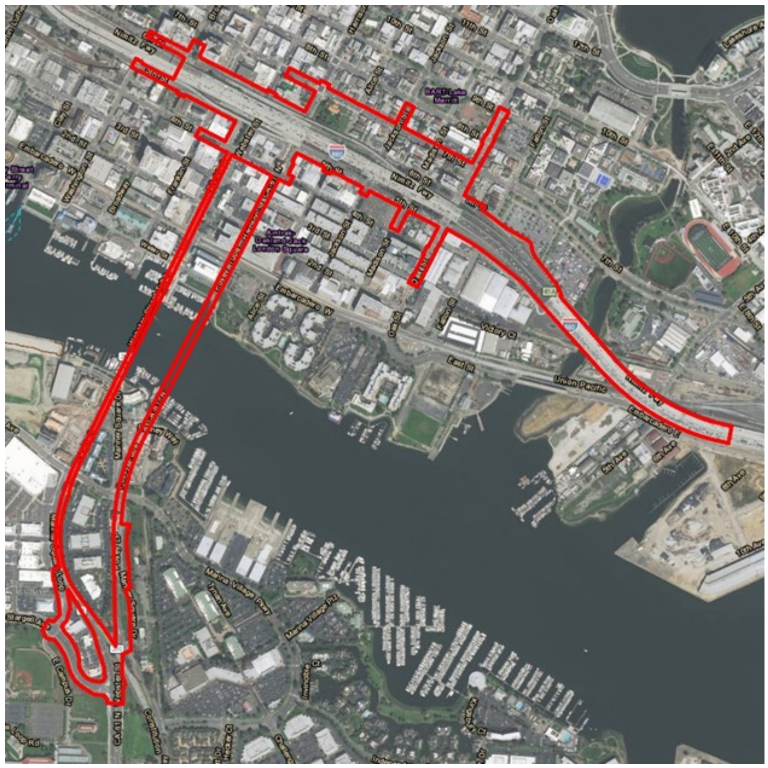
Water Quality Assessment Report

Oakland Alameda Access Project



Caltrans District 04

Alameda County, California

EA 04-0G360

04-ALA-880 PM 30.47/31.61,

04-ALA-260 PM R0.78/R1.90

April 2020

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April 2020

STATE OF CALIFORNIA
Department of Transportation

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EXECUTIVE SUMMARY

The proposed project (Project) is located in the cities of Oakland and Alameda in Alameda County, California. The Project proposes to improve access along Interstate (I-) 880 and in and around the Tubes, downtown Oakland, and the City of Alameda. Within the approximately 1-mile-long project, I-880 (Post Mile [PM] ALA 30.47 to PM 31.61) and State Route (SR)-260 (PM ALA R0.78 to R1.90) are major transportation corridors. Also, the I-880 freeway viaduct is a physical barrier, limiting bicycle and pedestrian connectivity between downtown Oakland and Chinatown to the north and the Jack London District and Oakland Estuary to the south. Existing local street patterns across I-880 are intertwined with on- and off-ramps and the Tubes connecting Oakland and Alameda affecting the cross-freeway circulation of motorists, bicyclists, and pedestrians.

The purpose of the Water Quality Assessment Report (WQAR) is to fulfill the requirements of the National Environmental Policy Act (NEPA) and California Environmental Quality Act (CEQA), and to provide information for National Pollutant Discharge Elimination System (NPDES) permitting. The document includes a discussion of the proposed Project, the physical setting of the Project study area, and the regulatory framework with respect to water quality. The WQAR provides data on surface water and groundwater resources within the Project study area and the water quality of these waters. It also describes water quality impairments and beneficial uses, identifies potential water quality impacts/benefits associated with the proposed Project, and recommends avoidance and/or minimization measures for potentially adverse impacts.

The Project is under the jurisdiction of the San Francisco Regional Water Quality Control Board (RWQCB). The RWQCB recognizes both the City of Oakland and the City of Alameda as members of the Alameda Countywide Clean Water Program under the Phase I Municipal Separate Storm Sewer System (MS4) Permit (NPDES Permit No. CAS612008, Order No. R2-2015-0049). The Project's Project Initiation Documents (PID) phase was approved in 2011; therefore, work done by the California Department of Transportation (Caltrans) must be compliant with the 1999 Caltrans MS4 permit. Caltrans and the cities of Oakland and Alameda would also have to adhere to the requirements of the Construction General Permit (CGP) (NPDES No. CAS000002, SWRCB Order No. 2009-0009-DWQ, adopted on November 16, 2010) to address potential temporary impacts during construction because the Project disturbs more than 1 acre of soil.

There are no surface waters within areas of ground disturbance. Lake Merritt Channel, which connects Lake Merritt to the San Francisco Bay, is located within the Project limits in Oakland. However, the only work proposed near Lake Merritt Channel is roadway striping on I-880 over the channel. Two saline emergent wetlands are located just beyond the Project limits in Alameda. However, they are not located within the Project limits and would not be impacted. Water from the Oakland side of the Project will drain into Lake Merritt Channel and Oakland Estuary, and runoff from the Alameda side will drain into the Oakland Estuary.

The following table identifies the disturbed soil area (DSA) and impervious surface improvement values resulting from the proposed Project improvements.

DSA and Impervious Areas for Proposed Project

Units: Acres	DSA	Added	Removed	Net New Impervious	Replaced
Caltrans	2.96	0.86	0.02	0.84	2.09
City of Oakland	2.93	0.04	0.01	0.03	2.89
City of Alameda	0.21	0.09	0.00	0.09	0.13
Special District[1]	0.04	0.00	0.04	-0.04	0.00
Total	**6.14**	**0.99**	**0.07**	**0.92**	**5.11**

The Project would disturb a total of 6.14 acres of soil. Therefore, the Project must comply with the CGP. The risk level has to be determined in order to understand the required monitoring, sampling, and reporting requirements, and the types of temporary construction site best management practices (BMPs) that should be implemented to minimize construction impacts. The risk level determination performed for this Project concluded that there is a low sediment and low receiving water risk, so this means that the Project must follow CGP permitting requirements for risk level 1.

This Project would result in a total of 0.92 acres of net new impervious area, 0.84 acres of which is in Caltrans' right-of-way (ROW). Because this value is less than one acre, stormwater treatment is not required within Caltrans' ROW, but stormwater treatment should be considered to the maximum extent practicable. The Project location is already heavily paved, so this increase in impervious area is expected to have a relatively minor impact.

Pollutant source control, low-impact development (LID), and temporary construction site BMPs would be considered to address Project impacts; promote infiltration; reduce erosion; and collect, retain, and treat roadway runoff. BMPs such as temporary silt fencing and temporary concrete washout facilities could limit the effects of runoff from construction activity. The specific BMPs used will be determined in later phases of this Project.

This Project has high groundwater on both the Oakland and Alameda sides of the Project location. This high groundwater means that dewatering activities would occur at the Project excavation sites for retaining walls 1, 2, 3, 4A, 4B, 5, 6, 8R, and 9 the construction of westbound I-980 Jackson Street Off-Ramp in Oakland, and the instillation of an Overhead sign Foundation in Alameda. Dewatering activities should follow the guidelines provided in the Caltrans *Field Guide to Construction Site Dewatering* (Caltrans 2014). If pollutants are found within the groundwater, impacts could be avoided using the procedures described in the San Francisco Bay

[1] Special District is the Peralta Community College District. Modifications are proposed at the Laney College parking lot north of the Oak St off-ramp.

RWQCB's General Waste Discharge Requirements for Discharge or Reclamation of Extracted and Treated Groundwater Resulting from the Cleanup of Groundwater Polluted by Volatile Organic Compounds (VOCs), Fuel Leaks, Fuel Additives, and Other Related Wastes (VOC and Fuel General Permit) (NPDES No. CAG912002, RWQCB Order No. R-2012-0012).

The Project's water quality design goal would be to avoid and minimize impacts to water resources to the maximum extent practicable and preserve natural and sensitive habitats using temporary and permanent BMPs. By meeting these goals and incorporating applicable NPDES requirements, water quality impacts should be minimized.

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Acronyms

BMP	best management practices
Caltrans	California Department of Transportation
CASGEM	California Statewide Groundwater Elevation Monitoring
CGP	Construction General Permit
CEQA	California Environmental Quality Act
CWA	Clean Water Act
DSA	Disturbed Soil Area
EBMUD	East Bay Municipal Utility District
MS4	Municipal Separate Storm Sewer System
NB	Northbound
NEPA	National Environmental Policy Act
NES-MI	Natural Environmental Study Minimal Impact
NPDES	National Pollutant Discharge Elimination System
Project	Oakland Alameda Access Project
ROW	right-of-way
RWQCB	Regional Water Quality Control Board
SB	Southbound
SWMP	Storm Water Management Plan
SWPPP	Storm Water Pollution Prevention Plan
SWRCB	State Water Resources Control Board
TMDL	total maximum daily load
USACE	U.S. Army Corps of Engineers
USEPA	United States Environmental Protection Agency
WB	Westbound
WDR	Waste Discharge Requirement
WPCP	Water Pollution Control Program
WQAR	Water Quality Assessment Report

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1 INTRODUCTION

1.1 Approach to Water Quality Assessment

The purpose of this Water Quality Assessment Report (WQAR) is to fulfill the requirements of the National Environmental Policy Act (NEPA) and the California Environmental Quality Act (CEQA), as well as to provide information for National Pollutant Discharge Elimination System (NPDES) permitting. The document includes a discussion of the Oakland Alameda Access project, the general environmental setting of the Project location, and the regulatory framework with respect to water quality. Additionally, the report also provides data on surface water and groundwater resources within the Project location and the water quality of these waters, describes water quality impairments and beneficial uses, identifies potential water quality impacts/benefits associated with the proposed Project, and recommends avoidance and/or minimization measures for potentially adverse impacts.

1.2 Project Description

The proposed project (Project) is located in the cities of Oakland and Alameda in Alameda County, California. The Project proposes to improve access along Interstate (I-) 880 and in and around the Tubes, downtown Oakland, and the City of Alameda. Within the approximately 1-mile-long project, I-880 (Post Mile [PM] ALA 30.47 to PM 31.61) and State Route (SR)-260 (PM ALA R0.78 to R1.90) are major transportation corridors. Also, the I-880 freeway viaduct is a physical barrier, limiting bicycle and pedestrian connectivity between downtown Oakland and Chinatown to the north and the Jack London District and Oakland Estuary to the south. Existing local street patterns across I-880 are intertwined with on- and off-ramps and the Tubes connecting Oakland and Alameda affecting the cross-freeway circulation of motorists, bicyclists, and pedestrians.

1.2.1 Purpose

The purpose of the Project is to:

- Improve multimodal safety and reduce conflicts between regional and local traffic;
- Enhance bicycle and pedestrian accessibility and connectivity within the project study area;
- Improve mobility and accessibility between I-880, SR-260 (Tubes), City of Oakland downtown neighborhoods, and City of Alameda;
- Reduce freeway-bound regional traffic and congestion on local roadways and in area neighborhoods.

1.2.2 Need

Access between the freeway and the roadway networks between I-880 and the Tubes is limited and indirect, and access to/from the cities of Oakland and Alameda is circuitous. Existing access to I-880 from Alameda and the Jack London District requires loops through several local streets and intersections, routing vehicles through the downtown Oakland Chinatown neighborhood, which has the following operational impacts on local streets:

- Streets in and around the downtown Oakland Chinatown area have a high volume of pedestrian activity and experience substantial vehicle-pedestrian conflicts, and the I-880 viaduct limits bicycle and pedestrian connectivity between downtown Oakland and the Jack London District.

- SB I-880 traffic heading to Alameda must exit at the Broadway/Alameda off-ramp, then travel south along 5th Street for more than a mile — through nine signalized and unsignalized intersections — before reaching the Webster Tube at 5th Street/Broadway.

- WB I-980 traffic heading to Alameda must exit at the Jackson Street off-ramp and circle back through Chinatown through seven signalized and unsignalized intersections to reach the Webster Tube.

- NB I-880 traffic heading to Alameda must exit at the Broadway off-ramp and form a queue on Broadway between 5th and 6th streets, which backs up onto the ramp. Alternatively, drivers may loop through Chinatown to access the Webster Tube.

1.2.3 No-Build Alternative

Under the No-Build Alternative, there would be no improvements to bicycle or pedestrian connectivity or safety. Freeway traffic to/from the cities of Oakland and Alameda would continue to use city streets through Oakland and Chinatown, which are areas with a high volume of pedestrian activity. Vehicle-pedestrian or -bicycle conflicts from traffic traveling through city streets would continue. The I-880 viaduct would continue to impede connectivity between downtown Oakland and the Jack London District, and access would not be improved for bicycles and pedestrians traveling between Oakland and Alameda.

1.2.4 Build Alternative

Under the Build Alternative, Caltrans and ACTC propose to remove and modify the existing freeway ramps and to modify the Posey Tube exit in Oakland. The Build Alternative would improve access to NB and SB I-880 from the Posey Tube via a right turn-only lane from the Posey Tube to 5th Street and a new horseshoe connector at Jackson Street below the I-880 viaduct that would connect to the existing NB I-880/Jackson Street on ramp. The existing WB I-980/Jackson Street off ramp would be reconstructed and shifted to the south.

The Webster Tube entrance at 5th Street and Broadway would be shifted to the east to create more space for trucks to make the turn from Broadway into the Webster Tube. A bulb-out would be constructed to extend the sidewalk, reducing the crossing distance and allowing improved visibility of pedestrians on the southeast corner.

The NB I-880/Broadway off-ramp would be removed and the NB I-880/ Oak Street off-ramp to 6th Street would be widened. The NB I-880/Oak Street intersection would become the main NB I-880 off-ramp to downtown Oakland and to Alameda. 6th Street would become a one-way through street from Oak Street to Harrison Street and a two-way street from Harrison Street to Broadway.

The proposed Project would include the addition of a Class IV two-way cycle track on 6th Street between Oak and Washington streets and on Oak Street between 3rd and 9th streets. Bicycle and pedestrian improvements would be constructed at the Tubes' approaches in Oakland and Alameda, and the Webster Tube westside walkway would be opened to pedestrians. This would improve connectivity to existing and future planned bicycle paths in the City of Oakland and implement various "complete streets" improvements to create additional opportunities for non-motorized vehicles and pedestrians to cross under I-880 between downtown Oakland, the Jack London District, and Alameda. See Figure 1, Figure 2, Figure 3, and Figure 4 for proposed elements of the Build Alternative.

Additional details on the Build Alternative improvements:

1. **Construction of a new horseshoe connector under I-880 at Jackson Street.**

   Vehicles exiting the Posey Tube would have direct access to NB I-880 via the proposed horseshoe connector. Vehicles heading to NB and SB I 880 would use the right-turn-only lane at the Posey Tube exit to turn onto eastbound 5th Street. Access to a new horseshoe connector would be provided from the left side of 5th Street and would loop below the I 880 viaduct to connect to the existing NB I 880/Jackson Street on-ramp. Traffic heading to SB I 880 would continue eastbound on 5th Street to the SB I-880/Oak Street on-ramp. Figure 2 shows the new horseshoe connector under I-880 at Jackson Street.

   Construction of the new right-turn-only lane onto 5th Street would require new retaining walls along the right side of the Posey Tube exit replacing the historic Posey Tube wall. The horseshoe connector would provide a direct route between the Posey Tube and NB I-880/ eastbound I-980 and SB I-880, substantially improving connectivity and minimizing the need for freeway-bound vehicles to travel through Chinatown to access the ramps. This configuration would also reduce intersection and bicycle-pedestrian conflicts.

   Posey Tube traffic heading to Chinatown and downtown Oakland would remain in the left lane and continue onto Harrison Street or turn left onto 6th Street to reach downtown via Broadway. A new left-turn pocket to accommodate the turn onto 6th Street would be constructed requiring removal of a section of the historic Posey Tube western exit wall.

2. **Reconstruction of the existing WB I-980/Jackson Street off-ramp.**

   To provide space for unimpeded movement from the Posey Tube to the new horseshoe connector, the WB I-980/Jackson Street off-ramp would be realigned to the south. Figure 2 shows the relocated Jackson Street off-ramp. The realigned off-ramp would touch down at grade on 5th Street at the Alice Street intersection. Off-ramp and 5th Street traffic would continue to be separated by a landscaped median past the condominium building at 428 Alice Street. 5th Street would be converted to a two-way street to accommodate condominium residents allowing vehicles to turn left or right onto 5th Street.

3. **Removal of the existing NB I-880/Broadway off-ramp viaduct structure, including the bridge deck and supporting columns.**

   Removing the NB I-880/Broadway off-ramp structure would provide the space for complete street improvements on 6th Street. It would also restore an element of the City of Oakland's street grid system by providing a continuous 6th Street between Oak Street and Broadway. Figure 2 shows where the existing NB I 880/Broadway off-ramp would be removed. This would provide for a more efficient street network, and it would allow traffic to be more evenly distributed on Oakland city streets. Also, it would improve traffic operations at the Broadway/6th Street and Broadway/5th Street intersections by eliminating the stream of traffic exiting the Broadway off-ramp and heading to the Webster Tube entrance. Instead, this traffic would use 6th Street and turn left at Webster Street to access the Webster Tube.

4. **Widening of the NB I-880/Oak Street off-ramp.**

   The existing Oak Street off-ramp would be widened from a one- to a two-lane exit by restriping the NB I-880 mainline and reconfiguring the ramp terminus. Figure 3 shows the proposed widening at the NB I-880/Oak Street off-ramp and restriping on NB I-880. At the Oak Street intersection, the ramp would be further widened from one left-turn-only pocket lane, one through and left-turn lane, and one through and right-turn lane to provide one left-turn-only (SB) pocket lane, one through westbound (WB) lane, one through (WB) and right-turn (NB) lane, and one right-turn-only (NB) lane. Two new retaining walls would be constructed along the widened ramp's new edge of the shoulder. In advance of the Oak Street exit, NB I 880 would be restriped from four to five lanes, including a standard 1,400-foot-long auxiliary lane to accommodate the additional traffic resulting from the Broadway off-ramp removal.

5. **Modification of the 5th Street/Broadway access to the Webster Tube.**

   The 5th Street/Broadway entrance to the Webster Tube would be moved slightly east (refer to Figure 2). Also, the 5th Street crosswalk on the east side of Broadway would be shifted east and considerably shortened, and the signal phasing would be modified to include a pedestrian-led signal phase for eastbound pedestrian traffic. This would improve safety by giving pedestrians priority over turning traffic. Also, this would improve truck access to the Webster Tube and minimize conflicts with other vehicular traffic.

6. **Construction of a new through 6th Street connecting Oak Street to Broadway.**

   Improvements to 6th Street would be accomplished by turning the street into a one-way street in the westbound direction from Oak Street to Harrison Street and a two-way street from Harrison Street to Broadway (refer to Figure 2). The lanes would be a minimum of 11 feet wide. There would be a minimum of two through lanes with additional turn pockets at intersections in the westbound direction. There would be one lane in the eastbound direction from Harrison Street to Broadway.

A new sidewalk would be constructed along the south side between Broadway and Oak Street. Segments of the existing sidewalk along the north side between Oak Street and Broadway would be reconstructed to a minimum of 10 feet wide between Harrison and Alice streets to provide continuity for pedestrians. A continuous Class IV two-way cycle track would also be provided between Oak and Washington streets. Parking spaces would be provided along portions of this roadway.

7. **Construction of a two-way bicycle/pedestrian path and walkway from Webster Street in Alameda to 6th Street in Oakland through the Posey Tube and from 4th Street in Oakland through the Webster Tube to Mariner Square Loop in Alameda.**

   The path would begin at Webster Street and Constitution Way in Alameda, would continue through the Posey Tube on the existing eastside walkway, and would exit the Tube via a new ramp with a hairpin turn at 5th Street. Figure 4 shows the proposed bicycle and pedestrian improvements. The path in Alameda connecting to the Posey Tube would be realigned and widened. The path in Oakland would wrap around the back of the Portal building on 4th Street and continue onto Harrison Street. It would continue onto a Class I two-way bicycle/pedestrian path under I-880 just west of Harrison Street and connect to the Class IV two-way cycle track on 6th Street between Oak and Washington streets. The new bicycle and pedestrian ramp exit from the Posey Tube would require removal of the existing historic Posey Tube staircase to provide street level ADA-compliant access from the Tube.

   The proposed Project would improve access between Oakland and Alameda by opening the Webster Tube maintenance walkway to bicycle and pedestrian travel. The walkway would connect to the proposed path under I-880 at 4th Street (near the Posey Tube Portal building).It would continue onto 4th Street to Webster Street, and it would turn north through the existing parking lot on the west side of the Webster Tube entrance before making a hairpin turn to connect to the westside walkway inside the Tube.

   On the Alameda side, the walkway would connect to existing bicycle and pedestrian facilities at Mariner Square Loop and Willie Stargell Avenue. The existing sidewalk within Neptune Park would be widened to match the proposed sidewalk to the north. Improvements inside the Tube would include widening the existing walkway, upgrading the existing railings, and relocating call boxes and fire extinguishers.

8. **Modification of 5th, 7th, Madison, Jackson, Harrison, Webster, Oak, and Franklin streets.**

   The street modifications (refer to Figure 2) would include replacing the dual right turns at the 7th Street/Harrison Street intersection with a single right-turn-only lane and removing the free right turn (where the island allows cars to turn right without stopping) at the 7th Street/ Jackson Street intersection. These would no longer be needed because Alameda traffic bound for NB/SB I 880 would be better served by the right turns from the Posey Tube to 5th Street. With the removal of the free right turns, vehicles would observe the traffic signal before turning right. With the curb extension proposed at this location, the pedestrian crossing distance would be shortened, which would decrease vehicle-pedestrian conflicts. In addition, a PHB beacon would be installed on 7th Street across the street from the Chinese Garden Park. There would also be restrictive right-turn movements to reduce bicycle and vehicle conflicts at the 5th/Broadway, 6th/Webster, 6th/Harrison, 6th/Jackson, 6th/Madison, 5th/Jackson, 8th/Oak, and 7th/Oak intersections.

A continuous sidewalk would be installed along the perimeter of Chinese Garden Park. Additional improvements, including landscaping modifications, could occur adjacent to the southern boundary of the park and would be coordinated through the City of Oakland.

Jackson Street between 5th and 6th streets would be converted from two- to one-way travel lanes in the northbound direction, and it would provide an emergency-only access lane.

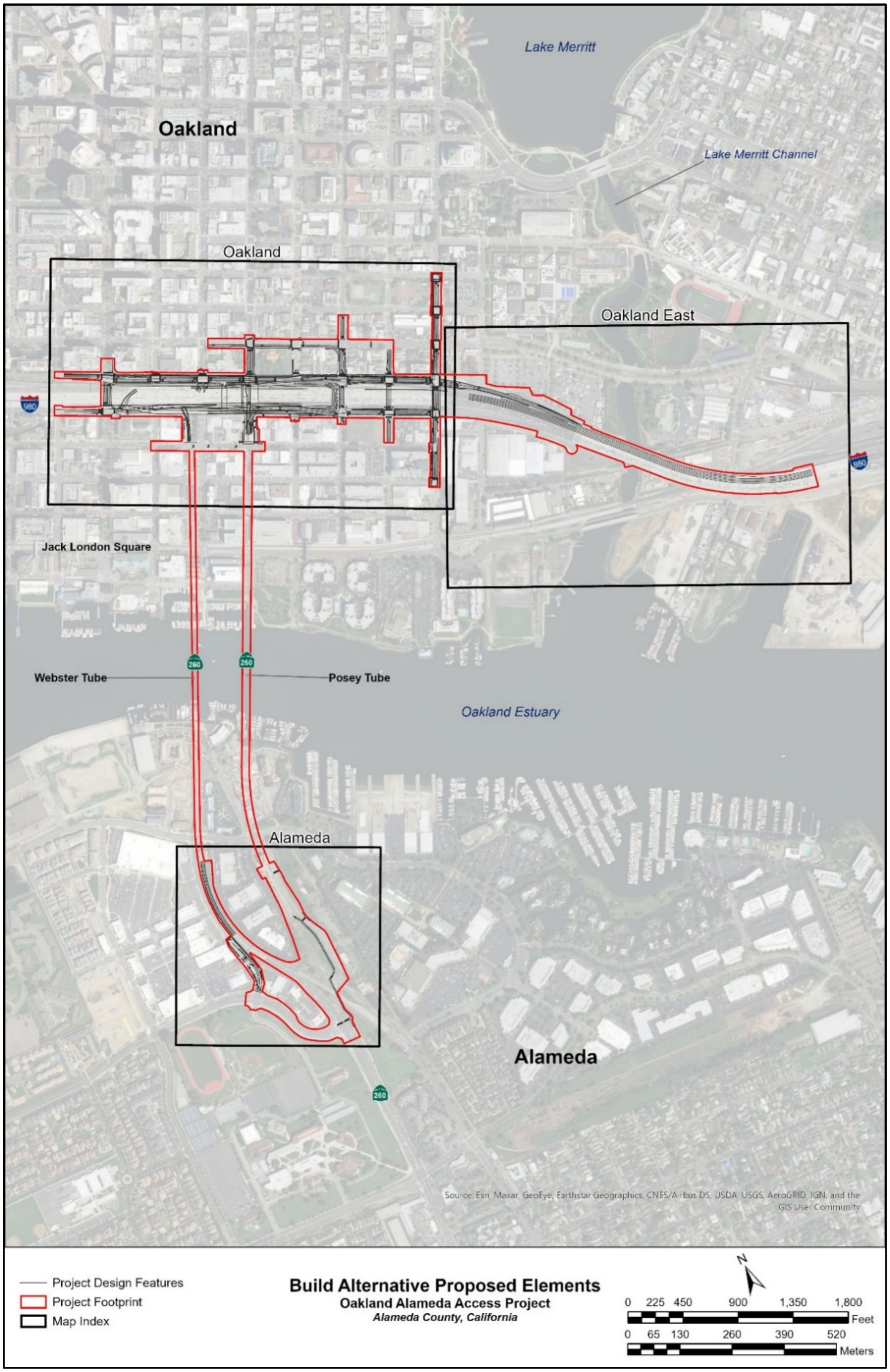

Figure 1. Build Alternative Proposed Elements, Project Overview

Source: HNTB

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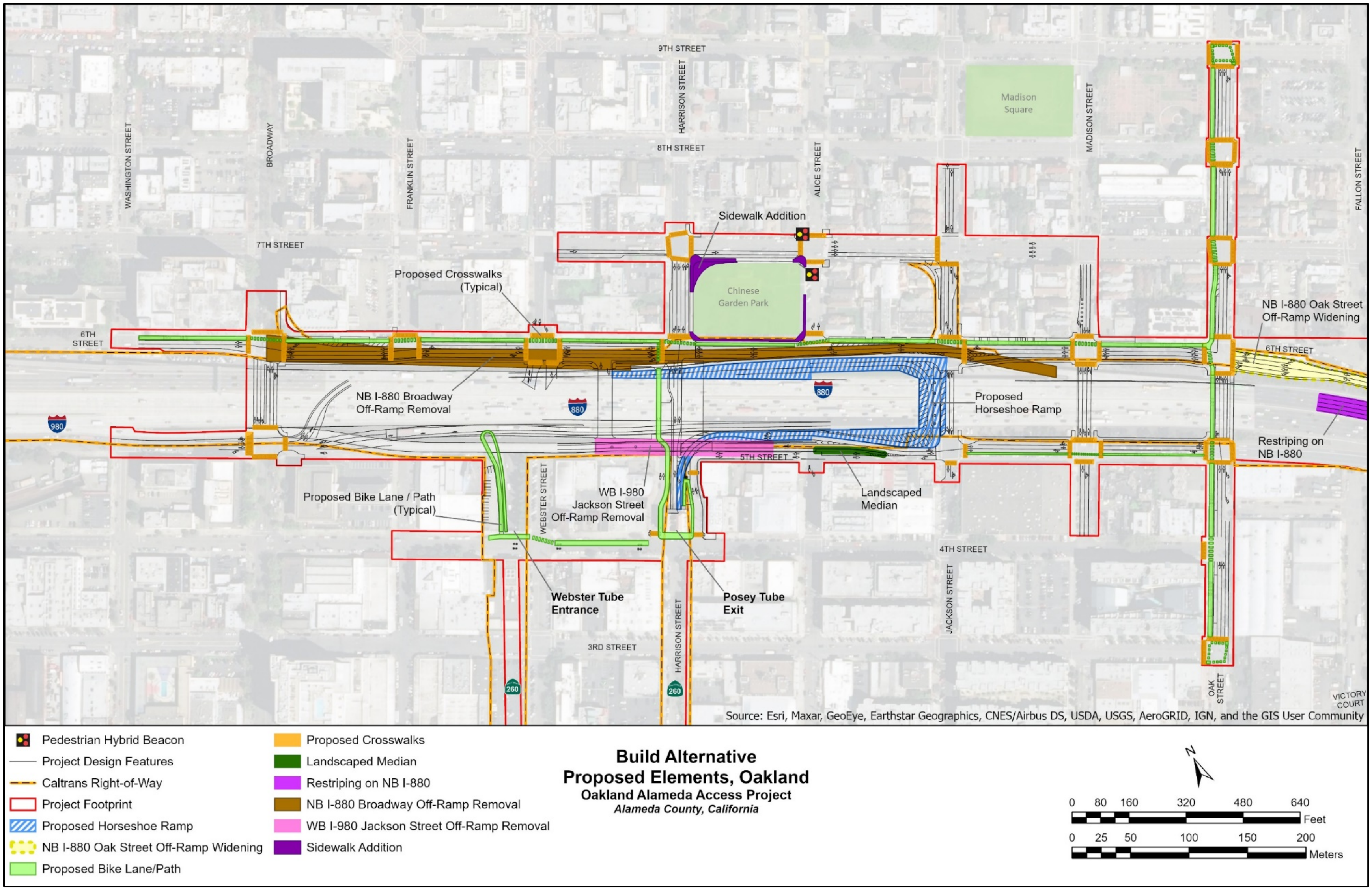

Figure 2. Build Alternative Proposed Elements, Oakland

Source: HNTB

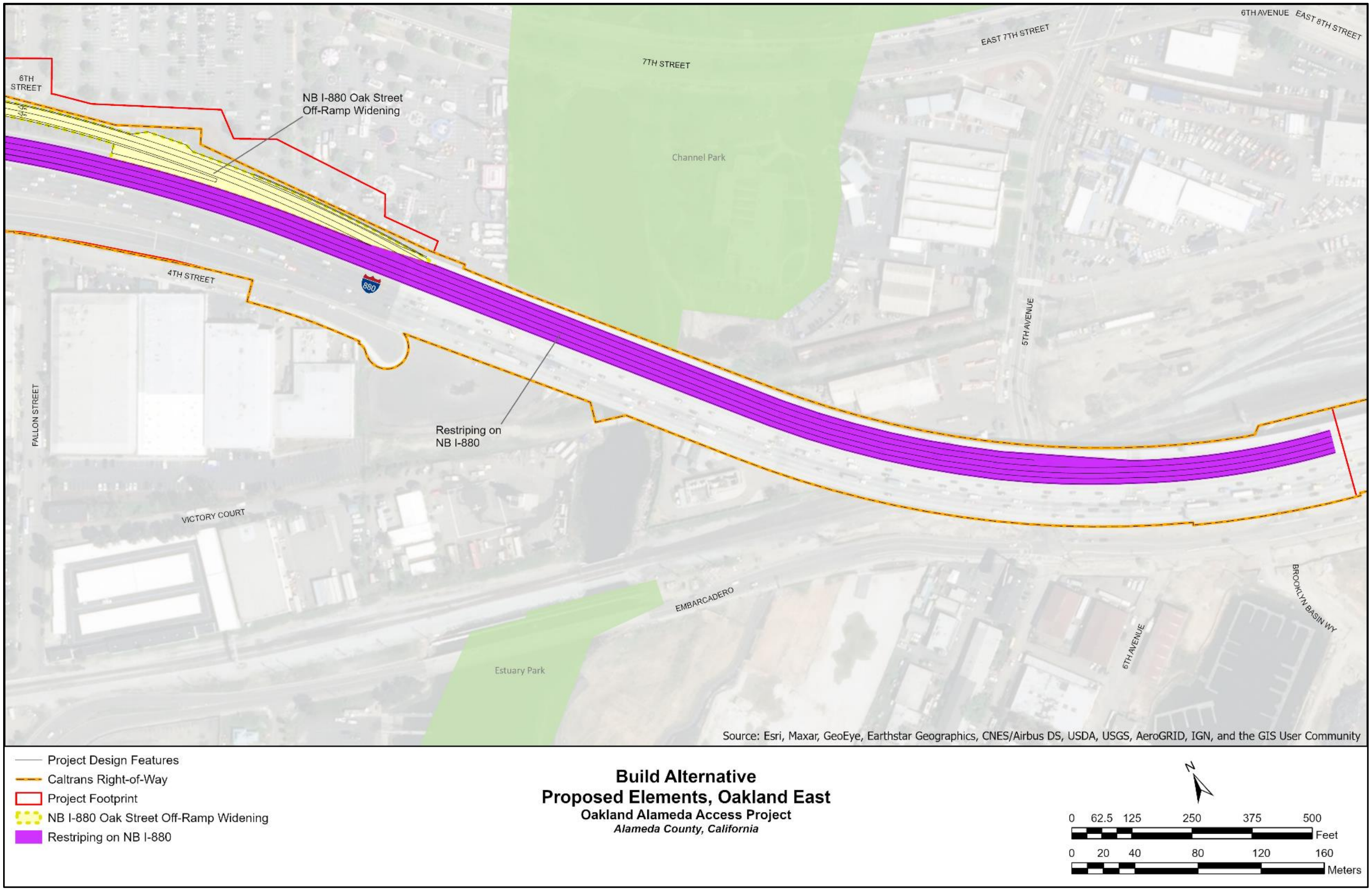

Figure 3. Build Alternative Proposed Elements, Oakland East

Source: HNTB

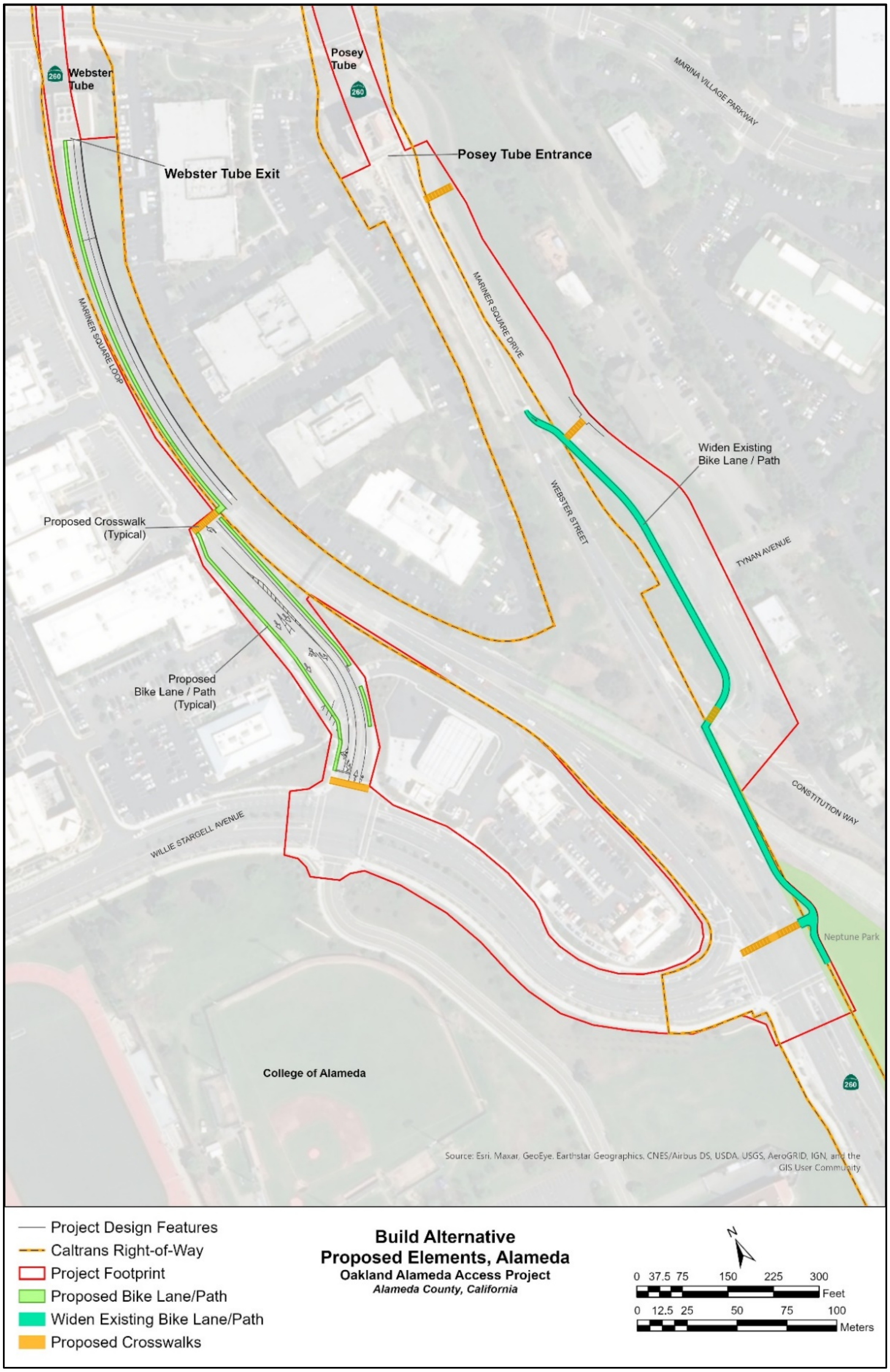

Figure 4. Build Alternative Elements, Alameda

Source: HNTB

Retaining Walls and Excavation

The proposed improvements would include construction of several new retaining walls along the NB I-880 Jackson Street on-ramp, WB I-980 Jackson Street off-ramp, NB I-880 Oak Street off-ramp, and new horseshoe connector. Retaining wall construction would minimize the need for right-of-way (ROW) acquisition. Table 1 lists the retaining walls needed for the proposed Project including their locations and approximate dimensions. Table 2 lists the excavation depths of other proposed Project features.

Table 1. Retaining Wall Locations and Dimensions (Oakland)

Wall Number	Location	Approximate Length (feet)	Height (feet)	Maximum Excavation Depth (feet)
1	Supporting Harrison Street as Posey Tube right lane runs onto 5th Street	215	8-12	36
2	Supporting existing fill in front of the existing abutment at Harrison Street	65	8-30	13
3	Supporting the I-880 mainline	410	24-32	28
4	Supporting the Jackson Street abutment	145	17	2
4A	Supporting the Jackson Street abutment	60	10	20
4B	Supporting the Jackson Street abutment	60	14	20
5	Supporting cut slope south of 6th Street and parallel to existing NB I-880 Broadway off-ramp	510	4-22	44
6	Supporting Posey Tube bicycle/pedestrian switchback on the exit’s east side	105	10	32
7	Supporting along the NB I-880 Oak Street off-ramp to accommodate an additional left-turn pocket	215	4-10	6
8R	Supporting reconstruction of the WB I-980 Jackson Street off-ramp (north wall)	230	24	32
8L	Supporting reconstruction of the WB I-980 Jackson Street off-ramp (south wall)	225	22	6
9	Supporting additional left-turn pocket for traffic from the Posey Tube at Harrison Street and 6th Street intersection	95	8	12
10	Supporting NB I-880 Oak Street off-ramp widening	399	12	4

Table 2. Excavation Depths

Feature	Description	Excavation Depth (feet)
OAKLAND		
Bike Path	Assumed pavement depth = 0.5’ PCC, 0.5’ CL 2 aggregate base (AB)	1
Roadway	Assumed pavement depth =0.75’ hot mix asphalt (HMA) (type A), 0.75’ class 2 AB, 1’ class 2 aggregate subbase (AS)	2.5
WB I-980 Jackson Street Off-ramp	New bents (columns) and an abutment	50
ALAMEDA		
Bike Path	Assumed pavement depth = 0.5’ PCC, 0.5’ class 2 AB	1
Roadway	Assumed pavement depth =0.75’ HMA (type A), 0.75’ class 2 AB, 1’ class 2 AS	2.5
Overhead Sign Foundation	Truss single-post Type V with assumed span length = 32’	20

Construction Schedule

Construction activities would last approximately 36 months. Construction is expected to begin in mid-2023. There would be two major stages with several phases in each. The first stage would include construction of the Jackson Street horseshoe and associated improvements on the southside of I-880 as well as the widening of the walkway in the Webster Tube. The second stage would include widening of the NB I-880/Oak Street off-ramp, removal of the Broadway NB I-880 off-ramp, and construct 6th Street improvements with associated elements on the northside of I-880.

Construction equipment would be staged in areas underneath I-880 that are owned by Caltrans and currently leased as parking lots. Construction activities would be completed during the day; however, nighttime work would be needed to minimize impacts to traffic, especially in the Webster Tube. Caltrans would continue to coordinate with the cities of Oakland and Alameda to develop and implement a Transportation Management Plan (TMP) and other measures to minimize construction impacts on the human and natural environment. As part of the TMP, a shuttle may be needed to transport bicyclists and pedestrians between Oakland and Alameda during construction.

The proposed Project contains a number of standardized project measures which are employed on most, if not all, Caltrans projects. They were not developed in response to any specific environmental impacts resulting from the proposed Project.

1.3 Construction General Permit Risk Level Assessment

This Project would disturb more than 1 acre of disturbed soil and must comply with the Construction General Permit (CGP), which includes performing a risk-level determination to determine the required monitoring and sampling of stormwater during construction. The risk-level assessment is determined from the combined receiving water risk and sediment risk.

The Project has a low receiving water risk for both the Oakland Estuary and Lake Merritt Channel because neither surface water is impaired for sediment or has the combined existing beneficial uses of cold freshwater habitat, fish spawning, and fish migration.

The sediment risk factor is determined from the product of the rainfall erosivity factor (R), the soil erosion factor (K), and the length-slope factor (LS). Using the United States Environmental Protection Agency (USEPA) Rainfall Erosivity Factor Calculator for Small Construction Sites, the R factor at the Project site is 158 in both the cities of Oakland and Alameda. The California Department of Transportation (Caltrans) Water Quality Planning Tool identifies the K factors as 0.37 in Oakland and 0.15 in Alameda, and the LS factors as 0.25 in Oakland and 0.2 in Alameda for the Project area. The product of these values is 14.6 (158 x 0.37 x 0.25) on the Oakland side, and 4.7 (158 x 0.15 x 0.2) on the Alameda side; because these values are less than 15, the Project has a low sediment risk.

The low receiving water and low sediment risks result in the Project being classified as having a risk level of 1. Therefore, in addition to the implementation of standard construction site best management practices (BMPs), the Contractor would be required to perform quarterly non-stormwater discharge visual inspections and rain-event visual inspections for pre-storm, daily during a storm event, and post-storm. This assessment may be updated during the Plans, Specifications, and Estimates (PS&E) phase as more detailed project information becomes available.

Under this build plan there would be disturbance to the surface area in Caltrans', the City of Oakland's, and the City of Alameda's ROW, with new impervious area being added as well as impervious surface area being replaced; these values are identified in Table 3.

Table 3. DSA and Added and Removed Impervious Surface Area

Units: Acres	DSA	Added	Removed	Net New Impervious	Replaced
Caltrans	2.96	0.86	0.02	0.84	2.09
City of Oakland	2.93	0.04	0.01	0.03	2.89
City of Alameda	0.21	0.09	0.00	0.09	0.13
Special District	0.04	0.00	0.04	-0.04	0.00
Total	**6.14**	**0.99**	**0.07**	**0.92**	**5.11**

Source: HNTB

2 REGULATORY SECTION

2.1 Federal Laws and Requirements

2.1.1 Clean Water Act

In 1972, Congress amended the Federal Water Pollution Control Act, making the adding of pollutants to the waters of the United States (U.S.) from any point source unlawful unless the discharge is in compliance with a NPDES permit. Known today as the Clean Water Act (CWA), Congress has amended it several times. In the 1987 amendments, Congress directed dischargers of stormwater from municipal and industrial/construction point sources to comply with the NPDES permit program. Important CWA sections are:

- Sections 303 and 304 require states to promote water quality standards, criteria, and guidelines.
- Section 401 requires an applicant for a federal license or permit to conduct any activity which may result in a discharge to waters of the U.S. to obtain certification from the State that the discharge will comply with other provisions of the act. (Most frequently required in tandem with a Section 404 permit request. See below.)
- Section 402 establishes the NPDES, a permitting system for the discharges (except for dredge or fill material) of any pollutant into waters of the U.S. USEPA delegated to the California State Water Resources Control Board (SWRCB) the implementation and administration of the NPDES program in California. The SWRCB established nine Regional Water Quality Control Boards (RWQCBs). The SWRCB enacts and enforces the federal NPDES program and all water quality programs and regulations that cross regional boundaries. The nine RWQCBs enact, administer and enforce all programs, including NPDES permitting, within their jurisdictional boundaries. Section 402(p) requires permits for discharges of stormwater from industrial, construction, and Municipal Separate Storm Sewer Systems (MS4s).
- Section 404 establishes a permit program for the discharge of dredge or fill material into waters of the U.S, including wetlands. This permit program is administered by the U.S. Army Corps of Engineers (USACE).

The objective of the CWA is “to restore and maintain the chemical, physical, and biological integrity of the Nation’s waters.”

The USACE issues two types of 404 permits: General and Individual. There are two types of General permits: Regional and Nationwide permits. Regional permits are issued for a general category of activities when they are similar in nature and cause minimal environmental effect. Nationwide permits are issued to authorize a variety of minor project activities with no more than minimal effects.

There are also two types of Individual permits: Standard Individual permit and Letter of Permission. Ordinarily, projects that do not meet the criteria for a Nationwide Permit may be permitted under one of the USACE's Individual permits. For Standard Individual permit, the USACE decision to approve is based on compliance with USEPA Section 404 (b)(1) Guidelines (CFR 40 Part 230), and whether permit approval is in the public interest. The 404(b)(1) Guidelines were developed by the USEPA in conjunction with the USACE and allows the discharge of dredged or fill material into the aquatic system (waters of the U.S.) only if there is no practicable alternative which would have less adverse effects. The guidelines state that the USACE may not issue a permit if there is a least environmentally damaging practicable alternative to the proposed discharge that would have less effects on waters of the U.S. and not have any other significant adverse environmental consequences. Per the guidelines, documentation is required that a sequence of avoidance, minimization, and compensation measures have been followed, in that order. The guidelines also restrict permitting activities that violate water quality or toxic effluent standards, jeopardize the continued existence of listed species, violate marine sanctuary protections, or cause "significant degradation" to waters of the U.S. In addition, every permit from the USACE, even if not subject to the 404(b)(1) Guidelines, must meet general requirements. (See 33 CFR 320.4).

2.2 State Laws and Requirements

2.2.1 Porter-Cologne Water Quality Control Act

California's Porter-Cologne Act, enacted in 1969, provides the legal basis for water quality regulation within California. This act requires a "Report of Waste Discharge" for any discharge of waste (liquid, solid, or gaseous) to land or surface waters that may impair beneficial uses for surface and/or groundwater of the State. It predates the CWA and regulates discharges to waters of the State. Waters of the State include more than just waters of the U.S., such as groundwater and surface waters not considered waters of the U.S. Additionally, it prohibits discharges of "waste" as defined in Section 25117 of the Health and Safety Code. (This definition is broader than the CWA definition of "pollutant.") Discharges under the Porter-Cologne Act are permitted by Waste Discharge Requirements (WDRs) and may be required even when the discharge is already permitted or exempt under the CWA.

The SWRCB and RWQCBs are responsible for establishing the water quality standards as required by the CWA and regulating discharges to protect beneficial uses of water bodies. Details regarding water quality standards in the Project location are contained in the applicable RWQCB Basin Plan. In California, Regional Boards designate beneficial uses for all water body segments in their jurisdictions, and then set standards necessary to protect these uses. Consequently, the water quality standards developed for particular water body segments are based on the designated use and vary depending on such use. Water body segments that fail to meet standards for specific pollutants are included in a Statewide List in accordance with CWA Section 303(d). If a Regional Board determines that waters are impaired for one or more constituents and the standards cannot be met through point source or non-source point controls (NPDES permits or Waste Discharge Requirements), the CWA requires the establishment of Total Maximum Daily Loads (TMDLs). TMDLs specify allowable pollutant loads from all sources (point, non-point, and natural) for a given watershed. The SWRCB implemented the requirements of CWA Section 303(d) through Attachment IV of the Caltrans Statewide MS4, as it includes specific TMDLs for which Caltrans is the named stakeholder.

2.2.2 State Water Resources Control Board and Regional Water Quality Control Boards

The SWRCB adjudicates water rights, sets water pollution control policy, and issues water board orders on matters of statewide application, and oversees water quality functions throughout the state by approving Basin Plans, TMDLs, and NPDES permits. RWCQBs are responsible for protecting beneficial uses of water resources within their regional jurisdiction using planning, permitting, and enforcement authorities to meet this responsibility.

2.2.3 National Pollutant Discharge Elimination System (NPDES) Program

2.2.3.1 Municipal Separate Storm Sewer Systems (MS4)

Section 402(p) of the CWA requires the issuance of NPDES permits for five categories of stormwater dischargers, including MS4s. The USEPA defines an MS4 as "any conveyance or system of conveyances (roads with drainage systems, municipal streets, catch basins, curbs, gutters, ditches, human-made channels, and storm drains) owned or operated by a state, city, town, county, or other public body having jurisdiction over stormwater, that are designed or used for collecting or conveying stormwater." The SWRCB has identified Caltrans an owner/operator of an MS4 pursuant to federal regulations. The Caltrans' MS4 permit covers all Caltrans rights-of-way, properties, facilities, and activities in the State. The SWRCB or the RWQCB issues NPDES permits for five years, and permit requirements remain active until a new permit has been adopted.

The Project's Project Initiation Documents (PID) phase was approved in 2011; therefore, the Project must comply with the 1999 Caltrans MS4 permit within Caltrans' ROW. The Caltrans' MS4 Permit contains the following basic requirements:

- Caltrans must implement a year-round program in all parts of the State to effectively control stormwater and non-stormwater discharges; and
- Caltrans stormwater discharges must meet water quality standards through implementation of permanent and temporary (construction) BMPs to the Maximum Extent Practicable, and other measures deemed necessary by the SWRCB and/or other agency having authority reviewing the stormwater component of the Project.

To comply with the permit, Caltrans developed the Statewide Storm Water Management Plan (SWMP) to address stormwater pollution controls related to highway planning, design, construction, and maintenance activities throughout California. The SWMP assigns responsibilities within Caltrans for implementing stormwater management procedures and practices as well as training, public education and participation, monitoring and research, program evaluation, and reporting activities. The SWMP describes the minimum procedures and practices Caltrans uses to reduce pollutants in stormwater and non-stormwater discharges. It outlines procedures and responsibilities for protecting water quality, including the selection and implementation of BMPs. The proposed Project will be programmed to follow the guidelines and procedures outlined in the latest SWMP to address stormwater runoff.

2.2.3.2 Construction General Permit

Construction General Permit (NPDES No. CAS000002, SWRCB Order No. 2009-0009-DWQ, adopted on November 16, 2010) became effective on February 14, 2011 and was amended by Order No. 2010-0014-DWQ and Order No. 2012-0006-DWQ. The permit regulates stormwater discharges from construction sites which result in a DSA of one acre or greater, and/or are smaller sites that are part of a larger common plan of development.

For all projects subject to the CGP, the applicant is required to hire a Qualified Storm Water Pollution Prevention Plan (SWPPP) Developer (QSD) to develop and implement an effective SWPPP. All projects Registration Documents, including the SWPPP, are required to be uploaded into the SWRCB's on-line Stormwater Multiple Application and Report Tracking System (SMARTS), at least 30 days prior to construction.

2.2.3.2.1 Waivers from CGP Coverage

Projects that disturb over one acre but less than five acres of soil, may qualify for waiver of CGP coverage. This occurs whenever the R factor of the Watershed Erosion Estimate (=RxKxLS) in tons/acre is less than 5. Within this CGP formula, there is a factor related to when and where the construction will take place. This factor, the 'R' factor, may be low, medium or high. When the R factor is below the numeric value of 5, projects can be waived from coverage under the CGP, and are instead covered by the Caltrans Statewide MS4.

In accordance with SWMP, a Water Pollution Control Plan (WPCP) is necessary for construction of a Caltrans project not covered by the CGP. Construction activity that results in soil disturbances of less than one acre is subject to this CGP if there is potential for significant water quality impairment resulting from the activity as determined by the RWQCB. Operators of regulated construction sites are required to develop a SWPPP, to implement soil erosion and pollution prevention control measures, and to obtain coverage under the CGP.

The CGP contains a risk-based permitting approach by establishing three levels of risk possible for a construction site. Risk levels are determined during the planning, design, and construction phases, and are based on project risk of generating sediments and receiving water risk of becoming impaired. Requirements apply according to the risk level determined. For example, a Risk Level 3 (highest risk) project would require compulsory stormwater runoff pH and turbidity monitoring and pre- and post-construction aquatic biological assessments during specified seasonal windows.

2.2.3.3 Section 401 Permitting

Under Section 401 of the CWA, any projects requiring a federal license or permit that may result in a discharge to a water of the U.S. must obtain a 401 Certification, which certifies that the project will be in compliance with State water quality standards. The most common federal permit triggering 401 Certification is a CWA Section 404 permit, issued by the USACE. The 401 permit certifications are obtained from the appropriate RWQCB, dependent on the project location, and are required before the USACE issues a 404 permit.
In some cases, the RWQCB may have specific concerns regarding discharges associated with a project. As a result, the RWQCB may prescribe a set of requirements known as WDRs under the

State Water Code (Porter-Cologne Act). WDRs may specify the inclusion of additional project features, effluent limitations, monitoring, and plan submittals that are to be implemented for protecting or benefiting water quality. WDRs can be issued to address both permanent and temporary discharges of a project.

2.3 Regional and Local Requirements

2.3.1 RWQCB Basin Plan

The Basin Plan is the master policy document that contains descriptions of the legal, technical, and programmatic base of water quality regulation in the region. Alameda County falls under the San Francisco Bay RWQCB, also identified as Region 2. The RWQCB's Basin Plan, most recently amended on May 4, 2017, establishes and enforces WDRs for both the point and non-point source(s) of pollutants to meet water quality objectives.

2.3.2 MS4

Alameda County has a Phase I MS4 plan. The Phase I program requires operators that service populations of 100,000 or more to implement a stormwater management program in order to control polluted discharges. The countywide MS4 requirement was issued on November 19, 2015 as one Municipal Regional Stormwater NPDES Permit.

The cities of Alameda and Oakland, and the Peralta Community College District (Laney College), located within Alameda County, are part of the Alameda Countywide Clean Water Program (hereinafter collectively referred to as the Alameda Permittees) and have submitted a permit application (Report of Waste Discharge), dated July 26, 2007, for reissuance of their WDRs under the NPDES permit to discharge stormwater runoff from storm drains and watercourses within the Alameda Permittees' jurisdictions. The Alameda Permittees are currently subject to NPDES Permit No. CAS0029831 issued by Order No. R22003-0021 on February 19, 2003, and amended by Order No. R2-2007-0025 on March 14, 2007, to the Alameda Permittees to discharge stormwater runoff from storm drains and watercourses within their jurisdictions.

2.3.3 Storm Water Management Plan

The Alameda Permittees follow the Alameda County Clean Water Program's 2017 *C.3 Stormwater Technical Guidance* regarding stormwater management and hydromodification management measures. To account for the significant effects human activity has on stormwater runoff, the Clean Water Program's municipal agencies require that new developments and redevelopment projects incorporate "post-construction stormwater site design, source control, and treatment measures within the project to the maximum extent practicable (MEP)" (C.3 Technical Guidance 2017). In addition, projects are required to comply with hydromodification management requirements if:

- One or more acres of impervious surface are created and/or replaced,
- There will be an increase of impervious surface over pre-project conditions, and
- The project location is in a susceptible area, as shown on the default susceptibility map.

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3 AFFECTED ENVIRONMENT/EXISTING CONDITIONS

3.1 General Setting

3.1.1 Population and Land Use

Alameda County is predominantly urbanized on the western side, with significant amounts of land being developed for uses such as business, housing, and transportation. Larger portions of undeveloped land can be found in the northeast and southeast parts of the county. According to estimates based on the 2010 U.S. Census, there are 1,510,258 people living in Alameda County. The Project is located in a very urbanized part of Alameda County, with primarily paved surface areas and little to no habitat. While Alameda County is home to various city and regional parks, none of these parks are located near the Project location.

3.1.2 Topography

The Oakland study area is located in the southern slope of the knoll that holds downtown Oakland. In addition to the sloped knoll, the Project site is also located on some flatter terrain near the Oakland Estuary and San Francisco Bay. The elevation at the Oakland study area varies from sea level (0 feet) to about 35 feet (United States Geological Survey 2001).

The Project location also extends into the City of Alameda. The main topographic feature is a ridgeline that runs down the middle of the island in the northwest-southeast direction (Schaaf and Wheeler 2008). The study area is located on the northerly side of the ridgeline, where terrain gently slopes toward the Oakland Estuary. The elevations in this study area range from near sea level to about 13 feet (United States Geological Survey 2001).

The very flat portions of the study area near sea level were reclaimed from historic tidal marshlands. These areas include land adjacent to Lake Merritt Channel, the northern portion of the Alameda study area, and the western margin of the Oakland study area (Sowers 2014).

3.1.3 Hydrology

3.1.3.1 Regional Hydrology

The proposed Project lies on either side of the Oakland Estuary, which is connected to the San Francisco Bay. According to the Caltrans Water Quality Planning Tool, the Project limits are entirely within an undefined hydrologic sub-area (#204.20) of the East Bay Cities hydrologic area, South Bay hydrologic unit, and San Francisco Bay hydrologic region.

3.1.3.2 Local Hydrology

3.1.3.2.1 Precipitation and Climate

According to the Köeppen climate classification system, the Project location has a Mediterranean climate, characterized by hot, dry summers and mild, moist winters (George 2015). The Project location generally experiences precipitation between mid-October and mid-April. A climate summary for the nearest National Oceanic and Atmospheric Administration (NOAA) weather station with similar elevation and topography to the Project reports the following precipitation and temperature information (Western Regional Climate Center 2015):

Oakland International Airport

- Average annual rainfall for Oakland is 18.27 inches
- Average minimum and maximum temperatures are 41.4 and 73.5º F

3.1.3.2.2 Existing Water Quality

The Lake Merritt Channel is the only waters of the U.S. located in the Project location. Saline emergent wetlands were also found near the Alameda side of the Project. The impact to habitat and species is explained in further depth in Section 4 of this report, and in the Project's Natural Environment Study-Minimal Impacts (NES-MI) (WRECO 2020).

The stormwater runoff within the Project location primarily collects along the roadway shoulders and conveys into underground storm drainage systems. In both the cities of Oakland and Alameda, the discharge flows into the Oakland Estuary (Sowers 2000; Schaaf and Wheeler 2008). Some runoff from the Oakland side of the Project also flows into the Lake Merritt Channel. The Oakland Estuary and Lake Merritt Channel are the receiving water bodies of this Project.

According to the 2014/2016 California 303d List of Water Quality Limited Segments, the Oakland Estuary (referred to as Central San Francisco Bay on the 303d List) is listed as a 303(d) water body with a TMDL for mercury and selenium. Additional pollutants on the 303(d) list impacting this section of the bay include: chlordane, DDT, dieldrin, dioxin compounds (including 2,3,7,8-TCDD), furan compounds, Invasive Species, polychlorinated biphenyls (PCBs), PCBs (dioxin-like), and trash. The Lake Merritt Channel is not classified as an impaired water body on the 303(d) list (Table 4).

Table 4. Oakland Estuary 303(d) Listed Pollutants

Pollutant	Potential Source	Estimated TMDL Completion Date
Chlordane	Nonpoint Source	2013
DDT (Dichlorodiphenyltrichloroethane)	Nonpoint Source	2013
Dieldrin	Nonpoint Source	2013
Dioxin compounds (including 2,3,7,8-TCDD)	Atmospheric Deposition	2019
Furan Compounds	Atmospheric Deposition	2019
Invasive Species	Ballast Water	2019
Mercury	Atmospheric Deposition Industrial Point Sources Municipal Point Sources Natural Sources Nonpoint Source Resource Extraction	USEPA Approved February 12, 2008
PCBs	Unknown Nonpoint Source	2008
PCBs (dioxin-like)	Unknown Nonpoint Source	2008
Selenium	Exotic Species Industrial Point Sources Natural Sources	2010
Trash	Illegal dumping Urban Runoff/Storm Sewers	2021

Source: San Francisco Bay RWQCB

According to the San Francisco Bay RWQCB Basin Plan, both the Lake Merritt Channel and Oakland Estuary (categorized under San Francisco Bay Central in the Basin Plan) have beneficial uses, which are listed in Table 5.

Table 5. Beneficial Uses

Beneficial Use	Lake Merritt Channel	Oakland Estuary
Industrial Service Supply		X
Industrial Process Supply		X
Commercial and Sport Fishing	X	X
Shellfish Harvesting		X
Estuary Habitat	X	X
Fish Migration		X
Preservation of Rare and Endangered Species		X
Fish Spawning		X
Wildlife Habitat	X	X
Water Contact Recreation	X	X
Noncontact Water Recreation	X	X
Navigation		X

Source: San Francisco Bay RWQCB

A more detailed description of the beneficial uses from the Basin Plan is included in Section 4.2.3.1 and Appendix A.

3.1.3.2.3 Floodplains

The Project site is located within the FIRM Number 06001C0067H, which is panel 67 of 725 and has been effective since December 21, 2018 (see Figure 5). The special flood hazard areas extending through the portions of the Project in both Oakland and Alameda are classified as Zone AE and shaded Zone X. A Zone AE floodplain is an area inundated by the 1 percent annual chance flood event (or 100-year storm event). The Zone AE floodplain inundation within the Project limits include Project areas over the Lake Merritt channel in the City of Oakland and the roadway and pedestrian/bike path areas in the City of Alameda including the entrance/exit of the Tubes. Per the FIRM, the stillwater elevation of the Zone AE floodplain with the Project limits both in Oakland and Alameda has an elevation of approximately 10 ft NAVD 88. The effective FIRM defines the shaded Zone X region in the vicinity of the Project a 0.2%-annual chance flood hazard are, where the 1%-annual chance flood has an average depth less than one foot or with drainage areas of less than one square mile.

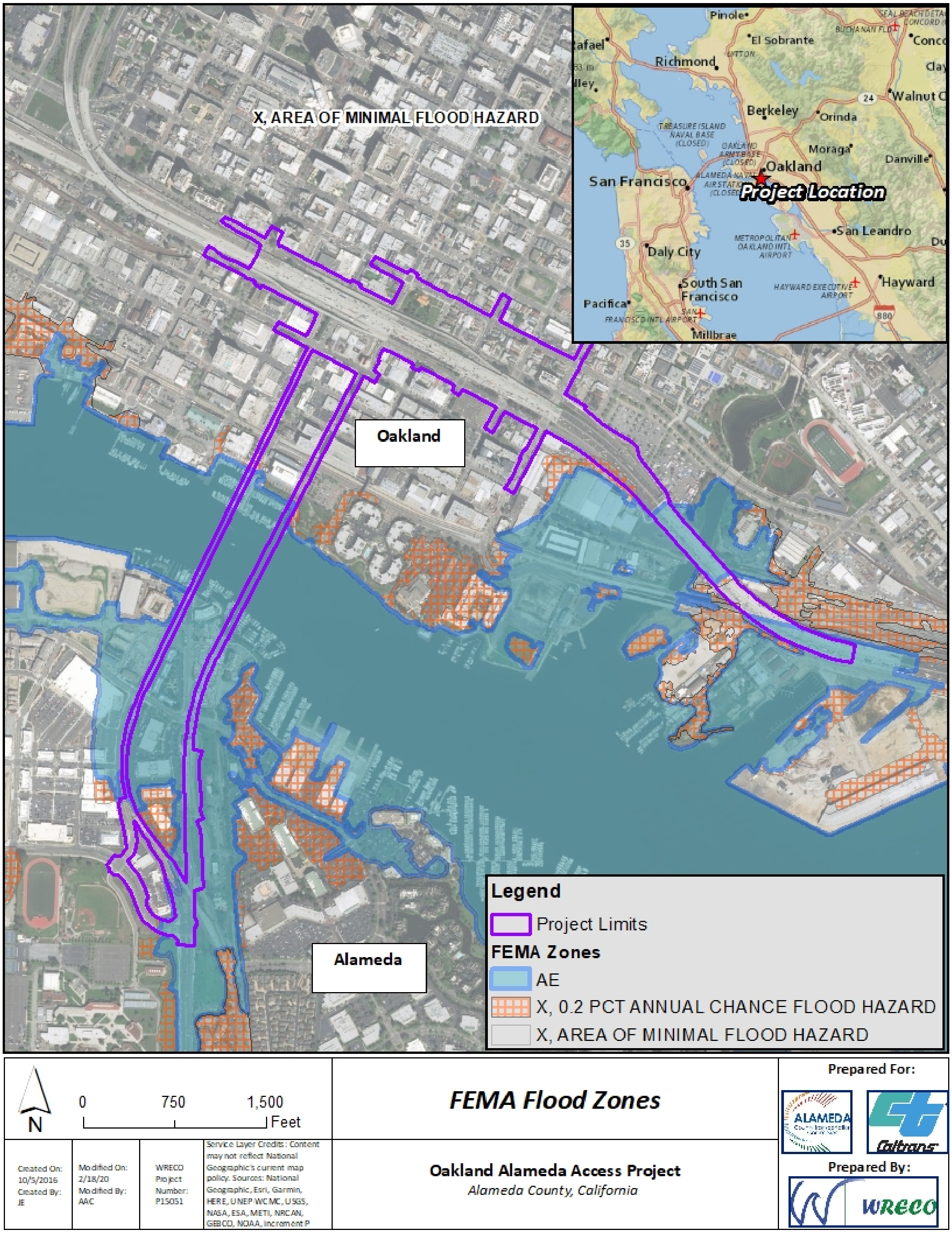

Figure 5. FEMA Flood Zones at Project Site (Effective FIRM)

Source: FEMA

3.1.3.2.4 Municipal Supply

According to the 2020-2021 District 4 Work Plan, none of the local water features – Lake Merritt Channel, Oakland Estuary, and the two Alameda wetlands – are considered to be drinking reservoirs or recharge facilities.

Both the City of Oakland's and City of Alameda's drinking water and wastewater is serviced by the East Bay Municipal Utility District (EBMUD). Water is primarily supplied from the Mokelumne River with supplements from local runoff to East Bay reservoirs and, in the case of dry years, the Sacramento River and Bayside groundwater.

3.1.3.3 Groundwater Hydrology

According to the Department of Water Resources Bulletin 118, both the Oakland and Alameda sides of the Project are located in the Santa Clara Valley – East Bay Plain (2-009.04) Groundwater Basin. This groundwater basin is approximately 77,800 acres in size and covers parts of both Alameda County and Contra Costa County. According to the 2003 Basin Description of Santa Clara Valley-East Bay Plan, the East Bay Plain Subbasin is a northwest trending alluvial plain, with the San Pablo Bay bounding it to the north, Franciscan Basement Rock to the east, and Niles Cone Groundwater Basin to the south. This basin extends beneath the San Francisco Bay to the west.

Boring logs for a past project, EA 04-399974, taken on the Oakland side near the tunnel entrances found that groundwater ranges from 7 to 26 feet below ground surface. According to data from the Caltrans Geotracker tool, groundwater monitoring wells within 0.2 miles south of the Almeda side of the Project have groundwater levels that range from 3.34 to 7.13 feet below ground level. On the Oakland side, Geotracker showed a greater range in groundwater levels, with the inland site ranging from 12.11 to 20.44 feet below ground level and more coastal sites ranging as high as 4.34 to 7.90 feet below the ground.

3.1.3.4 Groundwater Quality

Industrial and commercial activities in downtown Oakland have led to a risk for groundwater contamination, including a plume of petroleum hydrocarbons and volatile organic compounds (VOCs) near the intersection of Harrison and 7th streets. A subsurface and hazardous waste investigation is underway. The Basin Plan (2017) identifies narrative groundwater objectives for the region; the Basin Plan states, "at a minimum, groundwater shall not contain concentrations of bacteria, chemical constituents, radioactivity, or substances producing taste and odor in excess of the objectives unless naturally occurring background concentrations are greater."

The current and historic existence of businesses associated with hazardous material contamination in the Oakland area means that there is a potential for contaminated groundwater. According to the 2004 Groundwater Bulletin 118, there are 13 locations in the East Bay Plain Subbasin with areas of major groundwater contamination. Most of these polluted sites occurred due to the release of fuels and solvents, and appear to be restricted to the upper 50 feet of the subsurface.

The groundwater in the Santa Clara Valley – East Bay Plain has multiple beneficial uses according to the regional waterboard:

- Municipal and domestic water supply
- Industrial Process water supply
- Industrial service water supply
- Agricultural water supply

3.1.4 Geology/Soils

According to the Natural Resource Conservation Service, the soil at this Project site can be categorized into three groups: Urban Land, Urban Land - Baywood Complex, and Clayey Xerorthents.

Urban Land is soil that is covered by urban features such as buildings, roads, parking lots, and other structures. The soil is heterogeneous fill derived from various sources. This soil is mostly found in the reclaimed land adjacent to the San Francisco Bay. This soil unit has not been assigned a Hydrologic Soil Group.

Urban Land - Baywood Complex makes up a majority of the Project study area (USDA 1975). Urban Land - Baywood Complex consists of a mixture of about 60% urban land, 35% Baywood sandy loam, and 5% other soils. Baywood sandy loam is located on mounds and ridges adjacent to beach areas. It formed in eolian sediment derived from old beach deposits. Urban land soils are similar to Baywood soils but have been altered or mixed. Elevations range from 10 to 60 feet. Slopes range from 0% to 8%, with a majority between 2% and 5%. Runoff is slow to medium, and permeability is rapid. The Hydrologic Soil Group is A, indicating a soil with high permeability and low runoff potential; wind erosion is a hazard if the soil surface is left bare (USDA 1975).

Clayey Xerorthents consist of clayey material used as fill for building sites. These soils are typically dark brown to grayish brown in color. The texture is mainly heavy clay loam, but also includes some silty clay and clay. The soil profile consists of up to 15% of asphalt, concrete, sandstone, and glass debris by volume. Permeability is slow to very slow, and runoff is very slow. The Hydrologic Soil Group is D, indicating a soil with low permeability and high runoff potential (USDA 1975).

Boring tests were also conducted, which revealed that on the Oakland side of the Project Merritt sand is present in the upper 24 inches of the Project location (Parsons Brinckerhoff 2001). Merritt sand is a fine-grained (Silty-sandy texture sand), very well sorted, well drained, eolian, sand deposit (Graymer 2000). The sandy soils found on the Alameda portion of the Project location are representative of Holocene and Pleistocene dune sand present at the extreme southern margin of the Alameda portion of the Project location (Graymer 2000).

3.1.4.1 Erosion Potential

Alameda and Oakland were found to have different K values. The K value represents the potential of the soil to erode, the transportability of sediment, and the amount and rate of runoff during a rain event. The K factors within the Project site were found using the Caltrans Water Quality Mapping Tool. Alameda has a K factor of 0.15 and the Oakland location has a K factor of 0.37. The Alameda Project location has a low K factor, meaning that erosion is less likely to occur as compared to Oakland. The Oakland Project location has a moderate K value, which means erosion is more likely to occur.

3.1.5 Biological Communities

3.1.5.1 Aquatic Habitat

According to the Project's NES-MI, Lake Merritt Channel is classified as Other Waters of the U.S. (WRECO 2020). Lake Merritt Channel does not provide any significant habitat, although it could act as a corridor for fish moving between the estuary and the lake. Saline emergent wetlands were found on the Alameda side of the Project. These wetlands are classified as waters of the U.S. While these wetlands were found to provide habitat for wetland plants, no special-status species were found. No work is proposed to occur in the wetlands or in Lake Merritt Channel. The Wetlands are outside of the Project limits and thus there are no anticipated impacts to the wetlands.

For more information regarding aquatic habitats associated with the Project refer to the NES-MI (WRECO 2020).

3.1.5.2 Special-Status Species

No special-status plant or wildlife species were observed on the Project site. This is likely due to the high degree of disturbance associated with the long history of development and urbanization of both the cities of Oakland and Alameda. For more information regarding the special-status species refer to the Project's NES-MI.

4 ENVIRONMENTAL CONSEQUENCES

4.1 Introduction

The following sections present the potential temporary and permanent water quality impacts from the Project activities and standard BMPs that would be implemented to avoid or minimize these impacts.

Temporary water quality impacts can result from sediment discharge from DSAs and construction near water resources or drainage facilities that discharge to water bodies. Permanent impacts to water quality result from the addition of impervious area; this additional impervious area prevents runoff from naturally dispersing and infiltrating into the ground, resulting in increased concentrated flow.

The proposed Project would lead to a total 0.92 acre net increase of impervious surface and more than one acre of DSA throughout the whole Project site (see Table 3).

4.2 Potential Impacts to Water Quality

4.2.1 Anticipated Changes to the Physical/Chemical Characteristics of the Aquatic Environment

4.2.1.1 Currents, Circulation, or Drainage Patterns

The Project would not alter the greater existing drainage pattern within the Project limits. Proposed drainage facilities would ultimately connect to existing drainage facilities, which connect to the existing outfalls to Oakland Estuary and Lake Merritt Channel on the Oakland side, and Oakland Estuary on the Alameda side. Additional inlets and culverts will be added as necessary within the Project location in order to accommodate the increased runoff. These changes will be determined in the PS&E phase.

4.2.1.2 Suspended Particulates (Turbidity)

While the added impervious area could result in an increase of sediment-laden flow discharging to the receiving water body, the proposed added impervious area is minimal in comparison to the existing impervious area, so the potential increase in sediment-laden flows is expected to be minimal. Any stormwater impacts would be minimized through the proper implementation of permanent stormwater treatment measures. BMPs such as bioretention, biofiltration, and tree well filters are being considered.

4.2.1.3 Oil, Grease, and Chemical Pollutants

While the Project would not result in a change in source or frequency of pollutants, it does increase the amount of impervious surface on which pollutants can accumulate. This means that runoff from the site could contain more pollutants than it did under preconstruction conditions. However, the increase is expected to be relatively minor due to the already heavily paved conditions of the Project site. Stormwater impacts would be minimized through the proper implementation of permanent stormwater treatment measures. BMPs such as bioretention, biofiltration, and tree well filters are being considered.

4.2.1.4 Temperature, Oxygen Depletion, pH, and Other Parameters

The increase in impervious surface area could lead to more runoff and thus wash in more pollutants and litter into the drainage system. However, most of the Project site is already heavily paved making this increase in impervious surface relatively minor, and any increase in runoff would also be minor relative to the amount of runoff that already occurs.

4.2.1.5 Erosion and Accretion Patterns

This Project would lead to an increase in impervious area, which would lead to increased runoff during storm events. This Project would also lead to an increase in impervious area (Table 3). This increase in impervious surface area means that the Project is subject to the ‘Post-Construction Treatment Control’ requirements of Caltrans’ Statewide NPDES (NPDES Permit Number CAS000003).

The Project doesn’t require a 401 permit and is grandfathered from the 1999 Caltrans NPDES permit, so it is exempt from hydromodification management. Work within the cities’ ROW is also exempt from hydromodification under C.3 regulations because runoff will flow either into tidally influenced water or enclosed pipes or culverts (See Figure 6).

4.2.1.6 Aquifer Recharge/Groundwater

While an increase in impervious area does lead to a decrease in recharge area, this Project would only increase the impervious area in a small portion of the subbasin. Additionally, the Project location is within a part of the watershed that doesn’t have any recharge facilities. Thus, this Project is not expected to affect the recharge of the watershed.

Figure 6. Hydromodification Susceptibility Map

4.2.2 Anticipated Changes to the Biological Characteristics of the Aquatic Environment

4.2.2.1 Wildlife Habitat

Because of the impervious nature of the Project location, there are no critical habitats in the Project location. No work is proposed to occur within the wetlands, Lake Merritt Channel, or Oakland Estuary, so a 401 water quality permit from the San Francisco Bay RWQCB is not anticipated. Refer to Project's NES-MI for more information and other impacts to biological resources.

4.2.2.2 Invasive Species

Many invasive plant species were found in the Project site. Because ground-disturbing action or activity is proposed in the Project vicinity, there is a risk of introducing or spreading invasive weeds associated with construction activities. Caltrans will follow its prevention standards in order to prevent the spread of invasive species. For more information on invasive species, refer to the NES-MI.

4.2.3 Anticipated Changes to the Human-Use Characteristics of the Aquatic Environment

4.2.3.1 Other Water Related Recreation

None of the listed beneficial uses are expected to be impacted by this Project.

4.2.4 Temporary Impacts to Water Quality

There are temporary impacts associated with groundwater and stormwater. There are no direct impacts to water bodies.

4.2.4.1 Water Resources

No work is proposed within the water bodies on either the Oakland or Alameda side of the Project, and therefore no direct impacts to water bodies are anticipated. For more information about impacts to water resources refer to the NES-MI.

4.2.4.2 Groundwater

Both the Alameda and Oakland sides of the Project have high groundwater, which means dewatering will most likely be needed. On the Oakland side of the Project, excavation sites for retaining walls 1, 2, 3, 4A, 4B, 5, 6, 8R, and 9 and for the construction of the WB I-980 Jackson Street Off-Ramp likely require dewatering (Table 1 and Table 2). On the Alameda side, a 20-foot excavation for overhead sign foundation will need dewatering. The current and historic existence of businesses associated with hazardous material contamination (auto shops, cleaners, plating, gas stations, and truck stops) means that there is potential for contaminated groundwater near the Project location. Pumping activity, such as dewatering, could lead to the spread of polluted groundwater within the surrounding properties.

Proper dewatering procedures will need to be followed as described in the *Field Guide to Construction Site Dewatering* (Caltrans 2014) or be operated in coordination with EBMUD, the Public Owned Treatment Works (POTW) for Oakland and Alameda. A dewatering permit would be needed due to the presence of contaminated groundwater (see Section 5.1). There is ongoing coordination with the Project team to assess the possibility of dewatering activities near the exit of the Posey Tube which could potentially spread polluted groundwater. Suggested BMPs are listed in Table 6, and the specific BMPs to be implemented will be determined during the PS&E phase.

4.2.4.3 Stormwater

Ground-disturbing activities during construction on both the Oakland and Alameda sides of the Project would lead to increased sediment in stormwater runoff. Additionally, the use, storage, or maintenance of construction vehicles within the Project site during construction can increase the risk of accidental spills or releases of fuels, oils, or other potentially toxic materials. An accidental release of these materials could pose a threat to water quality if contaminants enter storm drains and drain to downstream receiving waters. The magnitude of the impact from an accidental release depends on the amount and type of material spilled.

BMPs will be needed to limit sediment-laden flows from leaving the construction site. BMPs such as temporary silt fencing, temporary drainage inlet protection, and street sweeping and vacuuming will help to prevent and reduce runoff from the construction site by blocking and filtering pollutants and keeping the site clean. BMPs such as spill prevention and control, staff training, materials management, and liquid waste management can be used to prevent accidental spills of toxic materials associated with construction operations, as well as the use and storage of construction vehicles and equipment. Some suggested BMPs are listed in Table 6, and the specific BMPs to be implemented will be determined during the PS&E phase.

Table 6. Suggested Construction BMPs

Temporary BMPs	Purpose
Soil Stabilization	
Preservation of Existing Vegetation	Preserve vegetation for erosion and sediment control and existing wildlife.
Temporary Hydroseeding	Protect disturbed soil from raindrop and wind impacts using a water-based mixture of wood/paper fiber, stabilizing emulsion, and seed from hydro-mulching equipment.
Geotextiles, Mats, Plastic Covers, Erosion Control Blankets	Place over DSAs to aid in soil stabilization and protection from wind and water erosion.
Temporary Soil Binder	Stabilize disturbed soils from raindrop and wind impacts by adding adhesives to soils.
Sediment Control	
Temporary Silt Fence	Linear, permeable fabric barriers to intercept sediment-laden sheet flow.
Temporary Drainage Inlet Protection	Runoff detainment devices used at storm drain inlets that is subject to runoff from construction activities.
Street Sweeping and Vacuuming	Removal of tracked sediment to prevent them entering a storm drain or watercourse.
Tracking Control	
Temporary Construction Entrances/Exits	Points of entrance/exit to a construction site that are stabilized to reduce the tracking of mud and dirt onto public roads.
Non-stormwater Management	
Dewatering operations	Prevents the discharge of pollutants causes by construction site dewatering operations associated with both stormwater and non-stormwater. These activities are subject to the requirements of the applicable NPDES permit, most often a 401 Certification, or Waste Discharge Requirements (WDRs) administered by the RWQCB. Detailed guidance for management of dewatering operation can be found in the Field Guide to Construction Site Dewatering.
Waste Management and Materials Pollution Control	
Temporary Concrete Washout Facilities	Specified vehicle washing areas to contain concrete waste materials.
All other anticipated waste mgmt. and materials pollution control measures are covered under Job Site Mgmt.	
Job Site Management	
General measures covered under job site management include:	Non-stormwater management consists of:
• Spill prevention and control • Materials management • Stockpile management • Waste management • Hazardous waste management • Contaminated soil • Concrete waste • Sanitary and septic waste and liquid waste	• Water control and conservation • Illegal connection and discharge detection and reporting • Vehicle and equipment cleaning • Vehicle and equipment fueling and maintenance • Paving, sealing, saw cutting and grinding operations • Thermoplastic striping and pavement markers • Concrete curing and concrete finishing
Miscellaneous job site management includes:	
• Training of employees and subcontractors • Proper selection, deployment and repair of construction site BMPs	

4.2.5 Operation and Maintenance Impacts

4.2.5.1 Water Resources

There will be no work within water bodies on either the Oakland or Alameda side of the Project. Thus, there are no direct impacts to water bodies expected. For more information about impacts to water resources, refer to the NES-MI.

4.2.5.2 Groundwater

The added impervious area would lead to a minimal decrease to the recharge area within the Project location. The implementation of BMPs and minimization measures are expected to prevent any long-term impacts. Bioretention or biofiltration would be considered to maintain groundwater recharge patterns. Construction details for these design features or BMPs would be developed and incorporated into the Project design documents.

4.2.5.3 Stormwater

The added impervious area would have a minimal stormwater pollution effects because runoff from Project activities would be treated with stormwater treatment facilities and diverted into modified drainage systems. Pollution and runoff sources are not expected to change.

Trash control devices, such as gross solids removal devices, inlet inserts, and inlets with inclined screens, would be considered to address permit requirements for trash capture and reduction. Bioretention and biofiltration systems, such as tree well filters, would be considered to treat stormwater. Construction details for these design features or BMPs would be developed and incorporated into the Project design documents.

Some suggested BMPs are listed below in Table 7, and the specific BMPs to be implemented will be determined during the PS&E phase.

Table 7. Suggested Permanent Project Features (BMPs)

Project Feature (BMP)	Purpose
Permanent Erosion Control	
Permanent Hydroseed	Water-based mixture of wood/paper fiber (straw), stabilizing emulsion (tackifier), fertilizer, compost, and native seed mix to be applied on unvegetated slopes.
Permanent Fiber Rolls	Degradable fibers rolled tightly and placed on the toe and face of slopes to intercept runoff.
Erosion Control Netting/Blankets	Netting/blankets placed on steep slopes to reduce soil erosion.
Slope Paving	Concrete slopes under bridge decks at abutments to provide erosion control and soil stabilization in areas that do not provide enough light for vegetation establishment.
Drainage Facilities	
Energy Dissipation Devices • Flared end sections • Tee dissipaters	Devices placed at pipe inlets and/or outlets to reduce scour and velocity of stormwater flows prior to discharge to receiving waters.
Rock Slope Protection	Angular rocks placed on streambanks, outfalls, and/or slopes to reduce soil erosion at locations where vegetation cannot be maintained.
Source Control Measures	
Drain Inlet Markers	Markers that inform people to not add pollutants into storm drains.
Protection of Existing Vegetation	Protection of existing trees and/or landscaped areas that would not be disturbed from Project activities.
Plant Selection	Selection of diverse species based on pest-and/or disease-resistance, drought-tolerance, and/or attraction of beneficial insects.
Irrigation Practices for Landscaping	Implementation of an effective irrigation system for landscaped areas and practices to conserve water.
Pesticide Management for Landscaping	Reduction of insect pests, plant diseases, and weeds without the use of pesticides and quick release synthetic fertilizers.
Treatment Measures	
Biofiltration Devices	Vegetated areas and channels that intercept stormwater runoff and remove sediment and pollutants through infiltration.
Bioretention Areas	Areas that intercept stormwater runoff and remove sediment and pollutants through infiltration in vegetation and biologically active soils.
Basins	Areas that intercept stormwater runoff and remove sediment and pollutants through detention/infiltration.
Media Filters	Sand filters that remove sediment and total suspended solids (metals, trash, nutrients).
Tree Well Filters	Trees planted along sidewalks that infiltrate stormwater runoff from streets and treat sediment and pollutants.
Trash Control Devices • Inlet inserts/screens • Gross solids removal devices	Devices designed to remove trash and other pollutants from stormwater runoff.

Source: Caltrans 2017 and ACCWP 2017

4.3 Cumulative Impacts

Any current or future projects within the area would also have to follow NPDES requirements and implement their own hydromodification and treatment BMPs. Therefore, no cumulative impacts are expected for the Project.

5 AVOIDANCE AND MINIMIZATION MEASURES

This section discusses the avoidance and minimization measures not already implemented under Caltrans' and the cities' standard operating practices.

5.1 WQ1- Dewatering

If the Project area contains potentially contaminated groundwater or groundwater that may release contaminated plumes when disturbed, a dewatering permit would be obtained prior to the start of construction. The dewatering permit would comply with the RWQCB's General WDRs for Discharge or Reclamation of Extracted and Treated Groundwater Resulting from the Cleanup of Groundwater Polluted by VOCs, Fuel Leaks, Fuel Additives, and Other Related Wastes (VOC and Fuel General Permit) (NPDES No. CAG912002, RWQCB Order No. R2-2017-0048). Dewatering could also be done in coordination with EBMUD. An active treatment system may also be necessary to treat contaminated groundwater exposed during excavation activities. Dewatering requirements, costs, and the design of the active treatment system would be determined during the PS&E phase.

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Appendix A Basin Plan

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CHAPTER 2: BENEFICIAL USES

State policy for water quality control in California is directed toward achieving the highest water quality consistent with maximum benefit to the people of the state. Aquatic ecosystems and underground aquifers provide many different benefits to the people of the state. The beneficial uses described in detail in this chapter define the resources, services, and qualities of these aquatic systems that are the ultimate goals of protecting and achieving high water quality. The Water Board is charged with protecting all these uses from pollution and nuisance that may occur as a result of waste discharges in the region. Beneficial uses of waters of the State presented here serve as a basis for establishing water quality objectives and discharge prohibitions to attain these goals.

Beneficial use designations for any given water body do not rule out the possibility that other beneficial uses exist or have the potential to exist. Existing beneficial uses that have not been formally designated in this Basin Plan are protected whether or not they are identified. While the tables in this Chapter list a large, representative portion of the water bodies in our region, it is not practical to list each and every water body.

2.1 DEFINITIONS OF BENEFICIAL USES

The following definitions (in italic) for beneficial uses are applicable throughout the entire state. A brief description of the most important water quality requirements for each beneficial use follows each definition (in alphabetical order by abbreviation).

2.1.1 AGRICULTURAL SUPPLY (AGR)

Uses of water for farming, horticulture, or ranching, including, but not limited to, irrigation, stock watering, or support of vegetation for range grazing.

The criteria discussed under municipal and domestic water supply (MUN) also effectively protect farmstead uses. To establish water quality criteria for livestock water supply, the Water Board must consider the relationship of water to the total diet, including water freely drunk, moisture content of feed, and interactions between irrigation water quality and feed quality. The University of California Cooperative Extension has developed threshold and limiting concentrations for livestock and irrigation water. Continued irrigation often leads to one or more of four types of hazards related to water quality and the nature of soils and crops. These hazards are (1) soluble salt accumulations, (2) chemical changes in the soil, (3) toxicity to crops, and (4) potential disease transmission to humans through reclaimed water use. Irrigation water classification systems, arable soil classification systems, and public health criteria related to reuse of wastewater have been developed with consideration given to these hazards.

2.1.2 AREAS OF SPECIAL BIOLOGICAL SIGNIFICANCE (ASBS)

Areas designated by the State Water Board.

These include marine life refuges, ecological reserves, and designated areas where the preservation and enhancement of natural resources requires special protection. In these areas, alteration of natural water quality is undesirable. The areas that have been designated as ASBS in this Region are Bird Rock, Point Reyes Headland Reserve and Extension, Double Point, Duxbury Reef Reserve and Extension, Farallon Islands, and James V. Fitzgerald Marine Reserve, depicted in Figure 2-1. The California Ocean Plan prohibits waste discharges into, and requires wastes to be discharged at a sufficient distance from, these areas to assure maintenance of natural water quality conditions. These areas have been designated as a subset of State Water Quality Protection Areas as per the Public Resources Code.

2.1.3 COLD FRESHWATER HABITAT (COLD)

Uses of water that support cold water ecosystems, including, but not limited to, preservation or enhancement of aquatic habitats, vegetation, fish, or wildlife, including invertebrates.

Cold freshwater habitats generally support trout and may support anadromous salmon and steelhead fisheries as well. Cold water habitats are commonly well-oxygenated. Life within these waters is relatively intolerant to environmental stresses. Often, soft waters feed cold water habitats. These waters render fish more susceptible to toxic metals, such as copper, because of their lower buffering capacity.

2.1.4 COMMERCIAL AND SPORT FISHING (COMM)

Uses of water for commercial or recreational collection of fish, shellfish, or other organisms, including, but not limited to, uses involving organisms intended for human consumption or bait purposes.

To maintain fishing, the aquatic life habitats where fish reproduce and seek their food must be protected. Habitat protection is under descriptions of other beneficial uses.

2.1.5 ESTUARINE HABITAT (EST)

Uses of water that support estuarine ecosystems, including, but not limited to, preservation or enhancement of estuarine habitats, vegetation, fish, shellfish, or wildlife (e.g., estuarine mammals, waterfowl, shorebirds), and the propagation, sustenance, and migration of estuarine organisms.

Estuarine habitat provides an essential and unique habitat that serves to acclimate anadromous fishes (e.g., salmon, striped bass) migrating into fresh or marine water conditions. The protection of estuarine habitat is contingent upon (1) the maintenance of adequate Delta outflow to provide mixing and salinity control; and (2) provisions to protect wildlife habitat associated with marshlands and the Bay periphery (i.e., prevention of fill activities). Estuarine habitat is generally associated with moderate seasonal fluctuations in dissolved oxygen, pH, and temperature and with a wide range in turbidity.

2.1.6 FRESHWATER REPLENISHMENT (FRESH)

Uses of water for natural or artificial maintenance of surface water quantity or quality.

Fresh water inputs are important for maintaining salinity balance, flow, and/or water quantity for such surface water bodies as marshes, wetlands, and lakes.

2.1.7 GROUNDWATER RECHARGE (GWR)

Uses of water for natural or artificial recharge of groundwater for purposes of future extraction, maintenance of water quality, or halting saltwater intrusion into freshwater aquifers.

The requirements for groundwater recharge operations generally reflect the future use to be made of the water stored underground. In some cases, recharge operations may be conducted to prevent seawater intrusion. In these cases, the quality of recharged waters may not directly affect quality at the wellfield being protected. Recharge operations are often limited by excessive suspended sediment or turbidity that can clog the surface of recharge pits, basins, or wells.

Under the state Antidegradation Policy, the quality of some of the waters of the state is higher than established by adopted policies. It is the intent of this policy to maintain that existing higher water quality to the maximum extent possible.

Requirements for groundwater recharge, therefore, shall impose the Best Available Technology (BAT) or Best Management Practices (BMPs) for control of the discharge as necessary to assure the highest quality consistent with maximum benefit to the people of the state. Additionally, it must be recognized that groundwater recharge occurs naturally in many areas from streams and reservoirs. This recharge may have little impact on the quality of groundwaters under normal circumstances, but it may act to transport pollutants from the recharging water body to the groundwater. Therefore, groundwater recharge must be considered when requirements are established.

2.1.8 INDUSTRIAL SERVICE SUPPLY (IND)

Uses of water for industrial activities that do not depend primarily on water quality, including, but not limited to, mining, cooling water supply, hydraulic conveyance, gravel washing, fire protection, and oil well repressurization.

Most industrial service supplies have essentially no water quality limitations except for gross constraints, such as freedom from unusual debris.

2.1.9 MARINE HABITAT (MAR)

Uses of water that support marine ecosystems, including, but not limited to, preservation or enhancement of marine habitats, vegetation such as kelp, fish, shellfish, or wildlife (e.g., marine mammals, shorebirds).

In many cases, the protection of marine habitat will be accomplished by measures that protect wildlife habitat generally, but more stringent criteria may be necessary for waterfowl marshes and other habitats, such as those for shellfish and marine fishes. Some marine habitats, such as important intertidal zones and kelp beds, may require special protection.

2.1.10 FISH MIGRATION (MIGR)

Uses of water that support habitats necessary for migration, acclimatization between fresh water and salt water, and protection of aquatic organisms that are temporary inhabitants of waters within the region.

The water quality provisions acceptable to cold water fish generally protect anadromous fish as well. However, particular attention must be paid to maintaining zones of passage. Any barrier to migration or free movement of migratory fish is harmful. Natural tidal movement in estuaries and unimpeded river flows are necessary to sustain migratory fish and their offspring. A water quality barrier, whether thermal, physical, or chemical, can destroy the integrity of the migration route and lead to the rapid decline of dependent fisheries.

Water quality may vary through a zone of passage as a result of natural or human- induced activities. Fresh water entering estuaries may float on the surface of the denser salt water or hug one shore as a result of density differences related to water temperature, salinity, or suspended matter.

2.1.11 MUNICIPAL AND DOMESTIC SUPPLY (MUN)

Uses of water for community, military, or individual water supply systems, including, but not limited to, drinking water supply.

The principal issues involving municipal water supply quality are (1) protection of public health; (2) aesthetic acceptability of the water; and (3) the economic impacts associated with treatment- or quality-related damages.

The health aspects broadly relate to: direct disease transmission, such as the possibility of contracting typhoid fever or cholera from contaminated water; toxic effects, such as links between nitrate and methemoglobinemia (blue babies); and increased susceptibility to disease, such as links between halogenated organic compounds and cancer.

Aesthetic acceptance varies widely depending on the nature of the supply source to which people have become accustomed. However, the parameters of general concern are excessive hardness, unpleasant odor or taste, turbidity, and color. In each case, treatment can improve acceptability although its cost may not be economically justified when alternative water supply sources of suitable quality are available.

Published water quality objectives give limits for known health-related constituents and most properties affecting public acceptance. These objectives for drinking water include the U.S. Environmental Protection Agency Drinking Water Standards and the California State Department of Health Services criteria.

2.1.12 NAVIGATION (NAV)

Uses of water for shipping, travel, or other transportation by private, military, or commercial vessels.

Navigation is a designated use where water is used for shipping, travel, or other transportation by private, military, or commercial vessels.

2.1.13 INDUSTRIAL PROCESS SUPPLY (PROC)

Uses of water for industrial activities that depend primarily on water quality.

Water quality requirements differ widely for the many industrial processes in use today. So many specific industrial processes exist with differing water quality requirements that no meaningful criteria can be established generally for quality of raw water supplies. Fortunately, this is not a serious shortcoming, since current water treatment technology can create desired product waters tailored for specific uses.

2.1.14 PRESERVATION OF RARE AND ENDANGERED SPECIES (RARE)

Uses of waters that support habitats necessary for the survival and successful maintenance of plant or animal species established under state and/or federal law as rare, threatened, or endangered.

The water quality criteria to be achieved that would encourage development and protection of rare and endangered species should be the same as those for protection of fish and wildlife habitats generally. However, where rare or endangered species exist, special control requirements may be necessary to assure attainment and maintenance of particular quality criteria, which may vary slightly with the environmental needs of each particular species. Criteria for species using areas of special biological significance should likewise be derived from the general criteria for the habitat types involved, with special management diligence given where required.

2.1.15 WATER CONTACT RECREATION (REC1)

Uses of water for recreational activities involving body contact with water where ingestion of water is reasonably possible. These uses include, but are not limited to, swimming, wading, water-skiing, skin and scuba diving, surfing, whitewater activities, fishing, and uses of natural hot springs.

Water contact implies a risk of waterborne disease transmission and involves human health; accordingly, criteria required to protect this use are more stringent than those for more casual water-oriented recreation.

Excessive algal growth has reduced the value of shoreline recreation areas in some cases, particularly for swimming. Where algal growths exist in nuisance proportions, particularly bluegreen algae, all recreational water uses, including fishing, tend to suffer.

One criterion to protect the aesthetic quality of waters used for recreation from excessive algal growth is based on chlorophyll a.

Public access to drinking water reservoirs is limited or prohibited by reservoir owner/operators for purposes of protecting drinking water quality and public health. In some cases, access to reservoir tributaries is also prohibited. For these water bodies, REC-1 is designated as E*, for the purpose of protecting water quality. No right to public access is intended by this designation.

2.1.16 NONCONTACT WATER RECREATION (REC2)

Uses of water for recreational activities involving proximity to water, but not normally involving contact with water where water ingestion is reasonably possible. These uses include, but are not limited to, picnicking, sunbathing, hiking, beachcombing, camping, boating, tide pool and marine life study, hunting, sightseeing, or aesthetic enjoyment in conjunction with the above activities.

Water quality considerations relevant to noncontact water recreation, such as hiking, camping, or boating, and those activities related to tide pool or other nature studies require protection of habitats and aesthetic features. In some cases, preservation of a natural wilderness condition is justified, particularly when nature study is a major dedicated use.

One criterion to protect the aesthetic quality of waters used for recreation from excessive algal growth is based on chlorophyll a.

2.1.17 SHELLFISH HARVESTING (SHELL)

Uses of water that support habitats suitable for the collection of crustaceans and filter-feeding shellfish (e.g., clams, oysters, and mussels) for human consumption, commercial, or sport purposes.

Shellfish harvesting areas require protection and management to preserve the resource and protect public health. The potential for disease transmission and direct poisoning of humans is of considerable concern in shellfish regulation. The bacteriological criteria for the open ocean, bays, and estuarine waters where shellfish cultivation and harvesting occur should conform with the standards described in the National Shellfish Sanitation Program, Manual of Operation.

Toxic metals can accumulate in shellfish. Mercury and cadmium are two metals known to have caused extremely disabling effects in humans who consumed shellfish that concentrated these elements from industrial waste discharges. Other elements, radioactive isotopes, and certain toxins produced by particular plankton species also concentrate in shellfish tissue. Documented cases of paralytic shellfish poisoning are not uncommon in California.

2.1.18 FISH SPAWNING (SPWN)

Uses of water that support high quality aquatic habitats suitable for reproduction and early development of fish.

Dissolved oxygen levels in spawning areas should ideally approach saturation levels. Free movement of water is essential to maintain well-oxygenated conditions around eggs deposited in sediments. Water temperature, size distribution and organic content of sediments, water depth, and current velocity are also important determinants of spawning area adequacy.

2.1.19 WARM FRESHWATER HABITAT (WARM)

Uses of water that support warm water ecosystems including, but not limited to, preservation or enhancement of aquatic habitats, vegetation, fish, or wildlife, including invertebrates.

The warm freshwater habitats supporting bass, bluegill, perch, and other fish are generally lakes and reservoirs, although some minor streams will serve this purpose where stream flow is sufficient to sustain the fishery. The habitat is also important to a variety of nonfish species, such as frogs, crayfish, and insects, which provide food for fish and small mammals. This habitat is less sensitive to environmental changes, but more diverse than the cold freshwater habitat, and natural fluctuations in temperature, dissolved oxygen, pH, and turbidity are usually greater.

2.1.20 WILDLIFE HABITAT (WILD)

Uses of waters that support wildlife habitats, including, but not limited to, the preservation and enhancement of vegetation and prey species used by wildlife, such as waterfowl.

The two most important types of wildlife habitat are riparian and wetland habitats. These habitats can be threatened by development, erosion, and sedimentation, as well as by poor water quality.

The water quality requirements of wildlife pertain to the water directly ingested, the aquatic habitat itself, and the effect of water quality on the production of food materials. Waterfowl habitat is particularly sensitive to changes in water quality. Dissolved oxygen, pH, alkalinity, salinity, turbidity, settleable matter, oil, toxicants, and specific disease organisms are water quality characteristics particularly important to waterfowl habitat. Dissolved oxygen is needed in waterfowl habitats to suppress development of botulism organisms; botulism has killed millions of waterfowl. It is particularly important to maintain adequate circulation and aerobic conditions in shallow fringe areas of ponds or reservoirs where botulism has caused problems.

2.2 EXISTING AND POTENTIAL BENEFICIAL USES

2.2.1 SURFACE WATERS

Surface waters in the Region consist of non-tidal wetlands, rivers, streams, and lakes (collectively described as inland surface waters), estuarine wetlands known as baylands, estuarine waters, and coastal waters. In this Region, estuarine waters consist of the Bay system including intertidal, tidal, and subtidal habitats from the Golden Gate to the Region's boundary near Pittsburg and the lower portions of streams that are affected by tidal hydrology, such as the Napa and Petaluma rivers in the north and Coyote and San Francisquito creeks in the south.

Inland surface waters support or could support most of the beneficial uses described above. The specific beneficial uses for inland streams include municipal and domestic supply (MUN), agricultural supply (AGR), commercial and sport fishing (COMM), freshwater replenishment (FRESH), industrial process supply (PRO), groundwater recharge (GWR), preservation of rare and endangered species (RARE), water contact recreation (REC1), noncontact water recreation (REC2), wildlife habitat (WILD), cold freshwater habitat (COLD), warm freshwater habitat (WARM), fish migration (MIGR), and fish spawning (SPWN).

The San Francisco Bay Estuary supports estuarine habitat (EST), industrial service supply (IND), and navigation (NAV) in addition to COMM, RARE, REC1, REC2, WILD, MIGR, and SPWN.

Coastal waters' beneficial uses include water contact recreation (REC1); noncontact water recreation (REC2); industrial service supply (IND); navigation (NAV); marine habitat (MAR); shellfish harvesting (SHELL); commercial and sport fishing (COMM); wildlife habitat (WILD), fish migration (MIGR), fish spawning (SPWN), and preservation of rare and endangered species (RARE). In addition, the California coastline within the Region is endowed with exceptional scenic beauty.

The beneficial uses of any specifically identified water body generally apply to all its tributaries. In some cases a beneficial use may not be applicable to the entire body of water, such as navigation in Richardson Bay or shellfish harvesting in the Pacific Ocean. In these cases, the Water Board's judgment regarding water quality control measures necessary to protect beneficial uses will be applied.

Beneficial uses of streams that have intermittent flows, as is typical of many streams in the region, must be protected throughout the year and are designated as "existing."

Beneficial uses of each significant water body have been identified and are organized according to the seven major Hydrologic Planning Areas within the Region (Figure 2-2). The maps locating each water body (Figures 2-3 through 2-9b) were produced using a geographical information system (GIS) at the Water Board. The maps use the hydrologic basin information compiled by the California Interagency Watershed map, with supplemental information from the Oakland Museum of California Creek and Watershed Map series, the Contra Costa County Watershed Atlas, and the San Francisco Estuary Institute EcoAtlas. More detailed representations of each location can be created using this GIS version.

Table 2-1 contains the beneficial uses for many surface water bodies in the Region, organized geographically by the Region's seven Hydrologic Planning Areas. Within each Hydrologic Planning Area, water bodies are listed geographically, with tributaries indented below their receiving water body. In cases where a water body shares the same name with another water body (e.g., Redwood Creek), the location of the water body (county and/or other identifier) is given in parentheses. An alternative name for a water body, where known, is also shown in parentheses. In Table 2-1, beneficial uses are indicated as follows:

E – indicates the beneficial use exists in the water body.

E* – indicates public access to the water body is limited or prohibited for purposes of protecting drinking water quality and public health. REC-1 is designated as E* for the purpose of protecting water quality. No right to public access is intended by this designation.

P – indicates the water body could potentially support the beneficial use.

2.2.2 GROUNDWATER

Groundwater is defined as subsurface water that occurs beneath the water table in soils and geologic formations that are fully saturated. Where groundwater occurs in a saturated geologic unit that contains sufficient permeable thickness to yield significant quantities of water to wells and springs, it can be defined as an aquifer. A groundwater basin is defined as a hydrogeologic unit containing one large aquifer or several connected and interrelated aquifers.

Water-bearing geologic units occur within groundwater basins in the Region that do not meet the definition of an aquifer. For instance, there are shallow, low permeability zones throughout the Region that have extremely low water yields. Groundwater may also occur outside of currently identified basins. Therefore, for basin planning purposes, the term "groundwater" includes all subsurface waters, whether or not these waters meet the classic definition of an aquifer or occur within identified groundwater basins.

The California Department of Water Resources (DWR) evaluated the characteristics of groundwater basins in the Region and throughout the state and summarized the results in California's Groundwater, Bulletin 118 (2003). Of special importance to the Region are the 28 groundwater basins and seven sub-basins classified by DWR that produce, or potentially could produce, significant amounts of groundwater (Figures 2-10 and 2-10A-D). The Water Board maintains a GIS for all water bodies in the Region and has the capacity to present information on each basin at a much higher level of resolution than is depicted in Figures 2-10A-D.

Existing and potential beneficial uses applicable to groundwater in the Region include municipal and domestic water supply (MUN), industrial water supply (IND), industrial process supply (PRO), agricultural water supply (AGR), groundwater recharge (GWR), and freshwater replenishment to surface waters (FRESH). Table 2-2 lists the 28 identified groundwater basins and seven sub-basins located in the Region and their existing and potential beneficial uses.

Unless otherwise designated by the Water Board, all groundwater is considered suitable, or potentially suitable, for municipal or domestic water supply (MUN). In making any exceptions, the Water Board will consider the criteria referenced in State Water Board Resolution No. 88-63 and Water Board Resolution No. 89-39, "Sources of Drinking Water," where:

- The total dissolved solids exceed 3,000 milligrams per liter (mg/L) (5,000 microSiemens per centimeter, µS/cm, electrical conductivity), and it is not reasonably expected by the Water Board that the groundwater could supply a public water system; or
- There is contamination, either by natural processes or by human activity (unrelated to a specific pollution incident), that cannot reasonably be treated for domestic use using either Best Management Practices (BMPs) or best economically achievable treatment practices; or
- The water source does not provide sufficient water to supply a single well capable of producing an average, sustained yield of 200 gallons per day; or
- The aquifer is regulated as a geothermal energy-producing source or has been exempted administratively pursuant to 40 Code of Federal Regulations (CFR) Part 146.4 for the purpose of underground injection of fluids associated with the production of hydrocarbon or geothermal energy, provided that these fluids do not constitute a hazardous waste under 40 CFR Part 261.3.

2.2.3 WETLANDS

Federal administrative law (e.g., 40 CFR Part 122.2, revised December 22, 1993) defines wetlands as waters of the United States. National waters include waters of the State of California, defined by the Porter-Cologne Act as "any water, surface or underground, including saline waters, within the boundaries of the State" (California Water Code §13050[e]). Wetland water quality control is therefore clearly within the jurisdiction of the State Water Board and Regional Water Boards.

Wetlands are further defined in 40 CFR 122.2 as "those areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas."

The Water Board recognizes that wetlands frequently include areas commonly referred to as saltwater marshes, freshwater marshes, open or closed brackish water marshes, mudflats, sandflats, unvegetated seasonally ponded areas, vegetated shallows, sloughs, wet meadows, playa lakes, natural ponds, vernal pools, diked baylands, seasonal wetlands, floodplains, and riparian woodlands.

Mudflats make up one of the largest and most important habitat types in the Estuary. Snails, clams, worms, and other animals convert the rich organic matter in the mud bottom to food for fish, crabs, and birds.

Mudflats generally support a variety of edible shellfish, and many species of fish rely heavily on the mudflats during at least a part of their life cycle. Additionally, San Francisco Bay mudflats are one of the most important habitats on the coast of California for millions of migrating shorebirds.

Another important characteristic of the Estuary is the fresh, brackish, and salt water marshes around the Bay's margins. These highly complex communities are recognized as vital components of the Bay system's ecology. Most marshes around the Bay have been destroyed through filling and development. The protection, preservation, and restoration of the remaining marsh communities are essential for maintaining the ecological integrity of the Estuary.

Identifying wetlands may be complicated by such factors as the seasonality of rainfall in the Region. Therefore, in identifying wetlands considered waters of the United States, the Water Board will consider such indicators as hydrology, hydrophytic plants, and/or hydric soils for the purpose of mapping and inventorying wetlands. The Water Board will, in general, rely on the federal manual for wetland delineation in the Region when issuing Clean Water Act Section 401 water quality certifications (U.S. Army Corps of Engineers (Corps) Wetlands Delineation Manual, 1987). In the rare cases where the U.S. EPA and Corps guidelines disagree on the boundaries for federal jurisdictional wetlands, the Water Board will rely on the wetlands delineation made by the U.S. EPA or the California Department of Fish and Game (CDFG). For the purpose of mapping and inventorying wetlands, the Water Board will rely on the protocols and naming conventions of the National Wetlands Inventory (NWI) prepared by the U.S. Fish and Wildlife Service (USFWS).

Many individual wetlands provide multiple benefits depending on the wetland type and location. There are many potential beneficial uses of wetlands, including Wildlife Habitat (WILD); Preservation of Rare and Endangered Species (RARE); Shellfish Harvesting (SHELL); Water Contact Recreation (REC1); Noncontact Water Recreation (REC2); Commercial, and Sport Fishing (COMM); Marine Habitat (MAR); Fish Migration (MIGR); Fish Spawning (SPAWN); and Estuarine Habitat (EST). Some of these general beneficial uses can be further described in terms of their component wetland function. For example, many wetlands that provide groundwater recharge (GWR) also provide flood control, pollution control, erosion control, and stream baseflow.

Table 2-3 shows how beneficial uses are associated with different wetland types. Table 2-4 lists and specifies beneficial uses for 34 significant wetland areas within the Region; generalized locations of these wetlands are shown in Figure 2-11. It should be noted that most of the wetlands listed in Table 2-4 are saltwater marshes, and that the list is not comprehensive.

The Water Board has participated in completing the Baylands Ecosystem Habitat Goals Report (1999) and the Baylands Ecosystem Species and Community Profiles (2000), which were written by scientists and managers in the Region in order to recommend sound wetland restoration strategies. Other efforts around the Bay to locate wetland sites include San Francisco Estuary Institute's (SFEI) EcoAtlas Baylands Maps (Baylands Maps) and Bay Area Wetlands Project Tracker (Wetlands Tracker), and the Wetland Tracker managed by the San Francisco Bay Joint Venture. Because of the large number of small and non-contiguous wetlands, it is not practical to delineate and specify beneficial uses of every wetland area. Therefore, beneficial uses may be determined site specifically, as needed. Chapter 4 of this Plan contains additional information on the process used to determine beneficial uses for specific wetland sites.

FIGURES

TABLES

Table 2-1: Existing and Potential Beneficial Uses of Water Bodies in the San Francisco Bay Region

MARIN COASTAL BASIN

	Human Consumptive Uses						Aquatic Life Uses									Wildlife Use	Recreational Uses		
COUNTY Waterbody	AGR	MUN	FRSH	GWR	IND	PROC	COMM	SHELL	COLD	EST	MAR	MIGR	RARE	SPWN	WARM	WILD	REC-1	REC-2	NAV
MARIN COUNTY																			
Pacific Ocean (Marin)					E		E	E			E	E	E	E		E	E	E	E
Abbotts Lagoon											E					E	E	E	
Drakes Estero							E	E			E	E	E	E		E	E	E	
East Schooner Creek								E	E			E	E	E	E	E	E	E	
Home Ranch Creek									E			E	E	E	E	E	E	E	
Limantour Estero							E	E			E	E	E	E		E	E	E	
Glenbrook Creek									E			E	E		E	E	E	E	
Muddy Hollow Creek									E			E	E	E	E	E	E	E	
Santa Maria Creek (Marin)									E			E	E	E	E	E	E	E	
Coast Creek								E	E			E	E	E	E	E	E	E	
Alamere Creek									E							E	E	E	
Wildcat Lake															E	E	E	E	
Crystal Lake									E					E	E	E	E	E	
Bass Lake							E								E	E	E	E	
Pelican Lake															E	E	E	E	
Arroyo Hondo (Marin)		E							E						E	E	E	E	
Bolinas Lagoon							E	E			E	E	E	E		E	E	E	E
Pine Gulch Creek		E							E			E	E	E	E	E	E	E	
Copper Mine Gulch Creek									E			E	E	E	E	E	E	E	
Wilkins Gulch Creek									E			E	E		E	E	E	E	

E: Existing beneficial use E*: Water quality objectives apply; water contact recreation is prohibited or limited to protect public health P: Potential beneficial use

MARIN COASTAL BASIN

COUNTY Waterbody	AGR	MUN	FRSH	GWR	IND	PROC	COMM	SHELL	COLD	EST	MAR	MIGR	RARE	SPWN	WARM	WILD	REC-1	REC-2	NAV
MARIN COUNTY, continued																			
Pike County Gulch Creek									E						E	E	E	E	
Morses Gulch Creek									E			E	E	E	E	E	E	E	
McKinnan Gulch Creek									E			E	E	E	E	E	E	E	
Stinson Gulch Creek		E							E			E	E	E	E	E	E	E	
Easkoot Creek									E			E	E	E	E	E	E	E	
Webb Creek		E							E				E		E	E	E	E	
Lone Tree Creek															E	E	E	E	
Redwood Creek (Marin)	E	E	E					E	E			E	E	E	E	E	E	E	
Green Gulch Creek									E			E	E	E	E	E	E	E	
Tennessee Valley Creek															E	E	E	E	
Rodeo Lagoon							E		E		E		E			E	E	E	
Rodeo Creek									E				E	E	E	E	E	E	
Tomales Bay							E	E			E	E	E	E		E	E	E	E
Millerton Gulch									E				E		E	E	E	E	
Grand Canyon Creek															E	E	E	E	
Tomasini Canyon Creek									E			E	E	E	E	E	E	E	
Walker Creek							E		E			E	E	E	E	E	E	E	
Chileno Creek									E			E	E		E	E	E	E	
Laguna Lake															E	E	E*	E	
Frink Canyon Creek									E			E	E		E	E	E	E	
Verde Canyon Creek									E			E	E		E	E	E	E	
Salmon Creek (Marin)									E			E	E		E	E	E	E	
Soulajule Reservoir		E	E				E								E	E	E*	E	
Arroyo Sausal			E						E				E		E	E	E	E	

E: Existing beneficial use   E*: Water quality objectives apply; water contact recreation is prohibited or limited to protect public health   P: Potential beneficial use

COUNTY Waterbody	AGR	MUN	FRSH	GWR	IND	PROC	COMM	SHELL	COLD	EST	MAR	MIGR	RARE	SPWN	WARM	WILD	REC-1	REC-2	NAV
MARIN COUNTY, continued																			
Lagunitas Creek	E	E	E						E			E	E	E	E	E	E	E	
Haggerty Gulch Creek			E						E			E	E	E	E	E	E	E	
Bear Valley Creek			E						E			E	E	E	E	E	E	E	
Olema Creek			E						E			E	E	E	E	E	E	E	
Nicasio Creek		E	E						E			E		E	E	E	E	E	
Nicasio Reservoir		E	E				E		P					E	E	E	E*	E	
Halleck Creek			E						E						E	E	E	E	
Devils Gulch Creek									E			E	E	E	E	E	E	E	
San Geronimo Creek									E			E	E	E	E	E	E	E	
Woodacre Creek									E			E	E		E	E	E	E	
Kent Lake		E					E		E					E	E	E	E*	E	
Big Carson Creek			E						E							E	E	E	
Alpine Lake		E					E		E					E	E	E	E*	E	
Cataract Creek			E						E							E	E	E	
Bon Tempe Lake		E							E					E	E	E	E*	E	
Lake Lagunitas		E					E		E					E	E	E	E*	E	

E: Existing beneficial use   E*: Water quality objectives apply; water contact recreation is prohibited or limited to protect public health   P: Potential beneficial use

SAN MATEO COASTAL BASIN

	Human Consumptive Uses						Aquatic Life Uses									Wildlife Use	Recreational Uses		
COUNTY Waterbody	AGR	MUN	FRSH	GWR	IND	PROC	COMM	SHELL	COLD	EST	MAR	MIGR	RARE	SPWN	WARM	WILD	REC-1	REC-2	NAV
SAN FRANCISCO COUNTY																			
Pacific Ocean (San Mateo, San Francisco Counties)					E		E	E			E	E	E	E		E	E[1]	E	E
Lake Merced		P					E		E					E	E	E	E	E	
SAN MATEO COUNTY																			
Milagra Creek												E	E		E	E	E	E	
Calera Creek (San Mateo)													E		E	E	E	E	
San Pedro Creek		E							E			E	E	E	E	E	E	E	
San Vicente Creek	E	E							E			E	E	E	E	E	E	E	
Denniston Creek	E	E							E			E	E	E	E	E	E	E	
Arroyo de en Medio									E						E	E	E	E	
Frenchmans Creek	E								E			E	E	E	E	E	E	E	
Pilarcitos Creek	E	E							E			E	E	E	E	E	E	E	
Arroyo Leon Creek									E						E	E	E	E	
Mills Creek (San Mateo)									E				E		E	E	E	E	
Apanolio Creek									E				E	E	E	E	E	E	
Corinda Los Trancos Creek									E				E		E	E	E	E	
Pilarcitos Reservoir		E							E				E	E	E	E	E*	E	
Purisima Creek	E								E			E	E	E		E	E	E	
Lobitos Creek	E								E			E	E	E		E	E	E	
Tunitas Creek	E	E							E			E	E	E	E	E	E	E	
San Gregorio Creek	E								E			E	E	E	E	E	E	E	
Clear Creek									E						E	E	E	E	
El Corte de Madera Creek									E			P	E	P	E	E	E	E	
Bogess Creek									E			E	E	E	E	E	E	E	
Harrington Creek									E			E	E	E	E	E	E	E	
La Honda Creek									E			E	E	E	E	E	E	E	

[1] REC-1 applies within a zone bounded by the shoreline and a distance of 1000 feet from the shoreline or the 30-foot depth contour, whichever is further from the shoreline. This distance is consistent with the applicability of water-contact standards in the Water Quality Plan for the Ocean Waters of California.

E: Existing beneficial use   E*: Water quality objectives apply; water contact recreation is prohibited or limited to protect public health   P: Potential beneficial use

SAN MATEO COASTAL BASIN

COUNTY Waterbody	AGR	MUN	FRSH	GWR	IND	PROC	COMM	SHELL	COLD	EST	MAR	MIGR	RARE	SPWN	WARM	WILD	REC-1	REC-2	NAV
SAN MATEO COUNTY, continued																			
Woodruff Creek									E						E	E	E	E	
Woodhams Creek									E						E	E	E	E	
Mindego Creek									E				E	E	E	E	E	E	
Alpine Creek									E			E	E	E	E	E	E	E	
Pomponio Creek	E								E			E	E	E	E	E	E	E	
Pomponio Reservoir									E						E	E	E	E	
Pescadero Creek	E	E							E			E	E	E	E	E	E	E	
Honsinger Creek									E				E		E	E	E	E	
McCormick Creek									E			E	E	E	E	E	E	E	
Hoffman Creek									E				E			E	E	E	
Jones Gulch Creek									E						E	E	E	E	
Tarwater Creek									E			E	E	E	E	E	E	E	
Peters Creek									E				E	E	E	E	E	E	
Lambert Creek									E				E	E	E	E	E	E	
Fall Creek									E						E	E	E	E	
Slate Creek									E				E	E	E	E	E	E	
Oil Creek									E			E	E	E	E	E	E	E	
Little Boulder Creek									E				E		E	E	E	E	
Waterman Creek									E				E	E	E	E	E	E	
Butano Creek									E			E	E		E	E	E	E	
Little Butano Creek									E				E	E	E	E	E	E	

E: Existing beneficial use E*: Water quality objectives apply; water contact recreation is prohibited or limited to protect public health P: Potential beneficial use

Human Consumptive Uses | Aquatic Life Uses | Wildlife Use | Recreational Uses

CENTRAL BASIN

COUNTY Waterbody	AGR	MUN	FRSH	GWR	IND	PROC	COMM	SHELL	COLD	EST	MAR	MIGR	RARE	SPWN	WARM	WILD	REC-1	REC-2	NAV
SAN FRANCISCO COUNTY																			
Golden Gate Channel							E				E	E	E	E		E	E	E	E
San Francisco Bay Central					E	E	E	E		E		E	E	E		E	E	E	E
Crissy Field Lagoon										E						E	E	E	
Golden Gate Park Lakes															E	E		E	
Lobos Creek		E												E	E	E	E	E	
Mountain Lake															E	E	E	E	
MARIN COUNTY																			
San Rafael Creek									E						E	E	E	E	E
Corte Madera Creek							E		E			E	E	E	E	E	E	E	E
Larkspur Creek									E				E	E	E	E	E	E	
Tamalpais Creek									E			E	E	E	E	E	E	E	
Ross Creek (Marin)									E			E	E	E	E	E	E	E	
Phoenix Lake		E					E		E				E	E	E	E	E*	E	
Phoenix Creek			E						E						E	E	E	E	
Bill Williams Creek			E						E					E	E	E	E	E	
Sleepy Hollow Creek									E			E	E	E	E	E	E	E	
San Anselmo Creek									E			E	E	E	E	E	E	E	
Fairfax Creek									E					E	E	E	E	E	
Cascade Creek									E			E	E	E		E	E	E	
Richardson Bay					E		E	E		E		E	E	E		E	E	E	E
Arroyo Corte Madera del Presidio								E	E			E	E	E	E	E	E	E	
Warner Creek (Mill Valley, Marin)									E			E	E	E	E	E	E	E	
Old Mill Creek									E			E	E	E	E	E	E	E	
Willow Reed Creek									E				E	E	E	E	E	E	
Coyote Creek (Marin)									E						E	E	E	E	
Nyhan Creek									E						E	E	E	E	
ALAMEDA COUNTY																			
Berkeley Aquatic Park Lagoon										E		E		P		E	E	E	
Lake Temescal							E		E					E	E	E	E	E	

E: Existing beneficial use E*: Water quality objectives apply; water contact recreation is prohibited or limited to protect public health P: Potential beneficial use

CENTRAL BASIN

COUNTY Waterbody	AGR	MUN	FRSH	GWR	IND	PROC	COMM	SHELL	COLD	EST	MAR	MIGR	RARE	SPWN	WARM	WILD	REC-1	REC-2	NAV
ALAMEDA COUNTY, continued																			
Temescal Creek									E						E	E	E	E	
Claremont Creek															E	E	E	E	
Strawberry Creek															E	E	E	E	
Codornices Creek									E			E	E	E	E	E	E	E	
Village Creek															E	E	E	E	
Capistrano Creek															E	E	E	E	
CONTRA COSTA COUNTY																			
Cerrito Creek															E	E	E	E	
Baxter Creek															E	E	E	E	
Richmond Inner Harbor							E			E						E	E	E	E

E: Existing beneficial use   E*: Water quality objectives apply; water contact recreation is prohibited or limited to protect public health   P: Potential beneficial use

SOUTH BAY BASIN

	Human Consumptive Uses							Aquatic Life Uses								Wildlife Use	Recreational Uses		
COUNTY Waterbody	AGR	MUN	FRSH	GWR	IND	PROC	COMM	SHELL	COLD	EST	MAR	MIGR	RARE	SPWN	WARM	WILD	REC-1	REC-2	NAV
SAN FRANCISCO COUNTY																			
San Francisco Bay Lower					E		E	E		E		E	E	E		E	E	E	E
Mission Creek (San Francisco)							E			E						E	E	E	E
Central Basin							E			E						E	E	E	E
Islais Creek, tidal							E			E						E	E	E	E
India Basin							E			E						E	E	E	E
South Basin							E			E						E	E	E	E
Yosemite Creek							E			E						E	E	E	
SAN MATEO COUNTY																			
Brisbane Lagoon										E						E	E	E	
Guadalupe Canyon Creek															E	E	E	E	
Colma Creek															E	E	E	E	
San Bruno Creek															E	E	E	E	
Mills Creek															E	E	E	E	
Easton Creek															E	E	E	E	
Burlingame Lagoon										E						E	E	E	
Anza Lagoon										E						E	E	E	
Sanchez Creek															E	E	E	E	
Cherry Canyon Creek															E	E	E	E	
San Mateo Creek			E						E			E	E	E	E	E	E	E	
Polhemus Creek									E						E	E	E	E	
Lower Crystal Springs Reservoir		E							E				E	E	E	E	E*	E	
Upper Crystal Springs Reservoir		E							E				E	E	E	E	E*	E	
San Andreas Creek			E						E						E	E	E	E	
San Andreas Reservoir		E							E				E	E	E	E	E*	E	
Marina Lagoon										E						E	E	E	
Seal Slough										E			E			E	E	E	
Leslie Creek															E	E	E	E	
Borel Creek															E	E	E	E	

E: Existing beneficial use   E*: Water quality objectives apply; water contact recreation is prohibited or limited to protect public health   P: Potential beneficial use

SOUTH BAY BASIN

COUNTY Waterbody	AGR	MUN	FRSH	GWR	IND	PROC	COMM	SHELL	COLD	EST	MAR	MIGR	RARE	SPWN	WARM	WILD	REC-1	REC-2	NAV
SAN MATEO COUNTY, continued																			
O'Neill Slough										E						E	E	E	
Foster City Lagoon										E						E	E	E	
Belmont Slough										E			E	E		E	E	E	
Belmont Creek															E	E	E	E	
Laurel Creek (San Mateo)															E	E	E	E	
Bay Slough (San Mateo)										E			E			E	E	E	
Steinberger Slough										E			E			E	E	E	
Corkscrew Slough										E			E			E	E	E	
Smith Slough (San Mateo)										E			E			E	E	E	
Pulgas Creek															E	E	E	E	
Cordilleras Creek															E	E	E	E	
Redwood Slough										E			E			E	E	E	E
Redwood Creek (San Mateo)															E	E	E	E	
Arroyo Ojo de Agua															E	E	E	E	
Westpoint Slough										E			E			E	E	E	
Atherton Creek															E	E	E	E	
Ravenswood Slough										E			E			E	E	E	
ALAMEDA COUNTY																			
Oakland Inner Harbor										E						E	E	E	E
Merritt Channel							E			E						E	E	E	
Lake Merritt							E	E		E				E	E	E	E	E	
Glen Echo Creek															E	E	E	E	
Sausal Creek (Alameda)									E				E	E	E	E	E	E	
Peralta Creek															E	E	E	E	
Lion Creek									E						E	E	E	E	
Arroyo Viejo									E						E	E	E	E	
Rifle Range Creek															E	E	E	E	
San Leandro Bay							E			E		E	E			E	E	E	E
Lower San Leandro Creek			E						E			E	E	E	E	E	E	E	
Lake Chabot (Alameda)		E					E		E					E	E	E	E*	E	
Grass Valley Creek			E						E						E	E	E	E	
Upper San Leandro Creek			E						E			P		P	E	E	E	E	

E: Existing beneficial use E*: Water quality objectives apply; water contact recreation is prohibited or limited to protect public health P: Potential beneficial use

SOUTH BAY BASIN

COUNTY Waterbody	AGR	MUN	FRSH	GWR	IND	PROC	COMM	SHELL	COLD	EST	MAR	MIGR	RARE	SPWN	WARM	WILD	REC-1	REC-2	NAV
ALAMEDA COUNTY, continued																			
Upper San Leandro Reservoir		E							E					E	E	E	E*	P	
Kaiser Creek			E						E					E	E	E	E	E	
Buckhorn Creek			E						E					E	E	E	E	E	
Redwood Creek (Alameda)			E						E					E	E	E	E	E	
Moraga Creek (in Contra Costa Co.)			E						E					E	E	E	E	E	
Estudillo Canal															E	E	E	E	
San Lorenzo Creek		E	E	E					E			E		E	E	E	E	E	
Don Castro Reservoir							E		E					E	E	E	E	E	
Castro Valley Creek									E				E		E	E	E	E	
Crow Creek									E			E	E	E	E	E	E	E	
Cull Creek									E				E	E	E	E	E	E	
Cull Canyon Reservoir							E		E					E	E	E	E	E	
Bolinas Creek									E						E	E	E	E	
Norris Creek									E						E	E	E	E	
Palomares Creek									E			E		E	E	E	E	E	
Eden Canyon Creek									E						E	E	E	E	
Hollis Creek									E				E		E	E	E	E	
Sulphur Creek (west Alameda)															E	E	E	E	
Mount Eden Creek										E						E	E	E	
Old Alameda Creek										E						E	E	E	
Ward Creek															E	E	E	E	
Zeile Creek															E	E	E	E	
Alameda Creek Quarry Ponds				E			E		E						E	E	E	E	
Coyote Hills Slough										E		E	E	E		E	E	E	
Alameda Creek	E			E			E		E			E	E	E	E	E	E	E	
Crandall Creek															E	E	E	E	
Dry Creek (Alameda, low in watershed)													E		E	E	E	E	
Stonybrook Creek									E			E	E	E	E	E	E	E	
Sinbad Creek									E			E	E	E	E	E	E	E	
San Antonio Creek (Alameda)			E						E				E	E	E	E	E*	E	
San Antonio Reservoir		E							E				E	E	E	E	E*	E	

E: Existing beneficial use E*: Water quality objectives apply; water contact recreation is prohibited or limited to protect public health P: Potential beneficial use

SOUTH BAY BASIN

COUNTY Waterbody	AGR	MUN	FRSH	GWR	IND	PROC	COMM	SHELL	COLD	EST	MAR	MIGR	RARE	SPWN	WARM	WILD	REC-1	REC-2	NAV
ALAMEDA COUNTY, continued																			
Indian Creek (central Alameda)			E						E				E	E	E	E	E*	E	
La Costa Creek			E						E				E	E	E	E	E	E	
Arroyo de la Laguna				E					E			E		E	E	E	E	E	
Vallecitos Creek															E	E	E	E	
Happy Valley Creek															E	E	E	E	
Sycamore Creek															E	E	E	E	
Arroyo del Valle		E		E					E			P	E	E	E	E	E	E	
Shadow Cliffs Reservoir				E			E		E					E	E	E	E	E	
Del Valle Reservoir		E					E		E					E	E	E	E	E	
Arroyo Mocho				E					E			E		E	E	E	E	E	
Tassajara Creek				E					P			E	E	E	E	E	E	E	
Arroyo las Positas				E					E			E	E	E	E	E	E	E	
Cottonwood Creek													E		E	E	E	E	
Collier Canyon Creek													E		E	E	E	E	
Cayetano Creek													E		E	E	E	E	
Arroyo Seco (Alameda)				E					E			E	E	E	E	E	E	E	
Altamont Creek				E					E				E		E	E	E	E	
Alamo Canal				E					P			E		E	E	E	E	E	
Alamo Creek				E					P			E	E	E	E	E	E	E	
Dublin Creek															E	E	E	E	
Martin Canyon Creek															E	E	E	E	
South San Ramon Creek															E	E	E	E	
SANTA CLARA COUNTY																			
Tributary to Alameda Creek:																			
Calaveras Creek			E						E				E	E	E	E	E	E	
Calaveras Reservoir		E							E				E	E	E	E	E*	E	
Arroyo Hondo		E	E						E				E	E	E	E	E	E	
Isabel Creek		E	E						E					E	E	E	E	E	
Smith Creek		E	E						E					E	E	E	E	E	
Sulphur Creek (Santa Clara)		E	E						E					E	E	E	E	E	
Colorado Creek *Trib. to Arroyo del Val*			E						E						E	E	E	E	

E: Existing beneficial use E*: Water quality objectives apply; water contact recreation is prohibited or limited to protect public health P: Potential beneficial use

SANTA CLARA BASIN

COUNTY Waterbody	AGR	MUN	FRSH	GWR	IND	PROC	COMM	SHELL	COLD	EST	MAR	MIGR	RARE	SPWN	WARM	WILD	REC-1	REC-2	NAV
	Human Consumptive Uses						Aquatic Life Uses									Wildlife Use	Recreational Uses		
San Francisco Bay South					E		E	E		E		E	E	E		E	E	E	E
ALAMEDA & SANTA CLARA COUNTIES																			
Newark Slough										E			E			E	E	E	
Plummer Creek (Zone 5 Line F-1)										E			E			E	E	E	
Mowry Slough										E			E			E	E	E	
Coyote Slough										E			E			E	E	E	
Mud Slough										E			E			E	E	E	
Laguna Creek (Arroyo la Laguna, or Zone 6 Line E)															E	E	E	E	
Mission Creek (Zone 6 Line L)															E	E	E	E	
Lake Elizabeth									E					E	E	E	E*	E	
Sabrecat Creek (Zone 6 Line K)															E	E	E	E	
Canada del Aliso (Zone 6 Line J)															E	E	E	E	
Agua Caliente Creek (Alameda) (Zone 6 Line F)															E	E	E	E	
Agua Fria Creek (Zone 6 Line D)															E	E	E	E	
Stivers Lagoon (Fremont Lagoon)			E												E	E	E	E	
Mallard (Artesian) Slough										E			E			E	E	E	
Scott Creek (Zone 6 Line A)															E	E	E	E	
Toroges Creek (Zone 6 Line C)													E		E	E	E	E	
SAN MATEO AND SANTA CLARA COUNTIES																			
San Francisquito Creek									E			E	E	E	E	E	E	E	
Lake Lagunita													E		E	E	E	E	
Los Trancos Creek									E			E	E	E	E	E	E	E	
Felt Lake	E													E	E	E	E	E	
Bear Creek (San Mateo)									E			E	E	E	E	E	E	E	
Bear Gulch Creek (San Mateo)		E							E			E	E	E	E	E	E	E	
West Union Creek									E			E	E	E	E	E	E	E	
Searsville Lake	E								E					E	E	E	E	E	

E: Existing beneficial use E*: Water quality objectives apply; water contact recreation is prohibited or limited to protect public health P: Potential beneficial use

SANTA CLARA BASIN

COUNTY Waterbody	AGR	MUN	FRSH	GWR	IND	PROC	COMM	SHELL	COLD	EST	MAR	MIGR	RARE	SPWN	WARM	WILD	REC-1	REC-2	NAV
SAN MATEO AND SANTA CLARA COUNTIES, continued																			
Alambique Creek									E						E	E	E	E	
Sausal Creek (San Mateo)									E						E	E	E	E	
SANTA CLARA COUNTY ONLY																			
Palo Alto Harbor & Baylands										E		E	E			E	E	E	
Mayfield Slough										E		E	E			E	E	E	
Matadero Creek									E			E	E	E	E	E	E	E	
Deer Creek (Santa Clara)									E				E		E	E	E	E	
Arastradero Creek									E				E		E	E	E	E	
Charleston Slough										E		E	E			E	E	E	
Barron Creek															E	E	E	E	
Adobe Creek (Santa Clara)									E						E	E	E	E	
Mountain View Slough										E			E			E	E	E	
Permanente Creek				E					E				E	E	E	E	E	E	
Hale Creek									E						E	E	E	E	
Stevens Creek			E	E					E			E	E	E	E	E	E	E	
Stevens Creek Reservoir		E		E			E		E			E		E	E	E	E	E	
Swiss Creek			E						E						E	E	E	E	
Guadalupe Slough										E			E			E	E	E	
Moffett Channel										E						E	E	E	
Calabazas Creek	E			E					E						E	E	E	E	
San Tomas Aquino Creek									E				E		E	E	E	E	
Saratoga Creek	E		E	E					E						E	E	E	E	
Bonjetti Creek									E						E	E	E	E	
McElroy Creek									E						E	E	E	E	
Alviso Slough										E		E	E			E	E	E	
Guadalupe River				E					E			E	E	E	E	E	E	E	
Los Gatos Creek		E	E	E					E			P	E	P	E	E	E	P	
Campbell Percolation Pond				E			E		E					E	E	E	E	E	
Vasona Reservoir		E		E			E		E					E	E	E	E	E	
Lexington Reservoir		E		E			E		E					E	E	E	E	E	
Soda Springs Creek			E						E						E	E	E	E	

E: Existing beneficial use E*: Water quality objectives apply; water contact recreation is prohibited or limited to protect public health P: Potential beneficial use

SANTA CLARA BASIN

COUNTY Waterbody	AGR	MUN	FRSH	GWR	IND	PROC	COMM	SHELL	COLD	EST	MAR	MIGR	RARE	SPWN	WARM	WILD	REC-1	REC-2	NAV
SANTA CLARA COUNTY ONLY, continued																			
Lake Elsman		E							E						E	E	E*	E	
Austrian Gulch Creek			E						E					E	E	E	E	E	
Ross Creek				E											E	E	E	E	
Canoas Creek															E	E	E	E	
Guadalupe Creek			E	E					E			E	E	E	E	E	E	E	
Los Capitancillos Percolation Ponds				E											E	E	E	E	
Guadalupe Percolation Ponds				E											E	E	E	E	
Pheasant Creek			E						E					E	E	E	E	E	
Guadalupe Reservoir		E		E					E					E	E	E	E	E	
Los Capitancillos Creek			E	E					E						E	E	E	E	
Rincon Creek			E	E					E			E	E		E	E	E	E	
Alamitos Creek			E	E					E			E	E	E	E	E	E	E	
Arroyo Calero			E						E			E	E	E	E	E	E	E	
Calero Reservoir		E		E										E	E	E	E*	E	
Almaden Reservoir		E		E					E				E	E	E	E	E*	E	
Herbert Creek			E						E						E	E	E	E	
Barrett Canyon Creek			E						E						E	E	E	E	
Coyote Creek (nontidal)				E			E		E			E	E	E	E	E	E	E	
Upper Penitencia Creek			E	E					E			E	E	E	E	E	E	E	
Arroyo Aguague Creek									E			E	E	E	E	E	E	E	
Halls Valley Lake (Grant Lake)							E							E	E	E	E	E	
Cherry Flat Reservoir	E	E												E	E	E	E*	E	
Lower Silver Creek															E	E	E	E	
Babb Creek															E	E	E	E	
South Babb Creek															E	E	E	E	
Flint Creek															E	E	E	E	
Thompson Creek															E	E	E	E	
Quimby Creek															E	E	E	E	
Yerba Buena Creek															E	E	E	E	
Upper Silver Creek													E		E	E	E	E	

E: Existing beneficial use   E*: Water quality objectives apply; water contact recreation is prohibited or limited to protect public health   P: Potential beneficial use

SANTA CLARA BASIN

COUNTY Waterbody	AGR	MUN	FRSH	GWR	IND	PROC	COMM	SHELL	COLD	EST	MAR	MIGR	RARE	SPWN	WARM	WILD	REC-1	REC-2	NAV
SANTA CLARA COUNTY ONLY, continued																			
Cottonwood Lake							E		E					E	E	E	E	E	
Fisher Creek															E	E	E	E	
Anderson Reservoir		E		E			E		E					E	E	E	E*	E	
San Felipe Creek			E						E					E	E	E	E	E	
Las Animas Creek			E						E						E	E	E	E	
Packwood Creek			E						E					E	E	E	E	E	
Hoover Creek			E						E					E	E	E	E	E	
Otis Canyon Creek			E						E						E	E	E	E	
Coyote Reservoir	E	E					E		E					E	E	E	E*	E	
Canada de los Osos Creek			E												E	E	E	E	
Soda Springs Canyon Creek									E						E	E	E	E	
Lower Penitencia Creek															E	E	E	E	
Berryessa Creek															E	E	E	E	
Calera Creek (Santa Clara)															E	E	E	E	
Tularcitos Creek															E	E	E	E	
Arroyo de los Coches													E		E	E	E	E	
Sandy Wool Lake							E		E					E	E	E	E*	E	

E: Existing beneficial use E*: Water quality objectives apply; water contact recreation is prohibited or limited to protect public health P: Potential beneficial use

SAN PABLO BASIN

Human Consumptive Uses: AGR, MUN, FRSH, GWR, IND, PROC; Aquatic Life Uses: COMM, SHELL, COLD, EST, MAR, MIGR, RARE, SPWN, WARM; Wildlife Use: WILD; Recreational Uses: REC-1, REC-2, NAV

COUNTY Waterbody	AGR	MUN	FRSH	GWR	IND	PROC	COMM	SHELL	COLD	EST	MAR	MIGR	RARE	SPWN	WARM	WILD	REC-1	REC-2	NAV
San Pablo Bay					E		E	E		E		E	E	E		E	E	E	E
SOLANO COUNTY																			
Mare Island Strait							E			E		E	E			E	E	E	E
White Slough							E			E		E	E	E		E	E	E	
South Slough							E			E		E	E			E	E	E	
Dutchman Slough							E			E		E	E			E	E	E	
Lake Chabot (Solano)	E	E							E					E	E	E	E	E	
Rindler Creek			E												E	E	E	E	
Blue Rock Springs Creek			E												E	E	E	E	
Lake Dalwigk															E	E	E	E	
CONTRA COSTA COUNTY																			
Rodeo Creek									E					E	E	E	E	E	
Refugio Creek															E	E	E	E	
Pinole Creek									E			E	E	E	E	E	E	E	
Garrity Creek															E	E	E	E	
Rheem Creek															E	E	E	E	
San Pablo Creek			E						E			E	E	E	E	E	E*	E	
San Pablo Reservoir		E					E		E					E	E	E	E*	E	
Lauterwasser Creek			E												E	E	E	E	
Briones Reservoir		E							E					E	E	E	E*	P	
Bear Creek (Contra Costa)			E										E		E	E	E	E	
Wildcat Creek			E						E			E	E	E	E	E	E	E	
Jewel Lake									E						E	E	E	E	
Lake Anza			E				E		E						E	E	E	E	
MARIN COUNTY																			
Black John Slough										E		E	E			E	E	E	
Rush Creek										E			E			E	E	E	
Bahia Lagoon										E						E	E	E	
Novato Creek		E					E		E			E	E	E	E	E	E	E	
Stafford Lake		E					E		E					E	E	E	E	E	

E: Existing beneficial use E*: Water quality objectives apply; water contact recreation is prohibited or limited to protect public health P: Potential beneficial use

SAN PABLO BASIN

COUNTY Waterbody	AGR	MUN	FRSH	GWR	IND	PROC	COMM	SHELL	COLD	EST	MAR	MIGR	RARE	SPWN	WARM	WILD	REC-1	REC-2	NAV
MARIN COUNTY, continued																			
Bowman Canyon Creek									E			E	E	E	E	E	E	E	
Warner Creek (Novato)									E			E	E		E	E	E	E	
Arroyo Avichi									E				E		E	E	E	E	
Pacheco Pond							E		E			P	E	P	E	E	E	E	
Arroyo San Jose									E				E		E	E	E	E	
Miller Creek									E			E	E	E	E	E	E	E	
Gallinas Creek									E				E		E	E	E	E	
SONOMA COUNTY																			
Petaluma River									E	E		E	E	E	E	E	E	E	E
San Antonio Creek									E			P		P	E	E	E	E	
Adobe Creek (Sonoma)									E			E	E	E	E	E	E	E	
Lynch Creek									E			E	E	E	E	E	E	E	
Willow Creek (Willow Canyon Creek)									E			E	E	E	E	E	E	E	
Lichau Creek									E			E		E	E	E	E	E	
Tolay Creek													E		E	E	E	E	
Second Napa Slough							E			E		E	E			E	E	E	
Third Napa Slough							E			E			E			E	E	E	
Steamboat Slough							E			E			E			E	E	E	
Hudeman Slough							E			E		E	E			E	E	E	
Rainbow Slough							E			E			E			E	E	E	
Sonoma Creek							E		E			E	E	E	E	E	E	E	
Fowler Creek									E			E	E		E	E	E	E	
Felder Creek									E						E	E	E	E	
Carriger Creek									E			E	E	E	E	E	E	E	
Rodgers Creek									E				E	E	E	E	E	E	
Schell Creek									E			E	E		E	E	E	E	
Arroyo Seco Creek (Sonoma)									E			E	E	E	E	E	E	E	
Nathanson Creek									E			E	E	E	E	E	E	E	
Agua Caliente Creek (Sonoma)									E			E	E	E	E	E	E	E	
Hooker Creek									E			E	E	E	E	E	E	E	

E: Existing beneficial use E*: Water quality objectives apply; water contact recreation is prohibited or limited to protect public health P: Potential beneficial use

SAN PABLO BASIN

COUNTY Waterbody	AGR	MUN	FRSH	GWR	IND	PROC	COMM	SHELL	COLD	EST	MAR	MIGR	RARE	SPWN	WARM	WILD	REC-1	REC-2	NAV
SONOMA COUNTY, continued																			
Mill Creek (Sonoma)									E			E	E	E	E	E	E	E	
Calabazas Creek (Sonoma)									E			E	E	E	E	E	E	E	
Stuart Creek									E			E	E	E	E	E	E	E	
Graham Creek									E			E	E	E	E	E	E	E	
Yulupa Creek									E			E	E	E	E	E	E	E	
Bear Creek (Sonoma)									E			E	E	E	E	E	E	E	
NAPA COUNTY																			
Napa Slough							E			E		E	E			E	E	E	
China Slough							E			E		E	E			E	E	E	
Napa River – tidal							E			E		E	E			E	E	E	E
American Canyon Creek															E	E	E	E	
Mud Slough (Napa)							E			E		E	E			E	E	E	
Devils Slough							E			E		E	E			E	E	E	
Huichica Creek									E			E	E	E	E	E	E	E	
Carneros Creek									E			E	E	E	E	E	E	E	
Fagan Creek															E	E	E	E	
Suscol Creek									E			E	E	E	E	E	E	E	
Bedford Slough (Napa)										E						E	E	E	
Lake Marie	E	E							P					E	P	E	E	E	
Tulucay Creek									E			E	E	E	E	E	E	E	
Spencer Creek									E			E	E	E	E	E	E	E	
Murphy Creek									E			E	E	E	E	E	E	E	
Napa River – nontidal	E	E		E			E		E			E	E	E	E	E	E	E	E
Napa Creek									E			E	E	E	E	E	E	E	
Browns Valley Creek									E			E	E	E	E	E	E	E	
Redwood Creek (Napa)									E			E	E	E	E	E	E	E	
Pickle Canyon Creek									E			E	E	E	E	E	E	E	
Milliken Creek			E						E			E	E	E	E	E	E	E	
Milliken Reservoir		E							E					E	E	E	E*	E	
Sarco Creek									E			E	E	E	E	E	E	E	
Salvador Creek									E				E	E	E	E	E	E	

E: Existing beneficial use E*: Water quality objectives apply; water contact recreation is prohibited or limited to protect public health P: Potential beneficial use

SAN PABLO BASIN

COUNTY Waterbody	AGR	MUN	FRSH	GWR	IND	PROC	COMM	SHELL	COLD	EST	MAR	MIGR	RARE	SPWN	WARM	WILD	REC-1	REC-2	NAV
NAPA COUNTY, continued																			
Soda Creek									E			E	E	E	E	E	E	E	
Dry Creek (Napa)	E	E							E			E	E	E	E	E	E	E	
Segassia Canyon Creek									E			E	E	E	E	E	E	E	
Montgomery Creek									E			E	E	E	E	E	E	E	
Hopper Creek									E						E	E	E	E	
Conn Creek		E	E						E			E	E	E	E	E	E	E	
Rector Creek			E						E			E	E	E	E	E	E	E	
Rector Reservoir		E							E					E	E	E	E*	E	
Lake Hennessey		E					E		E					E	E	E	E	E	
Chiles Creek		E	E						E					E	E	E	E	E	
Moore Creek			E						E						E	E	E	E	
Sage Creek		E	E						E					E	E	E	E	E	
Angwin Lakes		E													E	E	E	E	
Bale Slough									E			E	E	E	E	E	E	E	
Bear Canyon Creek									E				E		E	E	E	E	
Sulphur Creek (Napa)									E			E	E	E	E	E	E	E	
Heath Canyon Creek									E			E	E	E	E	E	E	E	
Iron Mine Creek									E			E	E	E	E	E	E	E	
York Creek									E			E	E	E		E	E	E	
Bell Canyon Creek									E			E	E	E	E	E	E	E	
Bell Canyon Reservoir		E													E	E	E	E	
Mill Creek (Napa)									E			E	E	E	E	E	E	E	
Ritchey Creek (Ritchie Creek)									E			E	E	E	E	E	E	E	
Selby Creek									E			E	E	E	E	E	E	E	
Dutch Henry Creek									E			E	E	E	E	E	E	E	
Diamond Mountain Creek									E					E	E	E	E	E	
Cyrus Creek									E			E	E	E	E	E	E	E	
Garnett Creek									E			E	E	E	E	E	E	E	
Jericho Canyon Creek									E				E	E	E	E	E	E	
Kimball Canyon Creek		E							E				E		E	E	E	E	
Kimball Reservoir		E													E	E	E	E	

E: Existing beneficial use E*: Water quality objectives apply; water contact recreation is prohibited or limited to protect public health P: Potential beneficial use

SUISUN BASIN

	Human Consumptive Uses						Aquatic Life Uses									Wildlife Use	Recreational Uses		
COUNTY Waterbody	AGR	MUN	FRSH	GWR	IND	PROC	COMM	SHELL	COLD	EST	MAR	MIGR	RARE	SPWN	WARM	WILD	REC-1	REC-2	NAV
Carquinez Strait					E		E			E		E	E	E		E	E	E	E
Suisun Bay					E	E	E			E		E	E	E		E	E	E	E
Sacramento-San Joaquin Delta	E	E		E	E	E	E			E		E	E	E		E	E	E	E
SOLANO COUNTY																			
Grizzly Bay							E			E		E	E			E	E	E	
Honker Bay							E			E		E	E			E	E	E	
Sulphur Springs Creek			E												E	E	E	E	
Lake Herman		E			E				E					E	E	E	E*	E	
Goodyear Slough							E			E		E	E			E	E	E	
Cordelia Slough							E			E		E	E			E	E	E	
Green Valley Creek			E						E			E	E	E	E	E	E	E	
Dan Wilson Creek									E						E	E	E	E	
Wild Horse Creek			E						E						E	E	E	E	
Lake Frey		E							E					E	E	E	E*	E	
Lake Madigan	E	E							E					E	E	E	E*	E	
Suisun Slough							E			E		E	E	E	E	E	E	E	E
Suisun Creek			E						E			E	E	E	E	E	E	E	
Suisun Reservoir			E						E						E	E	E	E	
Wooden Valley Creek									E			E	E	E	E	E	E	E	
Lake Curry		E												E	E	E	E	E	
Sheldrake Slough							E			E			E			E	E	E	
Boynton Slough							E			E			E			E	E	E	
Peytonia Slough							E			E			E			E	E	E	
Ledgewood Creek			E						E			E		E	E	E	E	E	
Gordon Valley Creek									E						E	E	E	E	
Laurel Creek (Solano)			E						E			E		E	E	E	E	E	
Hill Slough							E			E			E			E	E	E	
Cutoff Slough							E			E		E	E			E	E	E	
Spring Branch															E	E	E	E	

E: Existing beneficial use E*: Water quality objectives apply; water contact recreation is prohibited or limited to protect public health P: Potential beneficial use

SUISUN BASIN

COUNTY Waterbody	AGR	MUN	FRSH	GWR	IND	PROC	COMM	SHELL	COLD	EST	MAR	MIGR	RARE	SPWN	WARM	WILD	REC-1	REC-2	NAV
SOLANO COUNTY, continued																			
Volanti Slough							E			E			E			E	E	E	
Montezuma Slough							E			E		E	E	E	E	E	E	E	E
Nurse Slough							E			E		E	E			E	E	E	
Denverton Slough							E			E		E	E			E	E	E	
Denverton Creek													E	E	E	E	E	E	
CONTRA COSTA COUNTY																			
Alhambra Creek									E			E	E		E	E	E	E	
Franklin Creek									E			E	E	E	E	E	E	E	
Arroyo del Hambre									E						E	E	E	E	
Peyton Slough					E		E			E		E	E			E	E	E	
Pacheco Creek															E	E	E	E	
Walnut Creek									E			E	E	E	E	E	E	E	
Grayson Creek									E			E	E		E	E	E	E	
Pine Creek									E			E	E	E	E	E	E	E	
Galindo Creek									E						E	E	E	E	
San Ramon Creek															E	E	E	E	
Bollinger Canyon Creek									E					E	E	E	E	E	
Las Trampas Creek									E				E		E	E	E	E	
Tice Creek													E		E	E	E	E	
Lafayette Creek									E						E	E	E	E	
Lafayette Reservoir		E					E		E					E	E	E	E*	E	
Hastings Slough										E			E			E	E	E	
Mt. Diablo Creek									E			E	E	E	E	E	E	E	
Mitchell Creek									E			E	E	E	E	E	E	E	
Donner Creek									E					E	E	E	E	E	
Mallard Slough (Contra Costa)							E			E		E	E			E	E	E	
Kirker Creek													E		E	E	E	E	
New York Slough							E			E		E	E			E	E	E	E

E: Existing beneficial use E*: Water quality objectives apply; water contact recreation is prohibited or limited to protect public health P: Potential beneficial use

Table 2-2: Existing and Potential Beneficial Uses in Groundwater in Identified Basins

County	Groundwater Basin Name[1]	Groundwater Sub-Basin[1]	Basin Number[1]	MUN[2]	PROC[3]	IND[4]	AGR[5]	FRESH[6]
Alameda	Castro Valley	--	2-8	P	P	P	P	--
Alameda	Santa Clara Valley	Niles Cone	2-9.01	E	E	E	E	--
Alameda and Contra Costa	Santa Clara Valley	East Bay Plain	2-9.04	E	E	E	E	--
Alameda and Contra Costa	Livermore Valley	--	2-10	E	E	E	E	--
Alameda	Sunol Valley	--	2-11	E	E	E	E	--
Contra Costa	Pittsburg Plain	--	2-4	P	P	P	P	--
Contra Costa	Clayton Valley	--	2-5	E	P	P	P	--
Contra Costa	Ygnacio Valley	--	2-6	P	P	P	P	--
Contra Costa	San Ramon Valley	--	2-7	E	P	P	E	--
Contra Costa	Arroyo del Hambre Valley	--	2-31	P	P	P	P	--
Marin	Sand Point Area	--	2-27	E	P	P	P	--
Marin	Ross Valley	--	2-28	E	P	P	E	--
Marin	San Rafael Valley	--	2-29	P	P	P	P	--
Marin	Novato Valley	--	2-30	P	P	P	P	--
Napa	Napa-Sonoma Valley	Napa Valley	2-2.01	E	E	E	E	--
Napa and Solano	Napa-Sonoma Valley	Napa-Sonoma Lowlands	2-2.03	E	E	E	E	--
San Francisco and San Mateo	Visitacion Valley	--	2-32	P	E	E	P	--
San Francisco and San Mateo	Islais Valley A[7]	--	2-33A	P	E	E	P	--
San Francisco	Islais Valley B[7]	--	2-33B	P	P	P	E	--
San Francisco	South San Francisco	--	2-37	P	E	E	P	--
San Francisco and San Mateo	Westside A[7]	--	2-35A	E	P	P	E	--
San Francisco	Lobos	--	2-38	E	P	P	E	--
San Francisco	Marina	--	2-39	E	P	P	E	--
San Francisco	Downtown	--	2-40	E	P	P	E	--
San Francisco	Westside B[7]	--	2-35B	P	P	P	E	--
San Mateo	Westside C[7]	--	2-35C	E	P	P	E	--

County	Groundwater Basin Name[1]	Groundwater Sub-Basin[1]	Basin Number[1]	MUN[2]	PROC[3]	IND[4]	AGR[5]	FRESH[6]
San Mateo	Westside D[7]	--	2-35D	E	E	E	P	--
San Mateo	Santa Clara Valley	San Mateo Plain	2-9.03	E	E	E	P	--
San Mateo and Santa Clara	Santa Clara Valley[8]	Santa Clara	2-9.02	E	E	E	E	--
San Mateo	Half Moon Bay Terrace	--	2-22	E	P	P	E	--
San Mateo	San Gregorio Valley	--	2-24	E	P	P	E	--
San Mateo	Pescadero Valley	--	2-26	E	P	P	E	--
San Mateo	San Pedro Valley	--	2-36	P	P	P	P	--
Solano	Suisun-Fairfield Valley	--	2-3	E	E	E	E	--
Sonoma and Marin	Petaluma Valley	--	2-1	E	P	P	E	--
Sonoma	Napa-Sonoma Valley	Sonoma Valley	2-2.02	E	P	P	E	--
Sonoma and Marin	Wilson Grove Formation Highlands	--	1.59	E	P	P	E	--
Sonoma and Marin	Wilson Grove Formation Highlands	--	1.59	See RB1 Basin Plan[9]				
Sonoma	Kenwood Valley	--	2-19	E	P	P	E	--
Sonoma	Napa – Sonoma Volcanic Highlands	--	2-23	X	X	X	X	X
Santa Clara	Gilroy – Hollister Valley	Llagas Area	3-3.01	See RB3 Basin Plan[10]				

Notes:

1. Department of Water Resources (DWR) Bulletin 118 "California Groundwater", 2003.
2. MUN = Municipal and domestic water supply.
3. PROC = Industrial process water supply.
4. IND = Industrial service water supply.
5. AGR = Agricultural water supply.
6. FRESH = Freshwater replenishment to surface water; designation will be determined at a later date; for the interim, a site-by-site determination will be made.
7. The existing and potential beneficial uses for groundwater basins listed in the 1995 Basin Plan (Table 2-3) were assigned to the new groundwater basins based on the geographic location of the old basins compared to the new basins. The basin names, such as Westside A,

Westside B, etc., are informal names assigned by the Water Board to preserve the beneficial use designations in the 1995 Basin Plan and do not represent sub-basins identified by the Department of Water Resources.

8. The Santa Clara Valley groundwater basin/Santa Clara groundwater sub-basin is also known as Coyote Valley.
9. This groundwater basin is also located in the North Coast Region (RB1); beneficial uses of groundwater are specified in the Basin Plan for RB1.
10. This groundwater basin is also located in the Central Coast Region (RB3); beneficial uses of groundwater are specified in the Basin Plan for RB3.

E = Existing beneficial uses; based on best available information.
P = Potential beneficial uses; based on best available information.
X = This groundwater basin was not listed in the 1995 Basin Plan; designation will be determined at a later date; for the interim, a site-by-site determination will be made.
See DWR Bulletin 118 (2003) for groundwater basin characteristics.

Table 2-3: Examples of Existing and Potential Beneficial Uses of Selected Wetlands

	TYPE OF WETLAND				
BENEFICIAL USE	**MARINE**	**ESTUARINE**	**RIVERINE**	**LACUSTRINE**	**PALUSTRINE**
AGR		○	○	○	○
COLD			○	○	○
COMM	○	○			
EST		○			
FRESH			○	○	○
GWR	○	○	○	○	○
IND		○	●	●	
MAR	○				
MIGR	○	○	○	○	
NAV	○	○	○	○	○
PROC					
REC-1	○	○	○	○	○
REC-2	○	○	○	○	○
SHELL	○	○	○		
SPWN	○	○	○	○	○
WARM			○	○	○
WILD	○	○	○	○	○
RARE	○	○	○	○	○

NOTE:
○ Existing beneficial use
● Potential beneficial use

Table 2-4 Beneficial Uses of Wetland Areas[a]

Basin/Marsh Area	*Wetland Types*			*Beneficial Uses*								
	Fresh	Brackish	Salt	EST	MAR	MIGR	COMM	RARE	REC1	REC2	SPWN	WILD
Alameda County												
Arrowhead			•	•				•	•	•	•	•
Coyote Hills			•	•				•	•	•	•	•
Emeryville Crescent			•	•				•	•	•	•	•
Hayward (e.g., Cogswell, Hayward Area Recreation District, Oro Loma, & Triangle marshes)			•	•					•	•	•	•
Hayward Marsh		•		•				•		•	•	•
Contra Costa County												
North Contra Costa		•	•	•				•	•	•	•	•
Point Edith		•		•				•		•	•	•
San Pablo Creek			•	•				•	•	•	•	•
Wildcat Creek				•				•	•	•	•	•
Marin County												
Abbotts Lagoon			•		•				•	•		•
Bolinas Lagoon			•		•				•	•		•
Corte Madera			•	•				•	•	•	•	•
Drakes Estero			•						•	•	•	•
Gallinas Creek		•	•	•				•	•	•	•	•
Limantour Estero			•		•				•	•		•
Corte Madera Ecological Reserve			•	•					•	•		•
Novato Creek		•	•	•		•		•	•	•	•	
Richardson Bay			•	•				•	•	•	•	•
Rodeo Lagoon			•		•				•	•		•
San Pedro		•	•	•			•	•		•	•	•
San Rafael Creek		•	•	•				•	•	•		•
Tomales Bay			•		•	•			•	•	•	•
Napa County												
Mare Island			•	•						•		•
Napa		•		•		•	•	•	•	•	•	
San Pablo Bay			•	•		•	•	•	•	•	•	•
San Mateo County												
Bair Island			•	•				•	•	•		•
Belmont Slough			•	•				•	•	•	•	•
Pescadero	•		•		•	•		•	•	•	•	•
Princeton		•	•						•	•		•
Redwood City Area				•				•	•	•		•
Santa Clara County												
South San Francisco Bay			•	•		•	•	•	•	•	•	•
Solano County												
Southhampton Bay			•	•				•	•	•	•	•
Suisun	•	•		•		•		•	•	•	•	•
White Slough			•	•		•		•	•	•	•	•
Sonoma County												
Petaluma		•		•		•	•	•	•	•	•	•

NOTE:

a. General locations of wetlands areas are depicted in Figure 2-11.

CHAPTER 3: WATER QUALITY OBJECTIVES

The overall goals of water quality regulation are to protect and maintain thriving aquatic ecosystems and the resources those systems provide to society and to accomplish these in an economically and socially sound manner. California's regulatory framework uses water quality objectives both to define appropriate levels of environmental quality and to control activities that can adversely affect aquatic systems.

3.1 WATER QUALITY OBJECTIVES

There are two types of objectives: narrative and numerical. Narrative objectives present general descriptions of water quality that must be attained through pollutant control measures and watershed management. They also serve as the basis for the development of detailed numerical objectives.

Historically, numerical objectives were developed primarily to limit the adverse effect of pollutants in the water column. Two decades of regulatory experience and extensive research in environmental science have demonstrated that beneficial uses are not fully protected unless pollutant levels in all parts of the aquatic system are also monitored and controlled. The Regional Board is actively working towards an integrated set of objectives, including numerical sediment objectives, that will ensure the protection of all current and potential beneficial uses.

Numerical objectives typically describe pollutant concentrations, physical/chemical conditions of the water itself, and the toxicity of the water to aquatic organisms. These objectives are designed to represent the maximum amount of pollutants that can remain in the water column without causing any adverse effect on organisms using the aquatic system as habitat, on people consuming those organisms or water, and on other current or potential beneficial uses (as described in Chapter 2).

The technical bases of the region's water quality objectives include extensive biological, chemical, and physical partitioning information reported in the scientific literature, national water quality criteria, studies conducted by other agencies, and information gained from local environmental and discharge monitoring (as described in Chapter 6). The Regional Board recognizes that limited information exists in some cases, making it difficult to establish definitive numerical objectives, but the Regional Board believes its conservative approach to setting objectives has been proper. In addition to the technical review, the overall feasibility of reaching objectives in terms of technological, institutional, economic, and administrative factors is considered at many different stages of objective derivation and implementation of the water quality control plan.

Together, the narrative and numerical objectives define the level of water quality that shall be maintained within the region. In instances where water quality is better than that prescribed by the objectives, the state Antidegradation Policy applies (State Board Resolution 68-16: Statement of Policy With Respect to Maintaining High Quality of Waters in California). This policy is aimed at protecting relatively uncontaminated aquatic systems where they exist and preventing further degradation. The state's Antidegradation Policy is consistent with the federal Antidegradation Policy, as interpreted by the State Water Resources Control Board in State Board Order No. 86-17.

When uncontrollable water quality factors result in the degradation of water quality beyond the levels or limits established herein as water quality objectives, the Regional Board will conduct a case-by-case analysis of the benefits and costs of preventing further degradation. In cases where this analysis indicates that beneficial uses will be adversely impacted by allowing further degradation, then the Regional Board will not allow controllable water quality factors to cause any further degradation of water quality. Controllable water quality factors are those actions, conditions, or circumstances resulting from human activities that may influence the quality of the waters of the state and that may be reasonably controlled.

The Regional Board establishes and enforces waste discharge requirements for point and nonpoint source of pollutants at levels necessary to meet numerical and narrative water quality objectives. In setting waste discharge requirements, the Regional Board will consider, among other things, the potential impact on beneficial uses within the area of influence of the discharge, the existing quality of receiving waters, and the appropriate water quality objectives.

In general, the objectives are intended to govern the concentration of pollutant constituents in the main water mass. The same objectives cannot be applied at or immediately adjacent to submerged effluent discharge structures. Zones of initial dilution within which higher concentrations can be tolerated will be allowed for such discharges.

For a submerged buoyant discharge, characteristic of most municipal and industrial wastes that are released from submerged outfalls, the momentum of the discharge and its initial buoyancy act together to produce turbulent mixing. Initial dilution in this case is completed when the diluting wastewater ceases to rise in the water column and first begins to spread horizontally.

For shallow water submerged discharges, surface discharges, and nonbuoyant discharges, characteristic of cooling water wastes and some individual discharges, turbulent mixing results primarily from the momentum of discharge. Initial dilution, in these cases, is considered to be completed when the momentum-induced velocity of the discharge ceases to produce significant mixing of the waste, or the diluting plume reaches a fixed distance from the discharge to be specified by the Regional Board, whichever results in the lower estimate for initial dilution.

Compliance with water quality objectives may be prohibitively expensive or technically impossible in some cases. The Regional Board will consider modification of specific water quality objectives as long as the discharger can demonstrate that the alternate objective will protect existing beneficial uses, is scientifically defensible, and is consistent with the state Antidegradation Policy. This exception clause properly indicates that the Regional Board will conservatively compare benefits and costs in these cases because of the difficulty in quantifying beneficial uses.

These water quality objectives are considered necessary to protect the present and potential beneficial uses described in Chapter 2 of this Plan and to protect existing high quality waters of the state. These objectives will be achieved primarily through establishing and enforcing waste discharge requirements and by implementing this water quality control plan.

3.2 OBJECTIVES FOR OCEAN WATERS

The provisions of the State Board's "Water Quality Control Plan for Ocean Waters of California" (Ocean Plan) and "Water Quality Control Plan for Control of Temperature in the Coastal and Interstate Waters and Enclosed Bays and Estuaries of California" (Thermal Plan) and any revision to them will apply to ocean waters. These plans describe objectives and effluent limitations for ocean waters.

3.3 OBJECTIVES FOR SURFACE WATERS

The following objectives apply to all surface waters within the region, except the Pacific Ocean.

3.3.1 BACTERIA

Table 3-1 provides a summary of the bacterial water quality objectives and identifies the sources of those objectives. Table 3-2 summarizes U.S. EPA's water quality criteria for water contact recreation based on the frequency of use a particular area receives. These criteria will be used to differentiate between pollution sources or to supplement objectives for water contact recreation.

3.3.3.1 Implementation Provisions for Water Contact Recreation Bacteria Objectives

Water quality objectives for bacteria in Table 3-1 shall be strictly applied except when otherwise provided for in a TMDL. In the context of a TMDL, the Water Board may implement the objectives in fresh and marine waters by using a "reference system and antidegradation approach" as discussed below. Implementation of water quality objectives for bacteria using a "reference system and antidegradation approach" requires control of bacteria from all anthropogenic sources so that bacteriological water quality is consistent with that of a reference system. A reference system is defined as an area (e.g., a subwatershed or catchment) and associated monitoring point(s) that is minimally impacted by human activities that potentially affect bacteria densities in the reference receiving water body.

This approach recognizes that there are natural sources of bacteria (defined as non-anthropogenic sources) that may cause or contribute to exceedances of the objectives for indicator bacteria. It also avoids requiring treatment or diversion of water bodies or treatment of natural sources of bacteria from undeveloped areas. Such requirements, if imposed by the Water Board, could have the potential to adversely affect valuable aquatic life and wildlife beneficial uses supported by water bodies in the region.

Under the reference system approach, a certain frequency of exceedance of the single-sample objectives shall be permitted. The permitted number of exceedances shall be based on the observed exceedance frequency in a selected reference system(s) or the targeted water body, whichever is less. The "reference system and antidegradation approach" ensures that bacteriological water quality is at least as good as that of a reference system and that no degradation of existing bacteriological water quality is permitted where existing bacteriological water quality is better than that of the selected reference system(s).

The appropriateness of this approach, the specific exceedance frequencies to be permitted under it, and the permittees to whom it would apply will be evaluated within the context of TMDL development for a specific water body, and decided by the Water Board when considering adoption of a TMDL. These implementation provisions may only be used within the context of a TMDL addressing municipal stormwater (including discharges regulated under statewide municipal NPDES waste discharge requirements), discharges from confined animal facilities, and discharges from nonpoint sources.

3.3.2 BIOACCUMULATION

Many pollutants can accumulate on particles, in sediment, or bioaccumulate in fish and other aquatic organisms. Controllable water quality factors shall not cause a detrimental increase in concentrations of toxic substances found in bottom sediments or aquatic life. Effects on aquatic organisms, wildlife, and human health will be considered.

3.3.3 BIOSTIMULATORY SUBSTANCES

Waters shall not contain biostimulatory substances in concentrations that promote aquatic growths to the extent that such growths cause nuisance or adversely affect beneficial uses. Changes in chlorophyll a and associated phytoplankton communities follow complex dynamics that are sometimes associated with a discharge of biostimulatory substances. Irregular and extreme levels of chlorophyll a or phytoplankton blooms may indicate exceedance of this objective and require investigation.

3.3.4 COLOR

Waters shall be free of coloration that causes nuisance or adversely affects beneficial uses.

3.3.5 DISSOLVED OXYGEN

For all tidal waters, the following objectives shall apply:

In the Bay:

Downstream of Carquinez Bridge	5.0 mg/l minimum
Upstream of Carquinez Bridge	7.0 mg/l minimum

For nontidal waters, the following objectives shall apply:

Waters designated as:

Cold water habitat	7.0 mg/l minimum
Warm water habitat	5.0 mg/l minimum

The median dissolved oxygen concentration for any three consecutive months shall not be less than 80 percent of the dissolved oxygen content at saturation.

Dissolved oxygen is a general index of the state of the health of receiving waters. Although minimum concentrations of 5 mg/l and 7 mg/l are frequently used as objectives to protect fish life, higher concentrations are generally desirable to protect sensitive aquatic forms. In areas unaffected by waste discharges, a level of about 85 percent of oxygen saturation exists. A three-month median objective of 80 percent of oxygen saturation allows for some degradation from this level, but still requires a consistently high oxygen content in the receiving water.

3.3.6 FLOATING MATERIAL

Waters shall not contain floating material, including solids, liquids, foams, and scum, in concentrations that cause nuisance or adversely affect beneficial uses.

3.3.7 OIL AND GREASE

Waters shall not contain oils, greases, waxes, or other materials in concentrations that result in a visible film or coating on the surface of the water or on objects in the water, that cause nuisance, or that otherwise adversely affect beneficial uses.

3.3.8 POPULATION AND COMMUNITY ECOLOGY

All waters shall be maintained free of toxic substances in concentrations that are lethal to or that produce significant alterations in population or community ecology or receiving water biota. In addition, the health and life history characteristics of aquatic organisms in waters affected by controllable water quality factors shall not differ significantly from those for the same waters in areas unaffected by controllable water quality factors.

3.3.9 pH

The pH shall not be depressed below 6.5 nor raised above 8.5. This encompasses the pH range usually found in waters within the basin. Controllable water quality factors shall not cause changes greater than 0.5 units in normal ambient pH levels.

3.3.10 RADIOACTIVITY

Radionuclides shall not be present in concentrations that result in the accumulation of radionuclides in the food web to an extent that presents a hazard to human, plant, animal, or aquatic life. Waters designated for use as domestic or municipal supply shall not contain concentrations of radionuclides in excess of the limits specified in Table 4 of Section 64443 (Radioactivity) of Title 22 of the California Code of Regulations (CCR), which is incorporated by reference into this Plan. This incorporation is prospective, including future changes to the incorporated provisions as the changes take effect (see Table 3-5).

3.3.11 SALINITY

Controllable water quality factors shall not increase the total dissolved solids or salinity of waters of the state so as to adversely affect beneficial uses, particularly fish migration and estuarine habitat.

3.3.12 SEDIMENT

The suspended sediment load and suspended sediment discharge rate of surface waters shall not be altered in such a manner as to cause nuisance or adversely affect beneficial uses.

Controllable water quality factors shall not cause a detrimental increase in the concentrations of toxic pollutants in sediments or aquatic life.

3.3.13 SETTLEABLE MATERIAL

Waters shall not contain substances in concentrations that result in the deposition of material that cause nuisance or adversely affect beneficial uses.

3.3.14 SUSPENDED MATERIAL

Waters shall not contain suspended material in concentrations that cause nuisance or adversely affect beneficial uses.

3.3.15 SULFIDE

All water shall be free from dissolved sulfide concentrations above natural background levels. Sulfide occurs in Bay muds as a result of bacterial action on organic matter in an anaerobic environment.

Concentrations of only a few hundredths of a milligram per liter can cause a noticeable odor or be toxic to aquatic life. Violation of the sulfide objective will reflect violation of dissolved oxygen objectives as sulfides cannot exist to a significant degree in an oxygenated environment.

3.3.16 TASTES AND ODORS

Waters shall not contain taste- or odor-producing substances in concentrations that impart undesirable tastes or odors to fish flesh or other edible products of aquatic origin, that cause nuisance, or that adversely affect beneficial uses.

3.3.17 TEMPERATURE

Temperature objectives for enclosed bays and estuaries are as specified in the "Water Quality Control Plan for Control of Temperature in the Coastal and Interstate Waters and Enclosed Bays of California," including any revisions to the plan.

In addition, the following temperature objectives apply to surface waters:

- The natural receiving water temperature of inland surface waters shall not be altered unless it can be demonstrated to the satisfaction of the Regional Board that such alteration in temperature does not adversely affect beneficial uses.
- The temperature of any cold or warm freshwater habitat shall not be increased by more than 5°F (2.8°C) above natural receiving water temperature

3.3.18 TOXICITY

All waters shall be maintained free of toxic substances in concentrations that are lethal to or that produce other detrimental responses in aquatic organisms. Detrimental responses include, but are not limited to, decreased growth rate and decreased reproductive success of resident or indicator species. There shall be no acute toxicity in ambient waters. Acute toxicity is defined as a median of less than 90 percent survival, or less than 70 percent survival, 10 percent of the time, of test organisms in a 96-hour static or continuous flow test.

There shall be no chronic toxicity in ambient waters. Chronic toxicity is a detrimental biological effect on growth rate, reproduction, fertilization success, larval development, population abundance, community composition, or any other relevant measure of the health of an organism, population, or community.

Attainment of this objective will be determined by analyses of indicator organisms, species diversity, population density, growth anomalies, or toxicity tests (including those described in Chapter 4), or other methods selected by the Water Board. The Water Board will also consider other relevant information and numeric criteria and guidelines for toxic substances developed by other agencies as appropriate.

The health and life history characteristics of aquatic organisms in waters affected by controllable water quality factors shall not differ significantly from those for the same waters in areas unaffected by controllable water quality factors.

3.3.19 TURBIDITY

Waters shall be free of changes in turbidity that cause nuisance or adversely affect beneficial uses. Increases from normal background light penetration or turbidity relatable to waste discharge shall not be greater than 10 percent in areas where natural turbidity is greater than 50 NTU.

3.3.20 UN-IONIZED AMMONIA

The discharge of wastes shall not cause receiving waters to contain concentrations of un-ionized ammonia in excess of the following limits (in mg/l as N):

Annual Median	0.025
Maximum, Central Bay (as depicted in Figure 2-5) and upstream	0.16
Maximum, Lower Bay (as depicted in Figures 2-6 and 2-7):	0.4

The intent of this objective is to protect against the chronic toxic effects of ammonia in the receiving waters. An ammonia objective is needed for the following reasons:

- Ammonia (specifically un-ionized ammonia) is a demonstrated toxicant. Ammonia is generally accepted as one of the principle toxicants in municipal waste discharges. Some industries also discharge significant quantities of ammonia.

- Exceptions to the effluent toxicity limitations in Chapter 4 of the Plan allow for the discharge of ammonia in toxic amounts. In most instances, ammonia will be diluted or degraded to a nontoxic state fairly rapidly. However, this does not occur in all cases, the South Bay being a notable example. The ammonia limit is recommended in order to preclude any build up of ammonia in the receiving water.
- A more stringent maximum objective is desirable for the northern reach of the Bay for the protection of the migratory corridor running through Central Bay, San Pablo Bay, and upstream reaches.

3.3.21 OBJECTIVES FOR SPECIFIC CHEMICAL CONSTITUENTS

Surface waters shall not contain concentrations of chemical constituents in amounts that adversely affect any designated beneficial use. Water quality objectives for selected toxic pollutants for surface waters are given in Tables 3-3, 3-3A, 3-3B, 3-3C, 3-4 and 3-4A.

The Water Board intends to work towards the derivation of site-specific objectives for the Bay-Delta estuarine system. Site-specific objectives to be considered by the Water Board shall be developed in accordance with the provisions of the federal Clean Water Act, the State Water Code, State Board water quality control plans, and this Plan. These site-specific objectives will take into consideration factors such as all available scientific information and monitoring data and the latest U.S. EPA guidance, and local environmental conditions and impacts caused by bioaccumulation. The objectives in Tables 3-3 and 3-4 apply throughout the region except as otherwise indicated in the tables or when site-specific objectives for the pollutant parameter have been adopted. Site-specific objectives have been adopted for copper in segments of San Francisco Bay (see Figure 7.2-1-01), for nickel in South San Francisco Bay (Table 3-3A), and for cyanide in all San Francisco Bay segments (Table 3-3C). Objectives for mercury that apply to San Francisco Bay are listed in Table 3-3B. Objectives for mercury that apply to Walker Creek, Soulajule Reservoir, and their tributaries, and to waters of the Guadalupe River watershed are listed in Table 3-4A.

South San Francisco Bay south of the Dumbarton Bridge is a unique, water-quality-limited, hydrodynamic and biological environment that merits continued special attention by the Water Board. Controlling urban and upland runoff sources is critical to the success of maintaining water quality in this portion of the Bay. Site-specific water quality objectives have been adopted for dissolved copper and nickel in this Bay segment. Site-specific objectives may be appropriate for other pollutants of concern, but this determination will be made on a case-by-case basis, and after it has been demonstrated that all other reasonable treatment, source control and pollution prevention measures have been exhausted. The Water Board will determine whether revised water quality objectives and/or effluent limitations are appropriate based on sound technical information and scientific studies, stakeholder input, and the need for flexibility to address priority problems in the watershed.

3.3.22 CONSTITUENTS OF CONCERN FOR MUNICIPAL AND AGRICULTURAL WATER SUPPLIES

At a minimum, surface waters designated for use as domestic or municipal supply (MUN) shall not contain concentrations of constituents in excess of the maximum (MCLs) or secondary maximum contaminant levels (SMCLs) specified in the following provisions of Title 22, which are incorporated by reference into this plan: Table 64431-A (Inorganic Chemicals) of Section 64431, and Table 64433.2-A (Fluoride) of Section 64433.2, Table 64444-A (Organic Chemicals) of Section 64444, and Table 64449-A (SMCLs-Consumer Acceptance Limits) and 64449-B (SMCLs-Ranges) of Section 64449. This incorporation-by-reference is prospective, including future changes to the incorporated provisions as the changes take effect. Table 3-5 contains water quality objectives for municipal supply, including the MCLs contained in various sections of Title 22 as of the adoption of this plan.

At a minimum, surface waters designated for use as agricultural supply (AGR) shall not contain concentrations of constituents in excess of the levels specified in Table 3-6.

3.4 OBJECTIVES FOR GROUNDWATER

Groundwater objectives consist primarily of narrative objectives combined with a limited number of numerical objectives. Additionally, the Water Board will establish basin- and/or site-specific numerical groundwater objectives as necessary. For example, the Water Board has groundwater basin-specific objectives for the Alameda Creek watershed above Niles to include the Livermore-Amador Valley as shown in Table 3-7.

The maintenance of existing high quality of groundwater (i.e., "background") is the primary groundwater objective.

In addition, at a minimum, groundwater shall not contain concentrations of bacteria, chemical constituents, radioactivity, or substances producing taste and odor in excess of the objectives described below unless naturally occurring background concentrations are greater. Under existing law, the Water Board regulates waste discharges to land that could affect water quality, including both groundwater and surface water quality. Waste discharges that reach groundwater are regulated to protect both groundwater and any surface water in continuity with groundwater. Waste discharges that affect groundwater that is in continuity with surface water cannot cause violations of any applicable surface water standards.

3.4.1 BACTERIA

In groundwater with a beneficial use of municipal and domestic supply, the median of the most probable number of coliform organisms over any seven-day period shall be less than 1.1 most probable number per 100 milliliters (MPN/100 mL) (based on multiple tube fermentation technique; equivalent test results based on other analytical techniques as specified in the National Primary Drinking Water Regulation, 40 CFR, Part 141.21 (f), revised June 10, 1992, are acceptable).

3.4.2 ORGANIC AND INORGANIC CHEMICAL CONSTITUENTS

All groundwater shall be maintained free of organic and inorganic chemical constituents in concentrations that adversely affect beneficial uses. To evaluate compliance with water quality objectives, the Water Board will consider all relevant and scientifically valid evidence, including relevant and scientifically valid numerical criteria and guidelines developed and/or published by other agencies and organizations (e.g., U.S. Environmental Protection Agency (U.S. EPA), the State Water Board, California Department of Health Services (DHS), U.S. Food and Drug

Administration, National Academy of Sciences, California Environmental Protection Agency's (Cal/EPA) Office of Environmental Health Hazard Assessment (OEHHA), U.S. Agency for Toxic Substances and Disease Registry, Cal/EPA Department of Toxic Substances Control (DTSC), and other appropriate organizations.)

At a minimum, groundwater designated for use as domestic or municipal supply (MUN) shall not contain concentrations of constituents in excess of the maximum (MCLs) or secondary maximum contaminant levels (SMCLs) specified in the following provisions of Title 22, which are incorporated by reference into this plan: Tables 64431-A (Inorganic Chemicals) of Section 64431, Table 64433.2-A (Fluoride) of Section 64433.2, and Table 64444-A (Organic Chemicals) of Section 64444. This incorporation-by-reference is prospective, including future changes to the incorporated provisions as the changes take effect. (See Table 3-5.)

Groundwater with a beneficial use of agricultural supply shall not contain concentrations of chemical constituents in amounts that adversely affect such beneficial use. In determining compliance with this objective, the Water Board will consider as evidence relevant and scientifically valid water quality goals from sources such as the Food and Agricultural Organizations of the United Nations; University of California Cooperative Extension, Committee of Experts; and McKee and Wolf's "Water Quality Criteria," as well as other relevant and scientifically valid evidence. At a minimum, groundwater designated for use as agricultural supply (AGR) shall not contain concentrations of constituents in excess of the levels specified in Table 3-6.

Groundwater with a beneficial use of freshwater replenishment shall not contain concentrations of chemicals in amounts that will adversely affect the beneficial use of the receiving surface water.

Groundwater with a beneficial use of industrial service supply or industrial process supply shall not contain pollutant levels that impair current or potential industrial uses.

3.4.3 RADIOACTIVITY

At a minimum, groundwater designated for use as domestic or municipal supply (MUN) shall not contain concentrations of radionuclides in excess of the MCLs specified in Table 4 (Radioactivity) of Section 64443 of Title 22, which is incorporated by reference into this plan. This incorporation-by-reference is prospective, including future changes to the incorporated provisions as the changes take effect. (See Table 3-5.)

3.4.4 TASTE AND ODOR

Groundwater designated for use as domestic or municipal supply (MUN) shall not contain taste- or odor-producing substances in concentrations that cause a nuisance or adversely affect beneficial uses. At a minimum, groundwater designated for use as domestic or municipal supply shall not contain concentrations in excess of the SMCLs specified in Tables 64449-A (Secondary MCLs-Consumer Acceptance Limits) and 64449-B (Secondary MCLs-Ranges) of Section 64449 of Title 22, which is incorporated by reference into this plan. This incorporation-by-reference is prospective, including future changes to the incorporated provisions as the changes take effect. (See Table 3-5.)

3.5 OBJECTIVES FOR THE DELTA

The objectives contained in the State Water Board's 1995 "Water Quality Control Plan for the San Francisco Bay/Sacramento-San Joaquin Delta Estuary" and any revisions thereto shall apply to the waters of the Sacramento-San Joaquin Delta and adjacent waters as specified in that plan.

3.6 OBJECTIVES FOR ALAMEDA CREEK WATERSHED

The water quality objectives contained in Table 3-7 apply to the surface and groundwaters of the Alameda Creek watershed above Niles.

Wastewater discharges that cause the surface water limits in Table 3-7 to be exceeded may be allowed if they are part of an overall wastewater resource operational program developed by those agencies affected and approved by the Water Board.

TABLES

Table 3-1: Water Quality Objectives for Bacteria[a]

Beneficial Use	Fecal Coliform (MPN/100ml)	Total Coliform (MPN/100ml)	Enterococcus (MPN/100ml)[g]
Water Contact Recreation	geometric mean < 200 90th percentile < 400	median < 240 no sample > 10,000	geometric mean < 35 no sample > 104
Shellfish Harvesting[b]	median < 14 90th percentile < 43	median < 70 90th percentile < 230[c]	
Non-contact Water Recreation[d]	mean < 2000 90th percentile < 4000		
Municipal Supply: - Surface Water[e] - Groundwater	geometric mean < 20	geometric mean < 100 < 1.1[f]	

Notes:

a. Based on a minimum of five consecutive samples equally spaced over a 30-day period.

b. Source: National Shellfish Sanitation Program.

c. Based on a five-tube decimal dilution test or 300 MPN/100 ml when a three-tube decimal dilution test is used.

d. Source: Report of the Committee on Water Quality Criteria, National Technical Advisory Committee, 1968.

e. Source: California Department of Public Health recommendation.

f. Based on multiple tube fermentation technique; equivalent test results based on other analytical techniques, as specified in the National Primary Drinking Water Regulation, 40 CFR, Part 141.21(f), revised June 10, 1992, are acceptable.

g. Applicable to marine and estuarine waters only. Numeric values are based on Section 7958 of Title 17 of the California Code of Regulations, 69FR 67217 et seq., and 40 CFR Part 131.41 (effective date December 16, 2004).

Table 3-2: U.S. EPA Bacteriological Criteria for Water Contact Recreation[1,2] (in colonies per 100 ML)

	Fresh Water		Salt Water
	Enterococci	**E. Coli**	**Enterococci**
Steady State (all areas)	33	126	35
Maximum at:			
- designated beach	61	235	104
- moderately used area	89	298	124
- lightly used area	108	406	276
- infrequently used area	151	576	500

NOTES:

1. The criteria were published in the Federal Register, Vol. 51, No. 45 / Friday, March 7, 1986 / 8012-8016. The Criteria are based on:
   (a) Cabelli, V.J. 1983. Health Effects Criteria for Marine Recreational Waters. U.S. EPA, EPA 600/1-80-031, Cincinnati, Ohio, and
   (b) Dufour, A.P. 1984. Health Effects Criteria for Fresh Recreational Waters. U.S. EPA, EPA 600/1-84-004, Cincinnati Ohio.

2. The U.S. EPA criteria apply to water contact recreation only. The criteria provide for a level of production based on the frequency of usage of a given water contact recreation area. The criteria may be employed in special studies within this region to differentiate between pollution sources or to supplement the current coliform objectives for water contact recreation.

Table 3-3: Marine[a] Water Quality Objectives for Toxic Pollutants for Surface Waters (all values in ug/l)

Compound	4-day Average	1-hr Average	24-hr Average
Arsenic[b, c, d]	36	69	
Cadmium[b, c, d]	9.3	42	
Chromium VI[b, c, d, e]	50	1100	
Copper[c, d, f]			
Cyanide[g]			
Lead[b, c, d]	8.1	210	
Mercury[h]	0.025	2.1	
Nickel[b, c, d]	8.2	74	
Selenium[i]			
Silver[b, c, d]		1.9	
Tributyltin[j]			
Zinc[b, c, d]	81	90	
PAHs[k]			15

NOTES:

a. Marine waters are those in which the salinity is equal to or greater than 10 parts per thousand 95% of the time, as set forth in Chapter 4 of the Basin Plan. Unless a site-specific objective has been adopted, these objectives shall apply to all marine waters except for the South Bay south of Dumbarton Bridge (where the California Toxics Rule (CTR) applies) or as specified in note h (below). For waters in which the salinity is between 1 and 10 parts per thousand, the applicable objectives are the more stringent of the freshwater (Table 3-4) or marine objectives.

b. Source: 40 CFR Part 131.38 (California Toxics Rule or CTR), May 18, 2000.

c. These objectives for metals are expressed in terms of the dissolved fraction of the metal in the water column.

d. According to the CTR, these objectives are expressed as a function of the water-effect ratio (WER), which is a measure of the toxicity of a pollutant in site water divided by the same measure of the toxicity of the same pollutant in laboratory dilution water. The 1-hr. and 4-day objectives = table value X WER. The table values assume a WER equal to one.

e. This objective may be met as total chromium.

f. Water quality objectives for copper were promulgated by the CTR and may be updated by U.S. EPA without amending the Basin Plan. Note: at the time of writing, the values are 3.1 ug/l (4-day average) and 4.8 ug/l (1-hr. average). The most recent version of the CTR should be consulted before applying these values.

g. Cyanide criteria were promulgated in the National Toxics Rule (NTR) (Note: at the time of writing, the values are 1.0 µg/l (4-day average) and 1.0 µg/l (1-hr. average)) and apply, except that site-specific marine water quality objectives for cyanide have been adopted for San Francisco Bay as set forth in Table 3-3C.

h. Source: U.S. EPA Ambient Water Quality Criteria for Mercury (1984). The 4-day average value for mercury does not apply to San Francisco Bay; instead, the water quality objectives specified in Table 3-3B apply. The 1-hour average value continues to apply to San Francisco Bay.

i. Selenium criteria were promulgated for all San Francisco Bay/Delta waters in the National Toxics Rule (NTR). The NTR criteria specifically apply to San Francisco Bay upstream to and including Suisun Bay and Sacramento-San Joaquin Delta. Note: at the time of writing, the values are 5.0 ug/l (4-day average) and 20 ug/l (1-hr. average).

j. Tributyltin is a compound used as an antifouling ingredient in marine paints and toxic to aquatic life in low concentrations. U.S. EPA has published draft criteria for protection of aquatic life (Federal Register: December 27, 2002, Vol. 67, No. 249, Page 79090-79091). These criteria are cited for advisory purposes. The draft criteria may be revised.

k. The 24-hour average aquatic life protection objective for total PAHs is retained from the 1995 Basin Plan. Source: U.S. EPA 1980.

Table 3-3A: Water Quality Objectives for Copper and Nickel in San Francisco Bay Segments (ug/L)

Compound	4-day Average (CCC)[1]	1-hr Average (CMC)[2]	Extent of Applicability
Copper	6.9	10.8	The portion of Lower San Francisco Bay south of the line representing the Hayward Shoals shown on Figure 7.1. and South San Francisco Bay
Copper	6.0	9.4	The portion of the delta located in the San Francisco Bay Region, Suisun Bay, Carquinez Strait, San Pablo Bay, Central San Francisco Bay, and the portion of Lower San Francisco Bay north of the line representing the Hayward Shoals on Figure 7.1.
Nickel	11.9	62.4*	South San Francisco Bay

[1]Criteria Continuous Concentration

[2]Criteria Maximum Concentration

*Handbook of Water Quality Standards, 2nd ed. 1994 in Section 3.7.6 states that the CMC = Final AcuteValue/2; 62.4 is the Final Acute Value (resident species database)/2; so the site-specific CMC is lower than the California Toxics Rule value because we are using the resident species database instead of the National Species Database.

Appendix B Risk Level Assessment

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R Factor

Facility Information

Start Date: 07/01/2024	**Latitude:** 37.7920
End Date: 06/30/2027	**Longitude:** -122.2754

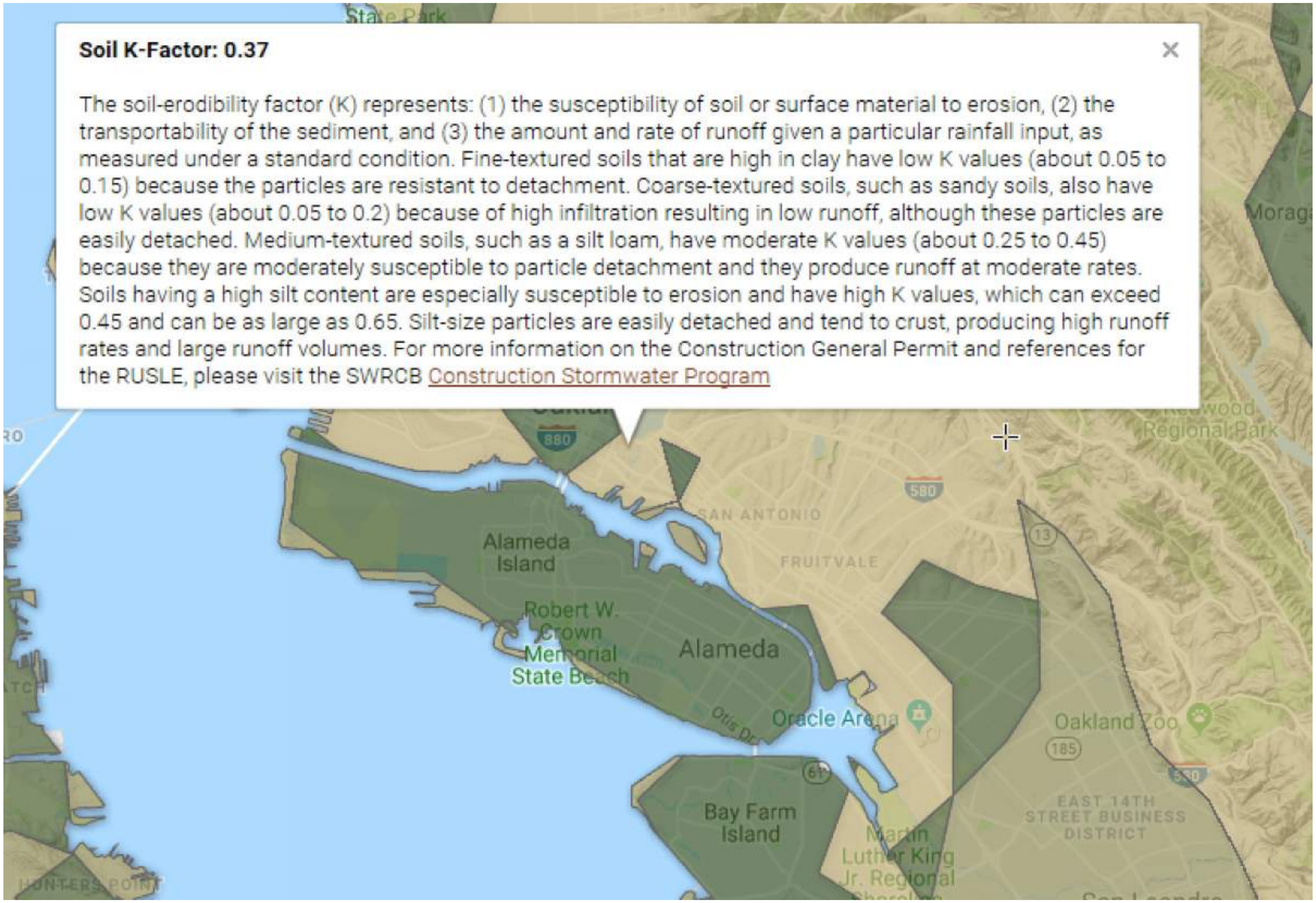
Calculation Results

Rainfall erosivity factor (R Factor) = **158**

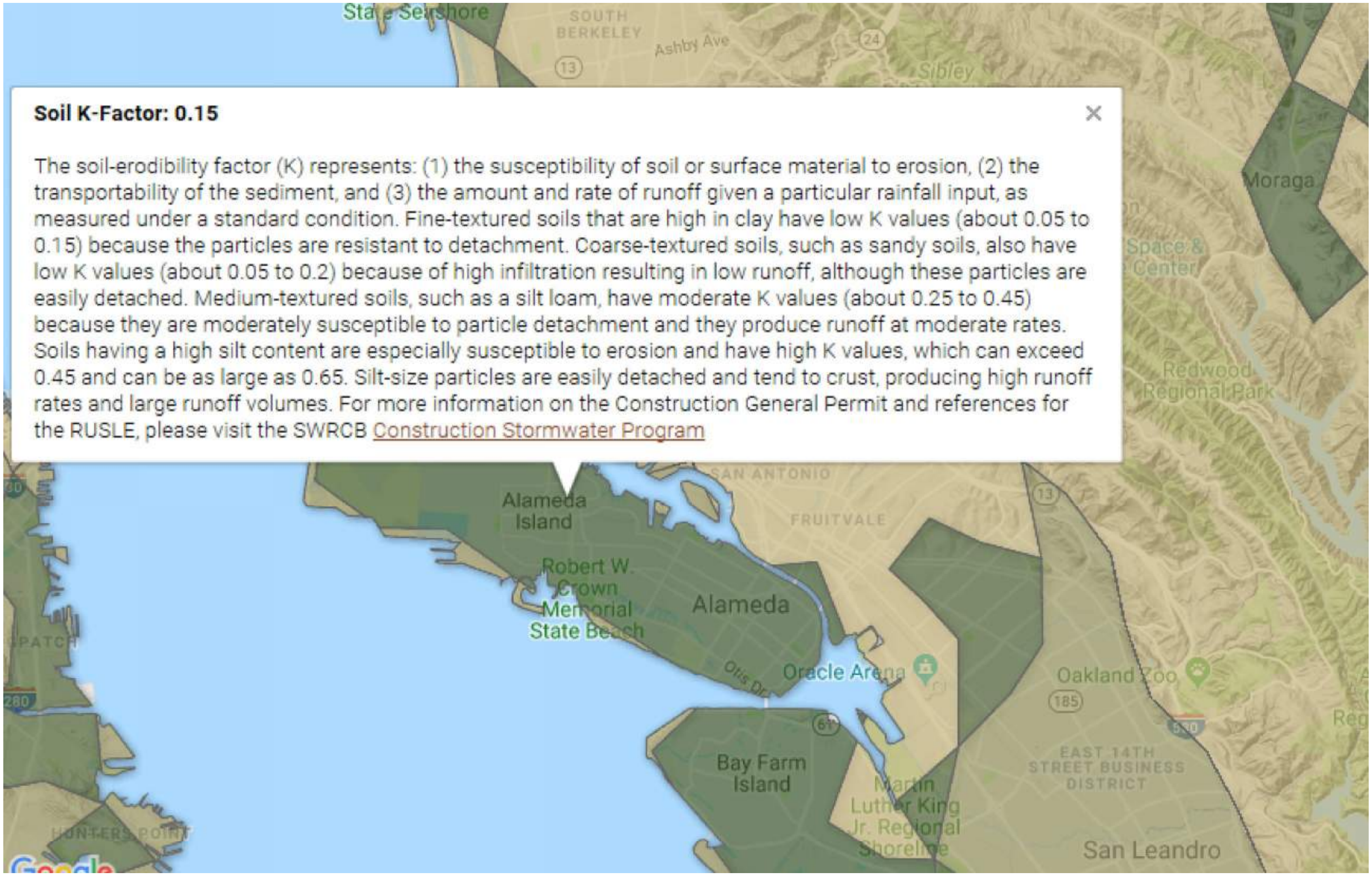
A rainfall erosivity factor of 5.0 or greater has been calculated for your site's period of construction.

You do NOT qualify for a waiver from NPDES permitting requirements and must seek Construction General Permit (CGP) coverage. If you are located in an area where EPA is the permitting authority, you must submit a Notice of Intent (NOI) through the NPDES eReporting Tool (NeT).Otherwise, you must seek coverage under your state’s CGP.

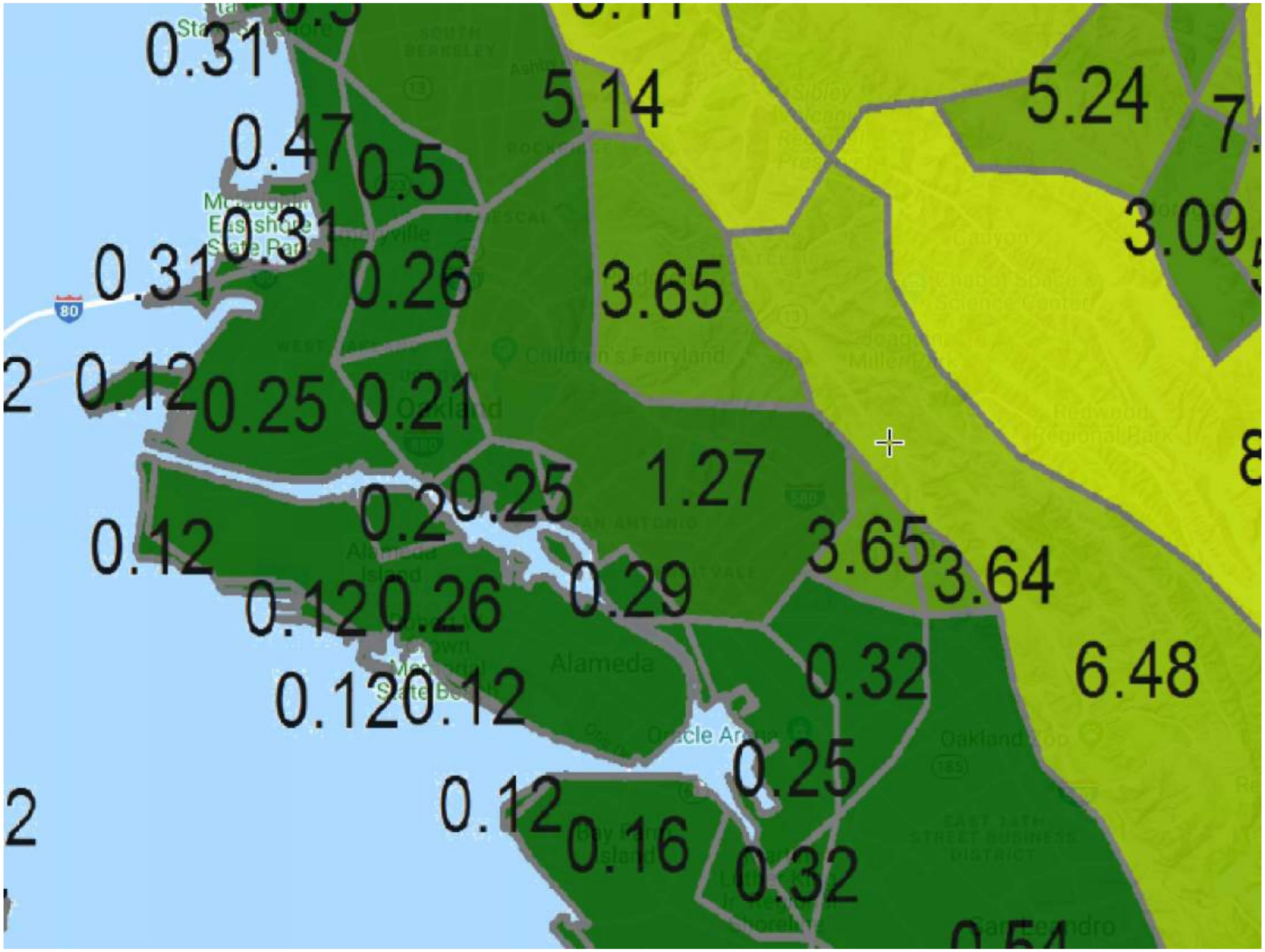
K Factor: Oakland Side



<u>K Factor: Alameda Side</u>



LS Factor


0.31
5.14
5.24
0.47
0.5
0.31
3.09
0.31
0.26
3.65
0.12
0.25
0.21
1.27
0.2
0.25
0.12
3.65
3.64
0.12
0.26
0.29
0.32
6.48
0.12
0.12
0.25
0.12
0.16
0.32
Alameda
Oakland
Children's Fairyland

Oakland Side

	A	B	C
1	**Sediment Risk Factor Worksheet**		**Entry**
2	**A) R Factor**		
3	Analyses of data indicated that when factors other than rainfall are held constant, soil loss is directly proportional to a rainfall factor composed of total storm kinetic energy (E) times the maximum 30-min intensity (I30) (Wischmeier and Smith, 1958). The numerical value of R is the average annual sum of EI30 for storm events during a rainfall record of at least 22 years. "Isoerodent" maps were developed based on R values calculated for more than 1000 locations in the Western U.S. Refer to the link below to determine the R factor for the project site.		
4	http://cfpub.epa.gov/npdes/stormwater/LEW/lewCalculator.cfm		
5	**R Factor Value**		158
6	**B) K Factor (weighted average, by area, for all site soils)**		
7	The soil-erodibility factor K represents: (1) susceptibility of soil or surface material to erosion, (2) transportability of the sediment, and (3) the amount and rate of runoff given a particular rainfall input, as measured under a standard condition. Fine-textured soils that are high in clay have low K values (about 0.05 to 0.15) because the particles are resistant to detachment. Coarse-textured soils, such as sandy soils, also have low K values (about 0.05 to 0.2) because of high infiltration resulting in low runoff even though these particles are easily detached. Medium-textured soils, such as a silt loam, have moderate K values (about 0.25 to 0.45) because they are moderately susceptible to particle detachment and they produce runoff at moderate rates. Soils having a high silt content are especially susceptible to erosion and have high K values, which can exceed 0.45 and can be as large as 0.65. Silt-size particles are easily detached and tend to crust, producing high rates and large volumes of runoff. Use Site-specific data must be submitted.		
8	Site-specific K factor guidance		
9	**K Factor Value**		0.37
10	**C) LS Factor (weighted average, by area, for all slopes)**		
11	The effect of topography on erosion is accounted for by the LS factor, which combines the effects of a hillslope-length factor, L, and a hillslope-gradient factor, S. Generally speaking, as hillslope length and/or hillslope gradient increase, soil loss increases. As hillslope length increases, total soil loss and soil loss per unit area increase due to the progressive accumulation of runoff in the downslope direction. As the hillslope gradient increases, the velocity and erosivity of runoff increases. Use the LS table located in separate tab of this spreadsheet to determine LS factors. Estimate the weighted LS for the site prior to construction.		
12	LS Table		
13	**LS Factor Value**		0.25
14			
15	**Watershed Erosion Estimate (=RxKxLS) in tons/acre**	14.6	
16	**Site Sediment Risk Factor**	**Low**	
17	Low Sediment Risk: < 15 tons/acre		
18	Medium Sediment Risk: >=15 and <75 tons/acre		
19	High Sediment Risk: >= 75 tons/acre		
20			

Alameda Side

	A	B	C
1	**Sediment Risk Factor Worksheet**		**Entry**
2	**A) R Factor**		
3	Analyses of data indicated that when factors other than rainfall are held constant, soil loss is directly proportional to a rainfall factor composed of total storm kinetic energy (E) times the maximum 30-min intensity (I30) (Wischmeier and Smith, 1958). The numerical value of R is the average annual sum of EI30 for storm events during a rainfall record of at least 22 years. "Isoerodent" maps were developed based on R values calculated for more than 1000 locations in the Western U.S. Refer to the link below to determine the R factor for the project site.		
4	http://cfpub.epa.gov/npdes/stormwater/LEW/lewCalculator.cfm		
5	**R Factor Value**		158
6	**B) K Factor (weighted average, by area, for all site soils)**		
7	The soil-erodibility factor K represents: (1) susceptibility of soil or surface material to erosion, (2) transportability of the sediment, and (3) the amount and rate of runoff given a particular rainfall input, as measured under a standard condition. Fine-textured soils that are high in clay have low K values (about 0.05 to 0.15) because the particles are resistant to detachment. Coarse-textured soils, such as sandy soils, also have low K values (about 0.05 to 0.2) because of high infiltration resulting in low runoff even though these particles are easily detached. Medium-textured soils, such as a silt loam, have moderate K values (about 0.25 to 0.45) because they are moderately susceptible to particle detachment and they produce runoff at moderate rates. Soils having a high silt content are especially susceptible to erosion and have high K values, which can exceed 0.45 and can be as large as 0.65. Silt-size particles are easily detached and tend to crust, producing high rates and large volumes of runoff. Use Site-specific data must be submitted.		
8	Site-specific K factor guidance		
9	**K Factor Value**		0.15
10	**C) LS Factor (weighted average, by area, for all slopes)**		
11	The effect of topography on erosion is accounted for by the LS factor, which combines the effects of a hillslope-length factor, L, and a hillslope-gradient factor, S. Generally speaking, as hillslope length and/or hillslope gradient increase, soil loss increases. As hillslope length increases, total soil loss and soil loss per unit area increase due to the progressive accumulation of runoff in the downslope direction. As the hillslope gradient increases, the velocity and erosivity of runoff increases. Use the LS table located in separate tab of this spreadsheet to determine LS factors. Estimate the weighted LS for the site prior to construction.		
12	LS Table		
13	**LS Factor Value**		0.2
14			
15	**Watershed Erosion Estimate (=RxKxLS) in tons/acre**	4.7	
16	**Site Sediment Risk Factor**	**Low**	
17	Low Sediment Risk: < 15 tons/acre		
18	Medium Sediment Risk: >=15 and <75 tons/acre		
19	High Sediment Risk: >= 75 tons/acre		
20			

Oakland and Alameda Side

Receiving Water (RW) Risk Factor Worksheet	Entry	Score
A. Watershed Characteristics	yes/no	
A.1. Does the disturbed area discharge (either directly or indirectly) to a **303(d)-listed waterbody impaired by sediment** (For help with impaired waterbodies please visit the link below) or has a **USEPA approved TMDL implementation plan for sediment**?: http://www.waterboards.ca.gov/water_issues/programs/tmdl/integrated2010.shtml **OR** A.2. Does the disturbed area discharge to a waterbody with designated beneficial uses of SPAWN & COLD & MIGRATORY? (For help please review the appropriate Regional Board Basin Plan) http://www.waterboards.ca.gov/waterboards_map.shtml	**No**	**Low**

Combined Risk Level Matrix

Receiving Water Risk \ Sediment Risk	Low	Medium	High
Low	Level 1	Level 2	Level 2
High	Level 2	Level 2	Level 3

Project Sediment Risk: **Low**

Project RW Risk: **Low**

Project Combined Risk: **Level 1**