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Memorandum

To	Ed Pang	Page	1
CC			
Subject	Yerba Buena Island Ramps Improvement Project EIR/EIS Water Quality Technical Study Addendum		
From	Yvana Khun		
Date	July 9, 2010		

The following revisions are hereby made by addendum to the Final Water Quality Report dated August 21, 2009, based on comments from Caltrans Headquarters.

The first paragraph on page 1 under "I. Purpose of Study" has been revised as follows:

> The purpose of this study is to assess the impacts on surface water and groundwater quality of the and describe measures to protect water quality during and after construction of ~~proposed project and to propose measures to mitigate any water quality impacts associated with the construction of~~ the proposed Yerba Buena Island (YBI) Ramps Improvement Project. The location of the project site is shown in **Figure 1**.

The following text has been added on page 1, following "I. Purpose of Study""

> **Project Purpose and Need**
>
> The purpose of the proposed project is to improve:
>
> - Traffic safety for drivers using the westbound on- and off-ramps.
> - Geometric design of the westbound on- and off-ramps on the east side of YBI to and from I-80; and
> - Traffic operations levels of service (LOS) on the westbound on- and off-ramps.
>
> The proposed project is needed for the reasons listed below and explained in subsequent paragraphs:
>
> - **Geometric Design:** The existing westbound on-ramp merge lengths and off-ramp deceleration lengths on the east side of YBI do not meet current Caltrans standards. The existing westbound on-ramp on the east side of YBI has a very short merge distance of approximately 43 meters (141 feet) which calculates to a 1:11 transition rate. It has a steep entrance grade of approximately 10 percent leading to a 122-meter-long (400 feet) crest vertical curve, resulting in a 30 km/h (18.6 mph) design speed. Therefore, traffic cannot accelerate to a proper mainline speed of 80 km/h (50

mph) to merge with through traffic. The existing westbound off-ramp diverges from the left-side freeway lane. The left-side exit lane is nonstandard (Highway Design Manual Section 504.2) and is signed for 48 km/h (20 mph). The proposed ramps would meet Caltrans standards to a much greater extent than the existing ramps and is anticipated to improve the Level of Service (LOS) and safety of the ramps, as discussed below. LOS is a qualitative description of a ramp segment or intersection performance based on the criteria outlined in the Highway Capacity Manual (HCM). LOS ranges from A, which indicates free flow or excellent conditions with short delays, to F, which indicates congested or overloaded conditions with extremely long delays. Caltrans criteria are used to establish a goal of LOS C, when possible.

- **Operations:** Projections of 2035 traffic volumes indicate ramp operations at a failing LOS F on both the on- and off-ramps in both the morning and evening peak hours. Currently, the westbound left-lane off-ramp operates at LOS D in the morning peak hour and at LOS C in the evening peak hour. The existing westbound, on-ramp operates at LOS D in both the morning and the evening peak hours. In the future (2035) no build condition, both the westbound off-ramp and on-ramp would operate at LOS F in both the morning and the evening peak hours. Under the 2035 build condition without ramp meters, the westbound off-ramp would operate at LOS F in both peak hours, and the westbound on-ramp would operate at LOS F in the morning peak hour and LOS E in the evening peak hour. In the 2035 build condition with ramp meters, the proposed westbound off-ramp would operate at LOS E in both peak hours, and the proposed westbound on-ramp would operate at LOS C in both peak hours.
- **Safety:** The accident rate for the existing on- and off-ramps is higher than the statewide rate for similar facilities. The accident rate based on data collected over a 3-year period between April 1, 2003 and March 31, 2006 at all six ramps on YBI exceeded the statewide average rate (per million vehicle miles) for total collisions (sum of fatalities, injuries, and property damage) (TASAS Selective Accident Retreival, Table B).[1] This 3-year period is the latest data available for the existing on- and off-ramps because these ramps have since been closed for the construction of the SFOBB ESSSP project. The Actual Accident Rate for the existing westbound on-ramp is 0.75 per million vehicle miles compared to a rate of 0.60 for similar facilities statewide. For the existing westbound off-ramp, the accident rate is 1.4 compared to a 1.15 rate per million vehicle miles for similar facilities statewide. Geometric improvement of the ramps would better meet Caltrans standards compared to the existing ramps and would improve the LOS and is expected to decrease the accident potential rate. Rear end collisions on the westbound on-ramp are expected to decrease under the proposed project. The existing westbound on-ramp would be replaced by a 267-meter-long (876 feet) on-ramp thereby providing more merge length for traffic to accelerate to mainline speed. The existing left-side off-ramp would be replaced by a right-side 340-meter-long (1,115 feet) off-ramp, which would provide

[1] TASAS Table B reports for accident data calculations are available for any highway or section of highway, any or all ramps, any or all intersections for any time period specified. The report shows both actual and average rates. The report also shows total accidents, fatalities, injuries, multi-vehicles, wet, dark, persons killed and injured and the significance. Table B was generated for all six ramps on YBI and included in the Draft Project Report (DPR) prepared for this project.

greater distance for deceleration. Ramp meters would better control the flow of traffic and further improve safety.

The following text has been added to the end of the third paragraph under "III. Regulatory Setting" on page 5:

Section 402 of the CWA establishes the National Pollutant Discharge Elimination System (NPDES) Permit, which directs that storm water discharges are point source discharges and establishes a framework for regulating municipal and industrial storm water discharges. To ensure compliance with CWA Section 402, on July 15, 1999, the SWRCB issued the NPDES Permit, Statewide Storm Water Permit for Caltrans (Order No. 99-06-DWQ, NPDES No. CAS000003) (Caltrans 2003a). The Permit regulates storm water discharges from Caltrans properties, facilities and activities during and after construction. The Caltrans General Permit allows the discharge of uncontaminated construction dewatering in conformance with storm water management plan (SWMP) procedures.

The following text has been added following the first paragraph on page 8:

Hazardous waste is regulated under Title 22, Division 4.5, of the California Code of Regulations (CCR). CCR Title 22, Division 4.5 consists of statutes and regulations intended to prevent ultimate mismanagement of hazardous waste, with the primary focus being preventing disposal at unauthorized locations. Hazardous waste is defined and categorized in Chapter 11 of Title 22. California Health and Safety Code Sections 25150 and 58012 grants the Department of Toxic Substances Control (DTSC) the authority to adopt standards and regulations dealing with the management of hazardous waste. The DTSC regulates hazardous waste in California, cleans-up existing contamination, and looks for ways to reduce the hazardous waste produced in California.

Section "IV. Project Location and Receiving Water Bodies and Groundwater" on pages 8 to 9 has been revised as follows:

IV. PROJECT LOCATION ~~AND RECEIVING WATER BODIES AND GROUNDWATER~~

YBI is a 147-acre natural island that sits in the San Francisco Bay between the cities of San Francisco and Oakland. Land use within YBI has historically been dominated by various branches of the U.S. military. Current land uses on YBI involves operation and housing of USCG personnel. Several buildings on the island are used by Caltrans; Buildings 15 and 29 are being used as a substation/air compressor house and as a tow truck housing facility, respectively. AT&T owns two small buildings immediately south of the SFOBB East Span, where several underwater cables run onto the shore.

YBI serves as an access point for the adjacent man-made Treasure Island. The island's high point is located 338 feet above mean sea level, and large portions of it are undeveloped, with steep wooded hillsides leading down to the shoreline. Within the project area, the area just north and south of I-80 on the far east of the project area has an 8 percent representative

slope[2]. The area further east has a lower representative slope of 1 percent and the area west along I-80 toward the YBI Tunnel has a 40 percent representative slope. Finally, lands located further to the north and south of I-80 in the west side of the project area have a representative slope of 53 percent (USDA 2008a). The proposed project's build alternatives would occur within existing Caltrans right-of-way.

Existing Drainage

The existing project site is located in a developed area surrounded by the San Francisco Bay. The existing areas include vegetation on moderate to steep slopes, as described above. In general, YBI's soil classification is dense to very dense silty sand with an infiltration rate that varies between 5.1 and 20 centimeters per hour (2 to 8 inches per hour) (AECOM 2009). Two soil groups exist within the project area; soil groups C and D. Hydrologic soil group C comprises approximately 20 percent of the project area of interest and is characterized as having a slow infiltration rate. Hydrologic soil group D which comprises approximately 80 percent of the project area is characterized as having a very slow rate of water infiltration (high runoff potential) and consists chiefly of clays.

Unlike most of mainland San Francisco, Treasure Island and YBI are served by separate storm water and wastewater systems (SFPUC 2004, p.8). As a result, surface runoff from the project area flows untreated to the San Francisco Bay via the San Francisco Municipal Separate Storm Sewer System (MS4). The MS4 within the project area is not connected to San Francisco city's MS4 or combined sewer systems.

V. WATER RESOURCES

A. Storm Water

~~YBI is a 147-acre natural island that sits in the San Francisco Bay between the cities of San Francisco and Oakland. YBI serves as an access point for the adjacent man-made Treasure Island. The island's high point is located 338 feet above mean sea level, and large portions of it are undeveloped, with steep wooded hillsides leading down to the shoreline. Within the project area, the area just north and south of I-80 on the far east of the project area has an 8 percent representative slope[3]. The area further east has a lower representative slope of 1 percent and the area west along I-80 toward the YBI Tunnel has a 40 percent representative slope. Finally, lands located further to the north and south of I-80 in the west side of the project area have a representative slope of 53 percent (USDA 2008a).~~

The proposed project is located in the San Francisco Bay watershed. The hydrologic sub-area information is as follows (CSU Sacramento 2008, see **Figure 4**):

- Hydrologic unit: Bay Bridges
- Hydrologic area: Bay Waters
- Hydrologic sub-area: Undefined, Sub-area 203.10
- Watershed area: 21,461 hectares (53,031 acres)
- Average annual rainfall: 536 millimeters (21.1 inches).

[2] The slope gradient is recorded as three separate values: a low value, a high value, and a "representative" value. The representative value indicates the expected value.

[3] ~~The slope gradient is recorded as three separate values: a low value, a high value, and a "representative" value. The representative value indicates the expected value.~~

~~***Existing Drainage***~~

~~The existing project site is located in a developed area surrounded by the San Francisco Bay. The existing areas include vegetation on moderate to steep slopes, as described above. In general, YBI's soil classification is dense to very dense silty sand with an infiltration rate that varies between 5.1 and 20 centimeters per hour (2 to 8 inches per hour) (AECOM 2009). Two soil groups exist within the project area; soil groups C and D. Hydrologic soil group C comprises approximately 20 percent of the project area of interest and is characterized as having a slow infiltration rate. Hydrologic soil group D which comprises approximately 80 percent of the project area is characterized as having a very slow rate of water infiltration (high runoff potential) and consists chiefly of clays.~~

~~Unlike most of mainland San Francisco, Treasure Island and YBI are served by separate storm water and wastewater systems (SFPUC 2004, p.8). As a result, surface runoff from the project area flows untreated to the San Francisco Bay via the San Francisco Municipal Separate Storm Sewer System (MS4). The MS4 within the project area is not connected to San Francisco city's MS4 or combined sewer systems.~~

The section "Existing Contamination" on pages 13 and 14 has been revised as follows:

~~Existing~~ Soil Contamination

Along with other islands on San Francisco Bay, YBI has been used for military purposes over the years. Naval Station Treasure Island was decommissioned in 1997; however, USCG activity continues on YBI. Based on current and previous environmental investigations, several areas of known and potential contaminant sources have been identified on YBI (AECOM 2009).

The U.S. Navy occupies a significant portion of the project area on YBI. The U.S. Navy, as part of an Installation Restoration Program (IRP) for NSTI/YBI, established a Federal Facility Site Remediation Agreement among the U.S. Navy, the California Department of Toxic Substances Control (DTSC) and RWQCB. Under this agreement, the U.S. Navy agreed to undertake and report on specified tasks associated with environmental assessment and response actions at 25 Installation Restoration (IR) sites under the IRP in accordance with the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA).

The Navy transferred ownership of Installation Restoration (IR) Sites 8, 11, and 29 to Caltrans through the Federal Highway Administration (FHWA). The data review conducted as part of the Hazardous Wastes Assessment (HWA) for the SFOBB ESSSP identified the following potential contaminant sources on the YBI Ramps Improvement Project site:

- IR Site 8: Former U.S. Army Point Sludge Disposal Area,
- IR Site 11: Former Landfill,
- IR Site 29: East Side Contaminated Bridge Soils, and
- Site 270: Leaking Underground Storage Tank (LUST) site associated with Building 270.

~~At the high portion of the North east Point on YBI, elevated levels of beryllium, lead, and pesticides have been detected. Along the entire shadow area of the existing bridge and adjacent ramps, investigations indicate a potential for lead contamination in surficial soils. Petroleum hydrocarbons were also found at a former gas station and adjacent fire station,~~

~~both of which have been demolished. Petroleum hydrocarbons have also been found at an active underground storage tank (Leaking Underground Storage Tank or LUST). In addition, it has been established that there is petroleum hydrocarbon contamination in the groundwater. There is also probable Aerially Deposited Lead (ADL) contamination, primarily from tailpipe emissions, in the unpaved areas adjacent to the existing roadway.~~

The Site Management Plan for the Naval Station Treasure Island (Tetra Tech EM Inc. 2008) reflects the Navy's current strategies and schedules to achieve site closure at several sites on Naval Station Treasure Island. This plan indicates that environmental closeout schedules and site closure for Installation Restoration (IR) Sites 8, 11, and 29 as well as inactive fuel line YF3 may be impacted by construction activities related to the SFOBB and YBI Ramps Improvement Project. Site 8 is located on the northeast end of YBI and was used as an army sludge disposal area from the wastewater treatment plant for approximately 8 years between 1968 and 1976. Metals and pesticides have been identified as the contaminants of concern. Site 11 had been used as a landfill and contaminants of concern at this site include total petroleum hydrocarbons (TPH), polycyclic aromatic hydrocarbons (PAHs), volatile organic compounds (VOCs), and metals. Additional sources of contamination at the landfill include five underground storage tanks (USTs) and a fuel pipeline. Site 29 is located below and parallel to the SFOBB from the northeastern portion of YBI westward to the YBI tunnel. Site 29 contains lead due to maintenance of ramps (i.e., use of lead-based paint) as well as a result of vehicle emissions. An interim remedial investigation (RI) report for Sites 8 and 29 is being finalized and the RI report for Site 11 is in the process of being prepared. The estimated year for site closeout for all three sites is 2021.

The third paragraph under "B. Groundwater" on page 14 has been revised as follows:

Due to the absence of long-term monitoring of water levels, the natural groundwater depth is uncertain. The Packer testing[4] indicated that the bedrock was nearly impermeable below the weathered zone and therefore water introduced into the boreholes and in fractures of this material is not likely to perch at shallow depths. This leads to the possibility that the measured water depths were not representative and ~~to drain away. This leaves the possibility that the measured water depths are not normal and~~ the natural groundwater table should generally be expected near adjacent Bay levels. The ongoing Project Approval and Environmental Document (PA&ED) phase will determine the natural groundwater depth.

"A. Storm Water" under Section "V. Water Quality Impacts" on pages 14 and 15 has been revised as follows:

VI. WATER QUALITY IMPACTS

A. Storm Water

Caltrans has performed many studies to monitor and characterize highway storm water runoff throughout the State. Commonly found pollutants throughout the State are Total Suspended

[4] Packer tests consist of isolating specific sections of a bedrock borehole so that water-quality samples can be collected and aquifer tests can be conducted. A series of such tests allows definition of the vertical distribution of water quality (usually contaminants) and hydraulic conductivity (pathways for water and contaminant movement) in an aquifer.

Solids (TSS), nitrate nitrogen, Total Kjeldahl Nitrogen (TKN), phosphorous, orthophosphate, copper, lead and zinc (Caltrans 2007c). Some sources of these pollutants are natural erosion, phosphorus from tree leaves, combustion products from fossil fuels, and the wearing of ~~break~~ brake pads.

The westbound lanes of the new SFOBB as it approaches YBI would transition to a stacked configuration over the eastbound lanes. The proposed YBI ramps would connect to the high point of the westbound alignment located on this bridge. The SFOBB structures would be comprised of multi-cell cast-in-place concrete box girders. The structure depth would vary from approximately 1.8 to 5.9 meters (5.5 to 18 feet) (Caltrans 2000, p. 38). The current design of the proposed YBI ramp structures incorporates piped inlets directing storm water flows down the columns and into the Bay (Caltrans 2000, p. 38). The proposed drainage system would collect concentrated flows from the elevated ramp structures using inlets, storm drain pipes, and downdrain trenches. ~~and convey the runoff to the BMPs for treatment. After treatment runoff will be conveyed to the existing west tie-in drainage system (AECOM 2009).~~ The existing ramps on YBI do not have any cross drains and the proposed YBI ramps do not include the construction of any new cross drains. Temporary (construction-related) and permanent drainage and treatment best management practices (BMPs) are currently in the conceptual design stage, as described in Section VI.

The first bullet point on page 16 has been revised as follows:

- **Alternative 2B:** Would include the removal of the existing westbound on- and off-ramps on the east side of YBI, the construction of a westbound off-ramp to Macalla Road on the east side of YBI, and construction of a westbound hook on-ramp from Macalla Road on the east side of YBI. The disturbed soil area estimated for Alternative 2B is approximately 2.3 acres. The disturbed soil area is the area from the edge of the pavement to the construction limits created by the cut and fill slopes. The disturbed soil area does not include the paved ramp area. This alternative would have less water quality impacts than Alternative 4 due to less disturbed soil area and less amount of impervious area added to YBI. The amount of impervious area would increase from an existing 8.47 acres to 10.42 acres, a change of 1.95 acres (AECOM 2009; see Attachment 1). The percent of impervious area is expected to increase from 47% to 58% for the project site. Pervious area is the difference between the total area and impervious area within the project right-of-way. The surface runoff from Alternative 2B would be collected to the outfall near Macalla Road and treated in a BMP which is yet to be determined. ~~It is anticipated, however, that detention devices, lined biofiltration swales, and media filters would be used to treat runoff prior to discharge (as identified below in Section VI). For Alternative 2B, the required water quality treatment flow was calculated as approximately 0.0214 cubic meter per second (m^3/s). The required water quality treatment volume was calculated to be 119 cubic meters (m^3) (AECOM 2009; see Attachment 1).~~

The second bullet point on pages 16 and 17 has been revised as follows:

- **Alternative 4:** Would include the removal of the existing westbound on- and off-ramps on the east side of YBI, the construction of westbound on-ramp from Hillcrest Road, and construction of westbound off-ramp to Macalla Road on the east side of YBI. Alternative 4 would have the most water quality impacts of the three alternatives. The disturbed soil area estimated for Alternative 4 is approximately 4.4 acres, as it has the largest soil disturbance area, the largest increase in impervious area, and construction work would be required closer

to San Francisco Bay. The amount of impervious area would increase from an existing 6.34 acres to 10.74 acres, a change of 4.40 acres (AECOM 2009; see Attachment 1). The percent of impervious area is expected to increase from 59% to 100% for the project site. Surface runoff from the northern half of this alternative would be collected at the outfall near Macalla Road. Surface runoff from the southern portion of this alternative would be collected to the outfall near South Gate Road. The location and types of Permanent Design BMPs that would be used to control this surface runoff ~~of BMPs that would be used to treat this surface runoff~~ are in the conceptual design state and would be developed in detail at a future time. ~~; however, it is anticipated that detention devices, lined biofiltration swales, and media filters would be used to treat runoff prior to discharge (as identified below in Section VI). For Alternative 4, the required water quality treatment flow was calculated as approximately 0.0242 m^3/s. The required water quality treatment volume was calculated to be 267 m^3 (AECOM 2009; see Attachment 1).~~

The first full paragraph and second paragraph on page 17 has been revised as follows:

An integrated bridge and ramp drainage system would be designed and constructed within the YBI Ramps Improvement Project limits to collect all storm water runoff. An independent ramp drainage system would be designed and constructed to collect all ramp surface runoff. For all slopes, benching, rounding, and terracing would be considered to minimize concentrated flows and slope stabilization measures and retaining walls may be needed. In addition, slopes would include pipe or flume downdrains to collect concentrated flows, minimize erosion, and direct storm water into the proposed drainage system. ~~for treatment (AECOM 2009).~~ The need for slope stabilization and possible retaining walls would be determined as the project progresses. In addition, slopes would include concrete side drains to collect concentrated flows, minimize erosion, and direct storm water in the proposed drainage system and acceptable BMPs, which would eventually terminate into San Francisco Bay.

The pollutant load from the proposed YBI ramp area is negligible when compared to the overall pollutant loadings to the San Francisco Bay from the entire watershed and would not have a net impact on the overall water quality in San Francisco Bay. San Francisco Bay is listed as impaired for a number of pollutants outlined in Section IV.A above; however, only mercury (under the Caltrans general metals category) is listed on the Caltrans targeted design constituent (TDC) list. Thus, for design and stormwater permit purposes, any treatment BMPs ~~for~~ considered~~ation~~ include those used to treat general metals/general purpose pollutants. Temporary construction site BMPs, permanent design pollution BMPs, and permanent treatment BMPs, would be required to minimize or prevent impacts on water quality and pollutant loading, particularly during times of large flood flow runoff. Suggested BMPs are described below in Section VI. The total mass of storm water pollution is not expected to change as a result of the project since the total usage hours are not expected to increase and the pollutant generation rate is not expected to increase (Caltrans 2001, p. 4-68).

“B. Groundwater” on page 17 has been revised as follows:

B. Groundwater

Groundwater may be encountered during construction. At this time, excavated ~~spoils~~ soil ~~would be~~is considered potentially hazardous ~~along with any groundwater encountered~~ and

would require appropriate collection, testing, and if applicable, transport offsite for treatment and disposal.

Section "VI. Avoidance, Minimization and/or Mitigation Measures" on page 17 and 18 has been revised as follows:

VII. AVOIDANCE AND, MINIMIZATION ~~AND/OR MITIGATION~~ MEASURES

A. Section 401 of the Clean Water Act

There are potential Waters of the U.S. onsite[5]; however, verification has not yet been completed by the U.S. Army Corps of Engineers regarding if they are considered jurisdictional. If it is determined that there would be impacts to existing wetlands and Waters of the U.S. within the project limits, an Army Corps 404 permit would be required along with a 401 Water Quality Certification from Region 2.

A~~A~~voidance and minimization efforts including BMPs to avoid discharge to waters of the U.S. have been considered and described ~~in the Natural Environment Study (NES) as well as~~ in this Water Quality Report in the case that the U.S. Army Corps of Engineers makes a determination that a 401/404 permit is needed. Any i~~I~~mpacts to Water of the U.S. and appropriate mitigation measures would be described in the Environmental Impact Statement/Environmental Impact Report (EIS/EIR) for the Yerba Buena Island Ramps Improvement Project.

B. Section 402 of the Clean Water Act

Given a projected disturbance of greater than 0.4 hectares (one acre), the project is subject to Caltrans' statewide NPDES permit and Construction General permit. A SWPPP would be developed prior to construction. This dynamic document addresses the deployment of various erosion and water pollution control measures that are required commensurate to changing construction activities. The purpose of the SWPPP would be to identify pollutant sources that may affect the quality of the storm water discharges associated with the construction activities of the project and to identify, construct, and implement storm water pollution control measures to reduce pollutants in storm water discharges from the construction site during and after construction.

According to the Caltrans NPDES and General Permits, Best Management Practices (BMPs) would be incorporated into the proposed project to reduce the discharge of pollutants during and after construction to the Maximum Extent Practicable (MEP). These BMPs fall into ~~three~~ four categories, temporary Construction Site BMPs, permanent Design Pollution Prevention BMPs, ~~and~~ permanent Treatment BMPs, and operational maintenance BMPs..

The last paragraph on page 19 has been deleted as follows:

~~Given a projected disturbance of greater than 0.4 hectares (one acre), a SWPPP would be developed prior to construction. This dynamic document addresses the deployment of~~

[5] Waters of the U.S. include navigable waters, interstate waters, territorial seas, and other waters that may be used in interstate or foreign commerce. In the proposed YBI ramp area, there is no evidence of wetlands. Waters of the U.S. consist solely of unvegetated waters flowing in concrete or roadside swales.

~~various erosion and water pollution control measures that are required commensurate to changing construction activities. The purpose of the SWPPP would be to identify pollutant sources that may affect the quality of the storm water discharges associated with the construction activities of the project and to identify, construct, and implement storm water pollution control measures to reduce pollutants in storm water discharges from the construction site during and after construction.~~

Section "(3) Permanent Treatment BMPs" has been revised as follows:

(3) Permanent Treatment BMPs

The PPDG Section 4 (Caltrans 2007b) describes the process for determining the need for permanent treatment BMPs. ~~As the YBI Ramps Improvement Project will discharge water into surface waters that have TMDLs and other pollution controls, as described in Section IV, treatment BMPs are required. In addition, the project is within an urban MS4 area and would cause a change to historic drainage patterns. The project would also indirectly discharge surface runoff into the San Francisco Bay, and is considered a major reconstruction project[6] resulting in a net increase of greater than one acre of new impervious surface.~~ According to the PPDG evaluation process, this project must consider permanent treatment BMPs. The TMDL established for mercury, as described in Section IV, will affect the selection of permanent treatment BMPs.

Treatment BMPs are permanent devices and facilities that treat storm water runoff. Caltrans-approved Treatment BMPs include Biofiltration Systems (Biofiltration Strips and Swales), Infiltration Basins, Detention Basins, Traction Sand Traps, Dry Weather Flow Diversions, Media Filters, Gross Solids Removal Devices (GSRDs), Multi-Chamber Treatment Trains, and Wet Basins. Those most feasible in the Bay Area are Biofiltration Systems, Infiltration Basins, Detention Basins, Dry Weather Flow Diversions, Media Filters, and Multi-chamber Treatment Trains. ~~The selected treatment BMPs have been identified in the project's SWDR (AECOM 2009).~~<u>Bioswales are identified in the project's current SWDR as the preferred treatment BMP for consideration of incorporation into the project design (AECOM 2009).</u>

~~The SWDR identified Infiltration Devices as infeasible for the project site, as portions of the project site are known to have hazardous soil and contaminated groundwater. In addition, the impermeable soil found at the project site restricts opportunities for the use of infiltration devices (AECOM 2009). Multi-chamber Treatment Trains are also not appropriate at this~~

~~[6] As defined in the Storm Water Quality Handbook (Caltrans 2007b), new construction and major reconstruction includes new routes, route alignments, and route upgrades. New construction activity does not include routine maintenance to maintain original line and grade, hydraulic capacity, or original purpose of the facility, nor does it include emergency construction activities required to protect public health and safety. New Construction and major reconstruction projects may include, but are not limited to: new highways and freeways; highway-related facilities, including new or reconstructed maintenance facilities,~~
~~safety roadside rest areas, toll plazas and inspection and weigh stations; adding one or more lanes; adding HOV lanes; construction activities conducted within highway rights-of-way in conjunction with a new facility; new or reconstructed interchanges, including on-ramps, off-ramps, and connectors; new or reconstructed bridges; tunnels; and drainage system improvements, including changes to pipes, conduits, channels, etc.~~

~~project, as this project does not fall into any of the relevant categories (vehicle service facilities, parking areas, paved storage areas, or fueling stations). In addition, since dry weather flow diversions address non-storm water flows only, Dry Weather Flow Diversions are not recommended.~~

~~Detention Devices and Media Filters were evaluated as possible types of permanent Treatment BMPs. Detention Devices are effective at removing total suspended solids (TSS), phosphorus, particulate metals, and litter by temporarily detaining storm water runoff to allow sediment and particulates to settle out before it is discharged. Media Filters, specifically the Austin Vault Sand and Delaware Sand filters, are effective at removing general purpose pollutants. Both Detention Devices and Media Filters may require an impermeable lining to avoid leaking into potentially contaminated groundwater. Right-of-way concerns as well as the cost of these two permanent treatment BMPs were also considered to be issues in the PA&ED evaluation. However, Biofiltration Systems were identified as the favored permanent treatment BMP option.~~

The following text has been added following the third paragraph on page 21:

(4) Operation/Maintenance Stormwater BMPs

As described in the Caltrans Maintenance Manual (July 2006), it is the policy of Caltrans that the Division of Maintenance will:

(A) Implement the Maintenance Storm Water Management Program described in the Statewide Storm Water Management Plan;

(B) Implement the Best Management practices defined in the Caltrans Storm Water Quality Handbook Maintenance Staff Guide;

(C) Follow all appropriate State, federal, and local laws and regulations regarding water quality including all court orders and consent decrees.

(D) Meet all requirements of the RWQCB and SWRCB permits and orders.

As described in the Caltrans Maintenance Manual Chapter C5, “Drainage Facilities, Fences, and Roadside Appurtenances,” typical maintenance BMPs that could be used for stormwater control after the proposed project is constructed include, but would not be limited to (Caltrans 2006):

- C5.10.1 - Inspections of drainage facilities by District Maintenance Supervisors
  Visual, surface level inspections of drainage facilities shall be made annually and during and after each major storm to identify obvious defects, hazards or potential problems, and also to monitor known problems.

- C5.10.2 - Inspections of drainage facilities by District Culvert Inspection Program
  Thoroughly evaluates drainage facilities condition and identifies deficiencies at early stages where corrective maintenance strategies will be effective, or prevent failure from occurring.

- C5.12 - Ditches and Gutters
  Ditches and gutters should be inspected periodically and maintained to permit free flow. Lined ditches and gutters should be sealed or repaired to maintain structural integrity.

- C5.14 - Under Drains, Horizontal Drains and Down Drains
  Under drains (including underground groundwater relief systems, horizontal drains-cut slope groundwater drains, and down drains), surface drainage conduits, and accompanying collector systems should be inspected once a year and cleaned or repaired as necessary to ensure free flow. Surface water should not be permitted to discharge into an under drain.

- C5.15 - Edge Drains
  Edge drains should be inspected early in the winter season to assure that they are functioning. Edge drains should be inspect during or shortly after a rainstorm to observe the flow. If a drain appears to be clogged, it may be checked with a "snake" and cleaned by water jet equipment if necessary. Clean outs have been installed for this purpose.

- C5.16 - Structure Drainage Systems
  Bridge drainage systems should be inspected annually prior to the rainy season, and cleaned where necessary. These systems should be observed during storms to ensure proper functioning

- C5.21 - Maintenance of Over Side Drains and Slope Ditches
  Pipe or flume down drains should be maintained intact, and in the case of metal assemblies, maintained in tight contact with shoulder surfacing, side ditch lining, and dike paving. If embankment settlement occurs, restore to grade, and re-establish down drains or spillway, side ditch and dike. Fill and seal cracks around inlets of down drains to prevent seepage of water into embankment areas. If Rock Slope Protection is provided at the end of down drains, they should also be inspected and repaired if needed.

A new Section “IX. Recommendation to Designers” has been added prior to “References” on page 22:

IX. RECOMMENDATION TO DESIGNERS

Storm water discharges from construction activities of the proposed project would require permitting under Caltrans’ Statewide Storm Water NPDES permit and discharges would also have to comply with the substantive provisions of the SWRCB’s Statewide General Construction Permit. The proposed project would also require the preparation and implementation of a SWPPP. Coordination between the San Francisco Bay RWQCB and Caltrans District 4 would be crucial to ensure that all agency requirements and environmental concerns are addressed.

If utilized, bioswales would be designed in close consultation with the Regional/District NPDES coordinators due to the site's hazardous soil conditions and would likely require the use of impermeable liners and an underdrain.

Discharge to the storm sewer system (and eventually to the Bay) or directly to the Bay would be addressed by the Caltrans General Permit, which incorporates performance requirements and other technical provisions and would be subject to the quantitative water quality objectives included in the San Francisco Bay RWQCB Basin Plan.

Section "VII. References" has been revised as follows:

~~VII~~IX. REFERENCES

AECOM. 2009. ~~Draft~~ Final Long Form - Storm Water Data Report. Prepared for Caltrans. ~~February 12~~August 17, 2009.

California Department of Transportation (Caltrans). 2007c. Revised Water Quality Report for Caldecott Tunnel Improvement Project. April 27~~, 2007~~.

California Department of Transportation (Caltrans). 2006. Maintenance Manual Volume 1. July. Chapter C5 and F.

Pages 25 and 26 have been deleted.

Water Quality Report for Yerba Buena Island Ramps Improvement Project August 21, 2009

I. PURPOSE OF STUDY

The purpose of this study is to assess the impacts on surface water and groundwater quality of the proposed project and to propose measures to mitigate any water quality impacts associated with the construction of the proposed Yerba Buena Island (YBI) Ramps Improvement Project. The location of the project site is shown in **Figure 1**.

II. PROJECT DESCRIPTION

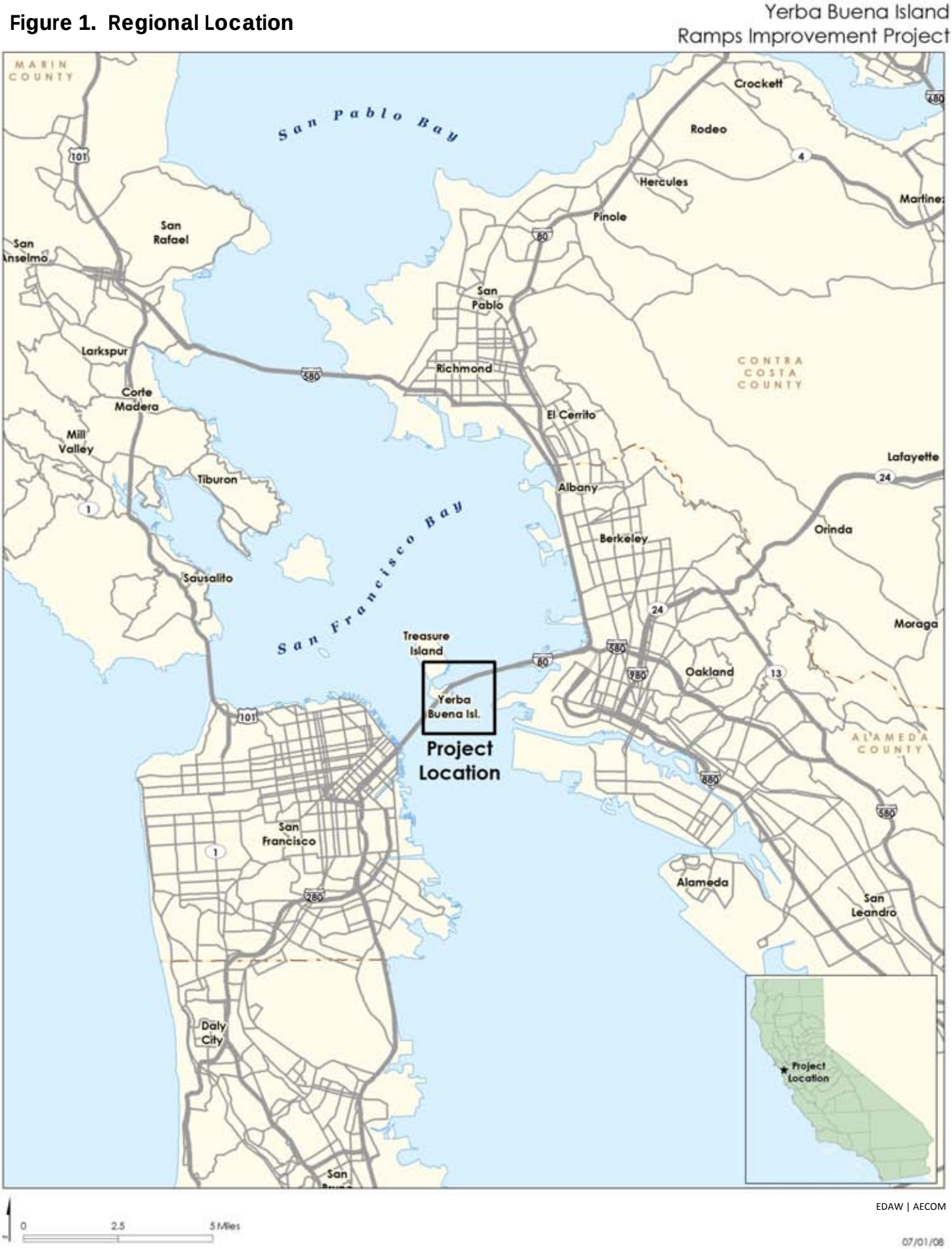
Yerba Buena Island (YBI) is located in the San Francisco Bay approximately halfway between Oakland and San Francisco. YBI is only accessible to vehicular traffic via the San Francisco Oakland Bay Bridge (SFOBB) stretch of I-80. The SFOBB is considered a "lifeline structure" and is a critical link between the East Bay and San Francisco. It provides the only vehicle access to YBI, the active U.S. Coast Guard (USCG) facilities located on the south side of the island, and Treasure Island, located immediately north of YBI. The project is located in San Francisco County and is within the San Francisco Bay Central Basin, one of seven major hydrologic units within the Region.

A large amount of the island's surface area is covered with thick vegetation consisting mostly of stands of large, mature eucalyptus trees, smaller ornamental landscape trees, shrubs and lawn areas. The south side of YBI hosts facilities of the USCG, and portions of the island are currently used to store materials related to construction and maintenance of the SFOBB. In addition, YBI has 105 housing units, which range from large single family residences originally built for military officers to two to four-unit buildings. Developed areas of the island are scattered throughout. The southern fringe of the island, where the USCG facility is located, is mostly flat and open with somewhat less vegetation cover.

The proposed project would replace the existing westbound on- and off-ramps located on the east side of YBI with new westbound on- and off-ramps. The new ramps would maintain the functional role of the current ramps while satisfying seismic requirements, highway design standards, traffic operations, and improve safety. The YBI Ramps Improvement Project is independent of both the SFOBB East Span Seismic Safety Project, currently under construction, and the Treasure Island and Yerba Buena Island (TI/YBI) Redevelopment Plan, currently undergoing its own environmental review process.

The purpose of the project is to improve the safety of the westbound on- and off-ramps to the extent physically and economically feasible. The current ramps do not meet current Caltrans design standards. The proposed project would provide standard deceleration length for the off-ramp and improved acceleration/merging length for the on-ramp. In addition, the project would improve traffic operations to and from YBI.

Figure 1. Regional Location



Alternatives have been proposed to address the geometric deficiencies of the existing on- and off-ramps. In addition to the no-build alternative, the proposed build alternatives would analyze the effects to the SFOBB (I-80) mainline structure and YBI. The proposed project is located between post-mile (PM) 7.6 and 8.1[1] beginning at the east portal of the YBI tunnel and ending at the east side of the Transition Structure portion of the new SFOBB. The SFOBB Transition Structure is located between PM 7.9 and 8.1 between the YBI tunnel and the SFOBB Self-Anchored Suspension (SAS) span.[2]

Three alternatives are currently under consideration, including:

A. No Build Alternative

This Alternative assumes that the existing on- and off-ramps would remain in place and no further action or improvements would occur.

B. Alternative 2b

Alternative 2b would include removal of the existing westbound on- and off-ramps on the east side of YBI, construction of a westbound loop on-ramp from Macalla Road on the east side of YBI, and construction of a westbound off-ramp to Macalla Road on the east side of YBI **(see Figure 2)**.

This alternative proposes to reconstruct two of the existing six on- and off-ramps at the I-80/YBI interchange. The proposed on- and off-ramps would provide standard shoulder widths, and would include the following features:

- Westbound on-ramp on the east side of YBI- This ramp would begin at a "T" intersection at Macalla Road, loop right with a tight radius, and merge on to the north side of the Bay Bridge. The length of this ramp would be approximately 876 feet (267 meters). This ramp would have two traffic lanes, merging into one as it connects to the SFOBB. One lane would be a high occupancy vehicle (HOV) lane and the other a mixed-flow[3] lane.

- Westbound off-ramp on the east side of YBI - This ramp would diverge from the new SFOBB Transition Structure between bents W3 and W4 curving around the Nimitz House and terminate at a "T" intersection at Macalla Road. The length of this ramp would be approximately 1,115 feet (340 meters). A stop sign is proposed at the ramp terminus.

- Macalla Road would be widened for approximately 660 feet adjacent to the terminus of the westbound on- and off-ramps. The existing roadway is about 20 feet wide near the ramp terminus. The roadway widening is required to

[1] Kilometer Post (KP) 12.3 and 13.2
[2] The SFOBB Transition Structure is the name of a section of the new Bay Bridge. The Transition Structure will connect the Self-Anchored Suspension (SAS) span to Yerba Buena Island, and will transition the East Span's side-by-side road decks to the upper and lower decks of the YBI tunnel and West Span.
[3] A mixed-flow lane is a general purpose travel lane with no traffic restrictions.

accommodate a 12-foot wide multi-use pedestrian/bike path and two 12-foot wide lanes within the Caltrans right-of-way. A retaining wall would be constructed adjacent to Macalla Road to provide the required width. The height of the retaining wall would vary from 4 to 16 feet and would retain the hillside above Macalla Road. The stairway adjacent to the Caltrans Substation would be relocated to the west side of the building to make room for the new retaining wall. The roadway width would vary around the curve at South Gate Road to provide proper width for truck turning movements.

Under Alternative 2B, the westbound on- and off-ramps would terminate at Macalla Road where Quarters 10 and Building 267 are currently located.[4] Quarters 10 and Building 267 would be relocated prior to construction of the ramps at Macalla Road. The relocation site for these buildings would be on YBI and would be determined under the Section 106 mitigation development process.

C. Alternative 4

Alternative 4 would include the removal of the existing westbound on- and off-ramps on the east side of YBI, construction of westbound on-ramp from South Gate Road, and construction of westbound off-ramp to Macalla Road on the east side of YBI **(see Figure 3)**.

This alternative proposes to reconstruct two of the existing six on- and off-ramps at the I-80/YBI interchange. The proposed on- and off-ramps would provide standard shoulder widths, and would include the following features:

- Westbound on-ramp on the east side of YBI - This ramp would begin at South Gate Road, proceed east paralleling the eastbound on-ramp, loop under the new SFOBB Transition Structure near its eastern end to provide adequate merging distances, cross over the westbound off-ramp along the north side of the Bay Bridge. The length of this ramp would be approximately 2,883 feet (879 meters). HOV lane would not be provided under Alternative 4.

- Westbound off-ramp on the east side of YBI - This ramp would diverge from the new SFOBB Transition Structure between bents W2 and W3, parallel the Transition Structure, cross under the westbound on-ramp and terminate at a "T" intersection at Macalla Road. The length of this ramp would be approximately 1,168 feet (356 meters). A stop sign is proposed at the ramp terminus.

- Macalla Road would be widened for approximately 660 feet adjacent to the terminus of the westbound on-and off-ramps. The existing roadway is about 20 feet wide near the ramp terminus. The roadway widening is required to accommodate a 12-foot wide multi-use pedestrian/bike path and two 12-foot wide lanes within the Caltrans right-of-way. A retaining wall would be constructed

[4] Quarters 10 and Building 267 (a contributing garage) are listed in the National Register of Historic Places and significant at the local level under Criterion C, as a significant example of mid-twentieth century residential architecture.

adjacent to Macalla Road to provide the required width. The height of the retaining wall would vary from 4 to 16 feet and would retain the hillside above Macalla Road. The roadway width would vary around the curve at South Gate Road to provide proper width for truck turning movements.

Under Alternative 4, Quarters 10 and Building 267 and its associated landscaping would remain in place.

The construction of the ramps is estimated to start in the spring of 2012 and be completed by spring of 2014. It is expected that construction would occur after construction of the connecting transition structure, which is included in the SFOBB East Span Seismic Safety Project. The YBI Ramps Improvement Project would utilize most of the construction easements as well as storage and stockpiling areas that were obtained for construction of the transition structure. However, extra construction easements would be needed on the north side of the SFOBB. Loaders and backhoes would be expected to perform the necessary earthwork during construction.

III. REGULATORY SETTING

The primary federal law regulating water quality is the Federal Clean Water Act (CWA), issued by the U.S. Environmental Protection Agency (EPA). The EPA has delegated its authority in California to the State Water Resources Control Board (SWRCB) and Regional Water Quality Control Boards (RWQCBs). Each RWQCB prepares and adopts a Water Quality Control Plan, (Basin Plan), a master policy document for managing surface and groundwater quality throughout each respective region. The SWRCB and RWQCBs issue permits, which implement the standards included in the Basin Plan as well as other requirements of the State Water Code and the CWA (Caltrans 2007c). The YBI Ramps Improvement Project is located within the jurisdiction of the San Francisco Bay RWQCB (Region 2), which is responsible for implementation of State and Federal water quality protection laws and regulations in the vicinity of the project site.

Section 401 of the CWA requires a water quality certification from the SWRCB or RWQCB when a project: 1) requires a federal license or permit (a Section 404 permit is the most common federal permit for State of California, Caltrans projects), and 2) would result in a discharge to waters of the United States.

Section 402 of the CWA establishes the National Pollutant Discharge Elimination System (NPDES) Permit, which directs that storm water discharges are point source discharges and establishes a framework for regulating municipal and industrial storm water discharges. To ensure compliance with CWA Section 402, on July 15, 1999, the SWRCB issued the NPDES Permit, Statewide Storm Water Permit for Caltrans (Order No. 99-06-DWQ, NPDES No. CAS000003) (Caltrans 2003a). The Permit regulates storm water discharges from Caltrans properties, facilities and activities during and after construction.

Figure 2. Alternative 2B

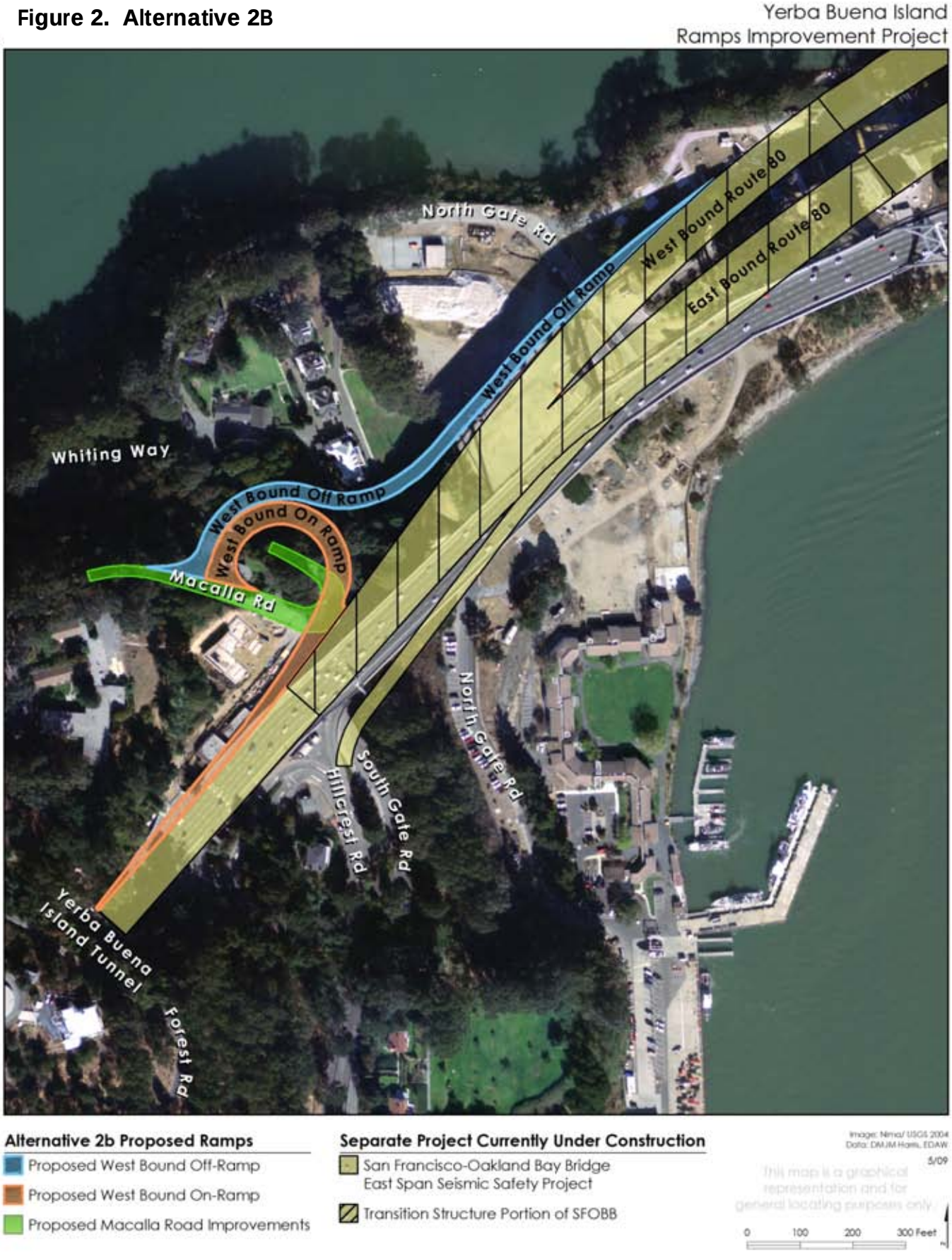
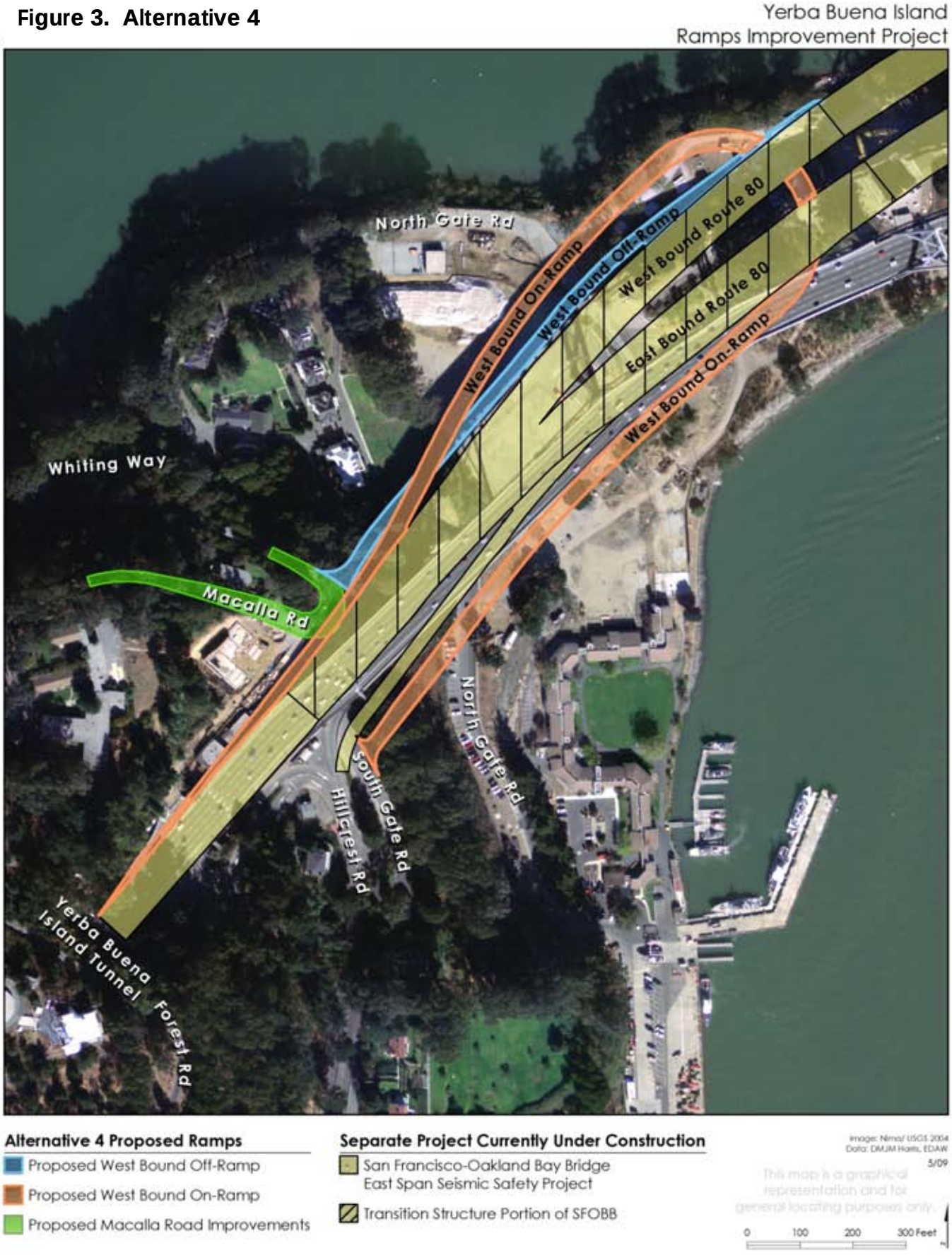


Figure 3. Alternative 4



The SWRCB has also issued a Statewide Construction General Permit (General Permit) for construction activities (Order No. 98-08-DWQ, CAS000002), which applies to all storm water discharges from land where clearing, grading, and excavation result in disturbances of at least 0.4 hectares (one acre) or more. The Caltrans permit (CAS000003) requires that Caltrans implement the technical provisions of the statewide general permit for construction activities. Construction activity that results in soil disturbances of less than 0.4 hectares (one acre) are subject to the General Permit if the construction activities are part of a larger Common Plan of Development totaling 0.4 hectares (one acre) or more of soil disturbing activities, or if there is potential for significant water quality impairment resulting from the activity as determined by the RWQCB (Caltrans 2007c). All projects that are subject to the General Permit require a Storm Water Pollution Prevention Plan (SWPPP). Construction projects that disturb less than 0.4 hectares (one acre) of soil are required to incorporate a Water Pollution Control Program (WPCP). The disturbed soil area estimated for YBI Ramps Improvement Project Alternatives 2B and 4 are approximately 2.3 acres and 4.4 acres, respectively. Regardless of requirement of a SWPPP or WPCP, a Storm Water Data Report (SWDR) is required, which summarizes the storm water quality issues of a project. A SWDR was prepared February 2009 (AECOM 2009) and was used to prepare this study.

The Caltrans Project Planning and Design Guide (PPDG) provides a process for determining the need for, selecting, and incorporating feasible Best Management Practices (BMPs) into projects (Caltrans 2007b). The PPDG describes the BMP selection and design process, as well as describing relevant regulations, permits, monitoring and reporting requirements.

IV. PROJECT LOCATION AND RECEIVING WATER BODIES AND GROUNDWATER

A. Storm Water

YBI is a 147-acre natural island that sits in the San Francisco Bay between the cities of San Francisco and Oakland. YBI serves as an access point for the adjacent man-made Treasure Island. The island's high point is located 338 feet above mean sea level, and large portions of it are undeveloped, with steep wooded hillsides leading down to the shoreline. Within the project area, the area just north and south of I-80 on the far east of the project area has an 8 percent representative slope[5]. The area further east has a lower representative slope of 1 percent and the area west along I-80 toward the YBI Tunnel has a 40 percent representative slope. Finally, lands located further to the north and south of I-80 in the west side of the project area have a representative slope of 53 percent (USDA 2008a).

The proposed project is located in the San Francisco Bay watershed. The hydrologic sub-area information is as follows (CSU Sacramento 2008, see **Figure 4**):

[5] The slope gradient is recorded as three separate values: a low value, a high value, and a "representative" value. The representative value indicates the expected value.

- Hydrologic unit: Bay Bridges
- Hydrologic area: Bay Waters
- Hydrologic sub-area: Undefined, Sub-area 203.10
- Watershed area: 21,461 hectares (53,031 acres)
- Average annual rainfall: 536 millimeters (21.1 inches).

Existing Drainage

The existing project site is located in a developed area surrounded by the San Francisco Bay. The existing areas include vegetation on moderate to steep slopes, as described above. In general, YBI's soil classification is dense to very dense silty sand with an infiltration rate that varies between 5.1 and 20 centimeters per hour (2 to 8 inches per hour) (AECOM 2009). Two soil groups exist within the project area; soil groups C and D. Hydrologic soil group C comprises approximately 20 percent of the project area of interest and is characterized as having a slow infiltration rate. Hydrologic soil group D which comprises approximately 80 percent of the project area is characterized as having a very slow rate of water infiltration (high runoff potential) and consists chiefly of clays.

Unlike most of mainland San Francisco, Treasure Island and YBI are served by separate storm water and wastewater systems (SFPUC 2004, p.8). As a result, surface runoff from the project area flows untreated to the San Francisco Bay via the San Francisco Municipal Separate Storm Sewer System (MS4). The MS4 within the project area is not connected to San Francisco city's MS4 or combined sewer systems.

Surface Water Quality

The San Francisco Estuary Institute (SFEI) conducts the Regional Monitoring Program (RMP) for water quality in the San Francisco Estuary. The RMP monitors contaminant concentrations in water, sediment, and fish and shellfish tissue in San Francisco Bay and the Delta. The RMP has been conducting long-term monitoring for over 15 years. **Table 1** presents a summary of the concentrations of various pollutants in the Central San Francisco Bay, monitored in 2006 (SFEI 2009). The Yerba Buena Station (sampling site BC10) is located near the project area.

Beneficial Uses

The Region 2 Basin Plan (SFBRWQCB 2007) establishes beneficial uses for waterways and water bodies within the Central Basin in San Francisco County. The existing beneficial uses for San Francisco Bay Central area include: industrial service water supply; industrial process supply; ocean, commercial, and sport fishing; shellfish harvesting; estuarine habitat; fish migration; preservation of rare and endangered species; fish spawning; wildlife habitat; water contact recreation; noncontact water recreation; and navigation.

303(d) List of Water Impairments and Total Maximum Daily Loads (TMDLs)

The San Francisco Bay is listed as impaired on the CWA Section 303(d) list for Chlordane, DDT, Dieldrin, Mercury, Polychlorinated Biphenyls (PCBs), PCBs (dioxin-like), Selenium, Polycyclic Aromatic Hydrocarbons (PAHs), Dioxin compounds, Furan compounds, and Exotic species. Total Maximum Daily Loads (TMDLs) are a calculation

Figure 4. Hydrologic Area

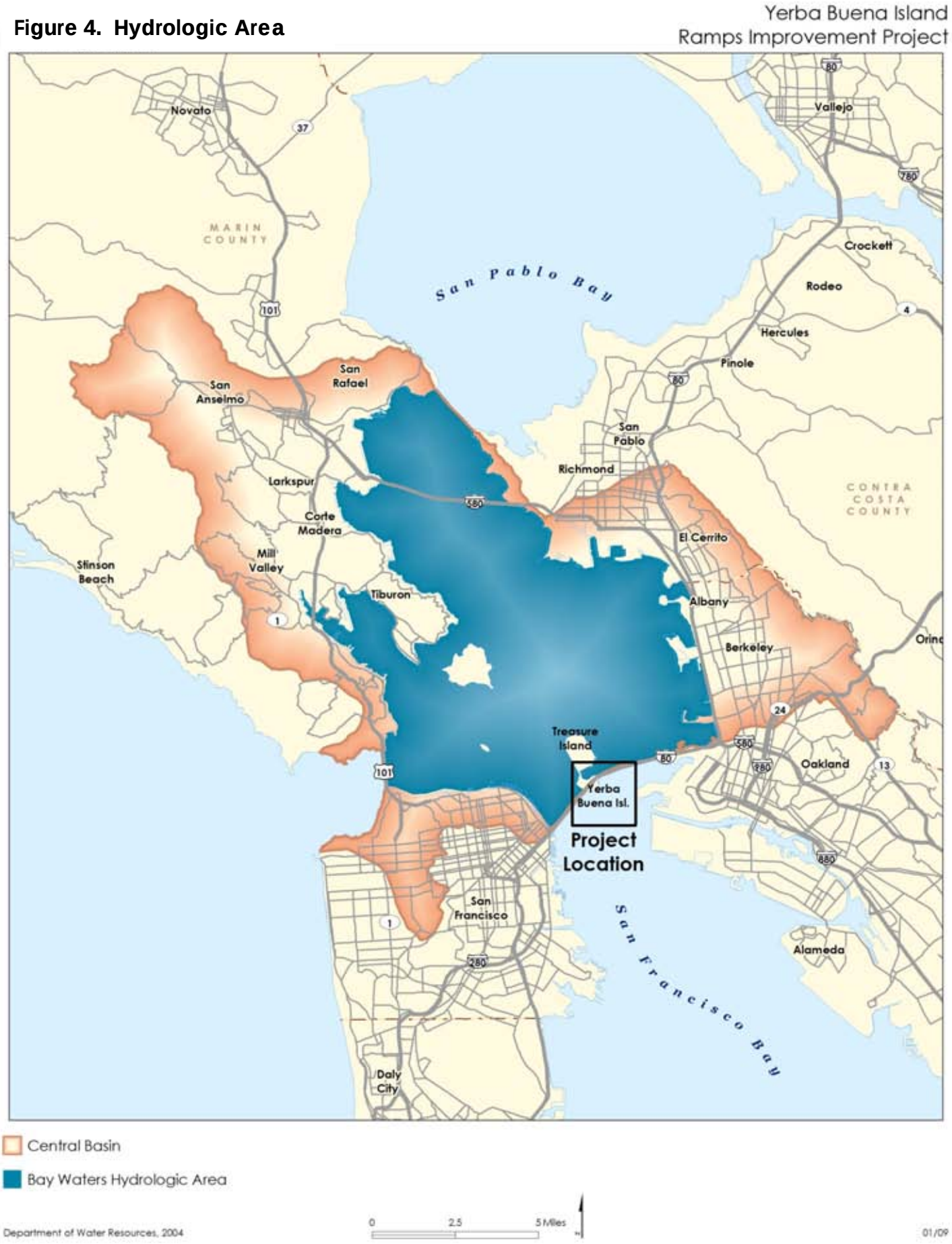


Table 1. Central San Francisco Bay Surface Water Concentrations from Sampling Site BC10, August 2006

Parameter	Dissolved	MDL	Units	Total	MDL	Units	Water Quality Objective
Salinity	29.543	2	psu	29.7	0.16	ppt	Controllable water quality factors shall not increase salinity of waters so as to adversely affect beneficial uses.
Ammonia	0.123257	0.001875	mg/L	NA	NA	NA	Annual Mean 0.025 mg/L, Max = 0.16 mg/L
DOC	1247.658	51.57674	µg/L	NA	NA	NA	No objective
Nitrate	0.198062		mg/L	NA	NA	NA	No objective
Nitrite	0.008425	0.000532	mg/L	NA	NA	NA	No objective
Phosphate	0.071735	0.001057	mg/L	NA	NA	NA	No objective
Arsenic (As)	1.44	0.08	µg/L	1.44	0.08	µg/L	4-day ave. 36.0 µg/L, 1-hr ave. 69.0 µg/L
Cadmium (Cd)	0.058937	0.000216	µg/L	0.06052	0.000216	µg/L	4-day ave. 9.3.0 µg/L, 1-hr ave. 42.0 µg/L
Copper (Cu)	1.035167	0.010588	µg/L	1.252406	0.010588	µg/L	4-day ave. 3.1 µg/L, 1-hr ave. 4.8 µg/L
Mercury (Hg)	0.000295	0.000127	µg/L	0.006018	0.000127	µg/L	4-day ave.0.025 µg/L, 1-hr ave. 2.1 µg/L
Nickel (Ni)	0.937488	0.01876	µg/L	1.484922	0.01876	µg/L	4-day ave. 8.2 µg/L, 1-hr ave. 74.0 µg/L
Lead (Pb)	0.006483	0.001016	µg/L	0.220943	0.001016	µg/L	4-day ave. 8.1 µg/L, 1-hr ave. 210.0 µg/L
Selenium (Se)	0.069	0.018	µg/L	0.055	0.018	µg/L	Selenium criteria were promulgated for all San Francisco Bay/Delta waters (SFBRWQCB 2007). 4-day ave. 5.0 ug/L, 1-hr ave 20 ug/l
Zinc (Zn)	0.432648	0.029593	µg/L	1.296622	0.029593	µg/L	4-day ave. 81.0 µg/L, 1-hr ave. 90.0 µg/L
Conductivity	NA	NA	NA	45670	1000	µmhos/cm	No objective
Dissolved Oxygen (DO)	NA	NA	NA	6.91	0.3	mg/L	5.0 mg/L minimum
Temperature	NA	NA	NA	18	0.1	°C	Elevated temperature waste discharges shall comply with limitations necessary to assure protection of beneficial uses. The maximum temperature of waste discharges shall not exceed the natural temperature of the receiving waters by more than 20°F. Thermal waste discharges having a maximum temperature greater than 4°F above the natural temperature of the receiving water are prohibited. (SWRCB 1998).
pH	NA	NA	NA	7.81	0.01	pH	pH shall not be depressed below 6.5 nor raised above 8.5. Controllable water quality factors shall not cause changes greater than 0.5 units in normal ambient pH levels.

Parameter	Dissolved	MDL	Units	Total	MDL	Units	Water Quality Objective
Notes: NA = not available/not applicable; MDL = method detection limit; psu = practical salinity unit; ND = non-detect; SCT = Salinity/Conductivity/Temperature Meters; ppt = parts per trillion; mg/L = milligram per liter; µg/L = microgram per liter; ng/L = nanogram per liter; µmhos/cm = micromhos per centimeter Source: SFEI 2009; SFBRWQCB 2007; SWRCB 1998.							

of the maximum amount of a pollutant that a waterbody can receive and still safely meet water quality standards.

TMDLs for the San Francisco Bay have been established based on the 2006 303(d) list (approval date: June 28, 2007). TMDLs have only been established at this time for mercury and PCBs[6]; all of the other pollutants listed in the 2006 303(d) list have not been completed. The San Francisco Bay RWQCB has also recommended the San Francisco Bay (Central) shoreline for placement on the 303(d) list for trash impairment (SFBRWQCB 2008, p. 15).

Existing Contamination

Along with other islands on San Francisco Bay, YBI has been used for military purposes over the years. Naval Station Treasure Island was decommissioned in 1997; however, USCG activity continues on YBI. Based on current and previous environmental investigations, several areas of known and potential contaminant sources have been identified on YBI (AECOM 2009). At the high portion of the North-east Point on YBI, elevated levels of beryllium, lead, and pesticides have been detected. Along the entire shadow area of the existing bridge and adjacent ramps, investigations indicate a potential for lead contamination in surficial soils. Petroleum hydrocarbons were also found at a former gas station and adjacent fire station, both of which have been demolished. Petroleum hydrocarbons have also been found at an active underground storage tank (Leaking Underground Storage Tank or LUST). In addition, it has been established that there is petroleum hydrocarbon contamination in the groundwater. There is also probable Aerially Deposited Lead (ADL) contamination, primarily from tailpipe emissions, in the unpaved areas adjacent to the existing roadway.

The Site Management Plan for the Naval Station Treasure Island (Tetra Tech EM Inc. 2008) reflects the Navy's current strategies and schedules to achieve site closure at several sites on Naval Station Treasure Island. This plan indicates that environmental closeout schedules and site closure for Installation Restoration (IR) Sites 8, 11, and 29 as well as inactive fuel line YF3 may be impacted by construction activities related to the SFOBB and YBI Ramps Improvement Project. Site 8 is located on the northeast end of YBI and was used as an army sludge disposal area from the wastewater treatment plant for approximately 8 years between 1968 and 1976. Metals and pesticides have been identified as the contaminants of concern. Site 11 had been used as a landfill and contaminants of concern at this site include total petroleum hydrocarbons (TPH), polycyclic aromatic hydrocarbons (PAHs), volatile organic compounds (VOCs), and metals. Site 29 is located below and parallel to the SFOBB from the northeastern portion of YBI westward to the YBI tunnel. Site 29 contains lead due to maintenance of ramps (i.e., use of lead-based paint) as well as a result of vehicle emissions. An interim remedial investigation (RI) report for Sites 8 and 29 is being finalized and the RI report for Site 11

[6] On February 13, 2008, the San Francisco Bay RWQCB adopted an amendment incorporating a TMDL and associated implementation plan for PCBs in San Francisco Bay into the Water Quality Control Plan for the San Francisco Bay Basin (Basin Plan). The amendment must still be approved by the State Water Resources Control Board, the state Office of Administrative Law, and EPA.

is in the process of being prepared. The estimated year for site closeout for all three sites is 2021.

Fuel pipelines once crossed Naval Station Treasure Island to transport gasoline, diesel, bunker C fuel, and other petroleum products. The majority of the pipeline system has been removed or abandoned in place; however, there are portions of the pipeline system where additional corrective actions are expected include the YF3 and USCG sites, which are both located on the northeast side of YBI (Tetra Tech EM Inc. 2008).

B. Groundwater

The project area is located in the Coast Range geomorphic province. The San Francisco Bay Area is underlain by various Quaternary sedimentary units, which are in turn, under lain by the Jurassic and Cretaceous age bedrock of the Franciscan Complex. YBI is composed of Franciscan Formation bedrock, which has been uplifted to the surface (AGS 2007 p. 5).

YBI does not have an existing designated groundwater basin in the Basin Plan. In general, groundwater is not likely to be encountered during the dry season, but it may be encountered during the rainy season near the interface between the soil and rock. Boring logs did not indicate if the depth to groundwater was measured in any of the borings; however, four borings were classified as "wet", which indicates that it was saturated, two borings were classified as "dry to damp" and all other borings classified the material overlying the bedrock as "moist." Relatively shallow groundwater conditions may be encountered in the project area, especially in the lower elevation areas of YBI where the westbound on- and off-ramps are proposed (AGS 2007 p.7).

Due to the absence of long-term monitoring of water levels, the natural groundwater depth is uncertain. The Packer testing[7] indicated that the bedrock was nearly impermeable below the weathered zone and therefore water introduced into the boreholes and in fractures of this material is not likely to drain away. This leaves the possibility that the measured water depths are not normal and the natural groundwater table should generally be expected near adjacent Bay levels. The ongoing Project Approval and Environmental Document (PA&ED) phase will determine the natural groundwater depth.

V. WATER QUALITY IMPACTS

A. <u>Storm Water</u>

Caltrans has performed many studies to monitor and characterize highway storm water runoff throughout the State. Commonly found pollutants throughout the State are Total Suspended Solids (TSS), nitrate nitrogen, Total Kjeldahl Nitrogen (TKN), phosphorous, orthophosphate, copper, lead and zinc (Caltrans 2007c). Some sources of these pollutants

[7] Packer tests consist of isolating specific sections of a bedrock borehole so that water-quality samples can be collected and aquifer tests can be conducted. A series of such tests allows definition of the vertical distribution of water quality (usually contaminants) and hydraulic conductivity (pathways for water and contaminant movement) in an aquifer.

are natural erosion, phosphorus from tree leaves, combustion products from fossil fuels, and the wearing of break pads.

The westbound lanes of the new SFOBB as it approaches YBI would transition to a stacked configuration over the eastbound lanes. The proposed YBI ramps would connect to the high point of the westbound alignment located on this bridge. The SFOBB structures would be comprised of multi-cell cast-in-place concrete box girders. The structure depth would vary from approximately 1.8 to 5.9 meters (5.5 to 18 feet) (Caltrans 2000, p. 38). The current design of the proposed YBI ramp structures incorporates piped inlets directing storm water flows down the columns and into the Bay (Caltrans 2000, p. 38). The proposed drainage system would collect concentrated flows from the elevated ramp structures using inlets, storm drain pipes, and downdrain trenches and convey the runoff to the BMPs for treatment. After treatment runoff will be conveyed to the existing west tie-in drainage system (AECOM 2009). The existing ramps on YBI do not have any cross drains and the proposed YBI ramps do not include the construction of any new cross drains. Temporary (construction-related) and permanent drainage and treatment best management practices (BMPs) are currently in the conceptual design stage, as described in Section VI.

The project would be one of the three alternatives; either the No Build or one of two proposed build-alternatives. In both Alternatives 2B and 4, the soil disturbances are limited to the construction of roadway embankments at ramp termini, structural excavations for column foundations, wall foundations, backfill for required retaining walls, and unpaved property for use as contractor lay-down area.

Alternatives for the YBI Ramps Improvement Project include the replacement of existing westbound on- and off-ramps located in two different configurations, or a no build alternative.

- **No Build:** The No Build assumes that the existing ramps would remain in place. This alternative would have water quality impacts due to continuing congestion, which may increase with the proposed Treasure Island Redevelopment Plan, which includes 6,000 units, approximately 270,000 square feet of neighborhood-serving and visitor-oriented retail, and 500 hotel rooms. At build out, there is expected to be a net increase of 1,664 vehicles during the morning peak hour and 2,909 vehicles during the afternoon peak hour (CHS Consulting Group 2009). Vehicles waiting to enter I-80 westbound would continue deposition of particulates from exhaust and heavy metals from braking. Continued traffic safety deficiencies and accident rates higher than the statewide average rates (Caltrans 2007a, p. 11) would also be anticipated to continue and contribute to water quality impacts due to oil spills and discharge or spill of other pollutants during collision. Storm water would continue to discharge untreated into the San Francisco Bay.

Both build alternatives would increase the surface area exposed to precipitation and have a corresponding increase in the quantity of pavement storm water runoff during rainfall events. The proposed project is currently in the conceptual design stage; however, storm

drain systems would be sized to handle the increase in runoff due to additional paved surface. As described above for the No Build Alternative, Alternatives 2B and 4 would have water quality impacts related to the net increase estimated future vehicle volumes (CHS Consulting Group 2009).

- **Alternative 2B:** Would include the removal of the existing westbound on- and off-ramps on the east side of YBI, the construction of a westbound off-ramp to Macalla Road on the east side of YBI, and construction of a westbound hook on-ramp from Macalla Road on the east side of YBI. The disturbed soil area estimated for Alternative 2B is approximately 2.3 acres. The disturbed soil area is the area from the edge of the pavement to the construction limits created by the cut and fill slopes. The disturbed soil area does not include the paved ramp area. This alternative would have less water quality impacts than Alternative 4 due to less disturbed soil area and less amount of impervious area added to YBI. The amount of impervious area would increase from an existing 8.47 acres to 10.42 acres, a change of 1.95 acres. The percent of impervious area is expected to increase from 47% to 58% for the project site. Pervious area is the difference between the total area and impervious area within the project right-of-way. The surface runoff from Alternative 2B would be collected to the outfall near Macalla Road and treated in a BMP which is yet to be determined. It is anticipated, however, that detention devices, lined biofiltration swales, and media filters would be used to treat runoff prior to discharge (as identified below in Section VI). For Alternative 2B, the required water quality treatment flow was calculated as approximately 0.0214 cubic meter per second (m^3/s). The required water quality treatment volume was calculated to be 119 cubic meters (m^3) (AECOM 2009; see Attachment 1).

- **Alternative 4:** Would include the removal of the existing westbound on- and off-ramps on the east side of YBI, the construction of westbound on-ramp from Hillcrest Road, and construction of westbound off-ramp to Macalla Road on the east side of YBI. Alternative 4 would have the most water quality impacts of the three alternatives. The disturbed soil area estimated for Alternative 4 is approximately 4.4 acres, as it has the largest soil disturbance area, the largest increase in impervious area, and construction work would be required closer to San Francisco Bay. The amount of impervious area would increase from an existing 6.34 acres to 10.74 acres, a change of 4.40 acres. The percent of impervious area is expected to increase from 59% to 100% for the project site. Surface runoff from the northern half of this alternative would be collected at the outfall near Macalla Road. Surface runoff from the southern portion of this alternative would be collected to the outfall near South Gate Road. The location and types of BMPs that would be used to treat this surface runoff are in the conceptual design state and would be developed in detail at a future time; however, it is anticipated that detention devices, lined biofiltration swales, and media filters would be used to treat runoff prior to discharge (as identified below in Section VI). For Alternative 4, the required water quality treatment flow was

calculated as approximately 0.0242 m^3/s. The required water quality treatment volume was calculated to be 267 m^3 (AECOM 2009; see Attachment 1).

An integrated bridge and ramp drainage system would be designed and constructed within the YBI Ramps Improvement Project limits to collect all storm water runoff. An independent ramp drainage system would be designed and constructed to collect all ramp surface runoff. For all slopes, benching, rounding, and terracing would be considered to minimize concentrated flows and slope stabilization measures and retaining walls may be needed. In addition, slopes would include pipe or flume downdrains to collect concentrated flows, minimize erosion, and direct storm water into the proposed drainage system for treatment (AECOM 2009). The need for slope stabilization and possible retaining walls would be determined as the project progresses. In addition, slopes would include concrete side drains to collect concentrated flows, minimize erosion, and direct storm water in the proposed drainage system and acceptable BMPs, which would eventually terminate into San Francisco Bay.

The pollutant load from the proposed YBI ramp area is negligible when compared to the overall pollutant loadings to the San Francisco Bay from the entire watershed and would not have a net impact on the overall water quality in San Francisco Bay. San Francisco Bay is listed as impaired for a number of pollutants outlined in Section IV.A above; however, only mercury (under the Caltrans general metals category) is listed on the Caltrans targeted design constituent (TDC) list. Thus, treatment BMPs for consideration include those used to treat general metals/general purpose pollutants. Temporary construction site BMPs, permanent design pollution BMPs, and permanent treatment BMPs, would be required to minimize or prevent impacts on water quality and pollutant loading, particularly during times of large flood flow runoff. Suggested BMPs are described below in Section VI. The total mass of storm water pollution is not expected to change as a result of the project since the total usage hours are not expected to increase and the pollutant generation rate is not expected to increase (Caltrans 2001, p. 4-68).

B. Groundwater

Groundwater may be encountered during construction. At this time, excavated spoils would be considered hazardous along with any groundwater encountered and would require appropriate collection, testing, and if applicable, transport offsite for treatment and disposal.

VI. AVOIDANCE, MINIMIZATION AND/OR MITIGATION MEASURES

A. Section 401 of the Clean Water Act

There are potential Waters of the U.S. onsite; however, verification has not yet been completed by the U.S. Army Corps of Engineers regarding if they are considered jurisdictional. If it is determined that there would be impacts to existing wetlands and Waters of the U.S. within the project limits, an Army Corps 404 permit would be required along with a 401 Water Quality Certification from Region 2.

Avoidance and minimization efforts including BMPs to avoid discharge to waters of the U.S. have been considered and described in the Natural Environment Study (NES) as well as in this Water Quality Report. Impacts to Water of the U.S. and appropriate mitigation measures would be described in the Environmental Impact Statement/Environmental Impact Report (EIS/EIR) for the Yerba Buena Island Ramps Improvement Project.

B. Section 402 of the Clean Water Act

According to the Caltrans NPDES and General Permits, Best Management Practices (BMPs) would be incorporated into the proposed project to reduce the discharge of pollutants during and after construction to the Maximum Extent Practicable (MEP). These BMPs fall into three categories, temporary Construction Site BMPs, permanent Design Pollution Prevention BMPs, and permanent Treatment BMPs.

(1) Temporary Construction Site BMPs

Construction Site BMPs are implemented during construction activities to reduce pollutants in storm water discharges throughout construction. Planning would consider scheduling and construction timing to schedule major grading operations for the non-winter season when practical and minimize the active construction area during the rainy season. Temporary concrete washouts, stabilized construction entrances/exits, silt fences, sand bag barriers, gravel bag berms, and fiber rolls may be used as temporary construction site BMPs. Additional items may be identified as the project design phase advances. Dewatering would not likely be necessary for project construction of the cast-in-drilled holes (CIDH) piles; however, if required, at this time, it is assumed that the excavated spoils from the piles would be considered hazardous. Any hazardous water and spoils would be collected appropriately, tested, and transported offsite for treatment and disposal. Proper handling and disposal methods would be determined based on the background chemical levels in groundwater and the typical chemical constituents expected from construction activities.

To minimize any additional groundwater contamination resulting from construction activities, inspection of vehicles and equipment would be conducted, spill prevention and prompt spill response would be practiced, absorbent materials would be used to contain any spills, and the proper officials would be contacted in the case of a spill. Materials associated with construction activities would also be delivered and stored using practices that prevent these materials from polluting receiving waters. Vehicle and equipment maintenance would occur off-site whenever practical, but when occurring on-site, drip plans or absorbent pads would be used and all maintenance areas would be required to have spill kits or other spill protection devices. For pile driving operations, pile driving areas and equipment would be inspected for leaks and spills on a daily basis and when not in use, store pile driving equipment away from concentrated flows or storm water (Caltrans 2003b).

Solid construction wastes would be contained, stored, and disposed of using practices that minimize contact with storm water. Adequate trash receptacles and dumpsters would be

provided to contain litter and construction waste. Solid waste will not be collected near drainage inlets or receiving waters and should be covered to avoid conveyance of waste due to wind or water. In addition, temporary sanitary facilities should not be located near drainage facilities or receiving waters, nor should they be located in areas that will collect water.

Wind erosion controls would also be implemented to minimize dust and transportation of waste. Wind erosion controls could include covering of stockpiles and waste receptacles, the use of hydroseeding, soil binders or geotextiles on stockpiles, as well as applying of water or dust palliatives to stabilize stockpiles, roadways, or work areas.

Grading of existing slopes would be required for both proposed build alternatives. The existing site condition includes varying slopes that are either vegetated or has exposed rocks. Minor clearing and grubbing would be required within the project area. Existing vegetation would be preserved to the extent possible and clearly marked to minimize erosion potential and runoff velocities. The project's environmentally sensitive areas (ESAs), including several mature trees, would be protected with bright orange "ESA" fences. The use of retaining structures, especially in excavation areas, would minimize the amount of grading required. Imported fill would be used to create the project ramps terminus and may be retained with walls, and in other cases the ramps would include side slopes of 1V:4H. Temporary silt fence, stockpile cover, installation of temporary barriers around stockpiles to prevent contact with storm water, stabilized construction entrance/exit and temporary soil stabilizers are some of the temporary erosion and water pollution control measures that would be utilized in combination to prevent and minimize soil erosion and sediment discharges during construction.

Erosion controls such as netting or soil stabilization fabrics in combination with hydroseeding would be implemented to facilitate the establishment of permanent vegetation at the end of construction. The biodegradable netting is effective in providing good initial mechanical protection while seed applied during the hydroseeding operation germinates and establishes itself.

As the new cut and fill slope areas have been established, vegetation strategies and the soil erosion control plans will be prepared. The District Landscape Architect and Maintenance Storm Water Coordinator will be consulted during the development of these plans. Vegetating hillside slopes with deep rooted plants is recommended to help stabilize the soil (AECOM 2009).

Given a projected disturbance of greater than 0.4 hectares (one acre), a SWPPP would be developed prior to construction. This dynamic document addresses the deployment of various erosion and water pollution control measures that are required commensurate to changing construction activities. The purpose of the SWPPP would be to identify pollutant sources that may affect the quality of the storm water discharges associated with the construction activities of the project and to identify, construct, and implement storm water pollution control measures to reduce pollutants in storm water discharges from the construction site during and after construction.

(2) Permanent Design Pollution Prevention BMPs

Design Pollution Prevention BMPs are permanent measures to improve storm water quality and include measures to stabilize disturbed soil areas and maximize vegetated surfaces, thereby reducing runoff and erosion. Erosion control measures would be provided on all disturbed areas. As earlier noted, the use of retaining wall structures would minimize the amount of open disturbed soil. Following construction, the final slopes would be vegetated with an approved Caltrans seed mix. Re-establishment of permanent vegetation cover provides erosion control. In addition, slopes will include pipe or flume downdrains to collect concentrated flows, minimize erosion, and direct storm water into the proposed drainage system for treatment (AECOM 2009).

(3) Permanent Treatment BMPs

The PPDG Section 4 (Caltrans 2007b) describes the process for determining the need for permanent treatment BMPs. As the YBI Ramps Improvement Project will discharge water into surface waters that have TMDLs and other pollution controls, as described in Section IV, treatment BMPs are required. In addition, the project is within an urban MS4 area and would cause a change to historic drainage patterns. The project would also indirectly discharge surface runoff into the San Francisco Bay, and is considered a major reconstruction project[8] resulting in a net increase of greater than one acre of new impervious surface. According to the PPDG evaluation process, this project must consider permanent treatment BMPs. The TMDL established for mercury, as described in Section IV, will affect the selection of permanent treatment BMPs.

Treatment BMPs are permanent devices and facilities that treat storm water runoff. Caltrans-approved Treatment BMPs include Biofiltration Systems (Biofiltration Strips and Swales), Infiltration Basins, Detention Basins, Traction Sand Traps, Dry Weather Flow Diversions, Media Filters, Gross Solids Removal Devices (GSRDs), Multi-Chamber Treatment Trains, and Wet Basins. Those most feasible in the Bay Area are Biofiltration Systems, Infiltration Basins, Detention Basins, Dry Weather Flow Diversions, Media Filters, and Multi-chamber Treatment Trains. The selected treatment BMPs have been identified in the project's SWDR (AECOM 2009).

[8] As defined in the Storm Water Quality Handbook (Caltrans 2007b), new construction and major reconstruction includes new routes, route alignments, and route upgrades. New construction activity does not include routine maintenance to maintain original line and grade, hydraulic capacity, or original purpose of the facility, nor does it include emergency construction activities required to protect public health and safety. New Construction and major reconstruction projects may include, but are not limited to: new highways and freeways; highway-related facilities, including new or reconstructed maintenance facilities, safety roadside rest areas, toll plazas and inspection and weigh stations; adding one or more lanes; adding HOV lanes; construction activities conducted within highway rights-of-way in conjunction with a new facility; new or reconstructed interchanges, including on-ramps, off-ramps, and connectors; new or reconstructed bridges; tunnels; and drainage system improvements, including changes to pipes, conduits, channels, etc.

The SWDR identified Infiltration Devices as infeasible for the project site, as portions of the project site are known to have hazardous soil and contaminated groundwater. In addition, the impermeable soil found at the project site restricts opportunities for the use of infiltration devices (AECOM 2009). Multi-chamber Treatment Trains are also not appropriate at this project, as this project does not fall into any of the relevant categories (vehicle service facilities, parking areas, paved storage areas, or fueling stations). In addition, since dry weather flow diversions address non-storm water flows only, Dry Weather Flow Diversions are not recommended.

Detention Devices and Media Filters were evaluated as possible types of permanent Treatment BMPs. Detention Devices are effective at removing total suspended solids (TSS), phosphorus, particulate metals, and litter by temporarily detaining storm water runoff to allow sediment and particulates to settle out before it is discharged. Media Filters, specifically the Austin Vault Sand and Delaware Sand filters, are effective at removing general purpose pollutants. Both Detention Devices and Media Filters may require an impermeable lining to avoid leaking into potentially contaminated groundwater. Right-of-way concerns as well as the cost of these two permanent treatment BMPs were also considered to be issues in the PA&ED evaluation. However, Biofiltration Systems were identified as the favored permanent treatment BMP option.

Biofiltration swales are effective at removing general purpose pollutants. The site conditions and climate are favorable to allow suitable vegetation to be established. The SWDR indicates that biofiltration swales should be considered as a permanent water quality treatment BMP for the project (AECOM 2009). If biofiltration swales are included, consultation with the Regional/District NPDES coordinators would be necessary to discuss how to proceed since the site contains hazardous soil. Use of impermeable liners and an underdrain may be required to prevent contact with existing hazardous soils and contaminated groundwater. The draft drainage plan provided in the SWDR indicates that for both build alternatives, a biofiltration swale would extend north from the ramps, terminating in the bay (AECOM 2009). During the design phase, the feasibility of using biofiltration swales will be further investigated.

VII. REFERENCES

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Attachment 1 (AECOM 2009)

Project: I-80 On and Off Ramp Improvement Funded by SFCTA

AECOM

Alt 2B

	acre	m^2
Total Site Area	17.95	72641
Pervious Area	9.48	38360
Impervious Area	10.42	42199
Existing impervious Area	8.47	34281
Increased impervious area	1.95	7918
Total Disturbed Soil Area	2.29	9267

Total Water Tributary Area for Alt 2B

	acre	m^2
Onsite Tributary Area	3.89	15756
Offsite Tributary Area	0.00	0
Total Tributary Area	3.89	15756

Alt 4

	acre	m^2
Total Site Area	10.74	43480
Pervious Area	0.00	0
Impervious Area	10.74	43480
Existing impervious Area	6.34	2564
Increased impervious area	4.40	17816
Total Disturbed Soil Area	4.40	17816

Total Water Tributary Areas for Alt 4

	acre	m^2
On Site Tributary Area	4.40	17816
Offsite Tributary Area	0.00	0
Total Tributary Area	4.40	17816

Note: (1) surface runoff from the outside of the Right of Way (RW) to the project site is collected to the proposed Caltrans drainage system

(2) Onsite tributary area is defined as the area that the runoff collected from the roadway within the RW.

(3) Offsite tributary area is defined as the area that surface runoff is collected from the unpaved area within the RW and contributed to the treatment BMPs

Project: I-80 On and Off Ramp Improvement Funded By SFCTA

AECOM

Water Quality Flow (WQF) for Alt 2B

Method: Rational Method

Q=0.28*C*I*A

Where

Q is a surface runoff, m^3/s (Q would be the WQF from the area that discharge flow to flow based treatment BMPs.)

C is runoff coefficient, dimensionless

I is a rainfall intensity, mm/hr

A is a water tributary area, km^2

Calculation:

Where:

c=0.95

I=5.1,mm/hr (Ref. 1)

A= 0.015756 km^2 (3.89 ac)

WQF=	**0.0214**	**m^3/s**
	0.755	**cfs**

Water Quality Flow (WQF) for Alt 4

Method: Rational Method

Q=0.28*C*I*A **Area**

Where

Q is a surface runoff, m^3/s (Q would be the WQF from the area that discharge flow to flow based treatment BMPs.)

C is runoff coefficient, dimensionless

I is a rainfall intensity, mm/hr

A is a water tributary area, km^2

Calculation:

Where:

c=0.95

I=5.1 mm/hr (Ref. 1)

A= 0.028763 m^2 (4.40 ac)

WQF=	**0.0242**	**m^3/s**
	0.854	**cfs**

Reference:

1. Caltrans May 2007 Storm Water Quality Handbooks: Project Planning and Design, pg 2-18 Section 2

Project: I-80 On and Off Ramp Improvement Funded By SFCTA

AECOM

Water Quality Volume (WQV) for Alt 2B

Method: Maximized Volume Method

WQV= A x I

Where: WQV is a water quality volume, m^3

A is a water tributary area to the proposed treatment BMPs, m^2

I is a rainfall depth per area, m^2-m

Calculation:

Where: I is calculated as 0.015m^2-m from basin sizer 1.4 using
Drawdown Time (Hours) 48
Runoff Coefficient 0.8
A is 7918, m^2

WQV= 7918 x 0.015

119 m^3

Water Quality Volume (WQV) for Alt 2B

Method: Maximized Volume Method

WQV= A x I

Where: WQV is a water quality volume, m^3

A is a water tributary area to the proposed treatment BMPs, m^2

I is a rainfall depth per area, m^2-m

Calculation:

Where: I is calculated as 0.015m^2-m from basin sizer 1.4 using
Drawdown Time (Hours) 48
Runoff Coefficient 0.8
A is 28763, m^2

WQV= 17816 x 0.015

267 m^3

Reference:

1. Caltrans May 2007 Storm Water Quality Handbooks: Project Planning and Design, pg 2-19 Section 2