertidal Marsh	IM-6	Wetlands	0.39
Intertidal Marsh	IM-7	Wetlands	0.82
Intertidal Marsh	IM-8	Wetlands	0.81
Intertidal Marsh	IM-9	Wetlands	0.29
Total			19.30



Sheet 4 of 6

Waters

- Modified Channel
- Channel
- Mud Flat
- Rocky Intertidal
- Bay

Wetlands

- Intertidal Marsh

Wetland Data Points

- Wetland
- Upland
- Wetland Delineation Study Area
- Control Point (California State Plane, Zone 3, feet)

0 100 200 Feet N

PREPARED BY: Horizon Water and Environment, 180 Grand Ave, Ste 1405, Oakland CA 94612, 510-986-1850

PREPARED FOR: County of San Mateo Dept. of Public Works, 555 County Center, 5th Floor, Redwood City, CA 94063, (650) 363-4100

DRAWN BY: P. Glendening
DELINEATION BY: K. Fisher
DATE OF FIELD WORK: August 8, 2014

USACE REGULATORY FILE:
VERIFIED BY:
DATE OF VERIFICATION:

REVISIONS		
DATE	DESCRIPTION	BY
25 Sept., 2015	Removed "Seasonally Ponded Depression". Expanded C-1	P. Glendening

Colma Creek
Flood Control Maintenance Project

Figure 5d

Wetland Delineation Map

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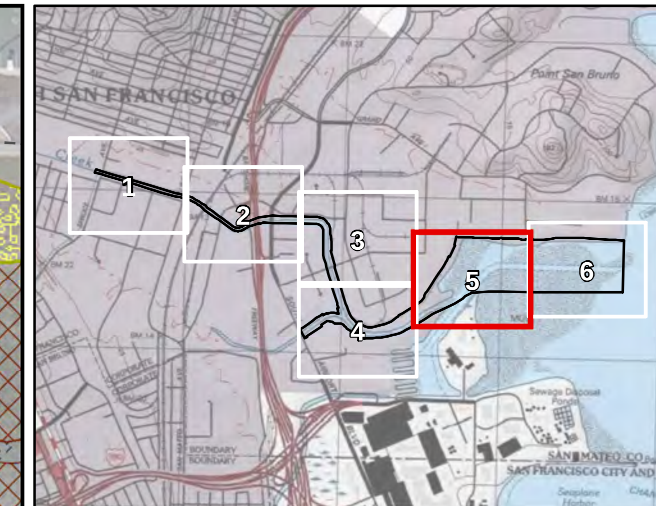
Summary of Wetlands and Non-wetland Waters of the U.S.			
Description	**Wetland ID**	**Type**	**Area (acres)**
Channel	C-1	Waters	12.22
Channel	C-3	Waters	7.32
Channel	C-4	Waters	1.87
Mud Flat	MF-10	Waters	23.48
Mud Flat	MF-11	Waters	9.32
Mud Flat	MF-12	Waters	15.00
Mud Flat	MF-3	Waters	1.52
Mud Flat	MF-7	Waters	0.04
Mud Flat	MF-8	Waters	0.03
Mud Flat	MF-9	Waters	0.86
Intertidal Marsh	IM-10	Wetlands	6.80
Intertidal Marsh	IM-8	Wetlands	0.81
Total			**79.26**



Sheet 5 of 6

Waters
- Modified Channel
- Channel
- Mud Flat
- Rocky Intertidal
- Bay

Wetlands
- Intertidal Marsh

Wetland Data Points
- Wetland
- Upland

Wetland Delineation Study Area

Control Point
(California State Plane, Zone 3, feet)

0 100 200
Feet
N

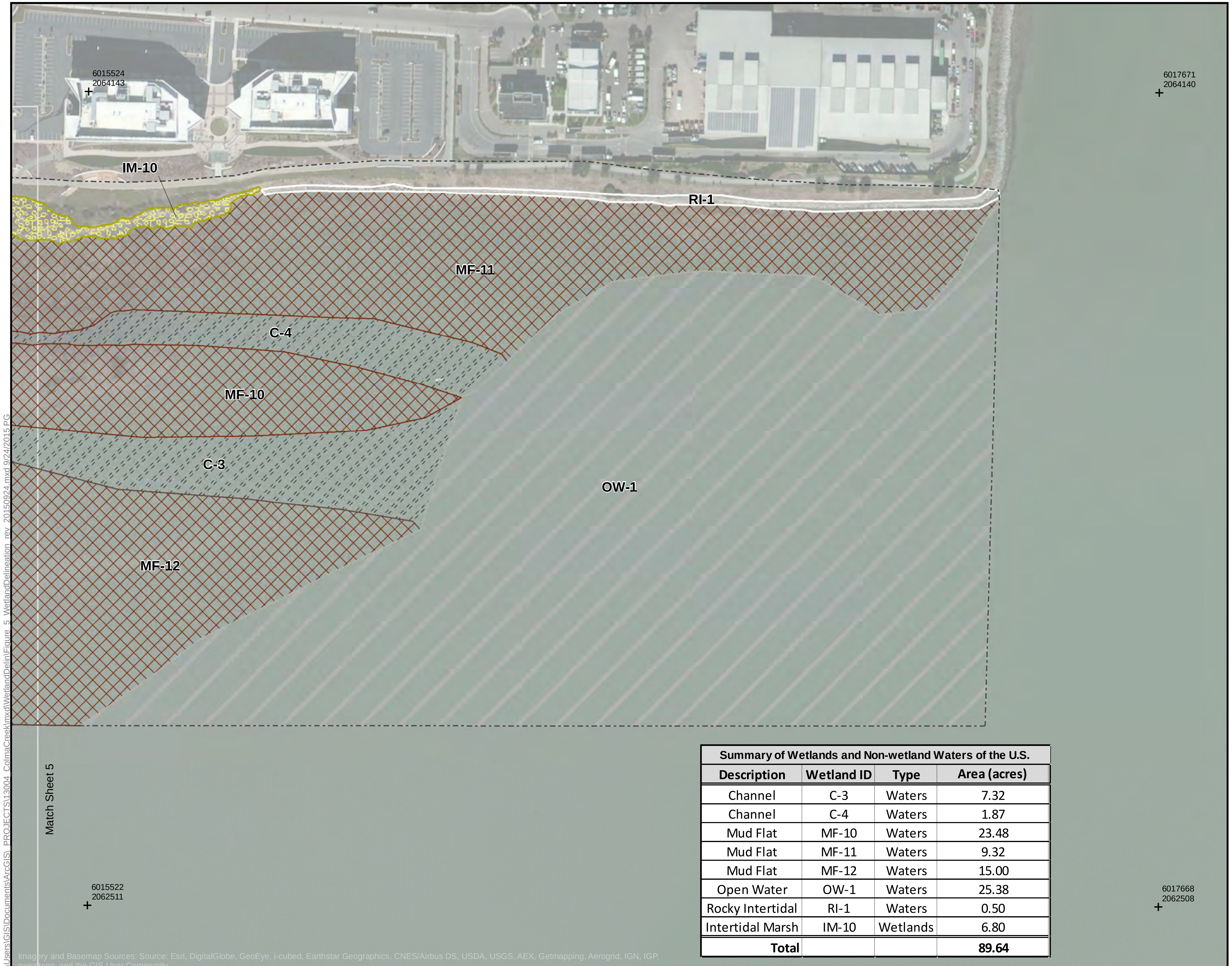
PREPARED BY:	PREPARED FOR:
Horizon WATER and ENVIRONMENT, 180 Grand Ave, Ste 1405, Oakland CA 94612, 510-986-1850	County of San Mateo Dept. of Public Works, 555 County Center, 5th Floor, Redwood City, CA 94063, (650) 363-4100
DRAWN BY: P. Glendening DELINEATION BY: K. Fisher DATE OF FIELD WORK: August 8, 2014	USACE REGULATORY FILE: VERIFIED BY: DATE OF VERIFICATION:

	REVISIONS	
DATE	DESCRIPTION	BY
25 Sept., 2015	Removed "Seasonally Ponded Depression". Expanded C-1	P. Glendening

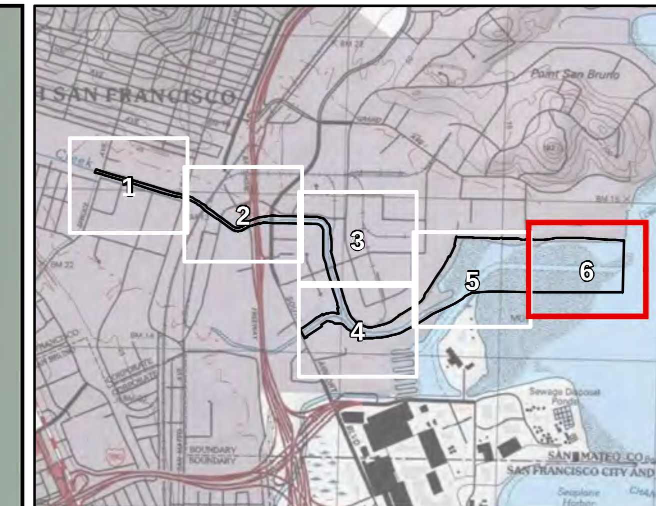
Colma Creek
Flood Control Maintenance Project

Figure 5e

Wetland Delineation Map



Summary of Wetlands and Non-wetland Waters of the U.S.			
Description	**Wetland ID**	**Type**	**Area (acres)**
Channel	C-3	Waters	7.32
Channel	C-4	Waters	1.87
Mud Flat	MF-10	Waters	23.48
Mud Flat	MF-11	Waters	9.32
Mud Flat	MF-12	Waters	15.00
Open Water	OW-1	Waters	25.38
Rocky Intertidal	RI-1	Waters	0.50
Intertidal Marsh	IM-10	Wetlands	6.80
Total			**89.64**



Sheet 6 of 6

Waters
Modified Channel
Channel
Mud Flat
Rocky Intertidal
Bay

Wetlands
Intertidal Marsh

Wetland Data Points
Wetland
Upland

Wetland Delineation Study Area

Control Point
(California State Plane, Zone 3, feet)

0 100 200
Feet
N

PREPARED BY:
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DRAWN BY: P. Glendening
DELINEATION BY: K. Fisher
DATE OF FIELD WORK:
August 8, 2014

USACE REGULATORY FILE:
VERIFIED BY:
DATE OF VERIFICATION:

REVISIONS		
DATE	DESCRIPTION	BY
25 Sept., 2015	Removed "Seasonally Ponded Depression". Expanded C-1	P. Glendening

Colma Creek
Flood Control Maintenance Project

Figure 5f

Wetland Delineation Map

Horizon
WATER and ENVIRONMENT

Appendix A

Wetland Determination Data Forms

Horizon
WATER and ENVIRONMENT

SEE DATA SHEETS

PROVIDED

SEPARATELY

Appendix B

Site Photographs

<table>
<tr><td>Photo No. 1</td><td>Date: 08/05/2014</td><td rowspan="2"></td></tr>
<tr><td colspan="2">Description:
Looking upstream at the upstream boundary of the study area. The dissipater teeth can be seen in the background of the photo.</td></tr>
<tr><td>Photo No. 2</td><td>Date: 08/05/2014</td><td rowspan="2"></td></tr>
<tr><td colspan="2">Description:
Staff plate on the wall of the channel near the upstream end of the study area. The ordinary high water mark is approximately 5 feet on the staff plate.</td></tr>
</table>

Photo No. 3	**Date:** 08/05/2014	
Description: Transition from concrete channel to a natural channel downstream of Highway 101.		
Photo No. 4	**Date:** 08/05/2014	
Description: Sample Point 1a/1b near Mitchell Ave. Looking upstream with South Airport Boulevard in the background.		

Photo No. 5	Date: 08/05/2014	
Description: Looking upstream near Utah Ave. bridge. Note earthen bed and banks comprised of fine sediment, some depositional bars along channel bend, and mid-bank bench with pickleweed.		
Photo No. 6	**Date:** 08/05/2014	
Description: Seasonal ponded depression north of Utah Ave. bridge (in background).		

Photo No. 7	**Date:** 12/19/2012	
Description: Emergent marsh and mudflats near the mouth of Colma Creek.		
Photo No. 8	**Date:** 08/05/2014	
Description: The confluence of Navigable Slough (left) and Colma Creek (right).		

Photo No. 9	**Date:** 08/05/2014	
Description: Sample Point 3a near the terminus of Corey Ave. Looking upstream with Utah Ave. bridge in the background. Pickleweed is the dominant vegetation throughout the mid-bank bench.		
Photo No.10	**Date:** 08/05/2014	
Description: Right bank downstream of Utah Ave. bridge.		

Appendix F
CULTURAL RESOURCES MEMORANDUM

June 23, 2015
(Revised December 15, 2015)

BASIN
RESEARCH
ASSOCIATES

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SUITE 210
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VOICE (510) 430-8441
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Mr. Kevin T. Fisher, MS, PWS
Senior Associate
Horizon Water and Environment, LLC
180 Grand Avenue, Suite 1405
Oakland, CA 94612

RE: Cultural Resources Records Search and Limited Literature Review
Colma Creek Flood Control Maintenance Project, San Mateo County

Dear Mr. Fisher,

Please let this letter stand as Basin Research Associates' *Cultural Resources Records Search and Literature Review* for the above project. This letter report provides the results of a records search conducted by the California Historical Resources Information System, Northwest Information Center (CHRIS/NWIC), Sonoma State University, Rohnert Park; a limited literature review; contact with the Native American Heritage Commission for search of the *Sacred Lands Inventory* and recommendations based on the archaeological information. A field review was not undertaken as the project consists of sediment removal and other maintenance operations for a 5.4 mile long alignment of the Colma Creek channel to provide adequate flood conveyance capacity in the channel. The channel has been extensively modified by previous construction and maintenance over the past 50 years as well as having been subject to numerous archaeological studies.

This records search and literature review was completed to meet applicable federal and state regulatory requirements for historic properties (cultural resources) which require the identification and evaluation of cultural resources that could be affected by the project. The research was undertaken to determine if any cultural resources could be affected by the proposed maintenance project which will require a Nationwide 404 Permit to be issued by the U.S. Army Corps of Engineers (Corps), San Francisco District. The Corps will use the information to provide appropriate conditions for cultural resources that could be affected by the sediment removal and other repairs. In addition, the document will be used for an Initial Study/Mitigated Negative Declaration to meet the requirements of the California Environmental Quality Act (CEQA).

PROJECT LOCATION

The proposed project is located in both the Town of Colma and the City of South San Francisco, San Mateo County and includes an approximately 5.4 mile-long section of the Colma Creek Flood Control Channel [USGS San Francisco South, CA 1993, T 3S, R 5W, unsectioned) [Figs. 1-3]. The flood control channel (channel) provides flood control protection for residents and businesses in the communities near the channel in South San Francisco, Colma, and Daly City. The three primary channel reaches scheduled for maintenance include earthen lined trapezoidal channels, channels with concrete walls and earthen beds, fully concrete lined channels, and concrete box culverts.

> Reach 1: The upper maintenance reach includes the channel upstream from A Street/El Camino Real downstream to Spruce Avenue.
>
> Reach 2: The middle maintenance reach is from Spruce Avenue downstream to Produce Avenue.
>
> Reach 3: The lower maintenance reach is from Produce Avenue downstream to the mouth of Colma Creek at San Francisco Bay.

Land uses adjacent to the channel consist of residential, manufacturing, offices, warehouses, airport services, vehicle services, the South San Francisco BART station, El Camino High School, and recreational uses at Orange Memorial Park and various cemeteries in the Town of Colma.

AREA OF POTENTIAL EFFECTS (APE)

The Area of Potential Effects (APE) for archaeology includes the area within which an undertaking may directly or indirectly cause changes in the character or use of historic properties, should any be present. The horizontal and vertical APE consists of the proposed construction within the project's right of way (ROW) including access roads to the project area, and staging areas for material laydown and storage of excavated spoils. The APE is commensurate with the footprint of the proposed undertaking which is focused on sediment removal and other maintenance operations for a 5.4 mile long alignment of the Colma Creek channel to provide adequate flood conveyance capacity in the channel.

The APE for archaeology includes the Colma Creek Channel alignment which includes the areas adjacent to the channel (e.g., service road) used for maintenance. The alignment extends from A Street/El Camino Real downstream to the mouth of Colma Creek at San Francisco Bay. The APE east of the U.S. 101/Bayshore Freeway (Reach 3) is south of Mitchell Avenue and bounded by the Colma Creek Service Road on the east and north. This portion of the APE consists of the engineered channel, filled land around the periphery of Point San Bruno, and part of the "San Bruno Canal," a deep water channel within the margin of San Francisco Bay. The San Bruno Shoals, a large mud bank, is just east of the deep-water channel opposite the cities of South San Francisco and San Bruno (Brown 1975:80) [Fig. 4].

DESCRIPTION

The objective of the proposed Colma Creek Flood Control Channel Maintenance Project is to complete various maintenance activities along the approximately 5.4 miles of the Colma Creek flood control channel to provide adequate flood conveyance capacity in the channel. The Colma Creek flood control channel (Colma Creek) provides flood control protection for residents and businesses in the communities near the channel in South San Francisco, Colma, and Daly City.

The project alignment is segmented into three reaches. Primary maintenance activities for Reaches 1 to 3 include: sediment removal at specific locations upstream of the U.S. 101/Bayshore Freeway crossing of Colma Creek; repair of blocked culverts, bank repair, debris and trash removal, vegetation management, and maintenance of trash capture devices (Table 1).

TABLE 1

Proposed Maintenance Activities - Colma Creek Reaches 1-3

Maintenance Activities	**Colma Creek Flood Control Segment**		
	Reach 1: A Street/El Camino Real downstream to Spruce Avenue.	**Reach 2: Spruce Ave. downstream to Produce Avenue**	**Reach 3 Produce Avenue downstream to creek mouth at San Francisco Bay**
Sediment removal on channel bed		X	
Clearing blocked culvert outfalls			X
Vegetation management on channel banks and bed	X	X	X
Repair or maintenance of concrete/hardened streambanks	X	X	X
Installing and maintaining fences on channel banks	X	X	X
Installing and maintaining trash collection devices	X	X	X
As needed general removal of obstructions (debris)	X	X	X
As needed graffiti removal	X	X	

Reach 1: A Street/El Camino Real downstream to Spruce Avenue

This reach consists entirely of a concrete lined channel and concrete box culverts. Downstream of A Street, the channel is culverted and then daylights from the entrance to the Holy Cross Cemetery along Mission Road. The channel is also culverted beneath the South San Francisco BART station but becomes an open trapezoidal concrete channel downstream of the BART station.

Maintenance activities within this reach may include repair or maintenance of concrete channel banks and bed, removal of debris, abatement of graffiti, installation and maintenance of trash capture devices, installation or repair of fencing, and control of vegetation in concrete joints on the channel banks and bed as necessary.

Reach 2: Spruce Avenue downstream to Produce Avenue

Reach 2 is a concrete lined channel and includes the recently constructed (2006 and 2012) concrete channel section from downstream of San Mateo Avenue to the flow dissipater teeth upstream of Spruce Avenue. The reach is divided into three segments.

> Reach 2a extends from downstream of the dissipater teeth to Linden Avenue. Compared to upstream in Reach 1, in Reach 2a, the channel slope decreases, the channel bed widens, and the banks become vertical. Reach 2a is straight, the channel bottom is 70 feet wide and the banks are approximately 14 feet tall. A relatively uniform layer of sediment is deposited on the channel bed in Reach 2a.
>
> Reach 2b extends from S. Linden to San Mateo Avenue and has a more complex alignment and more crossings than Reach 2a. Downstream of the Caltrain railroad crossing the channel alignment shifts to the south. Downstream of the railroad crossing, hydrodynamic conditions (flow separation and eddying along the south right bank) create a depositional environment and sediment accumulates.
>
> Reach 2c extends from San Mateo Avenue to Produce Avenue and was constructed in 1997. The County last removed approximately 300 cubic yards of sediment within this segment in 2003. The relatively sharp northward channel bend results in deposition at the interior of the channel bend (along the northern bank).
>
> A primary objective is to remove sediment within Reach 2 and to ensure adequate conveyance capacity within the Colma Creek flood control channel. Sediment removal activities would occur using equipment from the top of bank or within the channel if the channel is dry.
>
> Sediment removal activities would be conducted using equipment from the top of bank. Within Reach 2, removal would occur only when sediment accumulates more than two feet above the channel bottom. Sediment management in Reach 2 may include the redistribution of sediment from areas of higher aggradation (such as to areas without much deposition, which do not yet have 2 feet of measured accumulation on the channel bed. The removal or distribution of sediment along the concrete bed of Reach 2 may be achieved using a small skid steer loader or compact excavator (such as a Bobcat™).
>
> Other routine maintenance activities proposed within Reach 2 may include repair or maintenance of concrete channel banks and bed, removal of debris, abatement of graffiti, installation and maintenance of trash capture devices, installation or repair of fencing, and control of vegetation in concrete joints on the channel banks as necessary.

Reach 3: Produce Avenue to Mouth of Colma Creek

Reach 3 includes two segments: 3a and 3b.

> Reach 3a extends from Produce Avenue to S. Airport Boulevard. Downstream of Produce Avenue, the channel transitions from concrete to a trapezoidal earthen channel, consisting of earthen bed and bank materials.

Reach 3b extends from S. Airport Boulevard to the mouth of Colma Creek. The channel cross-section widens downstream of S. Airport Boulevard and the creek takes on the characteristics of a tidal channel. The channel bed is relatively shallow and wide in comparison to upstream reaches, and has a more gradual bank-slope transition to a salt marsh fringe found on mid-bank and upper-bank benches that flank the channel.

Proposed maintenance activities within Reach 3 include clearing sediment and debris from blocked culvert outfalls, repairing or replacing degraded or damaged culverts and outfalls, repair or maintenance of hardened channel banks, vegetation management on channel banks, installing and maintaining trash capture devices, debris removal at crossings, installation or repair of fencing, abatement of graffiti, and invasive vegetation removal. Within this reach, sediment removal from blocked culvert outfalls, and repair or replacement of damage culverts and outfalls would be limited to the area between Produce Avenue and Navigable Slough.

CONSTRUCTION METHODS

SEDIMENT REMOVAL

Sediment removal work within Reach 2 would be conducted during the summer months when the channel is typically low flow (June-September) and during low tide. Sediment removal activities are anticipated to occur on a routine basis (every 3-4 years), or as needed if deeper sediment deposits develop around structures. An earthen berm consisting of native materials would be constructed to keep any tidal water from entering the area to be excavated. To avoid working within the low-flow channel, sediment near the outer walls or structures would be removed first and a sediment boundary would be left between the excavated area and the active channel. After the sediment is removed, the berm would be breached to allow the incoming tide to enter the excavated area. Two feet of sediment depth would be preserved along the channel bed, in locations that have more than two feet of sediment depth.

The number of construction workers on-site to complete sediment removal work would be commensurate with the project tasks. Mechanized equipment such as excavators and dump trucks would not be employed in the channel.

On average, it is anticipated that up to 400 cubic yards of sediment would be removed per year, though as described above, sediment removal would not occur every year. The material would be hauled off-site depending on the selected disposal option.

DEWATERING

Channel dewatering may be required to allow equipment access to the channel to remove accumulated sediment.

OTHER ROUTINE MAINTENANCE ACTIVITIES (as needed)

Other routine maintenance activities would be completed an as-needed basis (see Table 1). Construction methods associated with these activities are described below.

Clearing Blocked Culverts and General Removal of Debris and Obstructions: Removal of sediment and debris that is blocking culverts or otherwise obstructing structures and facilities may be necessary to maintain flood control capacity. Facilities that may require clearing include culvert and storm drain outlets, and the dissipater teeth upstream of Spruce Avenue. As needed, the County would remove such obstructions by excavating localized portions of the channel during low flow or low-tide conditions from the top of bank. This activity also includes routine removal of fallen trees, branches, piping, and garbage immediately adjacent to flood control structures and trash collection facilities.

Vegetation Management: Sections of the channel which consist of a trapezoidal concrete channel with joints in the channel walls or joints between the walls and channel bottom, are often colonized by wetland or weedy vegetation in the joints. Vegetation such as cattails would be hand pulled or hand cut from the joints. Vegetation removal from the channel banks is often necessary to maintain access to the channel and preserve the integrity of the structures. No pickleweed or other native saltmarsh vegetation would be removed or disturbed. Invasive upland species such as pampas grass, ice plant and fennel, would be removed from all channel segments as necessary. Removal of non-native *Spartina* downstream of Spruce Avenue would be coordinated with the San Francisco Estuary Invasive *Spartina* Project.

Repair or Replacement of Damaged Culverts and Outfalls: Fifteen (15) damaged reinforced concrete pipe (RCP) or corrugated metal pipe (CMP) culverts ranging from 15- to 36-inch diameter and 20- to 50-foot long require maintenance in Reach 3 from Highway 101 downstream to Utah Avenue. [see Fig. 3]. Some culvert outfalls include existing sacked concrete structures for energy dissipation and slope protection. Several of these culverts and associated outfall structures are broken or degraded, and may require repair or replacement. Culverts will be evaluated and conditions assessed, and repaired or replaced on an as-needed basis with RCP or high density polyethylene (HDPE) pipes of same or slightly larger sizes. The degraded pipe will be excavated and disposed of at an appropriate facility. After the replacement culvert pipe is installed or repaired, the trench will then be backfilled, compacted, and restored to match surrounding surfaces. Should the assessment of the existing culvert determine that the condition of the pipe is not severely deteriorated, a rehabilitation of the pipe, such as slip lining, may be proposed and performed.

Replacement and/or repair of culverts and associated outfall structures shall not involve any expansion of hardened materials (rock or sacked concrete) along the channel bed or bank, beyond the original limits or what is necessary to properly support and protect the outfalls. Repairs may include the replacement of in-kind or similar hardened materials.

Where feasible, equipment will operate from the top of bank on the landward side of the existing concrete flood wall. However, pipe replacements in certain locations will require equipment to operate within the channel from the highly compacted, sparsely vegetated upper bank.

Repairs at Hardened Streambanks: This activity includes repairing damaged or failed sections of concrete wall revetments, riprap, or sacked concrete bank revetments. Minor damage to concrete channel walls such as crumbling or chipping would be repaired using grout. Larger-scale repair work may require concrete patching or reforming of the channel wall. Such work would be conducted when the channel is at its lowest or completely dry, and when rain is not in the 72-hour forecast. In addition, periodic cleaning of weep holes (small holes in the channel's concrete walls that drain excess water) may be necessary to prevent blockage and allow for water to drain.

Graffiti Removal: Graffiti would be removed by hand on an as-needed basis.

CONSTRUCTION STAGING AND ACCESS

Staging of equipment and materials used for sediment removal would occur within the maintenance access road adjacent to the channel. Potential staging of equipment and materials could occur within parts of Sister Cities Park along the south side of Colma Creek upstream of Spruce Avenue, and/or temporary use of the eastbound lane of North Canal Street.

Reach 2 would be accessed via U.S. Highway 101 and local access would occur via Produce Avenue, San Mateo Avenue, Linden Avenue, and Spruce Street. Within Reach 2a (between the dissipater teeth and Linden Avenue), a long reach excavator would need to operate from the top of bank on South Canal Street. Within Reaches 2b and 2c, the site would be accessible from an existing maintenance road just north of the channel.

SEDIMENT DISPOSAL

Sediment removed from the channel would be disposed in one of the following ways: (1) used on-site through distributing the sediment across the channel or easement area; (2) agricultural or commercial reuse; (3) landfill disposal; and if necessary (4) hazardous waste disposal facility. The disposal methods will be selected at a future date.

REGULATORY

The proposed undertaking requires a permit in accordance with Section 404(b)(1) of the Clean Water Act (33 U.S.C. § 1344) and must comply with the regulatory requirements of the Department of the Army, Corps of Engineers (Corps) with regard to cultural resources (historic properties). The Corps (San Francisco District) is the National Environmental Policy Act (NEPA) responsible entity and is required to complete the federal regulatory requirements for cultural resources pursuant to Section 106 of the National Historic Preservation Act (NHPA) of 1966 (as amended) (54 U.S.C. § 306108) and its implementing regulations 36 CFR Part 800. The regulations require a federal agency with jurisdiction over a federal, federally assisted or federally licensed undertaking to take into account the effects of the undertaking on Historic Properties, properties that are listed on or eligible for listing on the National Register of Historic Places (NRHP) and to afford the Advisory Council on Historic Preservation (ACHP) an opportunity to comment on the undertaking should it adversely affect a NRHP eligible or NRHP listed property. The criteria for determining NRHP eligibility are found in 36 CFR Part 60. The Corps (San Francisco District) is the lead federal agency for the project. The Corps is responsible for consulting with the California State Historic Preservation Office (SHPO) on their identification and evaluation efforts and on the effects, if any, of the undertaking upon historic properties in accordance with 54 U.S.C. § 302303(b)(5), (b)(6) and (b)(9).

In addition, the lead local agency is required to determine the potential impacts of the construction on both historical and unique archaeological cultural resources and mitigate impacts on any significant resources located that may be affected by the project to a less than significant effect in accordance with CEQA.

RESEARCH PROTOCOLS

A prehistoric and historic site record and literature search was conducted by the California Historical Resources Information System, Northwest Information Center, Sonoma State University (CHRIS/NWIC File Nos. 14-0524 and 14-0813).

Limited reference material from the Bancroft Library, University of California at Berkeley and Basin Research Associates, San Leandro was also consulted. The literature review by Basin Research Associates included a review of lists of various state and/or federal historically or architecturally significant structures, landmarks, or points of interest in/adjacent including the *Historic Properties Directory for San Mateo County* (CAL/OHP 2012a-b) and list of *California Historical Resources* (CAL/OHP 2015) with the most recent updates of the National Register of Historic Places; California Historical Landmarks; and, California Points of Historical Interest as well as other evaluations of properties reviewed by the State of California Office of Historic Preservation. Other sources included: *California History Plan* (CAL/OHP 1973); *California Inventory of Historic Resources* (CAL/OHP 1976); *Five Views: An Ethnic Sites Survey for California* (CAL/OHP 1988); and, other lists and maps (see References Cited and Consulted).

The Native American Heritage Commission (NAHC) was contacted for a review of the Sacred Lands Files (Busby 2014a) with negative results (Pilas-Treadway 2014). Letters were sent to the nine individuals/groups listed by the NAHC ". . . who may have knowledge of cultural resources in the project area" (Busby 2014b-j).

No other agencies, departments or local historical societies were contacted regarding landmarks, potential historic sites or structures.

SUMMARY BACKGROUND CONTEXT

Colma Creek flows approximately eight miles from its headwaters in the San Bruno Mountain State and County Park south and easterly to its final discharge in San Francisco Bay. The Colma Creek watershed includes the main drainages of Colma and Twelve Mile creeks and their tributaries. The *Creek & Watershed Map of Daly City & Vicinity* (Givler and Sowers 2007) maps the project alignment within "Historical Tidal Marsh" through which Colma Creek flowed/meandered to the bay. The creek was known in the 1770s as the *Arroyo de San Bruno*, and from the ca. 1880s onward as Colma Creek. The recent engineered channel is often referred to as the Colma Canal (see Brown 1975:21-22, 79) although the creek's channelization appears to have started in the 1890s with various stages of channel alignment (see USGS 1896, 1915, 1947, 1956; War Department 1939).

Development along the creek began during the filling of the historic marshlands from the early to mid-1900s (see USGS 1915, 1939, 1950). The USGS San Francisco South topographic quadrangle of 1950 shows the project area east of U.S. 101/Bayshore Freeway as marshy. Between 1950 and 1980, the far eastern portion of the project area (east of U.S. 101/Bayshore Freeway) including the south side of San Bruno Point was filled. Colma Creek was reconfigured through the filled areas to flow south following the west side of the Colma Creek Service Road and then easterly south of Littlefield Avenue and into San Francisco Bay (USGS 1950, 1980, 1995).

Since the completion of the original flood control project in 1974, several additional channel improvements and bridges have been constructed along Colma Creek. These improvements have included channel widening, constructing vertical concrete channel walls, and constructing transition structures between channel segments. The following bridges were constructed across Colma Creek: Linden Avenue (1974), Spruce Avenue (1975), Utah Avenue (1976), South Airport Boulevard (1999), Peninsula Corridor Joint Powers Board (Caltrain) Mainline (2003), and San Mateo Avenue (2006).

NATIVE AMERICAN - Prehistoric

The general study area appears to have been located in a favorable environment along the periphery of San Francisco Bay in an area with marshlands, riparian and inland resources available to the prehistoric population.

Native American occupation and use of the general area appears to extend over 5,000-10,000 years and may be longer. Archaeological information suggests an increase in the prehistoric population over time with an increasing focus on permanent settlements with large populations in later periods. This change from hunter-collectors to an increased sedentary lifestyle is due to more efficient resource procurement but with a focus on staple food exploitation, the increased ability to store food at village locations, and the development of increasing complex social and political systems including long-distance trade networks.

Prehistoric site types recorded in the region consist of shell mounds, lithic scatters, quarries, habitation sites (including burials), bedrock mortars or other milling feature sites, petroglyph sites, and isolated burial sites.

NATIVE AMERICAN - Ethnographic

The aboriginal inhabitants of the region belonged to a group known as the "Costanoan," derived from the Spanish word *Costanos* ("coast people" or "coastal dwellers"), also known as the *Ohlone* (e.g., Kroeber 1925; Gavlan 1967/1968; Margolin 1978). Following Brown (1973-1974), the project is situated within Shalshon territory; Levy (1978) places project within the *Ramaytush* subdivision of the *Costanoan*; while Milliken places the project within *Urebure (*San Bruno Area) territory. No known villages have been noted in, adjacent or near the project. The closest known village *sipliskin* (San Bruno), alternatively *Shiplishki* or *Siplichiquin* that "was probably at the former small lake in the valley of Colma Creek along the Daly City-Colma municipal boundary" (Levy 1978:485, Fig. 1, #15; Brown 1973-1974; Milliken 1983, 1995, 2006). Brown (1975:79) places the village of *Shiplishkin*, known by the Spanish in 1780s as the village of "San Bruno," at San Bruno Lake near present Villa Avenue and El Camino Real, Colma.

HISTORIC PERIOD - Hispanic (1769-1849)

Spanish government policy in northwestern New Spain was directed at the founding of presidios, missions, and secular towns, with the land held by the Crown (1769-1821), while the later Mexican policy (1821-1848) stressed the individual ownership of land (Hart 1987).

Early Spanish expeditions likely followed existing aboriginal trails. The period of initial historic exploration of the project area started in 1769. Between 1769 and 1776 a number of Spanish expeditions passed through Costanoan territory (e.g., Beck and Haase 1974:#17, 20-22; Levy 1978:486; Milliken 1995:33, Map 3; USNPS 1995). Even though the routes of the early explorers cannot be determined with total accuracy, the marshy project alignment would have been and was avoided. Nonetheless, it has been suggested that the name "San Bruno" used variously in the general study area was selected to honor the patron saint of expedition leader's Bruno Heceta's [Hezeta and Father Francisco Palou] in 1774/1775 (Brown 1975:79).

The project is located east of the northern part of *Rancho Buri Buri* and east of an "*Estero,"* that is an estuary where fresh water (e.g., Colma Creek) and sea water mix. The rancho "Embarcadero" was situated east of present-day San Mateo Avenue in the vicinity of Shaw Road and the terminus of the present-day channelized tendril of Colma Creek west of the U.S. 101/Bayshore Freeway (Mattewson 1858; United States Surveyor General 1864; Givler and Sowers 2007). From 1774 or 1775 Colma Creek was known as the *Arroyo de San Bruno* (Brown 1975:21-22).

HISTORIC PERIOD - American (1850 to Present)

In the mid-19th century, the majority of the rancho and pueblo lands and some of the ungranted land in California were subdivided as the result of population growth, the American takeover, and the confirmation of property titles. *San Mateo County* was created in 1856 from the southern part of San Francisco County and enlarged by annexing part of Santa Cruz County in 1868. Belmont was initially the County seat as a result of a fraudulent election; it was changed within a year to Redwood City.

Initial development in the general study area focused on El Camino Real – the "San Jose Stage Road" south from San Francisco - located west and south of the APE was the main road, later a county road. The general study area is also associated with Charles Lux and Henry Miller, owners of the largest West Coast 19th Century livestock company whose holdings included cattle ranches in Central Valley and Twelve Mile Ranch (1850) at Baden.

> *Baden,* an early farming community was situated inland along Colma Creek, was located approximately two miles from San Bruno Point within formerly Rancho Buri Buri. Reportedly, the tidal slough extended inland as far as Baden and included wharves accessible at high tide used to transport supplies and local crops. Miller and Lux fattened their cattle destined for stockyards of San Francisco's Butchertown at their Baden ranch. After Lux's death in 1887, 3,500 acres of his property were purchased in 1890 by Peter Iler of Omaha who was representing meat packer Gustavus F. Swift and subsequently by the South San Francisco Land and Improvement Company (established in 1891) and associated with G.F. Swift and several other capitalists.

> *South San Francisco,* the "pretentious name" used in 1891 or shortly thereafter by G.F. Swift, the original developer of the industrial area on San Bruno Point, was situated east of "Baden." The Baden subdivision was laid out on El Camino in 1890 up-wind to the west of the Southern Pacific Railroad/U.S. 101/Bayshore Freeway corridor. The east side in 1892 was followed by a stock yard and the Western Meat Company and later by other industries. Baden was gradually absorbed by South San Francisco which became a city of the sixth class September 19th, 1908. The Bay Shore Division of the Southern Pacific paralleling El Camino west and south of the APE was built 1904-1907 e.g., located approximately 0.9 mile west of Spruce Avenue. As late as 1920 Mission Road crossing the Southern Pacific railroad tracks was still known as Baden Crossing. South San Francisco has and still retains "a mix of residential and industrial communities" - industries on the east side of 101 that include shipbuilding especially during World War I and II, and in the 1950s modern industrial and biotechnology in 1970s with over 80 biotech companies by 2003 (Stanger 1963:146-147; Hoover et al. 1966:389; Outland 1973:158 and map; Beck and Haase 1974:#69-60; Hynding 1982:102-109; Brown 1975:5, 90-91; Patera 1991:12, 202, 298 [map]; Allan 2010:7-8; SSF:2014 Overview, Timeline and Events).

The APE is crossed by two notable features: (1) the alignment of the former San Francisco and San Jose Railroad (later owned by Southern Pacific) officially opened in October 1863 between San Francisco and Mayfield (within present-day Palo Alto); and, (2) the U.S. 101/Bayshore Highway - the old San Bruno turn pike - constructed between 1928 and 1935 after the underpass for the highway under the Southern Pacific railroad tracks. Other streets crossing the Colma Creek APE include Linden Avenue constructed prior to 1950 and Spruce Avenue constructed between 1950 and 1980 (e.g., USGS 1950, 1980; SSF:2014 Overview, Timeline and Events).

NATIVE AMERICAN CONSULTATION

The Native American Heritage Commission (NAHC) Sacred Lands Inventory search was negative for Native American resources in or adjacent to the project (Pilas-Treadway 2014). Nine letters soliciting additional information were sent to the Native Americans individuals/groups listed by the NAHC [see Attachments]. Follow up telephone calls and emails to the Native American individuals/groups were undertaken by Mr. Christopher Canzonieri, Basin Research Associates. Ms. Jakki Kehl, Ms. Irenne Zwierlein, Ms. Michelle Zimmer, Mr. Andrew Galvan and Ms. Ramona Garibay had no immediate concerns and generally recommended that if there is a find that proper measures should be implemented. Messages were left with Ms. Linda G. Yamane and Ms. Ann Marie Sayers. Messages could not be left with Ms. Rosemary Cambra and Mr. Tony Cerda.

RESEARCH FINDINGS

The intent of the research was to identify historic properties (prehistoric and historic resources) within the project area which may be listed, determined or potentially eligible for inclusion on the National Register of Historic Places (NRHP) and the California Register of Historical Resources (CRHR) which could be affected by the proposed project.

CHRIS/NWIC RESULTS[1]

Two archival searches were completed by the NWIC/CHRIS for the project alignment (CHRIS/NWIC File Nos. 14-0524 and 14-0813) (Hagel 2014, 2015) [see Attachments].

Recorded Resources

The records search and literature review of the APE determined that three prehistoric resources have been recorded within Reaches 1 and 3. One recorded historic archaeological resource is present in Reach 2. Five historic cemeteries and a building associated with cemetery architecture are present in Reach 1. Six other sites are within 0.25 miles of the APE and include five prehistoric resources and one historic era linear site (Southern Pacific track segment).

Reach 3

CA-SMA-380 (P-41-002164) - ". . an apparent prehistoric shell midden" is located within the APE in Reach 3. This site is mapped south of Littlefield Avenue between the railroad tracks and north side of Colma Creek opposite the east end of the sewage treatment plant on the south side of the creek. Evidence of this site was noted in three of eleven 2-inch diameter GeoProbe samples at a depth of approximately 516 to 889 cm below both historic and natural fill. The discontinuous cultural layers included species characteristic of different habitats (rocky tidal zones, tidal and subtidal zones, and muddy or sandy beaches and flats) - Bay Mussel (*Mytilus trossulus*), California Oyster (*Ostrea lurida*), Macoma clam (*Macoma nasuta* and/or *M. secta*), boring clams, and a piece of Gaper clam (*Tresus nuttali*). Several "tiny" fish bones (some burnt), crab claws, and two "tiny" obsidian flakes, a possible chert flake, fire-cracked rock, and gravels were noted (Clark 2006 with Clark 2006/form). This resource has not been formally evaluated.

Reach 2

SMA-353H (P-41-002147) - an approximately 20 x 5 meter historic era refuse scatter was observed eroding out of east railroad embankment just north of Colma Creek in 2000 in Reach 2. The site form sketch map places the site 5 meters (16.4 feet) north of the creek while the site form description indicates 10 meters. This ca. 1890-1918 refuse scatter includes glass fragments (some burned), a ceramic pipe stem, ironstone crockery, Chinese ceramics, glass and ceramic marbles and oyster shell intermixed with modern rail gravel (Cooley et al. 2000/form). The resource in 2005 could not be relocated as concrete barricades placed parallel to the railroad tracks associated with the installation

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1. The CHRIS/NWIC misplotted several prehistoric resources within or near the Reach 3 APE. Consultation with the CHRIS/NWIC (Lisa Hagel, personal communication) and a review of the Nelson (ca. 1912) annotated *Map of San Francisco Bay Region showing Distribution of Shell Heaps* indicates that 5 of the prehistoric site locations provided in the CHRIS/NWIC search <u>were</u> <u>mistakenly</u> <u>located</u> within or adjacent to Colma Creek. The resources should have been mapped three miles to the north of the project. Only one prehistoric resource, CA-SMA38 (P-41-000042), is within the APE on the south side of Point San Bruno. ***A revised search map was not issued by the CHRIS/NWIC although the records were corrected by staff***.

of concrete channel walls along Colma Creek hindered visibility. However, no archaeological materials were visible at around the probable site location (Leach-Palm and Thorpe 2005/form). The available information suggests that the materials were noted outside of the channel walls and service road paralleling Colma Creek. The resource has not been formally evaluated but the recordation in 2000 noted that the potential for important information was limited.

Reach 1

SMA-299 (P-41-00409) - a destroyed shell midden near intersection of Colma Creek and Southern Pacific RR (UPRR) tracks of unknown extent and depth. Recorded as occasional patches of shell and fire-cracked rock. Apparently mined in the 1930s-1950s and sold as "Colma Loam" (Bocek 1989). Rice (1994) found no surface indications of site and 20 shovel auger tests completed for the BART-San Francisco Airport Extension exposed no subsurface materials. This resource has not been formally evaluated but based on the two studies lacks integrity.

SMA-355 (P-41-00495) - an archaeological resource buried under 1.5 to 7.3 meters of natural and artificial overburden discovered during auger testing in vicinity of Mission Road and Chestnut Avenue for a development project. Shell midden with burnt and fire-cracked rock, charcoal, chert flakes, ground stone fragments, and burned and unburned bone fragments was present in the cores. Thickness of deposit varied from 10 to 130 cm. Deposit is outside of creek bank but this area was not tested. Site extent estimated as within an area 185 meters by 80 meters (Clark 2000a-c). This resource has not been formally evaluated.

Historic Cemeteries - Five cemeteries and the Salem Memorial Park Office/Chapel (P-41-000392) are adjacent to the flood control channel although the channel is culverted (underground) along this portion of the reach except for a small portion in front of the Holy Cross Cemetery. The resources include: P-41-000401 (Eternal Home Cemetery, Jewish cemetery established 1901); P-41-000402 (Salem Memorial Park Cemetery, Jewish cemetery established 1901); P-41-000403 (Home of Peace Cemetery, established 1901); P-41-000404 (Cypress Lawn Memorial Park/Cypress Lawn Cemetery, established 1892); and P-41-000405 (Holy Cross Cemetery, established 1886-1887) (Shoup et al. 1994a-b for detailed information).

The resources have evaluated as eligible for the NRHP and the CRHR (see Shoup et. al 1994a-b) or as contributors to a cemetery district that represents an excellent example of cemetery design during the period 1889-1945. However, they do not appear on the *Historic Properties Directory for San Mateo County* but five are listed as Town of Colma Historical Resources in the General Plan (Colma 1999, Section 5.0).

Compliance Reports

The majority of the 49 compliance reports on file are negative for archaeological sites in or adjacent to the proposed project APE. Reports include cultural resources evaluations, archaeological inventories, cultural resources sections within EIRs, subsurface testing, archaeological monitoring of ground disturbing construction, historic resources evaluations among other. A number of the reports provide information on the Belle Air Island Property project, various Colma Creek flood control related projects, as well as reports for pipelines/fiber optics, power generation/transmission lines, Caltrain, and the City of South San Francisco Wet Weather Program projects (see Table 2).

TABLE 2
STUDIES WITHIN AND IN THE VICINITY[2]

Study #	Author	Date	Study Type	Title	Resources
S-003043	David Chavez	1977	Cultural Resources Evaluation	Cultural Resources Evaluation of the Colma Wastewater Collection System, Town of Colma, San Mateo County, California	
S-003155	David Chavez	1980	Cultural Resources Evaluation	Archaeological Resources Evaluation for the Bart Daly City Station Turnback Improvement Project, San Mateo County, California	
S-003175	William Roop	1976	Cultural Resources Assessment	Belle Air Island Property (letter report)	
S-010402	Rebecca Loveland Anastasio, Donna M. Garaventa, Stuart A. Guedon, Robert M. Harmon, and John W. Schoenfelder	1988	Cultural Resources Assessment	A Cultural Resources Assessment for San Francisco Resource Supply Study, (San Mateo Substation to Martin Substation), Daly City to City of San Mateo, San Mateo County, California	
S-011396	BioSystems Analysis, Inc	1989	Cultural Resources Technical Report	Technical Report of Cultural Resources Studies for the Proposed WTG-WEST, Inc., Los Angeles to San Francisco and Sacramento, California: Fiber Optic Cable Project	numerous
S-013543	Matthew R. Clark	1992	Cultural Resources Evaluation	Initial Archaeological Evaluation of Proposed Park Additions and a Portion of the Colma Creek Channel for the Orange Memorial Park Master Plan EIR, South San Francisco	
S-016687	Carolyn Rice	1994	Draft EIR/ Supp Draft EIS Archaeological Survey Report	BART-San Francisco Airport Extension Project, Draft Environmental Impact Report/Supplemental Draft Environmental Impact Statement, Archaeological Survey Report	41-000409
S-016688	Carolyn Rice	1994	Draft EIR/ Supp Draft EIS Archaeological Resources Technical Report	BART-San Francisco Airport Extension Project, Draft Environmental Impact Report/ Supplemental Draft Environmental Impact Statement, Archaeological Resources Technical Report	41-000409
S-017191	Laurence H. Shoup, Mark Brack, Nancy Fee, and Bruno Giberti	1994	Draft EIR/ Supp EIS Historic Resources Evaluation Report	BART-San Francisco Airport Extension Project, Draft Environmental Impact Report/ Supplemental Environmental Impact Statement: A Historic Resources Evaluation Report of Seven Colma Cemeteries, Colma, California	41-000400 41-000401 41-000402 41-000403 41-000404 41-000405

2. Studies not generally cited in report references. All are on file with the NWIC/CHRIS, Sonoma State University.

TABLE 2, con't
STUDIES WITHIN AND IN THE VICINITY[3]

Study #	Author	Date	Study Type	Title	Resources
S-017192	Laurence H. Shoup, Mark Brack, Nancy Fee, and Bruno Giberti	1994	Draft EIR/ Supp Draft EIS Historic Architectural Survey Technical Report	BART-San Francisco Airport Extension Project, Draft Environmental Impact Report/ Supplemental Environmental Impact Statement, Historic Architectural Survey Technical Report	numerous
S-017730	Carolyn Rice	1995	Cultural Resources Technical Report	Colma Creek Zone Drainage Improvements Project, Cultural Resources Technical Report	
S-017993	Brian Hatoff, Barb Voss, Sharon Waechter, Stephen Wee, and Vance Bente	1995	Cultural Resources Inventory	Cultural Resources Inventory Report for the Proposed Mojave Northward Expansion Project	numerous
S-020359	William Roop and Dea Bacchetti	1997	Cultural Resources Evaluation	A Cultural Resources Evaluation of the Macy's Warehouse Site, El Camino Real, South San Francisco, California	
S-022243	Robert M. Harmon	1999	Literature Search	Literature Search Update for the San Mateo-Martin 115kV Reconductoring Project (letter report)	41-000281 41-000311 41-000314
S-022258	Suzanne Baker	1999	Monitoring Closure Report	BART Construction Archaeological Monitoring, Prehistoric Site CA-SMA-299 (letter report)	41-000409
S-022259	Suzanne Baker	1999	Monitoring Closure Report	BART Construction Archaeological Monitoring, Prehistoric Site CA-SMA-299 (letter report)	41-000409
S-022656	Matthew R. Clark	2000	Subsurface Archaeological Reconnaissance	Initial Subsurface Archaeological Reconnaissance of Two Redevelopment Parcels on Chestnut Avenue in the City of South San Francisco, California, with Preliminary Resource Evaluation and Management Recommendations	41-000495
S-022972	Matthew R. Clark	2000	Subsurface Archaeological Reconnaissance	An Addendum To: Initial Subsurface Archaeological Reconnaissance of Two Redevelopment Parcels on Chestnut Avenue in the City of South San Francisco, California; with Preliminary Resource Evaluation and Management Recommendations	41-000495
S-023263	George McKale and Sara E.P. Gillies	2000	Cultural Resources Assessment	Cultural Resources Assessment, Phase II, United Golden Gate Power Project, San Francisco International Airport, San Mateo County, California	
S-023264	James R. Allan	2000	Paleontological Resources Assessment	Paleontological Resources Assessment, Phase II, United Golden Gate Power Project, San Francisco International Airport, San Mateo County, California	
S-023271	Matthew R. Clark	2000	Subsurface Archaeological Reconnaissance	Final Report: Subsurface Archaeological Reconnaissance, Assessment of Potential Project Impacts, and Resource Management Recommendations for the Chestnut Creek Senior Housing Project, South San Francisco	41-000495
S-024907	Matthew R. Clark	2002	Archaeological Monitoring Plan	Colma Creek Flood Control Project, Archaeological Monitoring Plan	
S-026406	Matthew R. Clark	2003	Monitoring Closure Report	Colma Creek Flood Control Project, Final Report of Archaeological Monitoring	

3. Studies not generally cited in report references. All are on file with the NWIC/CHRIS, Sonoma State University.

TABLE 2, con't
STUDIES WITHIN AND IN THE VICINITY[4]

Study #	Author	Date	Study Type	Title	Resources
S-027830	Archaeological Resource Management	2003	Historic Evaluation	Historic Evaluation of the Structures at 1410 El Camino Real in the City of South San Francisco	41-002114
S-027831	Archaeological Resource Management	2003	Cultural Resource Evaluation	Cultural Resource Evaluation of the Property at 1410 El Camino Real in the City of South San Francisco.	41-002114
S-027930	Kyle Brown, Adam William Marlow, James Allan, and William Self	2003	Cultural Resource Assessment	Cultural Resource Assessment of Alternative Routes for PG&E's Jefferson-Martin Transmission Line, San Mateo County, California	numerous
S-029657	Wendy J. Nelson, Tammara Norton, Larry Chiea, and Reinhard Pribish	2002	Archaeological Inventory	Archaeological Inventory for the Caltrain Electrification Program Alternative in San Francisco, San Mateo, and Santa Clara Counties, California	numerous
S-030760	Laura Leach-Palm and Brian F. Byrd	2005	Archaeological Inventory	Archaeological Inventory for the South San Francisco Four-Tracking and New Station Project, Caltrain Peninsula Corridor Line, San Mateo County, California, From North of Tunnel Avenue in Brisbane, MP 6.1, to Colma Creek in San Bruno, MP 9.7	41-002140 41-002141 41-002147
S-031689	Matthew R. Clark	2006	Archaeological Inventory	City of South San Francisco Wet Weather Program, Extended Phase 1 Historic Properties Inventory Research: Subsurface Reconnaissance for Phase 4, Task 1: Pump Station 4 Improvements and Force Main	41-002164
S-031824	Laura Leach-Palm and Brian F. Byrd	2006	Archaeological Inventory	Archaeological Inventory for the South San Francisco Station and Track Work Project, Caltrain Peninsular Corridor Line, San Mateo County, California, From North of Tunnel Avenue in Brisbane, MP 6.1., to Scott Street in San Bruno, MP 10.6	41-000497 41-002140 41-002141 41-002147 41-002160
S-032250	Philippe Lapin	2003	Historic Property Survey Report	Historic Property Survey Report, Mission Bells Project, State Route 82/Interstate 101, San Mateo and Santa Clara Counties, California	
S-033061	Nancy Sikes, Cindy Arrington, Bryon Bass, Chris Corey, Kevin Hunt, Steve O'Neil, Catherine Pruett, Tony Sawyer, Michael Tuma, Leslie Wagner, and Alex Wesson	2006	Monitoring Closure Report	Cultural Resources Final Report of Monitoring and Findings for the Qwest Network Construction Project, State of California	numerous
S-033061a	SWCA Environmental Consultants	2006	Monitoring Closure Report	Cultural Resources Final Report of Monitoring and Findings for the Qwest Network Construction Project, State of California	
S-033061b	Nancy E. Sikes	2007	Monitoring Closure Report	Final Report of Monitoring and Findings for the Qwest Network Construction Project (letter report)	
S-033504	Heather Price	2007	Historical Resources Evaluation Report	Historical Resources Evaluation Report, Exhibit I of HPSR, Seismic Retrofit of BART Aerial Structures and Stations Along Concord, Richmond, Daly City and Fremont Lines, District 4, Alameda, Contra Costa, San Francisco, and San Mateo Counties, STPLZ-6000	38-004513 38-004514 38-004515 38-004516

4. Studies not generally cited in report references. All are on file with the NWIC/CHRIS, Sonoma State University.

TABLE 2, con't
STUDIES WITHIN AND IN THE VICINITY[5]

Study #	Author	Date	Study Type	Title	Resources
S-033505	Heather Price	2007	Archaeological Survey Report	Archaeological Survey Report Exhibit II of HPSR, Seismic Retrofit of BART Aerial Structures and Stations along the Concord, Richmond, Daly City and Fremont Lines, District 4, Alameda, Contra Costa, San Francisco, and San Mateo Counties, STPLZ- 6000 (25)	
S-033506	Cameron Bauer and Heather Price	2007	Historic Property Survey Report	Historic Property Survey Report, Seismic Retrofit of BART Aerial Structures and Stations Along the Concord, Richmond, Daly City and Fremont Lines, Alameda, Contra Costa, and San Mateo Counties, STPLZ-6000 (25)	38-004513 38-004514 38-004515 38-004516
S-033611	Matthew R. Clark	2006	Cultural Resources Report	South San Francisco Wet Weather Program: Phase II Altered APE & Effect on MOA (letter report)	41-000495
S-034087	Matthew R. Clark	2007	Monitoring Closure Report	City of South San Francisco Wet Weather Program Project, Section 106 Compliance for the South San Francisco Wet Weather Program: Phase I Archaeological Monitoring Report	
S-034087a	Matthew R. Clark	2002	Research Design	City of South San Francisco Wet Weather Program Project, Research Design for Historic Properties Identification for National Historic Preservation Act Section 106 Compliance for Phase 1 Project Elements	
S-035458	Matthew R. Clark	2008	Initial CEQA Historic Resources Research	City of South San Francisco East of 101 Sewer Improvements, Initial CEQA Historic Resources Research for East Grand, Allerton, Forbes & DNA Way Sanitary Sewer Project	
S-035507	Matthew R. Clark	2008	Archaeological Monitoring Report	City of South San Francisco Wet Weather Program Project, Section 106 Compliance for the South San Francisco Wet Weather Program: Phase II Archaeological Monitoring Report	41-002207
S-035507a	Matthew R. Clark	2007	Inventory, Subsurface Testing Report	City of San Francisco Wet Weather Program, Historic Properties Inventory Research and Subsurface Reconnaissance for Proposed Phase 2 Facilities (EPA 020713 A)	
S-035507b	Matthew R. Clark and Kathryn Entricken	2003	Archaeological Monitoring Report	City of San Francisco Wet Weather Program Project, Section 106 Compliance for Phase 3: The Colma Creek Bank Protection Project Archaeological Monitoring Report	
S-035858	Sunshine Psota	2009	Literature Search	Cultural Resources Records Search Review for Serramonte Blvd. Overlay between Junipero Serra Blvd. and El Camino Real, Colma, San Mateo County, Federal Project Number: ESPL 5264 (003) (letter report)	
S-036747	JRP Historical Consulting	2006	Finding of No Adverse Effect	Finding of No Adverse Effect for the Peninsula Corridor Joint Powers Board, South San Francisco Station and Track Work Project, Brisbane, South San Francisco and San Bruno, San Mateo County, California, Caltrans Mile Posts: 06.10 to 10.60	

5. Studies not generally cited in report references. All are on file with the NWIC/CHRIS, Sonoma State University.

TABLE 2, con't
STUDIES WITHIN AND IN THE VICINITY[6]

Study #	Author	Date	Study Type	Title	Resources
S-037087	James Allan	2010	Cultural Resources Assessment	Cultural Resources Assessment of the Colma Creek Flood Control Channel Wall Repair Project, South San Francisco, San Mateo County, California (letter report)	
S-039631	Allen G. Pastron and Michelle Touton	2011	Archaeological Survey Report	Historic Context and Archaeological Survey Report for the Regional Groundwater Storage and Recovery Project Area, San Mateo County, California	
S-039770	Archeo-Tec	2011	Archaeological Survey Plan	San Francisco Public Utilities Commission, Regional Groundwater Storage and Recovery Project, Archaeological Survey Plan	

LITERATURE REVIEW

No known Native American villages, trails, traditional use areas or contemporary use areas and/or other features of cultural significance have been identified within or adjacent to the alignment.

No known Hispanic Period expeditions, adobe dwellings, or other structures, features, etc. have been reported in or adjacent to the proposed project.

The *Creek & Watershed Map of Daly City & Vicinity* (Givler and Sowers 2007) maps portions of the project APE within Reaches 2 and 3 as within “Historical Tidal Marsh” through which Colma Creek flowed/meandered.

None of the historic or contemporary maps reviewed indicate the presence of potential archaeological/cultural resources in or adjacent to the proposed project.

No NRHP or CRHR listed properties (buildings and/or structures) were identified in or are adjacent to the APE.

NATIVE AMERICAN HERITAGE COMMISSION CONSULTATION [see Attachments]

The Native American Heritage Commission (NAHC) review of the Sacred Lands Files was negative (Pilas-Treadway 2014). Nine letters were sent to the individuals/groups listed by the NAHC “who may have knowledge of cultural resources in the project area.” Five individuals responded with no immediate concerns. The other individuals/groups did not respond.

ARCHAEOLOGICAL SENSITIVITY

The archival and literature record and focused subsurface archaeological testing within and adjacent to the creek alignment suggests a moderate to high potential for exposing significant subsurface archaeological resources with integrity adjacent to the stream channel

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6. Studies not generally cited in report references. All are on file with the NWIC/CHRIS, Sonoma State University.

at depths greater than 1.5 to 5.0 meters below the present grade. This observation is based on data from two buried prehistoric sites in Reaches 1 and 3 discovered during subsurface coring. It is probable that these former surface resources were buried by overbank flooding prior to the channelization of the creek for flood control. No surface indications of archaeological resources have been noted over the past 25 years during numerous construction projects.

RECOMMENDED PROJECT PERMIT CONDITIONS

A reasonable and good faith effort to identify cultural resources within the project APE was completed. The proposed project alignment has been impacted by construction of the Colma Creek flood control channel, maintenance road construction, culverting and is adjacent to industrial and commercial development that has occurred over the past 60 years.

Subsurface testing is not recommended due to the nature of the project. The objective of the proposed Colma Creek Flood Control Channel Maintenance Project is to complete various maintenance activities along the approximately 5.4 miles of the Colma Creek flood control channel to provide adequate flood conveyance capacity in the channel. Primary maintenance activities for Reaches 1 to 3 include: sediment removal at specific locations upstream of the U.S. 101/Bayshore Freeway crossing of Colma Creek; repair of blocked culverts, bank repair, debris and trash removal, vegetation management, and maintenance of trash capture devices. These maintenance activities coupled with the impacts from surface and subsurface disturbance from previous construction including the use of historic fill of the formal tidal marsh appear to preclude reliable systematic subsurface investigation to supplement the research results. Two buried recorded prehistoric sites are present within the APE and were discovered during coring operations.

CA-SMA-380, is within the APE for Reach 3. This resource is located under historic fill at depths ranging from 516 to 889 cm (17 to 29 feet). Project activities in this area of Reach 3 include clearing sediment and debris from blocked culvert outfalls, vegetation management on channel banks, installing and maintaining trash collection devices, debris removal at crossings, and invasive vegetation removal. None of these activities which require maintenance and enhancement of in-place structures or minimal surface impacts will impact the buried resource.

CA-SMA-355 is within Reach 1 and is buried under 1.5 to 7.3 meters (5-24 feet) of natural and artificial overburden. Project activities in this area of Reach 1 include vegetation management on channel banks, repair or maintenance of concrete/hardened streambanks, fence installation and maintenance on channel banks, debris removal, and installing and maintaining trash collection devices. None of these activities which require maintenance and enhancement of in-place structures or minimal surface impacts will impact the buried resource.

One recorded historic resource (CA-SMA-353H) is present possibly adjacent to the Reach 2 APE but will not be affected by channel sediment removal and disposal since all work will be within the APE for the project.

The proposed project will have no effect on the values for which the cemeteries adjacent to Reach 1 have been determined eligible for inclusion on the NRHP and the CRHP. Colma Creek is nearly contained within a culvert at the cemeteries and the proposed project will not affect the setting or cultural landscape of the cemeteries as the maintenance actions will not change the existing setting.

The development of a formal *Post-Review Discovery Plan* is not recommended due to the low potential for exposing significant archaeological materials[7] within the APE based on the proposed minimal ground disturbing maintenance activities. Both of the buried archaeological resources (SMA-355 and SMA-380) are at depths that will not be disturbed by the minimal ground disturbance of the proposed project.

Discoveries will be reviewed in accordance with 36 CFR Part 800.13(b)(3) for Post-Review Discoveries.[8] These may require identification and evaluation of the cultural materials and could result in the development of a treatment program including scientific removal, analysis and reporting.

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7. Significant prehistoric cultural materials may include:

   a. Human bone - either isolated or intact burials.
   b. Habitation (occupation or ceremonial structures as interpreted from rock rings/features, distinct ground depressions, differences in compaction (e.g., house floors).
   c. Artifacts including chipped stone objects such as projectile points and bifaces; groundstone artifacts such as manos, metates, mortars, pestles, grinding stones, pitted hammerstones; and, shell and bone artifacts including ornaments and beads.
   d. Various features and samples including hearths (fire-cracked rock; baked and vitrified clay), artifact caches, faunal and shellfish remains (which permit dietary reconstruction), distinctive changes in soil stratigraphy indicative of prehistoric activities.
   e. Isolated artifacts

   Significant historic cultural materials may include finds from the late 19th through early 20th centuries. Objects and features associated with the Historic Period can include.

   a. Structural remains or portions of foundations (bricks, cobbles/boulders, stacked field stone, postholes, etc.).
   b. Trash pits, privies, wells and associated artifacts.
   c. Isolated artifacts or isolated clusters of manufactured artifacts (e.g., glass bottles, metal cans, manufactured wood items, etc.).
   d. Human remains.

   In addition, cultural materials including both artifacts and structures that can be attributed to Hispanic, Asian and other ethnic or racial groups are potentially significant. Such features or clusters of artifacts and samples include remains of structures, trash pits, and privies.

8. 36 CFR Part 800.13(b)(3) - if the agency official has approved the undertaking and construction has commenced, determine actions that the agency official can take to resolve adverse effects, and notify the SHPO/THPO, any Indian tribe or Native Hawaiian organization that might attach religious and cultural significance to the affected property, and the Council within 48 hours of the discovery. The notification shall describe the agency official's assessment of National Register eligibility of the property and proposed actions to resolve the adverse effects. The SHPO/THPO, the Indian tribe or Native Hawaiian organization and the Council shall respond within 48 hours of the notification. The agency official shall take into account their recommendations regarding National Register eligibility and proposed actions, and then carry out appropriate actions. The agency official shall provide the SHPO/THPO, the Indian tribe or Native Hawaiian organization and the Council a report of the actions when they are completed.

State law shall be followed in regard to the discovery of Native American burials (Chapter 1492, Section 7050.5 to the Health and Safety Code, Sections 5097.94, 5097.98 and 5097.99 of the Public Resources Code). If the remains are Native American, the San Mateo County Medical Examiner has two working days to examine the remains and must notify the Native American Heritage Commission (NAHC) within 24 hours if it is determined that the remains are Native American. The NAHC will immediately appoint a Most Likely Descendant (MLD)[9] who has 48 hours to provide recommendations to the land owner for the protection and treatment of the remains.[10] It is not yet known what type of recovery or treatment action might be recommended by the MLD. If the descendent does not make recommendations within 48 hours the owner shall reinter the remains in an area of the property secure from further disturbance, or if the owner does not accept the MLD's recommendations, the owner or the MLD may request mediation by the NAHC.

CLOSING REMARKS

If I can provide any additional information or be of further service please don't hesitate to contact me.

Sincerely yours,
BASIN RESEARCH ASSOCIATES, INC.,

Colin I. Busby, Ph.D., RPA
Principal

CIB/dg
Enclosures

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9. California law uses the term "Most Likely Descendent" (MLD); that is, an individual recognized by the NAHC as most likely descended from the deceased Native American. Under California law this individual can recommend appropriate treatment of Native American human remains (e.g., *in situ* preservation, exhumation, analyses, report, etc.) discovered during construction or other activities.

10. Human Remains means the physical remains of a human body, including but not limited to bones, teeth, hair, ashes, or mummified or otherwise preserved soft tissues of a person of Native American ancestry.

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P-41-000048 (CA-SMA-44; Nelson #383).
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<u>Abbreviations</u>

n.d. no date
v.d. various dates
N.P. no publisher noted
n.p. no place of publisher noted

The abbreviated phrase "CHRIS/NWIC, Sonoma State University, Rohnert Park" is used for material on file at the California Historical Resources Information System, Northwest Information Center, California State University Sonoma, Rohnert Park.

ATTACHMENTS

FIGURES

FIGURE 1	General Project Location
FIGURE 2	Project Location (USGS San Francisco South, CA 1995 and Hunters Point, CA 1993)
FIGURE 3	Colma Creek Flood Control Maintenance Project Action Area
FIGURE 4	Archaeological Area of Potential Effects

CORRESPONDENCE

LETTER	Request to Native American Heritage Commission (October 22, 2014)
LETTER	Response from Native American Heritage Commission (November 5, 2014)
LETTER	Letters to Native Americans Recommended by the Native American Heritage Commission (November 12, 2014)
MEMO	Record of Native American Contacts, Proposed Colma Creek Flood Control Maintenance Project, San Mateo County (December 1, 2014)

CHRIS/NWIC SEARCH RESULTS

SEARCH	File No. 14-0524 dated 11/13/2014 and File No. 14-0813 dated 1/26/2015 (**No Confidential Information**) [Confidential Information on file with Basin Research Associates, San Leandro]

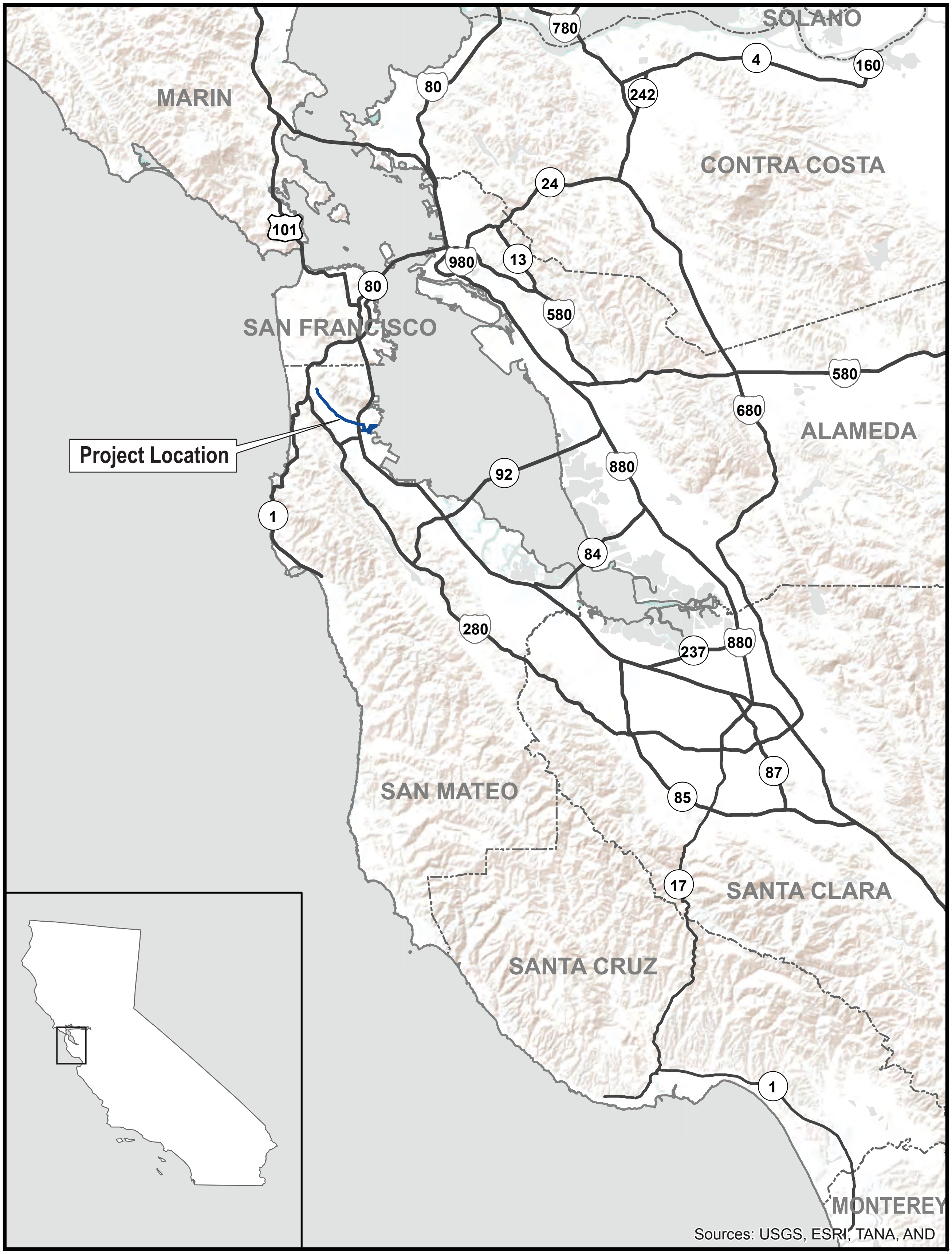


Figure 1: General Project Location

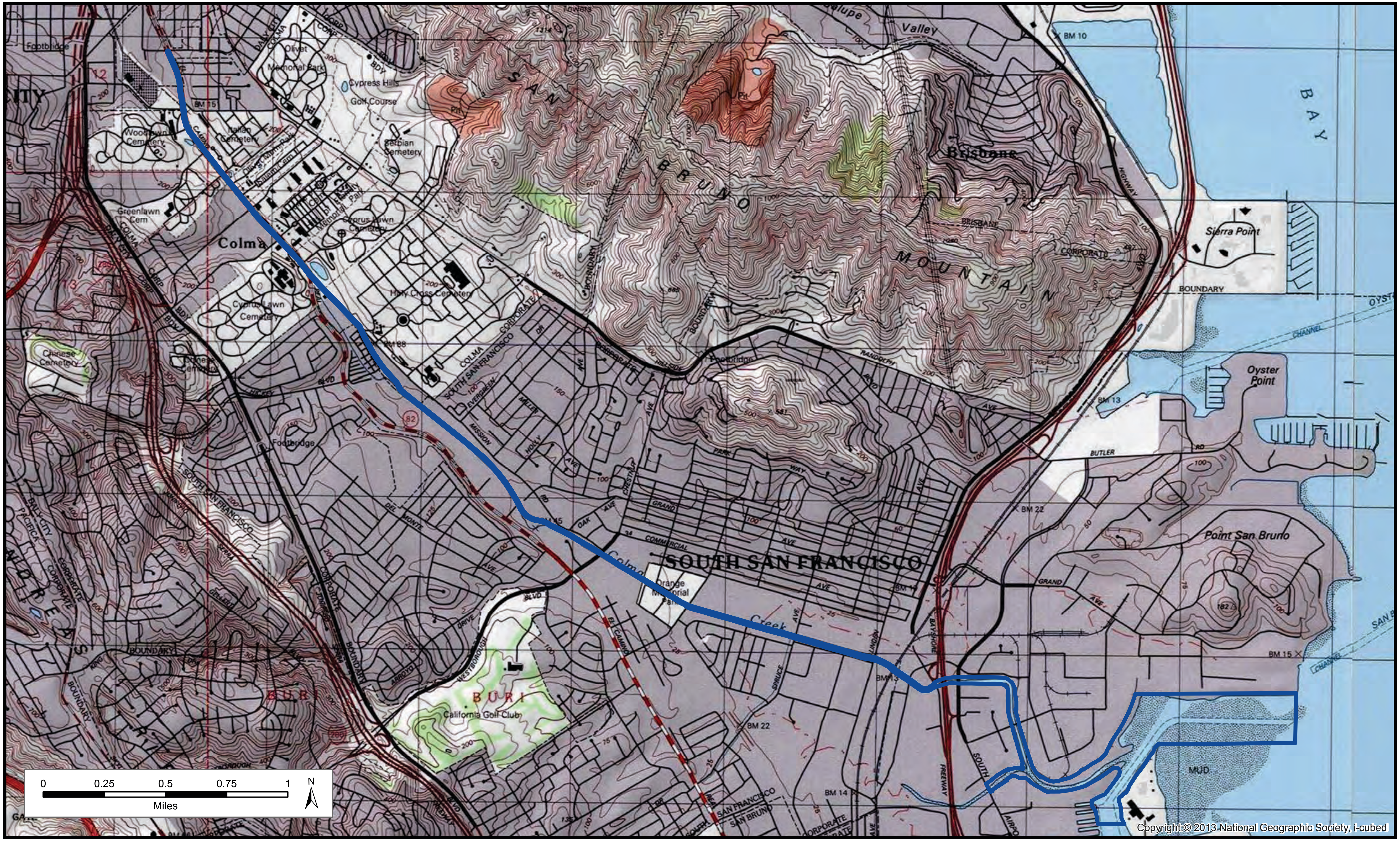
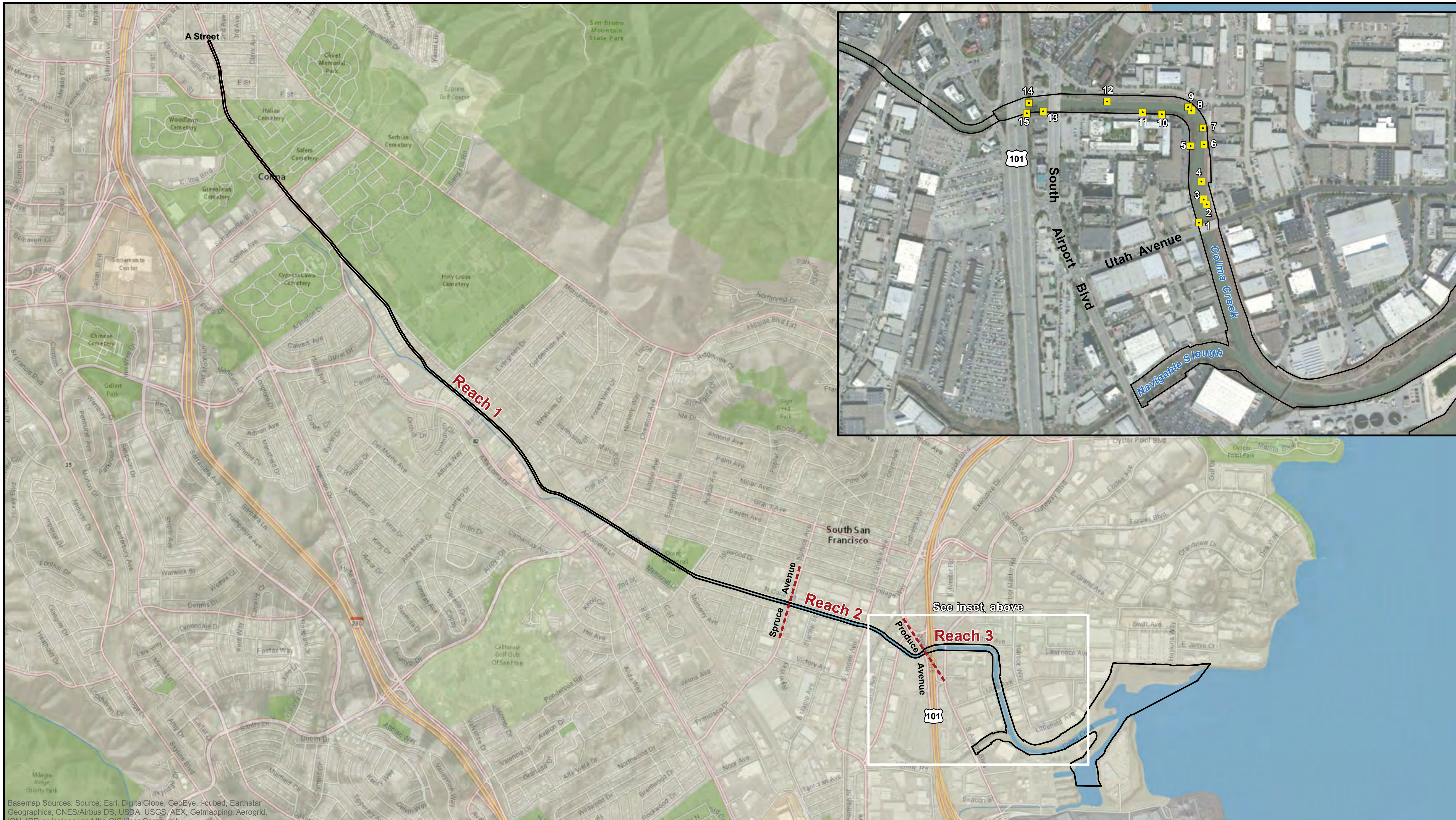


Figure 2: Project Location (USGS San Francisco South, CA 1995 and Hunters Point, CA 1993)



Prepared by:

Horizon WATER and ENVIRONMENT

N

Miles

0 0.25 0.5

Action Area

Culvert

Reach Break

Colma Creek
Flood Control Maintenance Project

Figure 3

Action Area

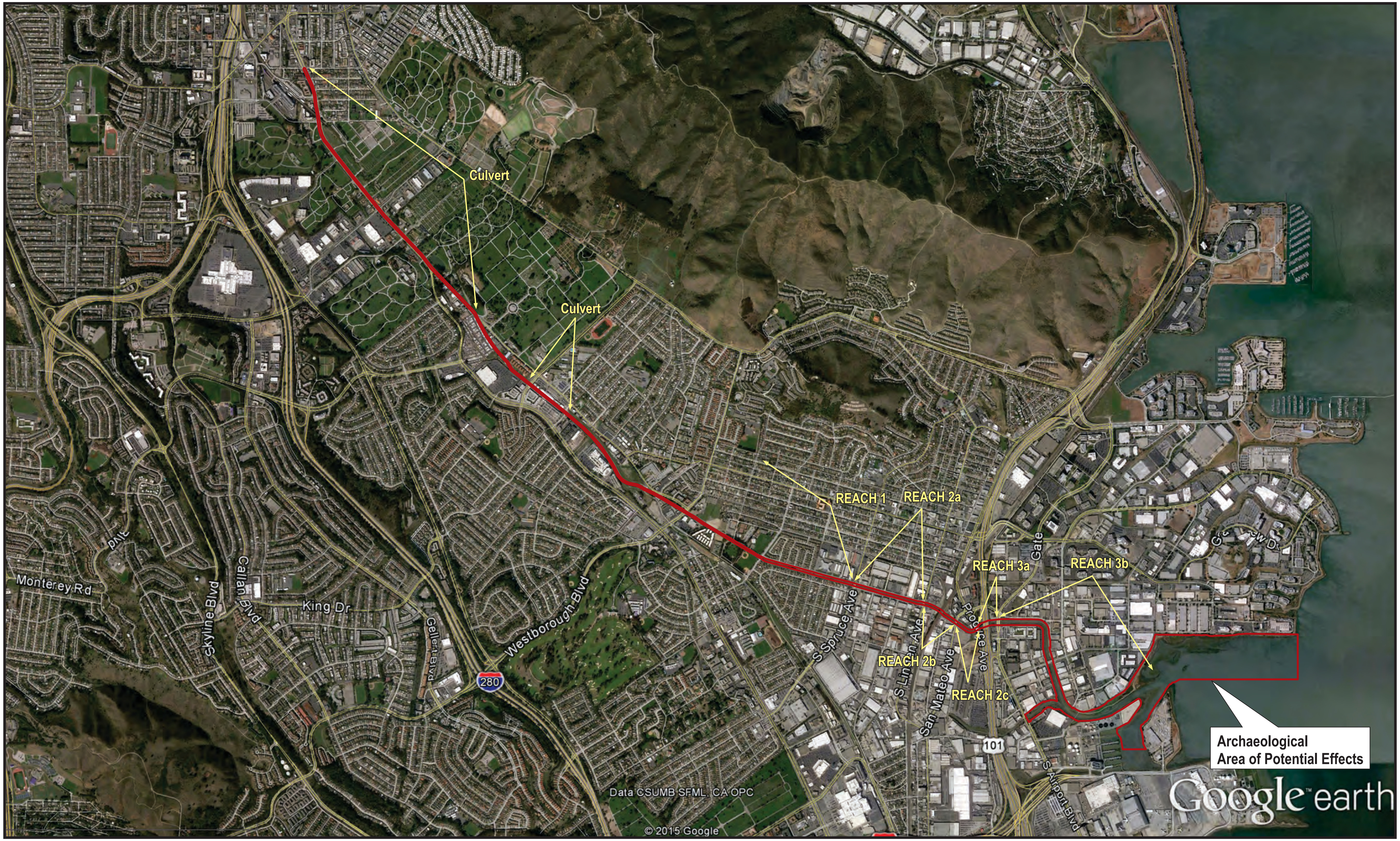


Figure 4: Archaeological Area of Potential Effects

October 22, 2014

BASIN RESEARCH ASSOCIATES

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Ms. Cynthia Gomez
Executive Secretary
Native American Heritage Commission
1550 Harbor Boulevard
West Sacramento, CA 95691

RE: Request for Review of Sacred Lands Inventory –
Colma Creek Flood Control Maintenance Project, San Mateo County

Dear Ms. Gomez,

Please let this letter stand as our request for the Native American Heritage Commission (NAHC) to conduct a review of the NAHC *Sacred Lands Inventory* to determine if any listed properties are present within or adjacent to the above proposed project area (see enclosed USGS map).

The proposed project consists of a proposed small scale sediment removal within a portion of Colma Creek, an engineered flood control channel, located in the City of South San Francisco.

Information from the NAHC *Sacred Lands Inventory* will be used in cultural resources letter report/memo to determine if significant archaeological resources may be affected by the proposed project.

If I can provide any further information, please don't hesitate to contact me (510 430-8441 or Basinres1@gmail.com). Thank you for your timely review of our request.

BASIN RESEARCH ASSOCIATES, INC.

Colin I. Busby, Ph.D., RPA
Principal

CIB/dg

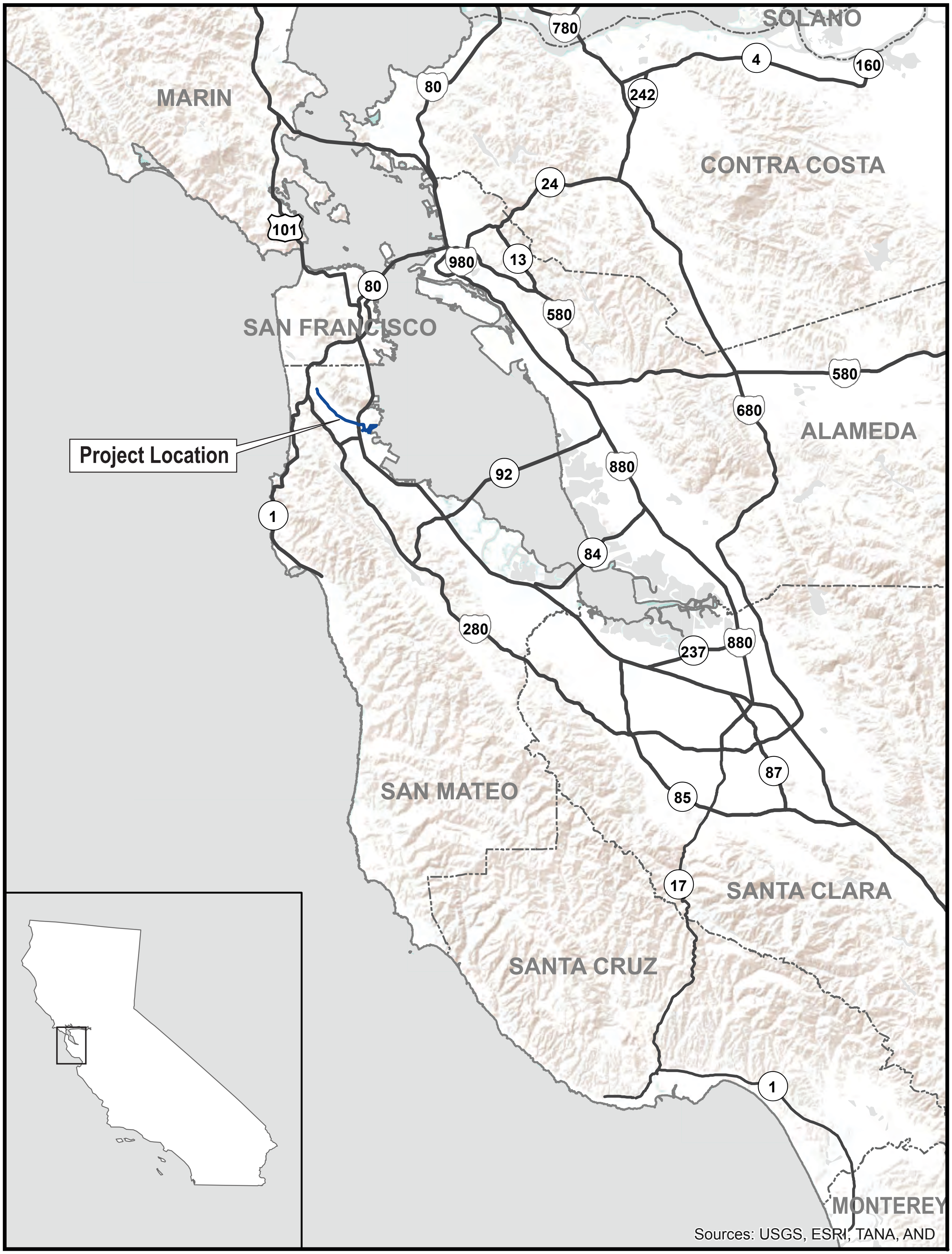

Figure 1: General Project Location

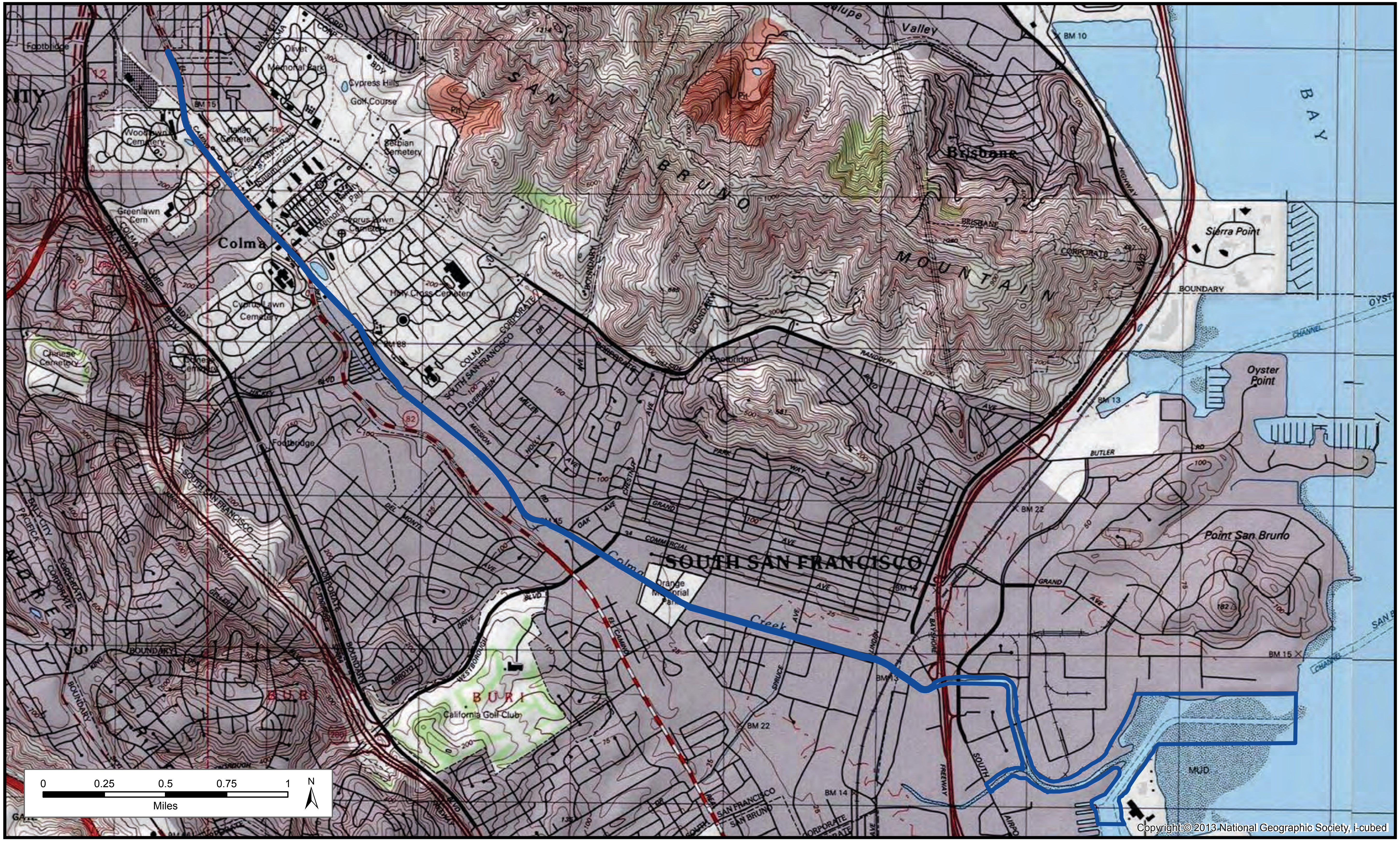

Figure 2: Project Location (USGS San Francisco South, CA 1995 and Hunters Point, CA 1993)

STATE OF CALIFORNIA Edmund G. Brown, Jr., Governor

NATIVE AMERICAN HERITAGE COMMISSION

1550 Harbor Blvd.
West Sacramento, CA 95691
(916) 373-3710
Fax (916) 373-5471

November 5, 2014

Colin I Busby Ph.D
BASIN
1933 Davis Street, Ste 210
San Leandro, CA 94577

By: FAX: 510-430-8443

2 Pages

Re: Colma Creek Flood Control Maintenance project, San Mateo County

Dr. Busby;

A record search of the sacred land file has failed to indicate the presence of Native American cultural resources in the immediate project area. The absence of specific site information in the sacred lands file does not indicate the absence of cultural resources in any project area. Other sources of cultural resources should also be contacted for information regarding known and recorded sites.

Enclosed is a list of Native Americans individuals/organizations who may have knowledge of cultural resources in the project area. The Commission makes no recommendation or preference of a single individual, or group over another. This list should provide a starting place in locating areas of potential adverse impact within the proposed project area. I suggest you contact all of those indicated, if they cannot supply information, they might recommend others with specific knowledge. By contacting all those listed, your organization will be better able to respond to claims of failure to consult with the appropriate tribe or group. If a response has not been received within two weeks of notification, the Commission requests that you follow-up with a telephone call to ensure that the project information has been received.

If you receive notification of change of addresses and phone numbers from any of these individuals or groups, please notify me. With your assistance we are able to assure that our lists contain current information. If you have any questions or need additional information, please contact me at (916) 373-3713.

Sincerely,

Katy Sanchez for

Debbie Pilas-Treadway
Environmental Specialist III

Native American Contacts
San Mateo County
November 7, 2014

Jakki Kehl
720 North 2nd Street — Ohlone/Costanoan
Patterson , CA 95363
jakkikehl@gmail.com
510-701-3975

Indian Canyon Mutsun Band of Costanoan
Ann Marie Sayers, Chairperson
P.O. Box 28 — Ohlone/Costanoan
Hollister , CA 95024
ams@indiancanyon.org
(831) 637-4238

Linda G. Yamane
1585 Mira Mar Ave — Ohlone/Costanaon
Seaside , CA 93955
rumsien123@yahoo.com
(831) 394-5915

Muwekma Ohlone Indian Tribe of the SF Bay Area
Rosemary Cambra, Chairperson
P.O. Box 360791 — Ohlone / Costanoan
Milpitas , CA 95036
muwekma@muwekma.org
(408) 205-9714
(510) 581-5194

Amah MutsunTribal Band of Mission San Juan Bautista
Irene Zwierlein, Chairperson
789 Canada Road — Ohlone/Costanoan
Woodside , CA 94062
amahmutsuntribal@gmail.com
(650) 400-4806 Cell
(650) 332-1526 Fax

The Ohlone Indian Tribe
Andrew Galvan
P.O. Box 3152 — Ohlone/Costanoan, Bay Miwok, Plains Miwok, Patwin
Fremont , CA 94539
chochenyo@AOL.com
(510) 882-0527 Cell
(510) 687-9393 Fax

Amah MutsunTribal Band of Mission San Juan Bautista
Michelle Zimmer
789 Canada Road — Ohlone/Costanoan
Woodside , CA 94062
amahmutsuntribal@gmail.com
(650) 851-7747 Home
(650) 332-1526 Fax

Trina Marine Ruano Family
Ramona Garibay, Representative
30940 Watkins Street — Ohlone/Costanoan, Bay Miwok, Plains Miwok, Patwin
Union City , CA 94587
soaprootmo@comcast.net
(510) 972-0645

Coastanoan Rumsen Carmel Tribe
Tony Cerda, Chairperson
240 E. 1st Street — Ohlone/Costanoan
Pomona , CA 91766
rumsen@aol.com
(909) 524-8041 Cell
(909) 629-6081

This list is current only as of the date of this document.

Distribution of this list does not relieve any person of statutory responsibility as defined in Section 7050.5 of the Health and Safety Code, Section 5097.94 of the Public Resource Section 5097.98 of the Public Resources Code

This list is only applicable for contacting local Native Americans with regard to cultural resources for the proposed Colma Creek Flood Control Maintenance project, San Mateo County

BASIN
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1933 DAVIS STREET
SUITE 210
SAN LEANDRO, CA 94577
VOICE (510) 430-8441
FAX (510) 430-8443

November 12, 2014

Ms. Jakki Kehl
720 North Second Street
Patterson, CA 95363

RE: Request for Information
Colma Creek Flood Control Maintenance Project, San Mateo County

Dear Jakki,

The Native American Heritage Commission has provided your name as an individual who may have information regarding Native American sites within or adjacent to the above proposed project (see enclosed USGS map).

The proposed project consists of a proposed small scale sediment removal within a portion of Colma Creek, an engineered flood control channel, located in the City of South San Francisco.

Any information provided will be used in cultural resources letter report/memo to determine if significant archaeological resources may be affected by the proposed project.

If I can provide any further information, please don't hesitate to contact me (510 430-8441 or Basinres1@gmail.com). Thank you for your timely review of our request.

BASIN RESEARCH ASSOCIATES, INC.

Colin I. Busby, Ph.D., RPA
Principal

CIB/dg

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1933 DAVIS STREET
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SAN LEANDRO, CA 94577
VOICE (510) 430-8441
FAX (510) 430-8443

November 12, 2014

Ms. Linda G. Yamane
1585 Mira Mar Avenue
Seaside, CA 93955

RE: Request for Information
Colma Creek Flood Control Maintenance Project, San Mateo County

Dear Linda,

The Native American Heritage Commission has provided your name as an individual who may have information regarding Native American sites within or adjacent to the above proposed project (see enclosed USGS map).

The proposed project consists of a proposed small scale sediment removal within a portion of Colma Creek, an engineered flood control channel, located in the City of South San Francisco.

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FAX (510) 430-8443

November 12, 2014

Ms. Irenne Zwierlein, Chairperson
Amah/Mutsun Tribal Band
789 Canada Road
Woodside, CA 94062

RE: Request for Information
Colma Creek Flood Control Maintenance Project, San Mateo County

Dear Irenne,

The Native American Heritage Commission has provided your name as an individual who may have information regarding Native American sites within or adjacent to the above proposed project (see enclosed USGS map).

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1933 DAVIS STREET
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VOICE (510) 430-8441
FAX (510) 430-8443

November 12, 2014

Ms. Michelle Zimmer
Amah/Mutsun Tribal Band of Mission San Juan Bautista
789 Canada Road
Woodside, CA 94062

RE: Request for Information
Colma Creek Flood Control Maintenance Project, San Mateo County

Dear Michelle,

The Native American Heritage Commission has provided your name as an individual who may have information regarding Native American sites within or adjacent to the above proposed project (see enclosed USGS map).

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FAX (510) 430-8443

November 12, 2014

Mr. Tony Cerda
Chairperson
Coastanoan Rumsen Carmel Tribe
240 E. 1st Street
Pomona, CA 91766

RE: Request for Information
Colma Creek Flood Control Maintenance Project, San Mateo County

Dear Tony,

The Native American Heritage Commission has provided your name as an individual who may have information regarding Native American sites within or adjacent to the above proposed project (see enclosed USGS map).

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BASIN RESEARCH ASSOCIATES, INC.

Colin I. Busby, Ph.D., RPA
Principal

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FAX (510) 430-8443

November 12, 2014

Ms. Ann Marie Sayers, Chairperson
Indian Canyon Mutsun Band of Costanoan
P.O. Box 28
Hollister, CA 95024

RE: Request for Information
Colma Creek Flood Control Maintenance Project, San Mateo County

Dear Ann Marie,

The Native American Heritage Commission has provided your name as an individual who may have information regarding Native American sites within or adjacent to the above proposed project (see enclosed USGS map).

The proposed project consists of a proposed small scale sediment removal within a portion of Colma Creek, an engineered flood control channel, located in the City of South San Francisco.

Any information provided will be used in cultural resources letter report/memo to determine if significant archaeological resources may be affected by the proposed project.

If I can provide any further information, please don't hesitate to contact me (510 430-8441 or Basinres1@gmail.com). Thank you for your timely review of our request.

BASIN RESEARCH ASSOCIATES, INC.

Colin I. Busby, Ph.D., RPA
Principal

CIB/dg

November 12, 2014

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FAX (510) 430-8443

Ms. Rosemary Cambra
Chairperson
Muwekma Ohlone Tribe of the SF Bay Area
P.O. Box 360791
Milpitas, CA 95036

RE: Request for Information
Colma Creek Flood Control Maintenance Project, San Mateo County

Dear Rosemary,

The Native American Heritage Commission has provided your name as an individual who may have information regarding Native American sites within or adjacent to the above proposed project (see enclosed USGS map).

The proposed project consists of a proposed small scale sediment removal within a portion of Colma Creek, an engineered flood control channel, located in the City of South San Francisco.

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If I can provide any further information, please don't hesitate to contact me (510 430-8441 or Basinres1@gmail.com). Thank you for your timely review of our request.

BASIN RESEARCH ASSOCIATES, INC.

Colin I. Busby, Ph.D., RPA
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SAN LEANDRO, CA 94577
VOICE (510) 430-8441
FAX (510) 430-8443

November 12, 2014

Mr. Andrew Galvan
The Ohlone Indian Tribe
P.O. Box 3152
Fremont, CA 94539

RE: Request for Information
Colma Creek Flood Control Maintenance Project, San Mateo County

Dear Andrew ,

The Native American Heritage Commission has provided your name as an individual who may have information regarding Native American sites within or adjacent to the above proposed project (see enclosed USGS map).

The proposed project consists of a proposed small scale sediment removal within a portion of Colma Creek, an engineered flood control channel, located in the City of South San Francisco.

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If I can provide any further information, please don't hesitate to contact me (510 430-8441 or Basinres1@gmail.com). Thank you for your timely review of our request.

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Colin I. Busby, Ph.D., RPA
Principal

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1933 DAVIS STREET
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VOICE (510) 430-8441
FAX (510) 430-8443

November 12, 2014

Ms. Ramona Garibay, Representative
Trina Marine Ruano Family
30940 Watkins Street
Union City, CA 94587

RE: Request for Information
Colma Creek Flood Control Maintenance Project, San Mateo County

Dear Ramona,

The Native American Heritage Commission has provided your name as an individual who may have information regarding Native American sites within or adjacent to the above proposed project (see enclosed USGS map).

The proposed project consists of a proposed small scale sediment removal within a portion of Colma Creek, an engineered flood control channel, located in the City of South San Francisco.

Any information provided will be used in cultural resources letter report/memo to determine if significant archaeological resources may be affected by the proposed project.

If I can provide any further information, please don't hesitate to contact me (510 430-8441 or Basinres1@gmail.com). Thank you for your timely review of our request.

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Colin I. Busby, Ph.D., RPA
Principal

CIB/dg

Record of Native American Contacts

Proposed Colma Creek Flood Control Maintenance Project, San Mateo County.

10/22/14 Letter to Ms. Cynthia Gomez, Executive Secretary, Native American Heritage Commission (NAHC), Sacramento. Regarding: Request for Review of Sacred Lands Inventory for project.

11/5/14 Letter response by Debbie Pilas-Treadway, NAHC

11/12/14 Letters sent to all parties recommended by NAHC

Letters to Jakki Kehl, Patterson; Linda G. Yamane, Seaside; Irenne Zwierlein, Chairperson, Amah Mutsun Tribal Band of Mission San Juan Bautista, Woodside; Michelle Zimmer Amah/Mutsun Tribal Band, Amah Mutsun Tribal Band of Mission San Juan Bautista, Woodside; Tony Cerda, Chairperson, Coastanoan Rumsen Carmel Tribe, Pomona, Ann Marie Sayers, Chairperson, Indian Canyon Mutsun Band of Costanoan, Hollister; Rosemary Cambra, Chairperson, Muwekma Ohlone Indian Tribe of the SF Bay Area, Milpitas; Andrew Galvan, The Ohlone Indian Tribe, Mission San Jose; and Ramona Garibay, Representative, Trina Marine Ruano Family, Lathrop.

12/1/14 Telephone calls and/or emails made by Basin Research Associates (Christopher Canzonieri) in the late morning to non-responding parties.

Jakki Kehl – called at 10:45 AM; no immediate concerns, recommends that if something is encountered the proper measures should be implemented (i.e., contact County Coroner and Native American Heritage Commission if Native American remains are exposed and follow recommendations). Also Ms. Kehl would like to be notified if something is found.

Linda G. Yamane – called at 10:54 AM; left a detailed message.

Irenne Zwierlein – called at 11:00 AM; no immediate concerns, recommends that if something is encountered the proper measures should be implemented (i.e., contact County Coroner and Native American Heritage Commission if Native American remains are exposed and follow recommendations). Also Ms. Zwierlein would like to be notified if something is found. Additionally, recommends that all crew receive cultural sensitivity training. The archaeologists should have experience with Northern and Central California archaeology and qualified and trained Native American monitors.

Michelle Zimmer – called at 11:00 AM; spoke with her mother, Ms. Zwierlein same recommendation.

Tony Cerda – called at 11:18 AM; unable to leave a message.

Ann Marie Sayers – called at 10:23 AM; left a detailed message.

Rosemary Cambra – called at 10:19 AM; unable to leave a message.

Andrew Galvan – called at 10:36 AM; Andy has no immediate concerns, but recommends that if something is encountered the proper measures should be implemented (i.e., contact County Coroner and Native American Heritage Commission if Native American remains are exposed and follow recommendations).

Ramona Garibay – called at 11:20 AM; no concerns.

CALIFORNIA
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SYSTEM

ALAMEDA
COLUSA
CONTRA COSTA
DEL NORTE

HUMBOLDT
LAKE
MARIN
MENDOCINO
MONTEREY
NAPA
SAN BENITO

SAN FRANCISCO
SAN MATEO
SANTA CLATA
SANTA CRUZ
SOLANO
SONOMA
YOLO

Northwest Information Center
Sonoma State University
150 Professional Center Drive, Suite E
Rohnert Park, California 94928-3609
Tel: 707.588.8455
nwic@sonoma.edu
http://www.sonoma.edu/nwic

11/13/2014 NWIC File No.: 14-0524

Donna Garaventa
Basin Research Associates, Inc.
1933 Davis Street, Suite 210
San Leandro, CA 94577

Resources -45 to -51
Misplotted as per NWIC

re: Colma Creek

The Northwest Information Center received your record search request for the project area referenced above, located on the San Francisco South USGS 7.5' quad. The following reflects the results of the records search for the project area and a 0.25 mile radius:

As indicated on the data request form, the locations of resources and reports are provided in the following format: ☒ custom GIS maps ☐ shapefiles ☐ hand-drawn maps

Resources within project area:	P-41-2147, 45, 46, 48, 49, 50, & 2164.
Resources within 0.25 mile radius:	P-41-42, 47, 51, & 497.
Reports within project area:	S-13543, 34087, 22243, 35458, 31689, 23263, 17730, 30760, 33061, 17993, 36747, 23264, 3043, 31824, 27930, 10402, 3175, 33611, 29657, 35507, & 37087.
Other Reports within records search radius:	S-33600, 9580, 848, 18217, 32596, 21889, 26045, 9462, 9583, 15529, & 1784. These reports are classified as Other Reports; reports with little or no field work or missing maps. The electronic maps do not depict study areas for these reports. In addition, you have not been charged digitized shape fees for the studies.

Resource Database Printout (list): ☒ enclosed ☐ not requested ☐ nothing listed

Resource Database Printout (details): ☒ enclosed ☐ not requested ☐ nothing listed

Resource Digital Database Records: ☐ enclosed ☒ not requested ☐ nothing listed

Report Database Printout (list): ☒ enclosed ☐ not requested ☐ nothing listed

Report Database Printout (details): ☒ enclosed ☐ not requested ☐ nothing listed

Report Digital Database Records: ☐ enclosed ☒ not requested ☐ nothing listed

Resource Record Copies:	☐ enclosed	☒ not requested	☐ nothing listed
Report Copies:	☐ enclosed	☒ not requested	☐ nothing listed
OHP Historic Properties Directory:	☒ enclosed	☐ not requested	☐ nothing listed
Archaeological Determinations of Eligibility:	☐ enclosed	☐ not requested	☒ nothing listed
CA Inventory of Historic Resources (1976):	☐ enclosed	☒ not requested	☐ nothing listed
Caltrans Bridge Survey:	☐ enclosed	☒ not requested	☐ nothing listed
Ethnographic Information:	☐ enclosed	☒ not requested	☐ nothing listed
Historical Literature:	☐ enclosed	☒ not requested	☐ nothing listed
Historical Maps:	☐ enclosed	☒ not requested	☐ nothing listed
Local Inventories:	☐ enclosed	☒ not requested	☐ nothing listed
GLO and/or Rancho Plat Maps:	☐ enclosed	☒ not requested	☐ nothing listed
Shipwreck Inventory:	☐ enclosed	☒ not requested	☐ nothing listed
Soil Survey Maps:	☐ enclosed	☒ not requested	☐ nothing listed

*Notes:

- The invoice will be kept open until 11/20/14. Let us know if you want copies of any resource record forms or reports.

Please forward a copy of any resulting reports from this project to the office as soon as possible. Due to the sensitive nature of archaeological site location data, we ask that you do not include resource location maps and resource location descriptions in your report if the report is for public distribution. If you have any questions regarding the results presented herein, please contact the office at the phone number listed above.

The provision of CHRIS Data via this records search response does not in any way constitute public disclosure of records otherwise exempt from disclosure under the California Public Records Act or any other law, including, but not limited to, records related to archeological site information maintained by or on behalf of, or in the possession of, the State of California, Department of Parks and Recreation, State Historic Preservation Officer, Office of Historic Preservation, or the State Historical Resources Commission.

Due to processing delays and other factors, not all of the historical resource reports and resource records that have been submitted to the Office of Historic Preservation are available via this records search. Additional information may be available through the federal, state, and local agencies that produced or paid for historical resource management work in the search area. Additionally, Native American tribes have historical resource information not in the CHRIS Inventory, and you should contact the California Native American Heritage Commission for information on local/regional tribal contacts.

Should you require any additional information for the above referenced project, reference the record search number listed above when making inquiries. Requests made after initial invoicing will result in the preparation of a separate invoice.

Thank you for using the California Historical Resources Information System (CHRIS).

Sincerely,

Lisa C. Hagel
Researcher

CALIFORNIA HISTORICAL RESOURCES INFORMATION SYSTEM

ALAMEDA
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MONTEREY
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SAN BENITO
SAN FRANCISCO
SAN MATEO
SANTA CLATA
SANTA CRUZ
SOLANO
SONOMA
YOLO

Northwest Information Center
Sonoma State University
150 Professional Center Drive, Suite E
Rohnert Park, California 94928-3609
Tel: 707.588.8455
nwic@sonoma.edu
http://www.sonoma.edu/nwic

1/26/2015 NWIC File No.: 14-0813

Donna Garaventa
Basin Research Associates
1933 Davis Street, Suite 210
San Leandro, CA 94577

re: Colma Creek

The Northwest Information Center received your record search request for the project area referenced above, located on the San Francisco South USGS 7.5' quad. The following reflects the results of the records search for the project area and a 0.25 mile radius:

Archaeological resources within project area:	P-41-495 & 409. Cemeteries = P-41-401, 402, 403, 404, & 392.
Archaeological resources within 0.25 mile radius:	P-41-48, 50, & 497. Cemeteries = P-41-400 & 405.
Reports within project area:	S-24907, 26408, 32250, 17191, 35858, 17192, 22656, 22972, 23271, 13543, 11396, 3043, 27930, 20359, 16687, 16688, 27830, 27831, 35507, 33611, 3155, 33504, 33505, 33506, 39631, 39770, 22258, 22259, 17730, & 37087.
Other Reports within records search radius:	S-33600, 3184, 9580, 848, 18217, 32596, 1784, 21889, 26045, 9462, 9583, & 15529. These reports are classified as Other Reports; reports with little or no field work or missing maps. The electronic maps do not depict study areas for these reports. In addition, you have not been charged digitized shape fees for the studies.

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Resource Database Printout (details): ☒ enclosed ☐ not requested ☐ nothing listed

Resource Digital Database Records: ☐ enclosed ☒ not requested ☐ nothing listed

Report Database Printout (list): ☒ enclosed ☐ not requested ☐ nothing listed

Report Database Printout (details): ☒ enclosed ☐ not requested ☐ nothing listed

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Resource Record Copies: ☐ enclosed ☐ not requested ☐ nothing listed

Report Copies: ☐ enclosed ☐ not requested ☐ nothing listed

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Archaeological Determinations of Eligibility:	☐ enclosed	☐ not requested	☒ nothing listed
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Historical Literature:	☐ enclosed	☒ not requested	☐ nothing listed
Historical Maps:	☐ enclosed	☒ not requested	☐ nothing listed
Local Inventories:	☐ enclosed	☒ not requested	☐ nothing listed
GLO and/or Rancho Plat Maps:	☐ enclosed	☒ not requested	☐ nothing listed
Shipwreck Inventory:	☐ enclosed	☒ not requested	☐ nothing listed

*Notes:
- Copied the HPD indices for Colma & Daly City (the South San Francisco indices were sent with the previous records search #14-0524).
- The invoice will be kept open until 2/2/15 – let us know if you need copies of resource records or reports.

Please forward a copy of any resulting reports from this project to the office as soon as possible. Due to the sensitive nature of archaeological site location data, we ask that you do not include resource location maps and resource location descriptions in your report if the report is for public distribution. If you have any questions regarding the results presented herein, please contact the office at the phone number listed above.

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Thank you for using the California Historical Resources Information System (CHRIS).

Sincerely,

Lisa C. Hagel
Researcher

Appendix G
NOISE IMPACT CALCULATIONS

Noise Calculations for the County of San Mateo's Colma Creek Flood Control Channel Maintenance Project

Construction Equipment 1 (excavator)	85	dBA at 50 feet
Construction Equipment 2 (truck)	88	dBA at 50 feet

Construction equipment above represents loudest equipment sources. Source: FTA 2006, Transit Noise and Vibration Impact Assessment.

Combined Noise at 50 feet (Ltotal at 50 feet) 89.8 dBA
Ltotal=10 log(10^L1/10+10^L2/10)

Distance (feet) from Middle of Project Site to Sensitivie	Noise level dBA	Noise Level Equation: Leq = EL50-20*log(D/50)
25	95.8	
30	94.2	Nearest project boundary from middle of channel
50	89.8	
55	88.9	Nearest residence to Reach 1
75	86.2	
100	83.7	
220	76.9	Nearest Residence to Reach 2
500	69.8	
650	67.5	
800	65.7	Nearest Residence to Reach 3
1000	63.7	
1250	61.8	
1500	60.2	
1750	58.9	
2000	57.7	
2500	55.8	
3000	54.2	
3500	52.9	

City of South San Francisco Noise Threshold Limits and Distances from Project Site to those Limits

Noise Threshold	Threshold Level - Leq (dBA)	Threshold Level - Lmax	Distance to Leq Threshold from Middle of Project Site (feet)	Distance to Lmax Threshold from Middle of Project Site (feet)
Residential Daytime Limit (7 am-10pm)	60	70	1,538.8	486.6
Nighttime Limit	50	80	4,866.2	153.9

Source: City of South San Francisco, Noise Ordinance, Table 8.32.030 (http://qcode.us/codes/southsanfrancisco/?view=desktop&topic=8-8_32)

Nearest Sensitive Receptors and Distances from Work Areas

Sensitive Receptor	Approximate Distance (feet) from channel edge (work area limit)	Approximate Distance (feet) from middle of project area/channel)
Residences nearest to Reach 1 Work Area (multiple locations)	30	55
Residences near Spruce Avenue (nearest to Reach 2 Work Area)	200	220
Residences nearest to Reach 3 Work Area	800	820

Vibration Source Levels for Construction Equipment (FTA 2006)

Equipment	PPV at 25 feet	VBA at 25 feet
Large bulldozer (used as substitute for excavator)	0.089	87
Loaded Trucks	0.076	86
Small bulldozer	0.003	58

Vibration Calculations with Equations for Vibration-Causing Equipment (use of large bulldozer)

Threshold	Distance to Threshold from Middle of Project Site (feet)	Notes
PPV=PPVref * (25/d)^1.5	20.5	Building damage threshold
Lvd=Lvref-30log(D/25)	92.2	residential, human perception threshold
	62.8	institutional threshold

Calculations for table in MND's Noise Section for Vibration Levels at Various Distances from project site

	Vibration Level (Lv) at 25 feet	Vibration Level at 30 feet	Vibration Level at 50 feet	Vibration Level at 55 feet	Vibration Level at 150 feet	Vibration Level at 220 feet
Large bulldozer (substitute for excavator)	87	85	78	77	64	59
Loaded trucks	86	84	77	76	63	58
Small bulldozer	58	56	49	48	35	30

where Lv(D) = Lv(25 feet)-30log(D/25), Lv= vibration level at any distance, D, and Lv(25ft) VdB values are applied.

Appendix H
MITIGATION MONITORING AND REPORTING PROGRAM (MMRP)

Appendix H. Mitigation Monitoring and Reporting Program

Introduction

This Mitigation and Monitoring and Reporting Program (MMRP) has been prepared for the Initial Study/Mitigated Negative Declaration for the Colma Creek Flood Control Channel Maintenance Project. All IS/MND sections and impacts which include mitigation measures are listed below, along with specific implementation procedures to ensure compliance. The MMRP describes monitoring actions, monitoring responsibilities, and monitoring schedules for each implementation procedure.

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<table>
<tr><th colspan="2">Mitigation Measure</th><th>Monitoring and Reporting Action</th><th>Monitoring Responsibility</th><th>Monitoring Schedule</th><th>Completion Date and Initials</th></tr>
<tr><td colspan="6">Biological Resources</td></tr>
<tr><td>BIO-1</td><td>Provide Compensatory Mitigation for Unavoidable Impacts to Sensitive Natural Communities and Federally Protected Wetlands

Upon USACE’s approval, the County shall implement the Colma Creek Flood Control Channel Maintenance Project Multi-Agency Compensatory Mitigation Plan developed for the project (Horizon 2015c), consistent with the terms of the Clean Water Act Section 404 permit issued for the Project and Final Compensatory Mitigation requirements of the permit. The Compensatory Mitigation Plan includes re-establishment of 0.1 acres of intertidal marsh in Reach 3 of the Project area (Figure 8 [attached]). The mitigation site is on County-owned land.

To ensure success of the wetland mitigation site, the County shall monitor the site and prepare and submit annual reports for five years after the wetland mitigation site is constructed. The performance criteria shall include but not be limited to:

▪ Less than 5% cover by non-native species with a California Invasive Plant Inventory rating of high in wetland areas of the mitigation site.

▪ Native vegetation shall be monitored to ensure a minimum of 10% cover after one year, 20% cover after 3 years, 50% cover after 4 years, and 70% cover after 5 years.

▪ Remedial actions, such as planting or weed removal, shall be conducted to ensure that the cover objectives are met.

▪ Two years after construction, the site shall be at least 75 percent inundated at high tide, and no ponding should occur at low tide.

▪ Remedial grading shall be implemented if hydrology performance criteria are not met. The County shall submit annual</td><td>1. Confirm that USACE approves the Compensatory Mitigation Plan developed for the Project.
2. Confirm implementation of the Mitigation Plan complies with the Final Compensatory Mitigation requirements of the Section 404 permit.
3. Confirm the preparation of annual monitoring reports for five years after compensatory mitigation site is constructed.</td><td>1. San Mateo County
2. San Mateo County
3. San Mateo County</td><td>1. Prior to start of construction
2. Prior to start of construction
3. After construction is complete</td><td></td></tr>
</table>

	Mitigation Measure	Monitoring and Reporting Action	Monitoring Responsibility	Monitoring Schedule	Completion Date and Initials
	reports for 5 years to resource agencies documenting the results of the mitigation wetland. During construction of the wetland mitigation, all BMPs listed in Chapter 2, Table 3 shall be implemented as appropriate for the mitigation actions. Although a small area of existing wetlands would be temporarily affected by the creation of the mitigation wetland, this impact is considered self-mitigating as wetlands would re-establish in that area. With implementation of the BMPs, no significant impacts are anticipated to occur from implementation of compensatory mitigation activities. In the event that the conceptual Compensatory Mitigation Plan is not approved by regulatory agencies, the County shall implement compensatory mitigation consisting of creation, re-establishment, or enhancement of 0.1 acre of intertidal marsh wetland habitat at an off-site location in proximity to the Project area or purchase of credits at a regulatory agency-approved mitigation bank or contribution to a regulatory agency-approved in-lieu fee program.				
Cultural Resources					
CUL-1	***Mitigation Measure CUL-1: Unexpected Discovery of Cultural Resources*** Not all cultural resources are visible on the ground surface. Prior to the start of construction or ground-disturbing activities, the County shall ensure all field personnel are educated of the possibility of encountering buried prehistoric or historic cultural resources. Personnel will be trained that upon discovery of buried cultural resources, work within 50 feet of the find must cease and the County will contact a qualified archaeologist immediately to evaluate the find. Once the find has been identified and found eligible for listing on the National Register of Historic Places or the California Register of Historical Resources, plans for treatment, evaluation, and mitigation of impacts to the find shall be developed and implemented according to the qualified archaeologist's recommendations. This measure will ensure that prehistoric and historic cultural resources are appropriately protected. Prehistoric or historic cultural materials that may be encountered include the following: unusual	1. Confirm that the requirement to conduct cultural resources studies in the event of unanticipated discoveries are incorporated in construction specifications. 2. Confirm that personnel undergo cultural resources training. 3. Confirm that any unanticipated discoveries are	1. San Mateo County 2. San Mateo County 3. San Mateo County	1. During development of plans and specifications 2. Prior to construction 3. During construction	

	Mitigation Measure	Monitoring and Reporting Action	Monitoring Responsibility	Monitoring Schedule	Completion Date and Initials
	amounts of bone or shell, flaked or ground stone artifacts, historic-era artifacts, human remains, or architectural remains.	evaluated and addressed appropriately.			
CUL-2	***Inadvertent Discovery of Human Remains***. If human remains are accidentally discovered during project construction activities, the County will implement the requirements of California Health and Human Safety Code section 7050.5. Potentially damaging excavation will cease in the area of the remains, with a minimum radius of 50 feet, and the San Mateo County Coroner will be notified. The Coroner is required to examine all discoveries of human remains within 48 hours of receiving notice of a discovery on private or state lands (Health and Safety Code section 7050.5[b]). If the Coroner determines the remains are those of a Native American, he or she will contact the Native American Heritage Commission (NAHC) by phone within 24 hours of making that determination (Health and Safety Code section 7050[c]). Pursuant to the provisions of PRC section 5097.98, the NAHC shall identify a Most Likely Descendent (MLD). The MLD designated by the NAHC shall have at least 48 hours to inspect the site and propose treatment and disposition of the remains and any associated grave goods.	1. Confirm that measure is included in plans and specifications. 2. Confirm that any discoveries of human remains are evaluated and addressed appropriately.	1. San Mateo County 2. San Mateo County	1. During preparation of plans and specifications 2. During construction	
Noise and Vibration					
NOI-1	***Implement Noise- and Vibration-Reducing Measures*** San Mateo County and/or its contractor shall ensure that noise-generating construction equipment is equipped with mufflers or other noise-reducing features. In addition, where feasible, construction equipment shall be operated 50 or more feet from any residences. Vibration damping devices shall be used to the extent feasible.	1. Confirm that measure is included in plans and specifications. 2. Confirm that equipment is operated 50 feet or more away from residences and that vibration damping devices are used where feasible.	1. San Mateo County 2. San Mateo County	1. During preparation of plans and specifications 2. During construction	
Transportation and Traffic					
TRA-1	***Prepare and Implement Traffic Control Plan*** The County and/or its contractor will prepare and implement a traffic control plan to reduce traffic impacts on local roads in the City of South San Francisco and Town of Colma, to reduce potential traffic safety hazards with bicyclists with motorists, and ensure adequate access for	1. Review and approve construction plans and specifications to confirm that measure is included.	1. San Mateo County 2. San Mateo County	1. During development of plans and specifications	

Mitigation Measure		Monitoring and Reporting Action	Monitoring Responsibility	Monitoring Schedule	Completion Date and Initials
	construction vehicles, as appropriate. The County and construction contractor will coordinate construction activities with South San Francisco Fire Department, as appropriate. The traffic control plan will provide for the appropriate control measures including (but not limited to) barricades, warning signs, speed control devices, and other measures. The traffic control plan may also require flaggers near the work areas.	2. Review and approve Traffic Control Plan.		2. Before start of construction	

Colma Creek
Flood Control Maintenance Project

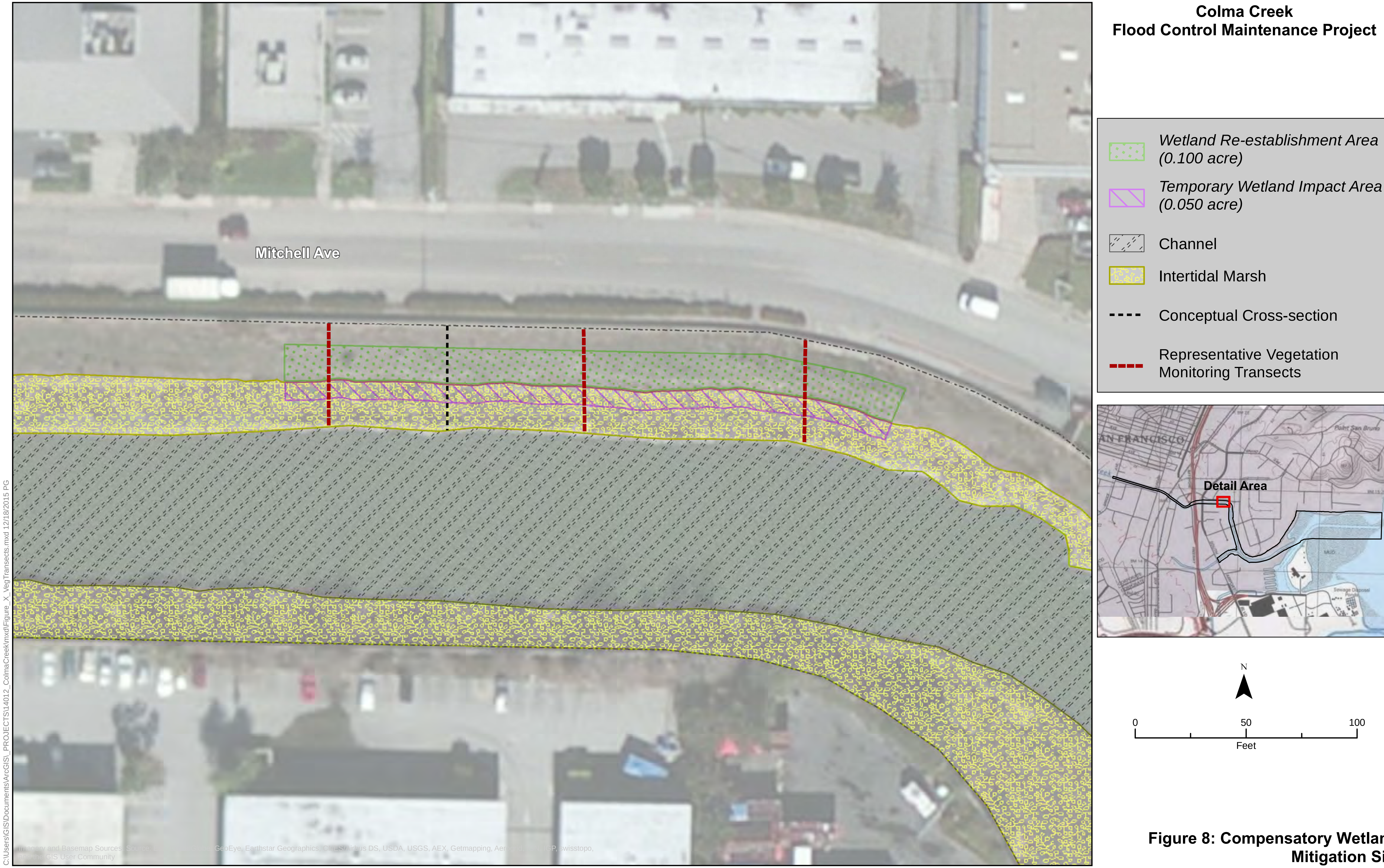

Figure 8: Compensatory Wetland Mitigation Site