Appendix I-1

Water Quality Assessment Report

Draft Water Quality Assessment Report

San Francisco-Oakland Bay Bridge
Regional Bicycle/Pedestrian Connection Project
Alameda County, California

Prepared for:

BAY AREA TOLL AUTHORITY

Caltrans

Prepared by:

WRECO

July 2014

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San Francisco-Oakland Bay Bridge
Regional Bicycle/Pedestrian Connection Project
City of Oakland, Alameda County, California
04-ALA-80/580/880 *EA 04-3G230*

July 2014

STATE OF CALIFORNIA
Department of Transportation

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Executive Summary

The San-Francisco-Oakland Bay Bridge (SFOBB or Bay Bridge) Regional Bicycle/Pedestrian Connection (Path or Project) is located in the City of Oakland, Alameda County, near the Interstate 880 and Interstate 80 interchange and the new East Span of the Bay Bridge. The new Path would be approximately 6,030 linear feet (ft) and would connect the existing bicycle/pedestrian path on Mandela Parkway to the existing bicycle/pedestrian path near the California Department of Transportation (Caltrans) maintenance facility on the south side of the Bay Bridge. The Path will more-or-less parallel West Grand Avenue. The proposed improvements for the Project are limited to areas within Caltrans' right-of-way and the City of Oakland's right-of-way.

The construction of the Project would involve the installation of elevated platform structures. Temporary construction activities would take place including construction staging, storage, and parking for workers. The amount of permanent and temporary activity in the construction of the Project would be minimal.

The purpose of this Water Quality Assessment Report (WQAR) is to fulfill the requirements of the National Environmental Policy Act and the California Environmental Quality Act, and to provide information, to the extent possible, for National Pollutant Discharge Elimination System (NPDES) permitting.

Lower San Francisco Bay is the ultimate receiving water body and is listed on the 303 (d) list of impaired waters. The Gateway *Project Concept Report* (Perkins+Will 2012) did not list any wetlands along the Project. An updated biological report was not available at the time of this report. Once this report is available, the WQAR will be updated as needed.

The Project would disturb more than 9 acres of soil and would be subject to the requirements stated within the State Water Resources Control Board, NPDES General Permit for Storm Water Discharges Associated with Construction and Land Disturbance Activities (Order No. 2009-0009-DWQ, NPDES No. CAS000002). A Storm Water Pollution Prevention Plan (SWPPP) would be required for the Project. A component of the SWPPP includes performing a risk level determination. The Construction General Permit separates projects into risk levels 1, 2, or 3. The Project would likely be classified as risk level 1 or 2.

The Project would be subject to the current Caltrans NPDES Permit (Order No. 99-06-DWQ). Based on the Caltrans *Project Planning and Design Guide* (2010), the Project is required to implement treatment best management practices (BMPs) because it would result in a net increase of more than 1 acre (ac) of new impervious surface. Treatment BMPs would be considered to avoid and minimize impacts to water resources to the maximum extent practicable.

Per the California Regional Water Quality Control Board's memorandum to Caltrans, dated July 21, 2008, hydromodification controls are required if a project submits a Report of Waste Discharge and lies within the political boundary of a municipality subject to

hydromodification requirements in an NPDES municipal permit. The segment of Alameda County within the Project site is a co-permittee under the "California Regional Water Quality Control Board San Francisco Bay Region Municipal Regional Stormwater NPDES Permit (MRP)" (Order R2-2009-0074, NPDES Permit No. CAS612008). However, per the Alameda Countywide Clean Water Program Hydromodification Management Plan Map, the Project is in an area that is tidally influenced and therefore exempt from hydromodification requirements.

The Project's overall design goal would be to avoid and minimize impacts to water resources to the maximum extent practicable, promote infiltration of stormwater runoff, maximize treatment of stormwater runoff, and reduce erosion by metering or detaining post-project runoff. The Project is expected to have a less-than-significant impact to water resources by meeting these goals and incorporating other applicable NPDES and Project-specific permit or agreement requirements.

Acronyms

ABAG	Association of Bay Area Governments
ACCWP	Alameda Countywide Clean Water Program
BCDC	Bay Conservation and Development Commission
bgs	below ground surface
BMP	best management practices
BSA	Biological Study Area
Caltrans	California Department of Transportation
CFR	Code of Federal Regulations
CGP	Construction General Permit
CEQA	California Environmental Quality Act
COC	Constituents of Concern
CTC	California Transportation Commission
CWA	Clean Water Act
DSA	disturbed soil area
EBRPD	East Bay Regional Park District
EPA	United States Environmental Protection Agency
ESA	Environmentally Sensitive Area
FEMA	Federal Emergency Management Agency
FIRM	Flood Insurance Rate Map
I-	Interstate
IS/NMD	initial study/mitigated negative declaration
MRP	Municipal Regional Permit
MS4	Municipal Separate Storm Sewer System
MSL	mean sea level
NEPA	National Environmental Policy Act
NPDES	National Pollutant Discharge Elimination System
NRCS	Natural Resources Conservation Service
NWI	National Wetland Inventory
OARB	Oakland Army Base
OC	Overcrossing
PAH	polyaromatic hydrocarbons
Path	SFOBB Regional Bicycle/Pedestrian Connection
PCB	polychlorinated biphenyls
PCR	Project Concept Report
PM	Post Mile
PS&E	Plans, Specifications, and Estimates
REC	Recognized Environmental Condition
RWQCB	Regional Water Quality Control Board
SFOBB	San Francisco-Oakland Bay Bridge
SFBRWQCB	San Francisco Bay Regional Water Quality Control Board
SWMP	Storm Water Management Plan
SWPPP	Storm Water Pollution Prevention Plan
SWRCB	State Water Resources Control Board
TMDL	total maximum daily load

UC	Undercrossing
USACE	U.S. Army Corps of Engineers
USGS	U.S. Geological Survey
VOH	Volatile Organic Hydrocarbons
WDR	Waste Discharge Requirement
WPCP	Water Pollution Control Plan
WQAR	Water Quality Assessment Report

1 INTRODUCTION

The proposed project is a new bicycle/pedestrian connection (Path or Project) between West Oakland and the new East Span of the San Francisco-Oakland Bay Bridge (SFOBB or Bay Bridge) in Oakland, California (see Figure 1 and Figure 2). The new Path would provide safe access to the existing Bay Bridge Trail, as well as access to existing and planned segments of the regional San Francisco Bay Trail.

The Path would be approximately 6,030 linear feet (ft). On the west end, the Project would connect to the existing bicycle/pedestrian path near the California Department of Transportation (Caltrans) maintenance facility on the south side of the Bay Bridge toll plaza. This path continues westward and connects to the Bay Bridge Trail. On the east end, the new path would connect to the existing bicycle/pedestrian path on Mandela Parkway (see).

The Project is proposed by the Gateway Park Working Group. The Gateway Park Working Group includes the following nine local, regional, and state agencies: The Bay Area Toll Authority (BATA), Caltrans, San Francisco Bay Conservation and Development Commission (BCDC), California Transportation Commission (CTC), East Bay Regional Park District (EBRPD), City of Oakland, Port of Oakland, East Bay Municipal Utility District (EBMUD), and Association of Bay Area Governments (ABAG's) Bay Trail Project. The agency responsible for operation and maintenance of the new path is anticipated to be Caltrans but could also be EBRPD or City of Oakland.

Caltrans is the lead agency under the National Environmental Policy Act (NEPA). BATA is the lead agency under the California Environmental Quality Act (CEQA). The environmental documents are a CEQA initial study/mitigated negative declaration (IS/MND) and a NEPA categorical exclusion.

1.1 Project Purpose

The purpose of the Project is to provide a safe connection for bicyclists and pedestrians to travel between West Oakland and the Bay Bridge Trail. The area between is occupied by industry, railways and Interstate 880 (I-880). Current access for bicyclists and pedestrians is on roadways extending through the industrial area, which have heavy truck traffic and are not considered safe.

1.2 Project Description

The proposed project is a new bicycle/pedestrian connection (Path or Project) between West Oakland and the new East Span of the San Francisco-Oakland Bay Bridge (Bay Bridge) in Oakland, California (see Figure 1). The new Path would provide safe access to the existing bicycle/pedestrian path on the Bay Bridge (Bay Bridge Trail), as well as access to existing and planned segments of the regional San Francisco Bay Trail (Figure 3).

The Path would be approximately 6,030 linear feet (ft). On the west end, the Path would connect to the Bay Bridge Trail near the Caltrans maintenance facility on the south side of the Bay

Bridge toll plaza. On the east end, the Project would connect to the existing bicycle/pedestrian path on Mandela Parkway.

The Project is proposed by the Gateway Park Working Group. The Gateway Park Working Group includes the following nine local, regional, and state agencies: BATA, Caltrans, BCDC, CTC, EBRPD, City of Oakland, Port of Oakland, EBMUD, and ABAG. The agency responsible for operation and maintenance of the new path is anticipated to be Caltrans but could also be City of Oakland.

Caltrans is the lead agency under the NEPA. BATA is the lead agency under CEQA. The environmental documents are a CEQA IS/MND and a NEPA categorical exclusion.

The purpose of the Project is to provide a safe connection for bicyclists and pedestrians to travel between West Oakland and the Bay Bridge Trail. The area between is occupied by industry, railways, and Interstate 880 (I-880). Current access for bicyclists and pedestrians is on roadways extending through the industrial area, which have heavy truck traffic. The proposed Project is a new Class I bike path located in the City of Oakland, Alameda County, near the I-880 and I-80 interchange and the new East Span of the Bay Bridge (see Required Attachments).

The Class I bike path would extend 6,030 ft (1.14 mile) between Mandela Parkway on the east and the Bay Bridge Trail on the west. The bike path is an elevated structure for most of this distance to provide access across existing freeways, railwayss and industrial areas. It is an independent structure, except over the railroad tracks where it would be on the West Grand Avenue overcrossing structure. The elevated bike path reaches a maximum height of 37 ft where it is on the overcrossing structure.

The Class I bike path would be 17 ft wide (15 ft clear width and 2 ft for fencing), except on the overcrossing structure where it reduces to 14 ft wide (10 ft clear width and 4 ft for fencing). The bike path would have a maximum grade of 5 percent.

The Project could also include Class II bike lanes and a 100-space parking lot at the east end of the Class I bike path, if funding is available. The Class II bike lanes would extend along surface streets near the east touchdown of the bike path, providing connections to Mandela Parkway and to the proposed Wood Street parking lot.

Table 1 lists the estimated total disturbed soils areas (DSA) and added and reworked impervious area values by right-of-way. The total DSA was estimated from the existing pervious areas, plus the existing impervious to be converted to pervious areas, and reworked impervious areas. The impervious area and DSA values will be further refined during the Plans, Specifications & Estimates (PS&E) phase once the limits of grading, construction staging locations, and other areas of disturbance have been developed.

Table 1. Disturbed Soil, Added, and Reworked Areas

Right-of-Way	Disturbed Soil Area (acre)	Existing Impervious Area (acre)	Proposed Impervious Area (acre)	Added Impervious Area (acre)	Replaced Impervious Area (acre)	Added and Replaced Impervious Area (acre)
Caltrans	2.22	10.36	10.92	0.54	0.13	0.68
Oakland	6.82	20.53	20.85	1.14	1.17	2.31
Total	9.04	30.89	31.77	1.68	1.30	2.99

Source: TY Lin,2014

The portion of the Project within the City of Oakland is within the Alameda County Phase I Municipal Separate Storm Sewer System (MS4) under the "California Regional Water Quality Control Board San Francisco Bay Region Municipal Regional Stormwater NPDES Permit" (Order R2-2009-0074, NPDES Permit No. CAS612008) (MRP). In addition, the portion of the Project within Caltrans' right-of-way would be subject to the current Caltrans National Pollutant Discharge Elimination System (NPDES) Permit (Order No. 99-06-DWQ).

1.3 Approach to Water Quality Assessment

The purpose of the Water Quality Assessment Report (WQAR) is to fulfill the requirements of the NEPA and the CEQA, and to provide information for NPDES permitting. The document includes a discussion of the proposed Project, the physical setting of the Project area, and the regulatory framework with respect to water quality. It also provides data on surface water and groundwater resources within the Project area and the 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.

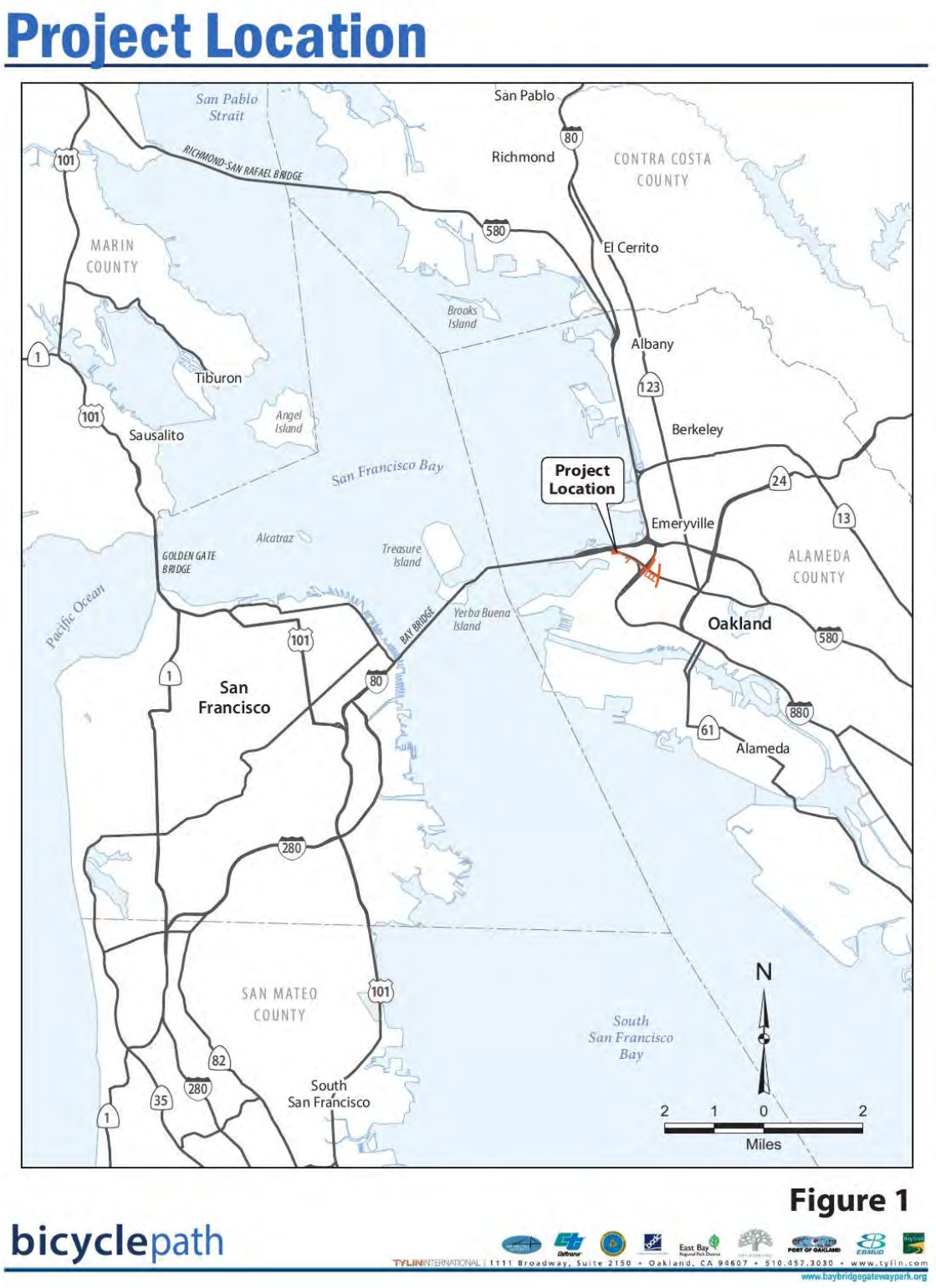

Figure 1. Project Location Map

Source: T.Y. Lin International, 2014

Figure 2. Vicinity Map

Source: T.Y. Lin International, 2014

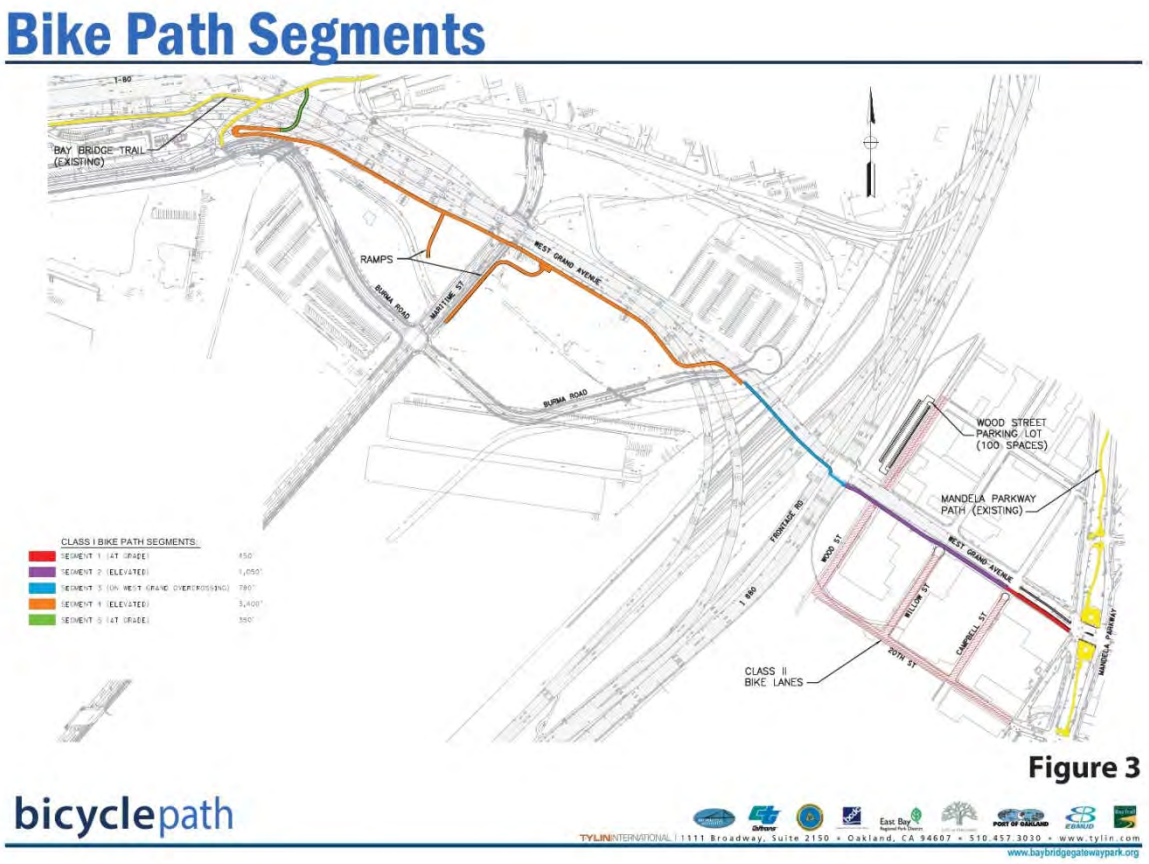

Figure 3. Bike Path Segments

Source: T.Y. Lin International, 2014

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 addition of pollutants to the waters of the U.S. from any point source unlawful unless the discharge is in compliance with an NPDES permit. Known today as the Clean Water Act (CWA), Congress has amended it several times. The objective of the CWA is "to restore and maintain the chemical, physical, and biological integrity of the Nation's waters."

In the 1987 amendments, Congress directed dischargers of stormwater from municipal and industrial/construction point sources to comply with the NPDES permit scheme. Important CWA sections are:

- Sections 303 and 304 require states to promulgate water quality standards, criteria, and guidelines.
- Section 401 requires that an applicant for a federal license or permit for any activity potentially resulting in a discharge to waters of the United States (U.S.) must obtain certification from the State of California (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. The Regional Water Quality Control Boards (RWQCBs) administer this permitting program in California. Section 402(p) requires permits for discharges of stormwater from industrial/construction and MS4s.
- Section 404 establishes a permit program for the discharge of dredge or fill material into waters of the U.S. This permit program is administered by the U.S. Army Corps of Engineers (USACE).

USACE issues two types of 404 permits: general and standard permits. For general permits, there are two types: regional permits 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 standard permits: individual permits and Letters of Permission. Ordinarily, projects that do not meet the criteria for a nationwide permit may be permitted under one of USACE's standard permits. For standard permits, the USACE's decision to approve is based on compliance with the U.S. Environmental Protection Agency's (EPA's) Section 404 (b)(1) Guidelines (EPA Code of Federal Regulations [CFR] 40 Part 230) and whether permit approval is in the public interest. The 404(b)(1) guidelines were developed by the EPA in

conjunction with the USACE, and allow the discharge of dredged or fill material into the aquatic system (waters of the U.S.) only if there is no practicable alternative that would have less adverse effects. The 404(b)(1) guidelines state that USACE may not issue a permit if there is a least environmentally damaging practicable alternative to the proposed discharge that would have fewer effects on waters of the U.S. and not have any other significant adverse environmental consequences. Per the 404(b)(1) guidelines, documentation is needed 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, which 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 State Water Resources Control Board (SWRCB) and RWQCBs are responsible for establishing the water quality standards (objectives and beneficial uses) required by the CWA, and regulating discharges to ensure compliance with the water quality standards. Details regarding water quality standards in a project area are contained in the applicable RWQCB Basin Plan. In California, RWQCBs designate beneficial uses for all water body segments in their jurisdictions, and then set criteria necessary to protect these uses. Consequently, the water quality standards developed for particular water segments are based on the designated use and vary depending on such use. In addition, the SWRCB identifies waters failing to meet standards for specific pollutants, which are then state-listed in accordance with CWA Section 303(d). If a state determines that waters are impaired for one or more constituents, and the standards cannot be met through point source or non-point source controls (NPDES permits or WDRs), 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.

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

The SWRCB adjudicates water rights, sets water pollution control policy, 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.

2.2.3 National Pollutant Discharge Elimination System Program

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 EPA 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 storm water." The portion of the Project within the City of Oakland is within the Alameda County Phase I Municipal Separate Storm Sewer System (MS4) under the "California Regional Water Quality Control Board San Francisco Bay Region Municipal Regional Stormwater NPDES Permit" (Order R2-2009-0074, NPDES Permit No. CAS612008) (MRP). In addition, the portion of the Project within Caltrans' right-of-way would be subject to the current Caltrans NPDES Permit (Order No. 99-06-DWQ)."

Construction General Permit

Construction General Permit (CGP) (Order No. 2009-009-DWQ, as amended by 2010-0014-DWG), adopted on November 16, 2010, became effective on February 14, 2011. The permit regulates stormwater discharges from construction sites that 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, applicants are required to develop and implement an effective Storm Water Pollution Prevention Plan (SWPPP). In accordance with Caltrans' Standard Specifications, a Water Pollution Control Plan (WPCP) is necessary for projects with a DSA of less than 1 ac.

By law, all stormwater discharges associated with construction activity where clearing, grading, and excavation results in soil disturbance of at least 1 ac must comply with the provisions of the CGP. Construction activity that results in soil disturbances of less than 1 ac 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 SWPPPs; implement sediment, erosion, and pollution prevention control measures; and obtain coverage under the CGP.

The CGP separates projects into risk levels 1, 2, or 3. Risk levels are determined during the planning and design phases and are based on potential erosion and transport to receiving waters. 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.

Section 401 Permitting

Under Section 401 of the CWA, any project 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 with discharges associated with a project. As a result, the RWQCB may issue WDRs under the State Water Code (Porter-Cologne Act) that define activities, such as the inclusion of specific 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.

The Project is not anticipated to need a 401 permit.

2.3 Regional and Local Requirements

2.3.1 San Francisco Bay RWQCB Basin Plan

The San Francisco Bay Regional Water Quality Control Board (SFBRWQCB) established a General Basin Plan (2013) with goals and policies that apply to water bodies, if any, within the Project area, regarding beneficial uses and water quality objectives.

2.3.2 Local Agency NPDES Permit

The segment of Alameda County within the Project site is a co-permittee under the "California Regional Water Quality Control Board San Francisco Bay Region Municipal Regional Stormwater NPDES Permit" (Order R2-2009-0074, NPDES Permit No. CAS612008). This MRP presents the provision for permanent post-construction stormwater requirements. Within the Project limits, the Municipal Regional Permit (MRP) is administered regionally by the Alameda Countywide Clean Water Program (ACCWP) and locally by the City of Oakland. The ACCWP has developed a *C.3 Stormwater Technical Guidance* (Version 4.0, May 2013) to assist developers and engineers in complying with treatment and hydromodification requirements.

The MRP provides provisions and requirements for permanent stormwater treatment. Stormwater treatment measures are required to reduce the sediment and pollutant load resulting from the loss of pervious area and creation of impervious area. The permit sets impervious area thresholds for requiring projects to implement permanent stormwater treatment measures. The thresholds applicable for the Project include requiring permanent stormwater treatment measures when 10,000 square ft or more of impervious roadway area is created or replaced. If a project creates and/or replaces impervious area equal to more than 50 percent of the existing impervious area not previously requiring treatment, then the project must provide treatment for all existing and newly created impervious area.

In addition to permanent stormwater treatment requirements, the MRP provides provisions and requirements for hydromodification mitigation. Hydromodification is defined as the alteration of the hydrologic characteristics of coastal and non-coastal waters, which in turn could cause degradation of water resources. In the case of a stream channel, this is the process whereby a

stream bank is eroded by flowing water. This typically results in the suspension of sediment in the water course. Under the permit, projects that create or replace 1 ac or more of impervious area are required to evaluate hydromodification impacts to downstream water bodies and implement mitigation measures where appropriate.

3 AFFECTED ENVIRONMENT/EXISTING CONDITIONS

The Project proposes the construction of a new path connecting the existing bicycle/pedestrian path on Mandela Parkway to the existing bicycle/ pedestrian path near the Caltrans maintenance facility on the south side of the Bay Bridge. The Path will more-or-less parallel West Grand Avenue. The proposed improvements for the Project are limited to areas within Caltrans' right-of-way and the City of Oakland's right-of-way.

3.1 General Setting

3.1.1 Precipitation and Climate

Oakland has a moderate year-round climate. Humidity remains high while precipitation is low. The average temperatures vary between 49.9° F in January to 62.1° F in July, and the warmest months are September and October. The average annual precipitation is 23 inches. Almost all the City's rainfall occurs between October and January.

3.1.2 Population and Land Use

According to the Association of Bay Area Governments, the City of Oakland had a population of 390,724 as of 2010.

A majority of the Bay Bridge approach area consists of paved and/or developed freeway lanes and ramps and graded, paved, and/or landscaped shoulders and pullouts. Surrounding land use includes industrial and commercial developments in general. Most of the land areas adjacent to the I-80 corridor in the City of Oakland are zoned as resource conservation area to the north and general industrial/transportation to the south (City of Oakland 2013).

3.1.3 Topography

The topography along West Grand Avenue in the Project area is generally flat. Site elevations range between 8 ft above mean sea level (MSL) to approximately 17 ft above MSL.

3.1.4 Floodplains

There are no Federal Emergency Management Agency (FEMA) delineated 100-yr base floodplains within the Project limits (Appendix A).

3.1.5 Hydrology

3.1.5.1 Regional Hydrology

The Caltrans Water Quality Planning Tool identifies I-80 within the Project limits as crossing hydrologic sub-area number 204.20, and the Caltrans Stormwater Design Application website identifies the planning watersheds within these hydrologic sub-areas (see Table 2).

Table 2. Hydrologic Units within the Project Limits

I-80 PM	Hydrologic Unit	Hydrologic Area	Hydrologic Sub-area Number	Planning Watershed
Ala-80-1.04L/3.34 Ala-880-R34.0	South Bay	East Bay Cities	204.20	Undefined

Source: Caltrans Water Quality Planning Tool 2013

3.1.5.2 Local Hydrology

The receiving water body for the Project is the Lower San Francisco Bay. The receiving water body for the area north of I-80 discharges to Central San Francisco Bay and the area south of I-80 which includes the Project discharges to Lower San Francisco Bay.

3.1.5.3 Groundwater Hydrology

The Project area overlies East Bay Plain Subbasin within Santa Clara Valley Groundwater Basin. The East Bay Plain Subbasin (Basin Number 2-9.04) encompasses 122 square miles.

Figure 4. Groundwater Wells in the Project is a map obtained from the SWRCBs Groundwater Ambient Monitoring and Assessment database, which indicates the approximate locations and depth of groundwater wells within the Project limits on the figure, dots denote well locations, and colors indicate relative median depth-to-water (the darker the color, the larger the depth-to-water).

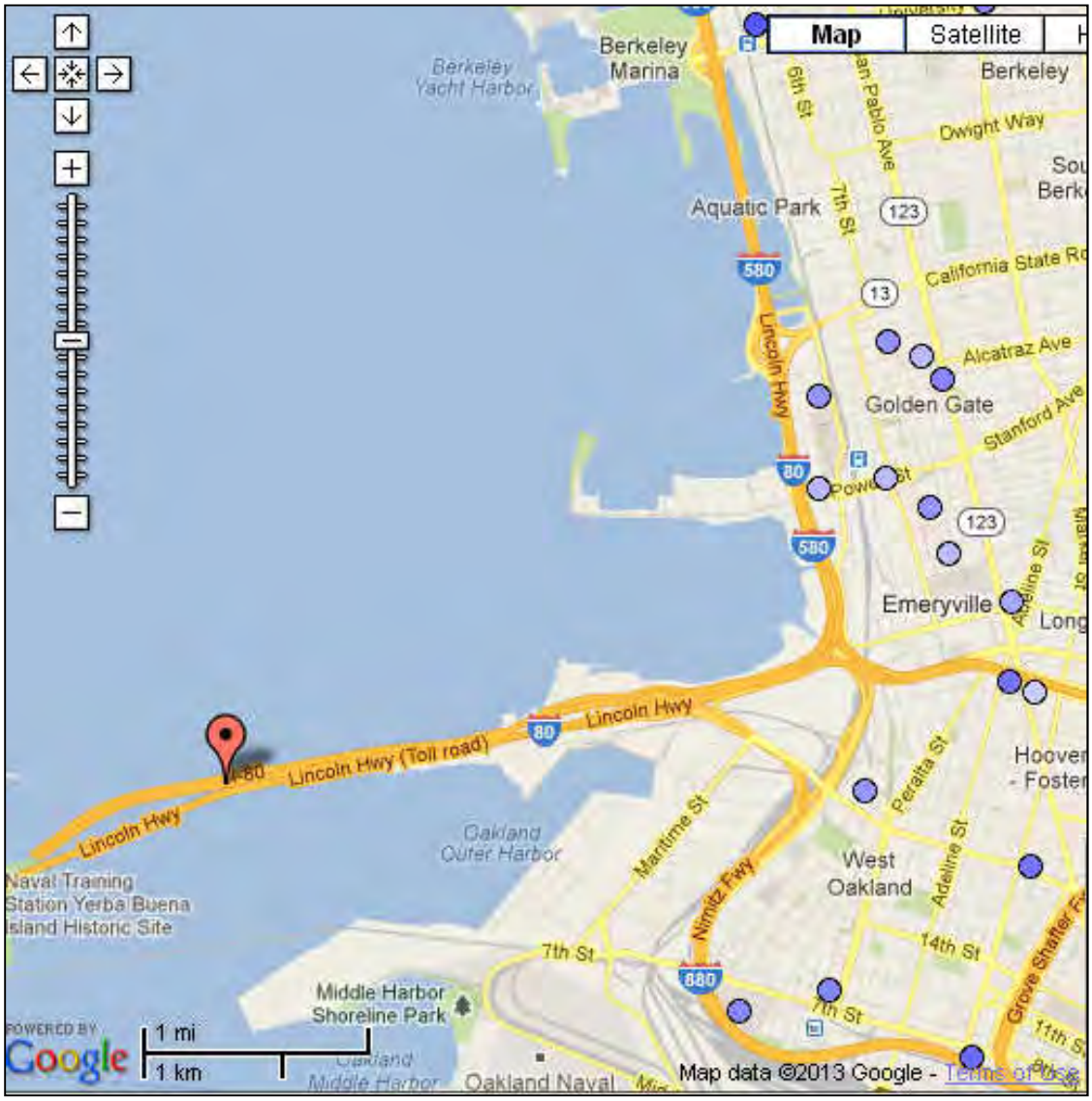

Figure 4. Groundwater Wells in the Project

Source: SWRCB, 2009

The groundwater depth varies from 3.1 ft to 16.8 ft below ground surface (bgs) within the Bay Bridge approach area (see Figure 4). The water table on the eastern end is higher than the western end, and is higher on the northern end than the southern end. The soil report for the Project is not available at this time. Project-specific groundwater information will be provided once the report is available.

Per the *Phase I Initial Site Assessment* (Fugro, 2014), groundwater is anticipated to occur at or slightly above mean sea level over the area of the Project. Accordingly, the depth to groundwater is expected to range from immediately bgs along and near the shoreline, up to a depth of 10 ft bgs at the farthest inland areas of the Site. Based on information provided in the report, [*Final, Upland Areas of Concern, Feasibility Study, BRAC Parcel 1, Oakland Army Base*, prepared by

Matrix Environmental Services, LLC (MES) and dated March 2006], the tidal influence on the groundwater gradient extends approximately 600 ft inland from the Oakland Harbor; in this area, groundwater flow is expected to be highly variable due to tidal forces. The groundwater gradient in areas beyond 600 ft from the harbor is anticipated to flow westward toward San Francisco Bay.

The groundwater level is anticipated to vary with the passage of time due to tidal influence, seasonal groundwater fluctuation, surface and subsurface flows into the bay, ground surface runoff, and other factors that may not have been present at the time of the previous investigation. Groundwater conditions within the Project limits should be verified during the PS&E phase.

3.1.6 Geology/Soils

The East Bay Plain Subbasin aquifer system consists of unconsolidated sediments of Quaternary age. Deposits include the early Pleistocene Santa Clara Formation, the late Pleistocene Alameda Formation, the early Holocene Temescal Formation, and artificial fill (see below for descriptions of the deposits). The cumulative thickness of the unconsolidated sediments is about 1,000 ft (CRWQCB 1999).

- The Santa Clara Formation consists of alluvial fan deposits inter-fingered with lake, swamp, river channel, and floodplain deposits. The formation ranges from 300 to 600 ft thick.

- The Alameda Formation includes a sequence of alluvial fan deposits bounded by mud deposits on top and bottom of the formation. The formation was deposited primarily in an estuarine environment and ranges from 26 to 245 ft thick.

- The Temescal Formation is an alluvial deposit consisting primarily of silts and clays with some gravel layers. The formation ranges from 1 to 50 ft thick. Artificial fill is found mostly along the bay front and wetlands areas and is derived primarily from dredging as well as quarrying, construction, demolition debris, and municipal waste. The fill ranges from 1 to 50 ft with the thickest deposits found nearer to the bay (California RWQCB 1999).

Per the Project *Initial Site Assessment* (Fugro, 2014), the geologic map titled: “Geologic Map of the San Francisco-San Jose Quadrangle, California” (California Division of Mines and Geology, dated 1991) shows that the majority of the Project (all areas west of the Nimitz Freeway) is mapped as artificial deposits. Based on the MES report, more than 6.5 million cubic yards of fill was placed to create the land surface that presently covers the area of the former Oakland Army Bases (OARB). The fill was placed by 1942, and rock fill for the seawall was imported from quarries located near Lake Temescal and Oak Knoll Naval Hospital. The remaining area is mapped as Pleistocene age alluvium (Older Alluvium) consisting of unconsolidated deposits of gravel, sand, silt, and clay. Clayey soils (known locally as “Bay Mud”) exist beneath the artificial fill and alluvial soils.

Soils data were reviewed from the USDA, Natural Resources Conservation Service (NRCS), to identify and evaluate existing soil conditions in the Project vicinity. Approximately three different soil units intersect in the Project (see Table 3). The major soil components mapped within the Project is primarily clay, loamy sand, and urban land complexes. Descriptions of all the soil features (e.g., setting, composition, and thickness) are included in Appendix B.

Table 3. Soil Information

Unit Name	Percentage of Area	Typical profile	Depth to Water (cm)
Urban land	97.4	N/A	>200
Urban land-Baywood complex	0.5	*0 to 16 inches:* Loamy sand *16 to 60 inches:* Loamy sand	>200
Urban land-Clear lake complex	2.1	*0 to 26 inches:* Clay *26 to 60 inches:* Clay	>200

Source: NRCS

3.1.6.1 Soil Erosion Potential

The NRCS provides information in their soil surveys regarding soil erodibility by providing a set of numerical indices for each soil type. The soil erodibility factor (K) is a measure of the susceptibility of a given soil type to erosion by water; it varies from 0.02 to 0.69, with soils having the highest K values as the most erodible. To estimate annual soil loss per acre, the K value of a soil is modified by factors representing plant cover, grade and length of slope, soil management practices, and climate. This value is used for the risk level determination associated with the CGP. See Appendix C for K factor maps in the Project area.

The Caltrans "CGP Info" GIS mapping system identifies the K factor for the Project area in the range of 0.24 to 0.37, which suggests moderate erosion susceptibility within the Project area.

3.1.7 Biological Communities

3.1.7.1 Aquatic Habitat

The National Wetland Inventory (NWI) database was referenced to determine if there were any previously documented aquatic features within the limit of the proposed Project. There are no aquatic features in the area of the proposed Project in the NWI. The *Gateway Park Draft Project Concept Report* (Gateway Report) (Perkins+Will 2011) does not mention any aquatic habitat in the Project.

3.1.7.2 Special-Status Species

The Gateway report lists special-status plants and wildlife species protected under the Federal and State endangered species acts with potential to occur in the vicinity. The current biological report was not available at the time of this report; information on special-status species will be updated once the report is available.

3.1.7.3 Stream/Riparian Habitats

The Gateway report did not list any stream/riparian habitats within the Project an updated biological report was not available at the time of this report. This information will be updated once the biological report is available.

3.1.7.4 Wetlands

Although there is a wetland under the elevated portion of the path near the railroad tracks have been identified by the Project biologist, no impact is anticipated to the wetland from the Project. Therefore, a 401 Certification from the SFBRWQCB is not expected to be required for this Project.

3.1.7.5 Fish Passage

There are no fish passages identified in the Project. However, the water bodies are identified as having the existing beneficial uses of fish migration see Section 3.2.1.

3.2 Water Quality Objectives/Standards and Beneficial Uses

3.2.1 Surface Water Quality Objectives/Standards and Beneficial Uses

The SFBRWQCB's Basin Plan (2013) lists the water quality objectives for the region in Chapter 3 of the Basin Plan (Appendix D). The surface water quality objectives consist of the following: bacteria, bioaccumulation, biostimulatory substances, color, dissolved oxygen, floating material, oil and grease, population and community ecology, pH, radioactivity, salinity, sediment, settleable material, suspended material, sulfide, taste and odors, temperature, toxicity, turbidity, and un-ionized ammonia.

Beneficial uses are critical to water quality management in California. According to State law, the beneficial uses of California's waters that may be protected against quality degradation include, but are not limited to, "domestic; municipal; agricultural and industrial supply; power generation; recreation; aesthetic enjoyment; navigation; and preservation and enhancement of fish, wildlife, and other aquatic resources or preserves" (Water Code Section 13050). Beneficial uses for surface water and groundwater are divided into the 20 standard categories with definitions listed in Appendix E. Protection and enhancement of existing and potential beneficial uses are the primary goals of water quality planning. Runoff from the Project goes into storm drain systems for both Caltrans and City of Oakland, the runoff from Mandela Parkway and W Grand Avenue flow into Caltrans storm drain systems.

There are no surface streams within the Project limits. Lower San Francisco Bay is the direct receiving water body for the Project. The Basin Plan identifies beneficial uses for water bodies within its jurisdiction. The existing beneficial uses listed for Lower San Francisco Bay are as follows:

- Industrial Service Supply (IND)
- Ocean, Commercial, and Sport Fishing (COMM)
- Shellfish Harvesting (SHELL)

- Estuarine Habitat (EST)
- Fish Migration (MIGR)
- Preservation of Rare and Endangered Species (RARE)
- Fish Spawning (SPWN)
- Wildlife Habitat (WILD)
- Water Contact Recreation (REC-1)
- Non-Contact Water Recreation (REC-2)
- Navigation (NAV)

3.2.2 Groundwater Quality Objectives/Standards and Beneficial Uses

Per the Phase I *Initial Environmental Site Assessment* (Fugro, 2014), a portion of the Project lies within the limits of the OARB where soil, groundwater, and sediment impacts are known to be present, which is considered a recognized environmental condition (REC). Additionally, the planned Project crosses immediately adjacent to several sites listed in regulatory agency databases due to known or suspected soil and/or groundwater contamination that are considered RECs, these sites include the Heroic War Dead – EBMUD, the Southern Pacific Transportation Company and Port of Oakland.

For the portion of the Site within the boundaries of the former OARB known chemicals of concern (COCs) include heavy metals, volatile organic compounds (VOCs), poly-chlorinated biphenyls (PCBs), polyaromatic hydrocarbons (PAHs), and organochlorine pesticides. Based on the known soil, groundwater, and offshore sediment impacts associated with the OARB facility, it is considered a REC to the Project.

The Basin Plan (2013) sets general water quality objectives addressing bacteria, organic and non-organic chemical constituents, taste and odor, and radioactivity for all groundwater in the area. The Basin Plan states that: 1) groundwater shall be free of organic and inorganic chemical constituents in concentrations that adversely affect beneficial uses; 2) groundwater shall not contain taste or odor producing substances in concentrations that adversely affect beneficial uses; and 3) radionuclides shall not be present in concentrations deleterious to humans, plants, animals, or aquatic life. Appendix C summarizes water quality objectives based on beneficial uses established by the SFBRWQCB.

Groundwater subbasins identified as having the existing groundwater beneficial use of municipal and domestic water supply are subject to further narrative and numeric groundwater objectives for bacteria, organic and inorganic constituents, radioactivity, and taste and odor. These objectives are presented in Section 3.3 of the Basin Plan. Groundwater subbasins identified as having the beneficial use of agricultural water supply are subject to additional objectives for organic and inorganic chemical constituents stated in Section 3.4.2 of the Basin Plan.

Based on the examination of GIS information from the SWRCB, the Project area is located within the East Bay Basin Groundwater Subbasin (Basin identification number 2-9.04). The East Bay Basin Groundwater Subbasin's existing beneficial uses are municipal and domestic

water supply (MUN) and agricultural water supply (AGR), industrial process water supply (PROC), and industrial water supply (IND).

Table 4 lists contaminant groups most frequently found to exist in the groundwater resources in the San Francisco Bay Hydrologic Region.

Table 4. Most Frequently Occurring Contaminants by Contaminant Group in the San Francisco Bay Hydrologic Region

Contaminant Group	Contaminant - # of Wells	Contaminant - # of Wells	Contaminant - # of Wells
Inorganics	Iron – 57	Manganese – 57	Fluoride – 7
Radiological	Gross Alpha – 2	Radium 226 – 1	
Nitrates	Nitrates Nitrate (as NO_3) -27	Nitrate + Nitrite – 3	Nitrite (as N) – 1
Pesticides	Di(2-Ethylhexyl)phthalate – 4	Heptachlor – 1	
VOCs[1]/SVOCs[2]	PCE[3] – 4	Dichloromethane – 3	TCE[4]– 2
			Vinyl Chloride – 2

Source: Department of Water Resources 2003

Notes:
[1]VOC = Volatile Organic Compound
[2]SVOC = Semivolatile Organic Compound
[3]PCE = Tetrachloroethylene
[4]TCE = Trichloroethylene

3.3 Existing Water Quality

3.3.1 Regional Water Quality

Caltrans has performed many studies to monitor and characterize highway stormwater runoff throughout the State. Commonly found pollutants are total suspended solids, nitrate nitrogen, total nitrogen, phosphorous, orthophosphate, copper, lead, and zinc. Some sources of these pollutants are natural erosion, phosphorus from tree leaves, combustion products from fossil fuels, and the wearing of brake pads and tires (Caltrans 2003).

3.3.2 List of Impaired Waters

Lower San Francisco Bay is the Project receiving water body listed on the 2010 Integrated Report (Clean Water Act Section 303[d] List /305[b] Report); see Table 5 for the Pollutants in the Lower San Francisco Bay and the estimated EPA Total Maximum Daily Loads approval date.

Table 5. 303(d) Listed Water Body-Lower San Francisco Bay

Pollutant	Expected TMDL Completion Date	EPA TMDL Approved Date	Potential Sources
Chlordane	2013		Nonpoint Source
DDT	2013		Nonpoint Source
Dieldrin	2013		Nonpoint Source
Dioxin compounds (including 2,3,7,8-TCDD)	2019		Atmospheric Deposition
Furan Compounds	2019		Atmospheric Deposition
Invasive Species	2019		Ballast Water
Mercury		2/29/2008	Natural Sources
Mercury		2/29/2008	Atmospheric Deposition
Mercury		2/29/2008	Industrial Point Sources
Mercury		2/29/2008	Municipal Point Sources
Mercury		2/29/2008	Nonpoint Source
Mercury		2/29/2008	Resource Extraction
PCBs	2008		Unknown Nonpoint Source
PCBs (dioxin-like)	2008		Unknown Nonpoint Source
Trash	2021		Illegal dumping
Trash	2021		Urban Runoff/Storm Sewers

Notes: DDT=Dichlorodiphenyltrichloroethane
PCBs= Polychlorinated biphenyls

Source: SWRCB 2010

4 ENVIRONMENTAL IMPACTS

The following sections present the potential temporary and permanent water quality impacts from the proposed Project activities. The following discussions include Caltrans' procedures for identifying these potential impacts.

During construction, potential water quality impacts include sediment-laden discharge from disturbed soil areas and pollutant-laden discharge from storage or work areas. Temporary impacts can also result from construction near or within water resources.

The disturbed soil area, existing and proposed impervious areas, newly created added impervious, and reworked impervious areas are shown in Table 6 for the entire Project area, the Caltrans portion, and the non-Caltrans portion within the City of Oakland. Based on definitions in the Caltrans MS4 permit, the Project build alternative would create a total of 1.68 ac of new impervious surface.

Table 6. Total Disturbed Soil and Impervious Areas by Project Area

Right-of-Way	Disturbed Soil Area (acre)	Existing Impervious Area (acre)	Proposed Impervious Area (acre)	New Added Impervious Area (acre)	Reworked Impervious Area (acre)	New Added and Reworked Impervious Area (acre)
Caltrans	2.22	10.36	10.92	0.54	0.13	0.68
Oakland	6.82	20.53	20.85	1.14	1.17	2.31
Total	9.04	30.89	31.77	1.68	1.30	2.99

Source: TY Lin 2014

4.1 Potential Impacts to Water Quality

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

This Project would result in a minimal increase of impervious areas when compared with the overall watershed areas and, therefore, would minimally increase the volume and velocity of stormwater flow to downstream receiving water bodies. In addition, pollutant loading is not anticipated to increase significantly. The added impervious area is directly related to the potential permanent water quality impacts. Stormwater runoff from the Project area drains directly into the bay and to nearby storm drain systems, which ultimately discharge into lined and unlined channels.

4.1.1.1 Currents, Circulation, or Drainage Patterns

The goal of the Project drainage design would be to maintain existing drainage patterns. The added impervious area created by the Project may result in minimal impacts to the existing hydrograph, including minimal increases in low flow and peak flow velocity and volume to Lower San Francisco Bay. Existing drainage systems at the edge of shoulders or in the median may need to be relocated. New drainage systems may be required to capture the drainage from the Project.

4.1.1.2 Suspended Particulates (Turbidity)

During construction, potentially sediment-laden flow can result from runoff over DSAs that enter storm drainage facilities or directly discharge into Lower San Francisco Bay, increasing the turbidity, decreasing the clarity, and potentially impacting the beneficial uses of the bay. Additional sources of sediment that could result in increases in turbidity include uncovered or improperly covered active and non-active stockpiles, un stabilized slopes and construction staging areas, and improperly maintained or cleaned construction equipment.

The Project would result in a minimal increase of impervious area when compared with the overall watershed area, which would minimally increase the amount of runoff not infiltrated or dispersed over unpaved surfaces. This non-infiltrated and concentrated runoff could result in the direct discharge of sediment-laden flow from the roadway to the bay.

4.1.1.3 Oil, Grease, and Chemical Pollutants

Heavy metals associated with vehicle tire and brake wear, oil and grease, and exhaust emissions are the primary pollutants associated with transportation corridors. Generally, stormwater runoff has the following pollutants: total suspended solids, nitrate nitrogen, total nitrogen, phosphorous, ortho-phosphate, copper, lead, and zinc. The pollutants are dispersed from tree leaves, combustion products from fossil fuels, and the wearing of brake pads and tires. The build alternatives would also potentially result in increased deposition of particulates resulting from increased traffic loads throughout the Project segment.

4.1.1.4 Erosion and Accretion Patterns

The increase in impervious area could result in the modification of existing receiving water body hydrographs by increasing the flow volumes and rates and peak durations from the loss of unpaved overland flow and native infiltration (hydromodification). These hydromodification impacts could cause increased bed and bank erosion, loss of habitat, increased sediment transport and deposition, and increased flooding. Per the Alameda County HMP susceptibility map (2007), the entire Project area is tidally influenced /depositional – exempt from hydromodification and no hydromodification mitigation is required.

4.1.1.5 Aquifer Recharge/Groundwater

Dewatering would be needed at locations of excavation work with high groundwater. The proposed construction work required for the Project may have localized impacts to the flow of groundwater. Existing groundwater recharge areas within the Project limits would not be affected due to the minimal increase in impervious areas, which would insignificantly decreases the area available for infiltration. The impacts would be insignificant in comparison to the overall groundwater area and due to the highly variable nature of the existing groundwater flow paths. In addition, because groundwater resources in the area do not represent a sole source aquifer, no significant impacts to water quality in groundwater wells are anticipated.

4.1.1.6 Baseflow

The increase of impervious surfaces compared with the total watershed areas would be minimal. The amount of surface runoff that infiltrates into the groundwater system would be minimally affected; therefore, the amount of base flow to the Bay would be minimally affected. The impacts would be insignificant in comparison to the overall baseflow and due to the resilience in the natural hydrologic cycle.

4.1.2 Anticipated Changes to the Biological Characteristics of the Aquatic Environment

4.1.2.1 Special Aquatic Sites

The Gateway report does not list any special aquatic sites. The updated biological report was not available at the time of this report. Once this report is available, this section will be updated accordingly.

4.1.2.2 Habitat for Fish and Other Aquatic Organisms

There is no mention of habitat for fish or other aquatic organisms in the Project area in the Gateway report. This section will be updated as needed when the biological report is available.

4.1.2.3 Wildlife Habitat

In the Gateway report it states that “potential impact to wildlife species from the project could affect nesting birds using trees, shrubs and ground within the study area.” The Gateway report also lists wildlife species that have the potential to occur because of suitable or marginally suitable habitats. This section will be updated as needed when the biological report is available.

4.1.2.4 Endangered or Threatened Species

The Gateway report has a list of the potential special status plant and wildlife species that could be found in the Project area. The plant list contains more than 40 species; however, after the plant survey in December 2009 it was determined that the habitat is unsuitable or not present for nearly all special-status plant species. This section will be updated as needed when the biological report is available.

4.1.2.5 Invasive Species

The Gateway report states that there are many non-native species as well as a few native shrubs and sub-shrubs. There are no maps showing locations of the invasive species and therefore it is unknown if any of these invasive species occur within the Project area. This section will be updated as needed when the biological report is available.

4.1.3 Anticipated Changes to the Human Use Characteristics of the Aquatic Environment

4.1.3.1 Recreational or Commercial Fisheries

Lower San Francisco Bay has been identified as having the combined existing beneficial uses of ocean, commercial, and sport fishing and shellfish harvesting (see Section 3.2.1). The Project is expected to facilitate these beneficial uses. Per the Project *Existing and Future Conditions Study* (Perkins+Will 2010), the proposed Project location currently has no formal public access facilities to the shoreline, although the area is used informally for fishing and shoreline viewing. Proposed bike access, will bring activity.

4.1.3.2 Parks, National and Historic Monuments, National Seashores, Wild and Scenic Rivers, Wilderness Areas, etc.

The Project is not located in the vicinity of any rivers designated as part of the National Wild and Scenic Rivers System. As such, no wild or scenic rivers would be directly affected by the construction or operation of the Project.

4.1.3.3 Traffic/Transportation Patterns

As the gateway between San Francisco and Oakland (including the East Bay), commuters and recreational users will use the Project area to stage between auto, bicycle, pedestrian, and transit modes. Detailed information from traffic studies will be updated in the next submittal.

4.1.3.4 Safety

Project implementation is anticipated to facilitate access to the park for pedestrians and bicyclists and reduce congestion within the interchange area, thereby improving safety for motorists and maintenance workers.

4.1.4 Short-Term Impacts During Construction

4.1.4.1 Physical/Chemical Characteristics of the Aquatic Environment

Earth-moving and other construction activities could cause minor erosion and runoff of topsoils into the drainage systems along the Project corridor during construction, which could temporarily affect water quality in local waterways.

During construction, the build alternative for the Project would have the potential for temporary water quality impacts due to grading and excavation activities, which can cause increased erosion. Stormwater runoff from the Project site may transport pollutants to nearby receiving waters and storm drains if Best Management Practices (BMPs) are not properly implemented. Generally, as the DSAs increase, the potential for temporary water quality impacts also increases. The proposed Project has an estimated DSA of 3.1 ac for the build alternative. Based on the preliminary calculated area, the Project would have potential water quality impacts during construction.

Fueling or maintenance of construction vehicles would occur within the Project site during construction, so there is risk of accidental spills or releases of fuels, oils, or other potentially toxic materials. An accidental release of these materials may pose a threat to water quality if contaminants enter storm drains, open channels, or surface water receiving bodies. The magnitude of the impact from an accidental release depends on the amount and type of material spilled.

The proposed improvements for the Project do not involve substantial excavations that affect groundwater resources. As indicated in Section 3.1.5.3, the water table is relatively shallow, and the build alternative would involve excavation for the installation of the elevated bike structures; therefore, dewatering would be anticipated for the Project.

5 AVOIDANCE AND MINIMIZATION MEASURES

This Project would have minimal impacts to water quality if the following avoidance and minimization measures are incorporated.

5.1 Avoidance and/or Minimization Measures for Water Resources

Any potential avoidance measures for the Project would be evaluated through consultation with local and regulatory agencies.

To minimize potential impacts to waters of the U.S., construction activities will be limited to the smallest area possible to complete the proposed work. Construction will follow approved BMPs, including but not limited to erosion control, sediment control, spill prevention, and vehicle/equipment refueling measures to minimize any potential for impacting wetlands and waters onsite or downstream of the Project (Caltrans 2013).

A qualified biologist will clearly delineate the limited construction areas and environmentally sensitive areas (ESAs), if any, for incorporation into the Project plans and specifications. The construction crew will be alerted if a sensitive habitat exists adjacent to the construction zone. Before construction begins, the contractor would install ESA fencing to clearly delineate protected areas and would confine workers and equipment to the designated construction areas (Caltrans 2013).

5.2 Avoidance and/or Minimization Measures for Stormwater and Groundwater

The design features to address water quality impacts are a condition of Caltrans' NPDES permit, CGP, and other regulatory agency requirements. Implementation of details for these design features or BMPs would be developed and incorporated into the Project design and operations prior to the Project startup. With proper implementation of these design features or BMPs, short-term construction-related water quality impacts and permanent water quality impacts would be avoided or minimized.

5.2.1 Construction General Permit

In accordance with the CGP, the Project is required to perform a risk assessment and determine the project-level risk. There are three risk levels. The Project risk level is determined from the sediment risk and the receiving water risk. The sediment risk factor is determined from the product of the rainfall runoff erosivity factor (R), the soil erodibility factor (K), and the length-slope factor (LS). The R factor is determined from the U.S. EPA "Stormwater Phase II Final Rule Construction Rainfall Erosivity Waiver" Fact Sheet 3.1 (2012). The Project K and LS factors were determined from the Caltrans Stormwater Design Application website. Table 7 lists the sediment risk factors by planning watershed. To be conservative, the maximum K and LS values within the planning watershed are used to determine the sediment risk. The sediment risk is classified as low when the product of the R, K, and LS factors are less than 15, medium when the product is between 15 and 75, and high when the value is greater than 75.

For the R factor for the Project, the Erosivity Index (EI) Zone was found based on the Project geographic location. The annual isoerodent value for the Project area was interpolated on the California Isoerodent Map. The construction start date and construction end date are conservatively estimated to be 1/1/2017 and 12/31/2018 (per response to RFI sent 4/4/14), respectively. The total EI percent value is 200% for the Project duration, because the Project lasts for two years. The R factor is determined by multiplying the percent value obtained by the annual isoerodent value for each segment.

The receiving water risk can be classified as low or high depending on whether a project drains to a sediment-sensitive water body. A sediment-sensitive water body is either on the most recent 303(d) list for water bodies impaired for sediment; has an EPA approved TMDL plan for sediment; or has the beneficial uses of cold freshwater habitat (COLD), fish spawning (SPAWN), and fish migration (MIGRATORY). Lower San Francisco Bay, the Project receiving water body, is not sediment-sensitive water body. Table 7 summarizes the sediment and receiving water risks, plus presents the risk levels.

Table 7. Risk Level by Planning Watershed

Planning Watershed	PM limits	EI Zone	Annual Isoerodent Value	R	K	LS	Sediment Risk	Receiving Water Risk	Risk Level
Undefined	West of Willow Street	24	40	80	0.37	0.25	Low	Low	1
	East of Willow Street				0.24	0.26	Low		1

Source: Caltrans' Stormwater Design Application, 2012

All risk levels are subject to temporary construction site BMP implementation and visual monitoring requirements. The BMP implementation and sampling required under each risk level are measures that will minimize impacts to receiving water bodies and water resources.

Risk level 1 projects will be subject to minimum best management practice (BMP) implementation and visual monitoring requirements.

The risk levels presented in this section are based on planning level information available at the time of preparation of this report. The actual planning watershed or overall project risk level will be refined during the Project design phase.

5.2.2 Project Construction

The proposed Project has a proposed soil disturbance of more than 1 ac; therefore, it shall be regulated under the NPDES permit for Construction Activities (Order No. 2009-009-DWQ, as

amended by 2010-0014-DWQ and 2012-0006-DWQ; effective on July 17, 2012). Because the Project must comply with the CGP, a Notice of Intent will need to be filed with the SWRCB's Storm Water Multiple Application and Report Tracking System. Caltrans requires the Project's contractors to implement a SWPPP to comply with the conditions of the Caltrans MS4 permit and CGP to address the temporary water quality impacts resulting from the construction activities associated with the Project.

The SWPPP would be submitted by the contractor and approved by City of Oakland prior to the start of construction; its intent is to address construction-phase impacts. The SWPPP required for the Project will include the following elements:

- Project Description: the project description will include maps and other information related to construction activities and potential sources of pollutants.
- Minimum Construction Control Measures: these measures may include limiting construction access routes, stabilizing areas denuded by construction, and using sediment controls and filtration.
- Erosion and Sediment Control: the SWPPP is required to contain a description of soil stabilization practices, control measures to prevent a net increase in sediment load in stormwater, controls to reduce tracking sediment onto roads, and controls to reduce wind erosion.
- Non-Stormwater Management: the SWPPP will include provisions to reduce and control discharges other than stormwater.
- Post-Construction Stormwater Management: the SWPPP will include a list of stormwater control measures that will provide ongoing (permanent) protection for water resources.
- Waste Management and Disposal: the SWPPP will include a waste management section including equipment maintenance waste, used oil, batteries, etc. All waste must be disposed of as required by state and federal law.
- Maintenance, Inspection, and Repair: the SWPPP requires an ongoing program to ensure that all controls are in place and operating as designed.
- Monitoring: this provision requires documented inspections of the control measures.
- Reports: Caltrans will prepare an annual report on the construction of the Project and submit this report to the RWQCB, which must certify compliance with the SWPPP.
- Training: trained personnel must do inspections, maintenance, and repair of construction site BMPs.
- Construction Site Monitoring Program: The SWPPP includes a Construction Site Monitoring Program detailing the procedures and methods related to the visual monitoring and analysis plans for non-visible pollutants,

Caltrans is required to reduce pollutants in stormwater discharge levels to the maximum extent practicable. For the discharges coming from a construction site, pollutants must be reduced using the best available technology economically achievable, and conventional pollutants must be reduced using the best conventional technology.

5.2.3 List of Proposed Temporary Construction Site Best Management Practices (BMPs)

Potential temporary impacts to water quality can be prevented or minimized by implementing standard BMPs recommended for a particular construction activity. The selected temporary BMPs are intended to achieve compliance with the requirements of the permit and are consistent with the practices and recommendations required under the permit. Compliance with the requirements of the permit, and adherence to its conditions, would reduce or avoid potentially significant construction-related impacts.

Adverse impacts can occur during construction-related activities. Soil erosion, especially during heavy rainfall, can increase the suspended solids, dissolved solids, and organic pollutants in stormwater runoff generated within the Project area. These conditions would likely persist until the completion of construction activities and the implementation of long-term erosion control measures.

The installation of platform structures for the Project, may require the need for dewatering at locations with a high water table. Dewatering and associated permitting activities would be confirmed during the design phase, and a dewatering plan would be provided by the contractor. Contract documents would address any necessary permits for dewatering measures.

Scheduling is also a BMP that needs to be considered for the Project. All proposed construction work in jurisdictional areas would be scheduled per regulatory construction windows to minimize potential impacts to waters of the U.S.

Non-storm water waste management is also essential to minimizing the potential of water quality impacts on a project site. Accidental spills of petroleum hydrocarbons (such as fuels and lubricating oils), concrete wastewater, and possibly sanitary wastes, are also of concern during construction activities. An accidental release of these wastes can adversely affect surface water quality, vegetation, and wildlife habitat.

Erosion control measures could be applied to all exposed areas during construction, including the trapping of sediments within the construction area through the placement of barriers, such as silt fences, at the perimeter of the downstream drainage points or through the construction of temporary detention basins. Other methods of minimizing erosion impacts include the implementation of hydromulching and/or limiting the amount and length of exposure of the graded soil. The Alameda County MRP requires all construction sites to have BMPs in six categories; Erosion Control, Run-on and Run-off Control, Sediment Control, Active Treament Systems (as necessary), Good Site Management and Non Stormwater Managment. Site specific BMPs can be a combination of BMPs from the California BMP Handbook, the Caltrans Stormwater Quality Handbook, the California Regional Water Quality Control Board and new BMPs available since these Handbooks. Temporary erosion control and water quality measures would be defined in detail in the erosion control and water pollution control design sheets prepared for the Project, which would also include the specifications for the SWPPP. The suggested minimum temporary control BMPs that are necessary for the Project are included in Table 8.

Table 8. Temporary BMPs

Temporary BMP	Purpose
Soil Stabilization	
Move-In/Move-Out	Mobilization locations where permanent erosion control or revegetation to sustain slopes is required within the projects.
Temporary Cover	Plastic covers for stockpiles.
Sediment Control	
Temporary Fiber Rolls	Degradable fibers rolled tightly and placed on the toe and face of slopes to intercept runoff.
Temporary Silt Fence	Linear, permeable fabric barriers to intercept sediment-laden sheet flow. Placed downslope of exposed soil areas, along channels and project perimeter.
Temporary Gravel Bag Berm	Single row of gravel bags installed end to end to form a barrier across a slope to intercept runoff. Can be used to divert or detain moderately concentrated flows.
Temporary Drainage Inlet Protection	Runoff detainment devices used at storm drain inlets that is subject to runoff from construction activities.
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.
Street Sweeping	Removal of tracked sediment to prevent them entering a storm drain or watercourse.
Non-Stormwater Management	
Dewatering Operations	Dewatering activities associated with stormwater and non-stormwater to prevent the discharge of pollutants from construction site.
All other anticipated non-stormwater management measures are covered under Job Site Management.	
Waste Management and Materials Pollution Control	
Temporary Concrete Washout Facilities	Specified vehicle washing areas to contain concrete waste materials.
All other anticipated waste management and materials pollution control measures are covered under Job Site Management.	
Job Site Management	
General measures covered under job site management includes • spill prevention and control • materials management • stockpile management • waste management • hazardous waste management • contaminated soil • concrete waste • sanitary and septic waste and liquid waste Miscellaneous job site management includes: • training of employees and subcontractors • proper selection, deployment and repair of construction site BMPs	Non-stormwater management consists of: • 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

Source: Caltrans 2012

5.2.4 Permanent Pollution Prevention Design Measures

In order to comply with the Caltrans' Statewide Permit (Order No. 2009-0009 DWQ), the MRP (Order No. R2-2009-0074) and the CGP, once construction is complete; Caltrans will take measures to reduce pollutant loadings from the facility to the MEP. This permit stipulates that permanent measures that control pollutant discharges must be considered and implemented for all new or reconstructed facilities. Permanent control measures located within Caltrans' right-of-way would reduce pollutants in the stormwater runoff from the roadway. These measures would reduce the suspended particulate loads, and thus prevent pollutants associated with the particulates from entering the waterways. These measures would be incorporated into the final engineering design or landscape design of the Project, and should take into account the expected runoff from the roadway. In addition, the NPDES permit stipulates that an operation and maintenance program be implemented for the permanent control measures. This category of water quality control measures could be identified to include both design pollution prevention BMPs and treatment BMPs.

Many design elements that are traditionally part of highway, drainage, and landscape design are considered beneficial to pollution prevention. In this particular discipline, designers must consider all of the items listed below for proper project design.

5.2.5 List of Proposed Design Pollution Prevention BMPs

Consideration of downstream effects related to potentially increased flow

The increase in impervious area can result in the modification of existing receiving water body's hydrographs by increasing the flow volumes and rates and peak durations from the loss of unpaved overland flow and native infiltration (hydromodification). These hydromodification impacts can cause increased bed and bank erosion, loss of habitat, increased sediment transport and deposition, and increased flooding.

Per the July 21, 2008 SWQCB's memorandum to Caltrans, the SWQCB does not require the Statewide permit (Order No. 99-06-DWQ) to implement hydromodification controls for its projects, unless the project submits a Report of Waste Discharge and lies within the political boundary of a municipality subject to hydromodification requirements in a NPDES municipal permit.

Accordingly, under the Alameda and Santa Clara County municipal agencies' Clean Water Programs (Alameda County Clean Water Program and Santa Clara Valley Urban Runoff Pollution Precipitation Plan), a project requires hydromodification management if the project creates and/or replaces one acre or more of impervious surface; increases impervious surface over pre-project conditions; and is located in a susceptible area as shown on the Hydromodification Management applicability maps, which are included in the Supplemental Attachments.

The Alameda County Clean Water Program Hydromodification Susceptibility map identifies the Project area as tidally influenced/depositional – exempt from hydromodification (Appendix F).

Concentrated flow conveyance systems
The Project will likely:

1. Have the potential to create water gullies
2. Create or modify existing slopes
3. Require the concentration of surface runoff
4. Require cross drains

Each of these conditions would require the proper design of these drainage facilities to handle the concentrated flows:

- Ditches, berms, dikes, and/or swales
- Overside drains
- Flared end sections
- Outlet protection/velocity dissipation devices

Slope/surface protection systems
The Project will create or modify existing slopes requiring the application of one or more of the following control measures:

- Vegetated surfaces
- Hard surfaces

Preservation of existing vegetation
Existing mature vegetation and landscaping would be protected in place where possible. Areas of clearing and grubbing would be limited to those areas impacted by new construction. Studies to determine environmentally sensitive areas are currently being conducted and will be discussed in PS&E phase Storm Water Data Report. Details of the areas to be preserved will be shown in the project plans to be developed during the PS&E phase.

Existing wetlands and other environmentally sensitive areas would be preserved during construction with the use of ESA fencing. Existing wetlands that cannot be preserved would be mitigated with appropriate measures to be developed during the PS&E phase.

The Project, including the elevated portions, could have plantings. The Project could include streetscape improvements, such as landscaping and art work, on Mandela Parkway within one block of West Grand Avenue.

5.2.6 List of Proposed Treatment BMPs

According to the Gateway report, the RWQCB encourages the use of rainwater harvesting and reuse, infiltration, evapotranspiration and bio-treatment as the preferred treatment options. Because of the high groundwater at the site, infiltration is not a viable option for stormwater quality. Rainwater harvesting may be used where feasible or non-potable uses; however, this may conflict with the East Bay Municipal Utilities District's (EBMUD's) desire to maximize the use of recycled water. It is

anticipated the biofiltration will be the primary treatment measure used to treat runoff from impervious surfaces.

Based on the site criteria, biofiltration strips and biofiltration swales are proposed as the preferred types of treatment BMPs for the Project.

5.2.7 Project Operation and Maintenance

Because the Caltrans Maintenance Unit is responsible for maintaining highway and BMP facilities once the Project is complete, the Maintenance Unit will be involved in the development process from conception through construction. The Maintenance Unit field representative has unique insight into local problems and maintenance and safety concerns. The Caltrans/Oakland Maintenance Unit typically comments on the following project-related issues:

- Drainage patterns (particularly known areas of flooding, debris, etc.)
- Stability of slopes and roadbed (help determine if the Project can be built and maintained economically)
- Possible material borrow or spoil sites
- Concerns of the local residents
- Existing and potential erosion problems
- Facilities within the right-of-way that will affect alternative designs
- Special problems such as deer crossings, endangered species, etc.
- Whether facilities are safe to maintain
- Known environmentally sensitive areas
- Frequency of traction sand use and estimate of sand quantity applied annually

The Maintenance Stormwater Coordinator for Caltrans and City of Oakland will be involved in the design review of any permanent stormwater treatment BMPs and will need to approve any such devices at the end of the PS&E phase.

5.3 Water Quality Assessment of Checklists

This Water Quality Assessment Checklist summarizes the stormwater quality evaluation process presented in the CEQA Environmental Checklist Form.

The following list of questions is from the Hydrology and Water Quality Checklist from Section 8 of the CEQA Environmental Checklist Form. The possible answers are: "Potentially Significant Impact," "Less than Significant with Mitigation Incorporated," "Less than Significant Impact," and "No Impact."

Would the Project:

a) *Violate any water quality standards or waste discharge requirements?*

Less than Significant Impact

The primary potential for impacts to water quality is soil erosion or suspended solids being introduced into the waterways. The proposed Project has a proposed soil disturbance of more than 1 ac; therefore, it shall be regulated under the NPDES permit for Construction Activities (Order No.

2009-009-DWQ, as amended by 2010-0014-DWQ and 2012-0006-DWQ; effective on July 17, 2012). This CGP is also referenced in Caltrans' and City of Oakland MRP. NPDES permit, from the SWRCB (Order No. 99-06-DWQ, National Pollutant Discharge Elimination System No. CAS000003). Stormwater discharges from Caltrans' transportation properties, facilities, and activities are regulated through this permit. Minimization measures that comply with this permit, such as requiring the contractor to submit a SWPPP prior to the start of construction and implementing permanent BMPs such as erosion control and treatment BMPs in the Project to address long-term impacts, would focus on the control of sediment and suspended solids from entering the waterways. Therefore, the proposed Project would comply with all water quality standards and waste discharge requirements, and the impact to water quality would be less than significant.

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

Less than Significant Impact

Groundwater recharge is reduced when the ground is compacted or when it is covered completely (by development); this way, less water can seep into the soil. The added impervious areas are small in relation with the size of the groundwater basin located within the Project limits; therefore, groundwater recharge impacts would be less than significant.

c) *Substantially alter the existing drainage pattern of the site area, including through the alteration of the course of a stream or river, in a manner which would result in substantial erosion or siltation on- or off-site?*

Less Than Significant Impact

There would not be any proposed changes to the existing drainage pattern due to the proposed improvements. No stream or river would be altered such that substantial erosion or siltation would result. The objective of the drainage design would be to limit the design water surface elevations and velocities to no greater than the existing conditions, or to what can be handled by the existing conditions, at the boundary of the proposed Project.

d) *Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, or substantially increase the rate or amount of surface runoff in a manner which would result in flooding on- or off-site?*

Less Than Significant Impact

Existing drainage patterns would be perpetuated. While the proposed Project would introduce added impervious surface area, the effect on the flow rate and amount of surface runoff would be negligible in comparison to the overall watershed of the receiving water body, Lower San Francisco Bay. Because drainage facilities within Caltrans' and City of Oakland right-of-way may discharge to local drainage facilities, the Project is expected to be required to comply with hydromodification management requirements stated within the California RWQCB San Francisco Bay Region Municipal Regional Stormwater NPDES Permit (Order R2-2009-0074, NPDES Permit No. CAS612008). Per the Alameda County HMP susceptibility map (2007), the entire Project area is

tidally influenced/depositional and is therefore exempt from hydromodification management requirements.

e) *Create or contribute runoff water which would exceed the capacity of existing or planned storm water drainage systems or provide substantial additional sources of polluted runoff?*

Less than Significant Impact

The proposed Project would increase the total impervious surface within the Project limits and, therefore, increase the volume of stormwater runoff. Potential sources of pollutants from the right-of-way include: total suspended solids, nutrients, pesticides, particulate metals, dissolved metals, pathogens, litter, biochemical oxygen demand, and total dissolved solids. Existing drainage facilities throughout the proposed Project limits, however, would be extended, replaced, repaired, and/or improved as necessary to provide proper off-site and highway drainage. In compliance with Caltrans' and City of Oakland NPDES requirements, water quality treatment BMPs would be included where practicable, which would include biofiltration swales and biofiltration strips at various locations throughout the Project area. Asphalt concrete dikes would not be used for areas with side slopes flatter than 4:1 (H:V). This may allow the pavement runoff to flow across the vegetated slopes, and flow in the vegetated swales along the highway. The impact to runoff, therefore, would be less than significant.

f) *Otherwise substantially degrade water quality?*

Less than Significant Impact

The primary potential impact to water quality is soil erosion or suspended solids being introduced into the waterways. The proposed Project has a soil disturbance of more than 1 ac, and therefore, shall be regulated under the CGP (Order No. 2009-009-DWQ, as amended by 2010-0014-DWQ and 2012-0006-DWQ; effective on July 17, 2012). This permit is also referenced in Caltrans' NPDES permit, from the SWRCB (Order No. 99-06-DWQ, National Pollutant Discharge Elimination System No. CAS000003). Stormwater discharges from Caltrans' and City of Oakland transportation properties, facilities, and activities are regulated through this permit. Minimization measures that comply with this permit, such as requiring the contractor to submit a SWPPP prior to start of construction and implementing permanent BMPs such as erosion control and treatment BMPs in the Project to address long-term impacts, would focus on the control of sediment and suspended solids from entering the waterways. Therefore, the proposed Project would comply with all water quality standards and waste discharge requirements, and the impact to water quality would be less than significant.

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Appendix A FEMA Flood Insurance Rate Maps

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JOINS PANEL 0054

ZONE X

ZONE VE
(EL 9)

San Francisco Bay

ZONE X

HT0858

80

ZONE X

W GRAND AVENUE

City Of
Oakland
065048

San Francisco Bay

ZONE VE
(EL 9)

MARITIME STREET

20TH ST

MAP SCALE 1" = 500'

250 0 500 1000

FEET

METER

NFIP

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0058G

FIRM

FLOOD INSURANCE RATE MAP

ALAMEDA COUNTY, CALIFORNIA
AND INCORPORATED AREAS

PANEL 58 OF 725

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
EMERYVILLE, CITY OF	060005	0058	G
OAKLAND, CITY OF	065048	0058	G

Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

MAP NUMBER
06001C0058G

EFFECTIVE DATE
AUGUST 3, 2009

Federal Emergency Management Agency

Appendix B Web Soil Survey

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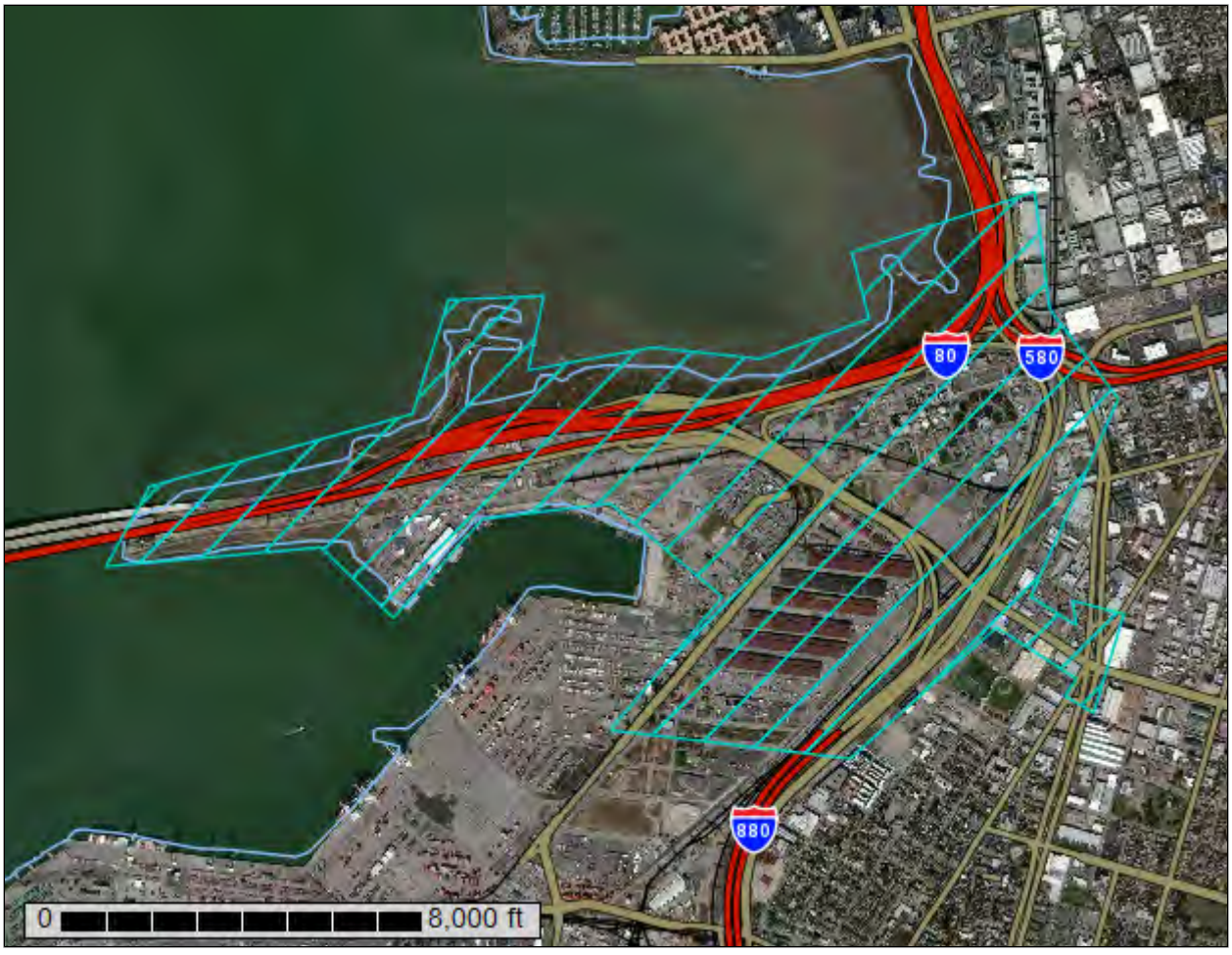
United States Department of Agriculture

NRCS

Natural Resources Conservation Service

A product of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local participants

Custom Soil Resource Report for Alameda County, California, Western Part



November 4, 2013

Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (http://soils.usda.gov/sqi/) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (http://offices.sc.egov.usda.gov/locator/app?agency=nrcs) or your NRCS State Soil Scientist (http://soils.usda.gov/contact/state_offices/).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Soil Data Mart Web site or the NRCS Web Soil Survey. The Soil Data Mart is the data storage site for the official soil survey information.

The U.S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, age, disability, and where applicable, sex, marital status, familial status, parental status, religion, sexual orientation, genetic information, political beliefs, reprisal, or because all or a part of an individual's income is derived from any public assistance program. (Not all prohibited bases apply to all programs.) Persons with disabilities who require alternative means

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Contents

How Soil Surveys Are Made

Soil surveys are made to provide information about the soils and miscellaneous areas in a specific area. They include a description of the soils and miscellaneous areas and their location on the landscape and tables that show soil properties and limitations affecting various uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They observed and described many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed or from the surface down to bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Currently, soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA, 2006). Soil survey areas typically consist of parts of one or more MLRA.

The soils and miscellaneous areas in a survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil scientists classified and named the soils in the survey area, they compared the

individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

Custom Soil Resource Report
Soil Map

Map Scale: 1:20,900 if printed on A landscape (11" x 8.5") sheet.

N

Meters: 0 300 600 1200 1800

Feet: 0 1000 2000 4000 6000

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 10N WGS84

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: http://websoilsurvey.nrcs.usda.gov
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Alameda County, California, Western Part
Survey Area Data: Version 7, Jul 27, 2010

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Oct 26, 2010—Sep 17, 2011

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Alameda County, California, Western Part (CA610)			
Map Unit Symbol	**Map Unit Name**	**Acres in AOI**	**Percent of AOI**
146	Urban land	738.2	84.0%
147	Urban land-Baywood complex	3.1	0.4%
148	Urban land-Clear Lake complex	15.4	1.8%
162	Water	122.4	13.9%
Totals for Area of Interest		**879.1**	**100.0%**

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If

intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Alameda County, California, Western Part

146—Urban land

Map Unit Composition

Urban land: 95 percent
Minor components: 5 percent

Description of Urban Land

Interpretive groups

Farmland classification: Not prime farmland
Land capability (nonirrigated): 8

Minor Components

Unnamed soils in marshes

Percent of map unit: 5 percent
Landform: Basin floors
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear

147—Urban land-Baywood complex

Map Unit Setting

Elevation: 20 to 500 feet
Mean annual precipitation: 15 to 35 inches
Mean annual air temperature: 52 to 55 degrees F
Frost-free period: 300 days

Map Unit Composition

Urban land: 60 percent
Baywood and similar soils: 35 percent
Minor components: 5 percent

Description of Urban Land

Interpretive groups

Farmland classification: Not prime farmland
Land capability (nonirrigated): 8

Description of Baywood

Setting

Landform: Beach ridges
Landform position (three-dimensional): Riser
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Eolian deposits

Properties and qualities

Slope: 2 to 9 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat excessively drained
Capacity of the most limiting layer to transmit water (Ksat): High to very high (5.95 to 19.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline (0.0 to 2.0 mmhos/cm)
Available water capacity: Low (about 4.9 inches)

Interpretive groups

Farmland classification: Not prime farmland
Land capability classification (irrigated): 3s
Land capability (nonirrigated): 4e
Hydrologic Soil Group: A

Typical profile

0 to 16 inches: Loamy sand
16 to 60 inches: Loamy sand

Minor Components

Laugenour

Percent of map unit: 3 percent
Landform: Flood plains
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear

Omni

Percent of map unit: 2 percent
Landform: Flood plains
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear

148—Urban land-Clear Lake complex

Map Unit Setting

Elevation: 20 to 1,500 feet
Mean annual precipitation: 10 to 35 inches
Mean annual air temperature: 57 to 63 degrees F
Frost-free period: 225 to 300 days

Map Unit Composition

Urban land: 55 percent
Clear lake and similar soils: 35 percent

Minor components: 10 percent

Description of Urban Land

Interpretive groups

Farmland classification: Not prime farmland
Land capability (nonirrigated): 8

Description of Clear Lake

Setting

Landform: Basin floors
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium derived from sedimentary rock

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: About 48 to 72 inches
Frequency of flooding: Rare
Frequency of ponding: None
Calcium carbonate, maximum content: 5 percent
Maximum salinity: Nonsaline to very slightly saline (0.0 to 4.0 mmhos/cm)
Sodium adsorption ratio, maximum: 15.0
Available water capacity: Moderate (about 8.4 inches)

Interpretive groups

Farmland classification: Not prime farmland
Land capability classification (irrigated): 2e
Land capability (nonirrigated): 4e
Hydrologic Soil Group: D

Typical profile

0 to 26 inches: Clay
26 to 60 inches: Clay

Minor Components

Omni

Percent of map unit: 5 percent
Landform: Flood plains
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear

Marvin

Percent of map unit: 5 percent
Landform: Flood plains
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear

162—Water

Map Unit Composition
Water: 100 percent

Soil Information for All Uses

Soil Properties and Qualities

The Soil Properties and Qualities section includes various soil properties and qualities displayed as thematic maps with a summary table for the soil map units in the selected area of interest. A single value or rating for each map unit is generated by aggregating the interpretive ratings of individual map unit components. This aggregation process is defined for each property or quality.

Water Features

Water Features include ponding frequency, flooding frequency, and depth to water table.

Depth to Water Table

"Water table" refers to a saturated zone in the soil. It occurs during specified months. Estimates of the upper limit are based mainly on observations of the water table at selected sites and on evidence of a saturated zone, namely grayish colors (redoximorphic features) in the soil. A saturated zone that lasts for less than a month is not considered a water table.

This attribute is actually recorded as three separate values in the database. A low value and a high value indicate the range of this attribute for the soil component. A "representative" value indicates the expected value of this attribute for the component. For this soil property, only the representative value is used.


122° 20' 8" W
122° 17' 1" W
37° 50' 11" N
37° 48' 35" N
558600
559000
559400
559800
560200
560600
561000
561400
561800
562200
562600
563000
4187800
4187400
4187000
4186600
4186200
4185800
4185400
4185000
162
162
80
880
80
580
580
148
32nd
Engineer Rd
146
Burma Rd
Peralta
146
Grand
148
19th St
147
Frontage
Ferry St
Maritime
880
14th
Map Scale: 1:20,900 if printed on A landscape (11" x 8.5") sheet.
N
Meters
0
300
600
1200
1800
Feet
0
1000
2000
4000
6000
Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 10N WGS84

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils

Soil Rating Polygons
- 0 - 25
- 25 - 50
- 50 - 100
- 100 - 150
- 150 - 200
- > 200
- Not rated or not available

Soil Rating Lines
- 0 - 25
- 25 - 50
- 50 - 100
- 100 - 150
- 150 - 200
- > 200
- Not rated or not available

Soil Rating Points
- 0 - 25
- 25 - 50
- 50 - 100
- 100 - 150
- 150 - 200
- > 200
- Not rated or not available

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: http://websoilsurvey.nrcs.usda.gov
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Alameda County, California, Western Part
Survey Area Data: Version 7, Jul 27, 2010

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Oct 26, 2010—Sep 17, 2011

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Table—Depth to Water Table

Depth to Water Table— Summary by Map Unit — Alameda County, California, Western Part (CA610)				
Map unit symbol	**Map unit name**	**Rating (centimeters)**	**Acres in AOI**	**Percent of AOI**
146	Urban land	>200	738.2	84.0%
147	Urban land-Baywood complex	>200	3.1	0.4%
148	Urban land-Clear Lake complex	>200	15.4	1.8%
162	Water	>200	122.4	13.9%
Totals for Area of Interest			**879.1**	**100.0%**

Rating Options—Depth to Water Table

Units of Measure: centimeters

Aggregation Method: Dominant Component

Component Percent Cutoff: None Specified

Tie-break Rule: Lower

Interpret Nulls as Zero: No

Beginning Month: January

Ending Month: December

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Appendix C Construction General Permit Risk Assessment

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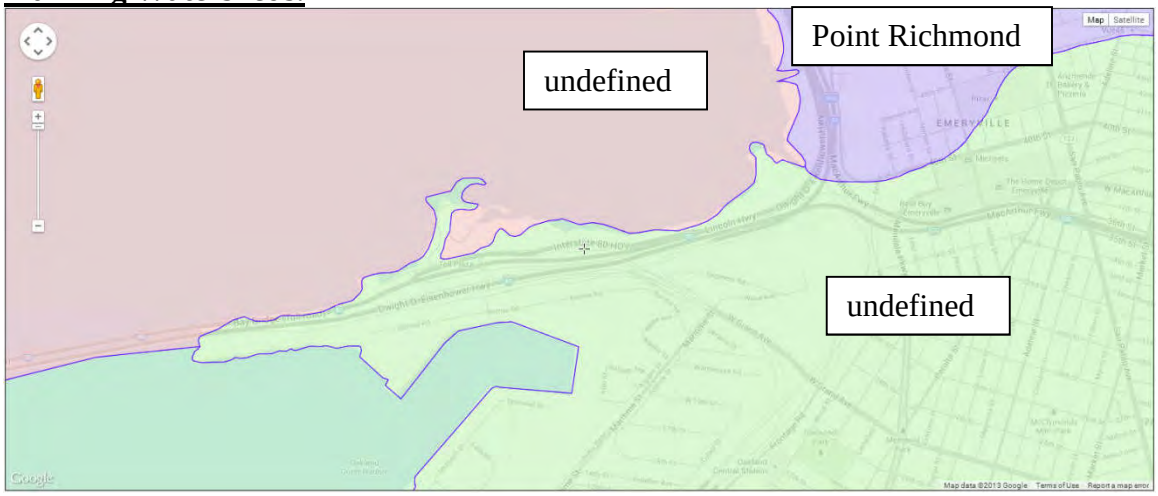
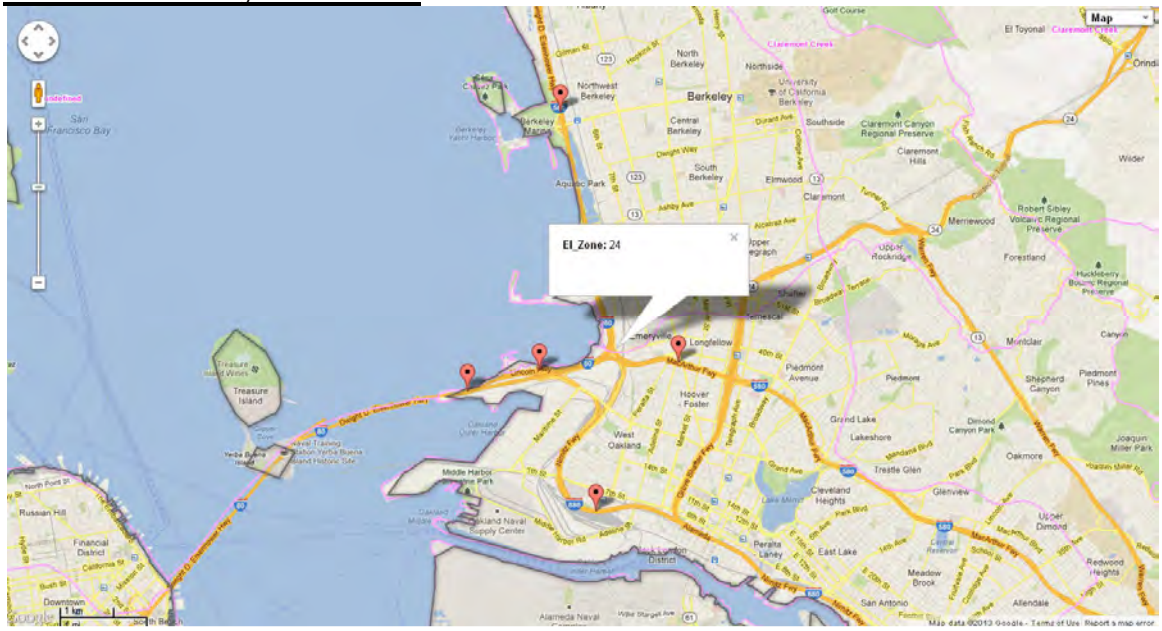
Planning Watersheds.



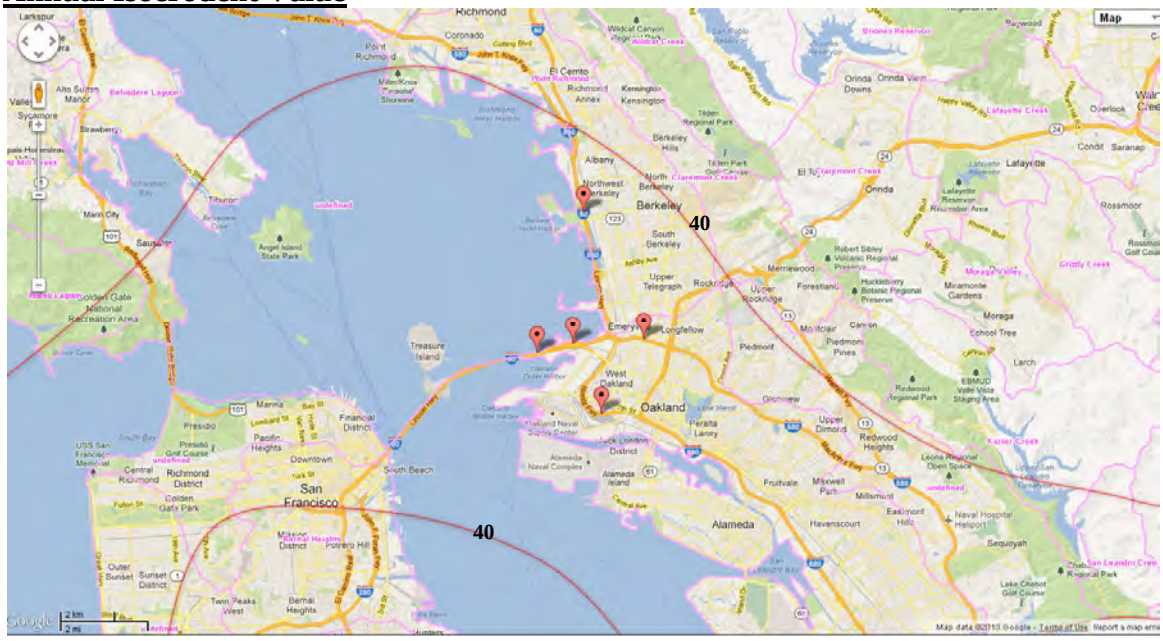
Source: Caltrans

R Factor Erosivity Index Zone



Source: Caltrans' Stormwater Design Application

Annual Isoerodent Value

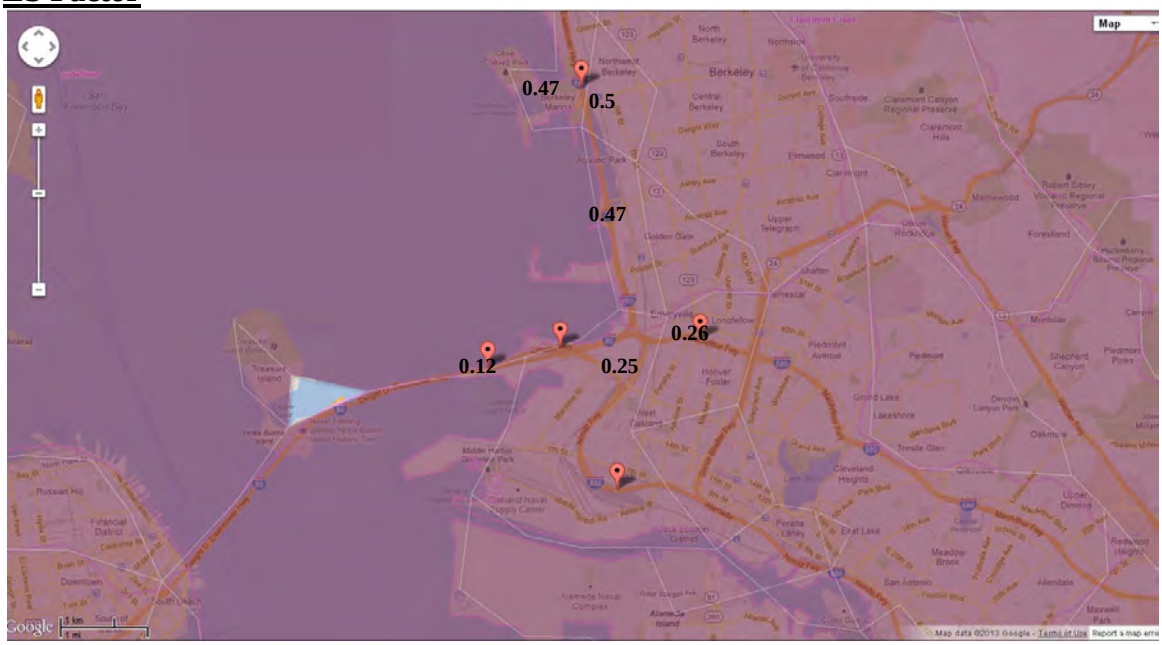


Source: Caltrans' Stormwater Design Application

K Factor

Source: Caltrans' Stormwater Design Application

LS Factor



Source: Caltrans' Stormwater Design Application

Receiving Water Risk

Note: Red areas = High receiving water risk

Source: Caltrans' Stormwater Design Application

Appendix D Water Quality Objectives

Appendix D.1 Objectives for Surface Waters

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.

3.3.2 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,

Appendix D.2 Objectives for Groundwater

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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

Table 3-2: U.S. EPA Bacteriological Criteria for Water Contact Recreation

Table 3-3: Marine Water Quality Objectives for Toxic Pollutants for Surface Waters

Table 3-3A: Water Quality Objectives for Copper and Nickel in San Francisco Bay Segments

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Appendix D.3 Objectives for Marine Waters

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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

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.

Table 3-3B: Marine[a] Water Quality Objectives for Mercury in San Francisco Bay[b]		
Protection of Human Health	0.2 mg mercury per kg fish tissue	Average wet weight concentration measured in the edible portion of trophic level 3 and trophic level 4 fish[c]
Protection of Aquatic Organisms and Wildlife	0.03 mg mercury per kg fish	Average wet weight concentration measured in whole fish 3–5 cm in length

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. For waters in which the salinity is between 1 and 10 parts per thousand, the applicable objectives are the more stringent of the freshwater or marine objectives.

b. Objectives apply to all segments of San Francisco Bay, including Sacramento/San Joaquin River Delta (within San Francisco Bay region), Suisun Bay, Carquinez Strait, San Pablo Bay, Richardson Bay, Central San Francisco Bay, Lower San Francisco Bay, and South San Francisco Bay (including the Lower South Bay).

c. Compliance shall be determined by analysis of fish tissue as described in Chapter 6, Surveillance and Monitoring.

Table 3-3C: Marine [a] Water Quality Objectives for Cyanide in San Francisco Bay [b] (values in ug/l)		
Cyanide	Chronic Objective (4-day Average)	2.9
Cyanide	Acute Objective (1-hour Average)	9.4

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. For waters in which the salinity is between 1 and 10 parts per thousand, the applicable objectives are the more stringent of the freshwater or marine objectives.

b. Objectives apply to all segments of San Francisco Bay, including Sacramento/San Joaquin River Delta (within San Francisco Bay region), Suisun Bay, Carquinez Strait, San Pablo Bay, Central San Francisco Bay, Lower San Francisco Bay, and South San Francisco Bay.

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Appendix E Descriptions of Beneficial Uses

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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 surface waters, groundwaters, marshes, and wetlands 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 (FRSH)

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

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.

2.1.13 INDUSTRIAL PROCESS SUPPLY (PRO)

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, andsedimentation, 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 2-9) 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.

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Appendix F Hydromodification Susceptibility Map

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Source: Alameda Countywide Clean Water Progra