3.9 Hydrology and Water Quality

3.9.1 Existing Conditions

3.9.1.1 Regulatory Setting

Federal, state, and local regulations related to hydrology and water quality and applicable to the Proposed Project are summarized below.

Federal

This section describes the primary federal regulations related to hydrology and water quality that are applicable to the Proposed Project.

Clean Water Act

The primary federal law governing water quality is the Clean Water Act (CWA) of 1972. The CWA provides for the restoration and maintenance of the chemical, physical, and biological integrity of the nation's waters. The CWA emphasizes technology-based (end-of-pipe) control strategies and requires discharge permits to allow use of public resources for waste discharge. The CWA also limits the amount of pollutants that may be discharged and requires wastewater to be treated with the best treatment technology economically achievable regardless of receiving water conditions. The control of pollutant discharges is established through National Pollutant Discharge Elimination System (NPDES) permits that contain effluent limitations and standards. The U.S. Environmental Protection Agency (EPA) has delegated responsibility for implementation of portions of the CWA, such as Sections 303, 401, and 402 (discussed below), to the State Water Resources Control Board (State Water Board) and the associated nine Regional Water Quality Control Boards (Regional Water Boards).

Section 303(d) and Total Maximum Daily Loads

The State of California adopts water quality standards to protect beneficial uses of waters of the state as required by Section 303(d) of the CWA and the Porter-Cologne Water Quality Control Act of 1969 (Porter-Cologne Act). Section 303(d) of the CWA established the total maximum daily load (TMDL) process to guide the application of state water quality standards (see the discussion of state water quality standards below). In order to identify candidate water bodies for TMDL analysis, a list of water quality–impaired segments is generated by the State Water Board. These stream or river segments are impaired by the presence of pollutants such as sediment and are more sensitive to disturbance because of this impairment.

In addition to the impaired waterbody list required by CWA Section 303(d), CWA section 305(b) requires states to develop a report assessing statewide surface water quality. Both CWA requirements are being addressed through the development of a 303(d)/305(b) Integrated Report, which will address both an update to the 303(d) list and a 305(b) assessment of statewide water quality. The State Water Board developed a statewide 2010 California Integrated Report based on the Integrated Reports from each of the nine Regional Water Boards. The 2010 California Integrated Report was approved by the State Water Board on August 4, 2010, and approved by the EPA on

November 12, 2010. A 2012 California Integrated Report with 303(d) listings is currently in development.

The following impaired water bodies will be crossed by the Proposed Project alignment: San Francisco Bay, Colma Creek, Lower San Mateo Creek, Laurel Creek, San Francisquito Creek, Matadero Creek, Permanente Creek, Stevens Creek, Saratoga Creek, Calabazas Creek, and the Guadalupe River. Section 3.9.1.2, *Environmental Setting*, describes water quality impairments for these water bodies.

Section 401—Water Quality Certification

Section 401 of the CWA requires that an applicant pursuing a federal permit to conduct an activity that may result in a discharge of a pollutant obtain a Water Quality Certification (or waiver). A Water Quality Certification requires the evaluation of water quality considerations associated with dredging or placement of fill materials into waters of the United States. Water Quality Certifications are issued by one of the nine geographically separated Regional Water Boards in California. Under the CWA, the Regional Water Board must issue or waive a Section 401 Water Quality Certification for a project to be permitted under CWA Section 404.

As shown in Table 2-14 in Chapter 2, *Project Description*, the Proposed Project may be required to obtain a Water Quality Certification if permanent facilities or construction disturbance is proposed within state jurisdictional waters.

Section 402—National Pollutant Discharge Elimination System

The 1972 amendments to the Federal Water Pollution Control Act established the NPDES permit program to control discharges of pollutants from point sources (Section 402). The 1987 amendments to the CWA created a new section of the CWA devoted to stormwater permitting (Section 402[p]). EPA has granted the State of California (the State Water Board and Regional Water Boards) primacy in administering and enforcing the provisions of CWA and NPDES. NPDES is the primary federal program that regulates point-source and nonpoint-source discharges to waters of the United States.

NPDES General Permit for Construction Activities

The General NPDES Permit for Storm Water Discharges Associated with Construction and Land Disturbance Activities (Order 2009-0009-DWQ) (Construction General Permit) regulates stormwater discharges for construction activities under CWA Section 402. Dischargers whose projects disturb 1 or more acres of soil, or whose projects disturb less than 1 acre but are part of a larger common plan of development that in total disturbs 1 or more acres, are required to obtain coverage under the Construction General Permit. The Construction General Permit requires the development and implementation of a Stormwater Pollution Prevention Plan (SWPPP).

As shown in Table 2-14 in Chapter 2, *Project Description*, the Proposed Project will be required to obtain a Construction General Permit for Linear Underground/Overhead Projects (LUPs) because total land disturbance would be greater than 1 acre. Permanent land disturbance for the Proposed Project would include overhead contact system (OCS) poles and traction power facilities and would cover approximately up to 3 acres (2.8 acres).

NPDES General Municipal Stormwater Permit

CWA Section 402 mandates programmatic permits for municipalities to address stormwater discharges, which are regulated under the NPDES General Permit for Municipal Separate Storm Sewer Systems (MS4) (MS4 Permit). Phase I MS4 regulations cover municipalities with populations greater than 100,000, certain industrial processes, or construction activities disturbing an area of 5 acres or more. Phase II (Small MS4) regulations require that stormwater management plans be developed by municipalities with populations smaller than 100,000 and construction activities disturbing 1 or more acres of land area.

The State Water Board is advancing Low Impact Development (LID) in California as a means of complying with municipal stormwater permits. LID incorporates site design, including among other things the use of vegetated swales and retention basins and minimizing impermeable surfaces, to manage stormwater to maintain a site's predevelopment runoff rates and volumes.

The Proposed Project area is located entirely within urban areas from San Francisco south to San Jose, and therefore will be subject to the requirements of San Francisco Bay Region Municipal Regional Stormwater NPDES Permit No. CAS029718 (Order No. R2-2009-0074-DWQ) (SF Bay MS4 Permit) with the San Francisco Bay Regional Water Board, most recently issued on October 14, 2009. Provision C.3 of the SF Bay MS4 Permit is for New Development and Redevelopment projects authorities to include appropriate source control, site design, and stormwater treatment measures in new development and redevelopment projects to address both soluble and insoluble stormwater runoff pollutant discharges and prevent increases in runoff flows from new development and redevelopment projects. This goal is to be accomplished primarily through the implementation of LID techniques including infiltration and biotreatment. The provision also states that "all projects regardless of size should consider incorporating appropriate source control and site design measures that minimize stormwater pollutant discharges to the maximum extent practicable [MEP]…". Regardless of a project's need to comply with Provision C.3, municipalities apply the MEP standard, including standard stormwater conditions of approval for projects that receive development permits.

Waste Discharge Requirements for Dewatering and Other Low Threat Discharges to Surface Waters

CWA Section 402 also includes waste discharge requirements (WDRs) for dewatering activities. While small amounts of construction-related dewatering are covered under the Construction General Permit, the San Francisco Bay Regional Water Board has regulations specific to dewatering activities that typically involve reporting and monitoring requirements.

If dewatering is required as part of the Proposed Project, then the contractor will comply with the San Francisco Bay Regional Water Board dewatering requirements.

Section 404—Dredge/Fill Permitting

The discharge of dredged or fill material into waters of the United States is subject to permitting specified under Title IV (Permits and Licenses) of this act and specifically under Section 404 (Discharges of Dredge or Fill Material) of the CWA. Section 404 of the CWA regulates placement of fill materials into the waters of the United States. Section 404 permits are administered by the U.S. Army Corps of Engineers (USACE).

As shown in Table 2-14 in Chapter 2, *Project Description*, the Proposed Project may be required to obtain a Section 404 Permit if power pole foundations or other permanent project features or construction occurs within federal jurisdictional waters.

National Flood Insurance Program

In response to increasing costs of disaster relief, Congress passed the National Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973. The intent of these acts was to reduce the need for large, publicly funded, flood control structures and disaster relief by restricting development on floodplains. The National Flood Insurance Program (NFIP) was created as a result of the passage of the National Flood Insurance Act of 1968. The Federal Emergency Management Agency (FEMA) administers the NFIP to provide subsidized flood insurance to communities that comply with FEMA regulations limiting development in floodplains. FEMA issues Flood Insurance Rate Maps (FIRMs) for communities participating in the NFIP. These maps delineate flood hazard zones in the community. A FIRM is the official map of a community prepared by FEMA to delineate both the special flood hazard areas and the flood risk premium zones applicable to the community.

The NFIP applies to the Proposed Project because portions of the alignment are located within a FEMA-designated 100-year floodplain, as discussed in Section 3.9.1.2, *Environmental Setting.*

State

This section describes the primary state regulations related to hydrology and water quality that are applicable to the Proposed Project.

Porter-Cologne Water Quality Control Act

The Porter-Cologne Act is the basic water quality control law for California. The Porter-Cologne Act authorizes the state to implement the provisions of the CWA. The Porter-Cologne Act establishes a regulatory program to protect the water quality of the state and the beneficial uses of state waters.

The Porter-Cologne Act requires project proponents whose projects would result in discharging, or proposing to discharge, wastes that could affect the quality of the state's water to file a Report of Waste Discharge (RWD) with the appropriate Regional Water Board. The Porter-Cologne Act also requires that State Water Board or a Regional Water Board adopt basin plans for the protection of water quality. Basin plans are updated and reviewed every 3 years and provide the technical basis for determining Waste Discharge Requirements (WDRs), taking enforcement actions, and evaluating clean water grant proposals. A basin plan must include the following sections (San Francisco Bay Regional Water Quality Control Board 2011).

- A statement of beneficial water uses that the Regional Water Board will protect.
- Water quality objectives needed to protect the designated beneficial water uses.
- Strategies and time schedules for achieving the water quality objectives.

The proposed project lies within the jurisdiction of the San Francisco Bay Regional Water Board. The board is responsible for the protection of beneficial uses of water resources in the San Francisco Bay Area, which includes Alameda, Contra Costa, San Francisco, Santa Clara (north of Morgan Hill), San Mateo, Marin, Sonoma, Napa, and Solano Counties. The San Francisco Bay Basin (Region 2) Water Quality Control Plan (Basin Plan) was last updated in 2011 (San Francisco Bay Regional Water Quality Control Board 2011).

Regional Water Boards designate beneficial uses for all water body segments in their jurisdictions, and then set criteria necessary to protect these uses. Consequently, the water quality objectives developed for particular water segments are based on the designated use and vary depending on such use. The *San Francisco Bay Basin (Region 2) Water Quality Control Plan (Basin Plan)* specifies region-wide and water body-specific beneficial uses; and has set numeric and narrative water quality objectives for several substances and parameters in numerous surface waters in its region. Specific objectives for concentrations of chemical constituents are applied to bodies of water based on their designated beneficial uses (San Francisco Bay Regional Water Quality Control Board 2011). In addition, the State Water Board identifies waters failing to meet standards for specific pollutants, which are then state-listed in accordance with CWA Section 303(d). If it is determined that waters of the state 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 TMDLs.

California Department of Fish and Game 1602 Streambed Alteration Agreement

Under Chapter 6 of the California Fish and Game Code, the California Department of Fish and Wildlife (CDFW) is responsible for the protection and conservation of the state's fish and wildlife resources. Section 1602 et seq. of the code defines the responsibilities of CDFW and requires that public and private applicants obtain an agreement to "divert, obstruct, or change the natural flow or bed, channel, or bank of any river, stream, or lake designated by the CDFW in which there is at any time an existing fish or wildlife resource or from which those resources derive benefit, or will use material from the streambeds designated by the department." A streambed alteration agreement is required under Section 1602 of the California Fish and Game Code for all activities that involve temporary or permanent activities within state jurisdictional waters.

As shown in Table 2-14 in Chapter 2, *Project Description*, the Proposed Project may be required to obtain a Streambed Alteration Agreement if the project permanently or temporarily disturbs the bed or bank of any state streams or other jurisdictional water bodies.

California Department of Pesticides Regulation

California Department of Pesticides Regulation (DPR) is the lead agency for regulating the registration, sale, and use of pesticides in California. It is required by law to protect the environment, including surface waters, from adverse effects of pesticides by prohibiting, regulating, or controlling the use of such pesticides. DPR has surface water and groundwater protection programs that address sources of pesticide residues in surface waters and has preventive and response components that reduce the presence of pesticides in surface and groundwaters. The preventive component includes local outreach and promotion of management practices that reduce pesticide runoff and prevent continued movement of pesticides to groundwater in contaminated areas. In order to promote cooperation to protect water quality from the adverse effects of pesticides, DPR and the State Water Board signed a Management Agency Agreement (MAA). The MAA, and its companion document, *The California Pesticide Management Plan for Water Quality*, are intended to coordinate interaction, facilitate communication, promote problem solving, and ultimately assure the protection of water quality.

Caltrain uses pesticides as part of current operations and maintenance to maintain and clear vegetation from the right of way (ROW). This practice would not change under the Proposed Project. The current and future use of pesticides for vegetation removal near the track alignment and other

facilities as part of operation and maintenance activities would be required to comply with DPR regulations.

Coastal and Ocean Working Group of the California Climate Action Team

The Coastal and Ocean Working Group of the California Climate Action Team (CO-CAT) developed the *State of California Sea-Level Rise Guidance Document* for state agencies to incorporate sea level rise (SLR) into planning and decision making for projects in California. The document was developed in response to Governor Schwarzenegger's Executive Order S-13-08, issued on November 14, 2008, which directed state agencies to plan for SLR and coastal impacts. That executive order also requested the National Research Council (NRC) to issue a report on SLR to advise California on planning efforts. The final report from the NRC, *Sea-Level Rise for the Coasts of California, Oregon, and Washington*, was released in June 2012. The *State of California Sea-Level Rise Guidance Document* was last updated in March 2013 with the scientific findings of the 2012 NRC report.

In the CO-CAT SLR guidance document (Coastal and Ocean Working Group of the California Climate Action Team 2013), three SLR projections based on time periods (2030, 2050, and 2100) were selected for south of Cape Mendocino using year 2000 as the baseline. SLR projections based on the *State of California Sea-Level Rise Guidance Document* are described later in this section.

The JPB will use the CO-CAT SLR guidance document for project planning and decision making.

Local

Pursuant to the San Mateo County Transit District's (SamTrans') enabling legislation (Public Utilities Code Section 103200 et seq.) and the 1991 Interstate Commerce Commission's approval of the Joint Powers Board (JPB) acquisition of the Caltrain line, JPB activities within the Caltrain ROW are exempt from local building and zoning codes and other land use ordinances. Nonetheless, the JPB will cooperate with local government agencies in performing improvements within its ROW and protecting local water quality. As such, the description of local water quality regulations is provided for contextual purposes only. Where local implementation of a state or federal regulation is provided (such as relative to the MS4 permits), that guidance is relative to compliance with state or federal regulations.

This section describes local requirements related to hydrology and water quality in the project area. The Proposed Project is located within the counties of San Francisco, San Mateo and Santa Clara. There are also several cities and municipalities with general plan goals and policies, ordinances, and other programs and requirements that are not discussed here.

San Francisco Stormwater Management Program

The San Francisco Public Utilities Commission (SFPUC) has developed stormwater design guidelines that introduce the stormwater performance measures that must be achieved for project approval and provide detailed instructions for developing a Stormwater Control Plan (SCP), a document which will allow city staff to assess compliance.

Approximately 90 percent of San Francisco is served by a combined sewer system that conveys both sewage and stormwater for treatment to three sewage treatment plants before being discharged to receiving water. Discharges from the treatment plants are subject to the requirements of individual NPDES permits for wastewater discharges. The remaining 10 percent of the system consists of stormwater discharges into the San Francisco Bay, Pacific Ocean, Lake Merced or smaller water

bodies within the city limits. The stormwater system is regulated by SFPUC, The Port of San Francisco, or various owners of redevelopment areas.

The northernmost portion of the project alignment borders the stormwater system area under the jurisdiction of the Port of San Francisco and a redevelopment area.

San Mateo Countywide Water Pollution Prevention Program

San Mateo Countywide Water Pollution Prevention Program (SMCWPPP) is a partnership of the City/County Association of Governments (C/CAG), each incorporated city and town in the county, and the County of San Mateo, which share a common MS4 permit. Each municipality in San Mateo County is responsible for complying with the MS4 permit requirements for stormwater runoff from its streets and local storm drain system. The permit prescribes how each municipality will regulate development and redevelopment projects, conduct its municipal maintenance activities, eliminate non-stormwater discharges, inspect businesses to control stormwater pollutants, and encourage the public's help in preventing pollution.

In order to meet local municipal requirements and requirements in the San Francisco Bay MS4 Permit, the County of San Mateo has developed a *Provision C.3 Stormwater Technical Guidance Handbook* (San Mateo County 2013) to help developers, builders, and project sponsors include post-construction stormwater controls in their projects. The municipalities must require post-construction stormwater controls as part of their obligations under Provision C.3 of the MS4 Permit. The Countywide Program has also prepared a *Sustainable Green Streets and Parking Lots Design Guidebook* to specifically assist municipalities and project applicants with designing street and parking lot projects that treat stormwater runoff in landscape-based treatment measures.

The SMCWPPP Hydromodification Management Plan (HMP) complies with the San Francisco Bay Region MS4 permit. The HMP delineates areas where increases in runoff are most likely to affect channel health and water quality and provides management options to maintain pre-project runoff patterns. As indicated in the HMP, none of the Proposed Project area in San Mateo County is subject to the HMP because it consists of areas that are already extensively impervious (more than 65 percent), low gradient areas, and/or drain to existing hardened channels.

The Proposed Project would be partially located within San Mateo County, and, therefore, the SMCWPPP stormwater requirements and guidelines are relevant to MS4 compliance in San Mateo County (other than the HMP requirements which do not apply).

Santa Clara Valley Urban Runoff Pollution Prevention Program

The Santa Clara Valley Urban Runoff Pollution Prevention Program (SCVURPPP) is an association of 13 cities and towns in the Santa Clara Valley, Santa Clara County, and the Santa Clara Valley Water District that share a common NPDES permit (Permit No. CAS612008) pertaining to the discharge stormwater to south San Francisco Bay.

The SCVURPPP HMP complies with the San Francisco Bay Region MS4 permit. As indicated in the HMP, none of the Proposed Project area in Santa Clara County is subject to the HMP because it consists of areas that are already extensively impervious (more than 65 percent), drain to tidal areas or existing hardened channels, or are extensively built out (90 to 100 percent, in which a 50-acre threshold applies instead of a 1 acre threshold, which the Proposed Project is well under).

The Proposed Project is partially located within Santa Clara County, and therefore the SCVURPP stormwater requirements and guidelines are relevant to MS4 compliance in San Mateo County (other than the HMP requirements which do not apply).

San Francisco Bay Conservation and Development Commission

The Bay Conservation and Development Commission (BCDC) has regulatory responsibility over development in San Francisco Bay and along the Bay's nine-county shoreline (within 100 feet of the designated Bay). BCDC is guided in its decisions by its law, the McAteer-Petris Act, the *San Francisco Bay Plan*, and other plans for specific areas around the Bay. It is necessary to obtain a BCDC permit prior to undertaking most work in or immediately adjacent the jurisdictional Bay, including tidal portions of waterbodies that flow into San Francisco Bay.

In a BCDC report on SLR (San Francisco Bay Conservation and Development Commission 2011), two SLR projections were presented as the basis for inundation vulnerability assessment: a 16-inch (40-centimeter [cm]) SLR by mid-century and a 55-inch (140-cm) rise in sea level by the end of the century. These projections are relevant because BCDC has jurisdiction within portions of the project area. However, statewide projections presented by CO-CAT are more recent, and, therefore, were used for the purposes of this analysis. More detail is provided in Section 3.9.1.2, *Environmental Setting, Current Flooding Risk.*

Because the project area includes several areas within the 100-foot shoreline band (i.e., at Brisbane Lagoon), a permit from BCDC may be required for portions of the Proposed Project.

3.9.1.2 Environmental Setting

Information for the hydrological setting was obtained from the NES for the Proposed Project (Parsons 2002), the EIS/EIR for the BART to San Francisco International Airport Project, general plans from communities along the project alignment, 100-year floodplain data from FEMA/ESRI Project Hazard website, and BCDC 16- and 55-inch SLR maps for the San Francisco Bay.

Surface Water

Hydrology

The Proposed Project is within the larger San Francisco Bay Hydrologic Region, which includes watersheds that drain directly into the San Francisco Bay, and coastal creek watersheds in San Francisco, San Mateo, and Santa Clara Counties that drain directly to the Pacific Ocean. As shown in Figure 3.9-1, the project area is within the South Bay and Santa Clara watersheds (or California Department of Water Resources [DWR] hydrologic units), both of which ultimately drain to the San Francisco Bay (California Department of Water Resources 2009). Figures 3.9-2a–c shows hydrological features crossed by the Proposed Project alignment and in the surrounding vicinity.

The hydrology in the San Francisco portion of the project alignment is substantially altered from its natural environment, and drainage is accomplished through a network of urban storm drains that flow into San Francisco Bay. There are two surface water features in the vicinity of the Caltrain alignment: China Basin (Mission Creek) and Islais Creek Channel.

In northern San Mateo County, the alignment passes through the Colma Creek drainage basin, which is a narrow alluvial valley, 2–3 miles wide, situated between San Bruno Mountain and the coastal hills. In South San Francisco, the project alignment runs parallel to Colma Creek and then crosses the

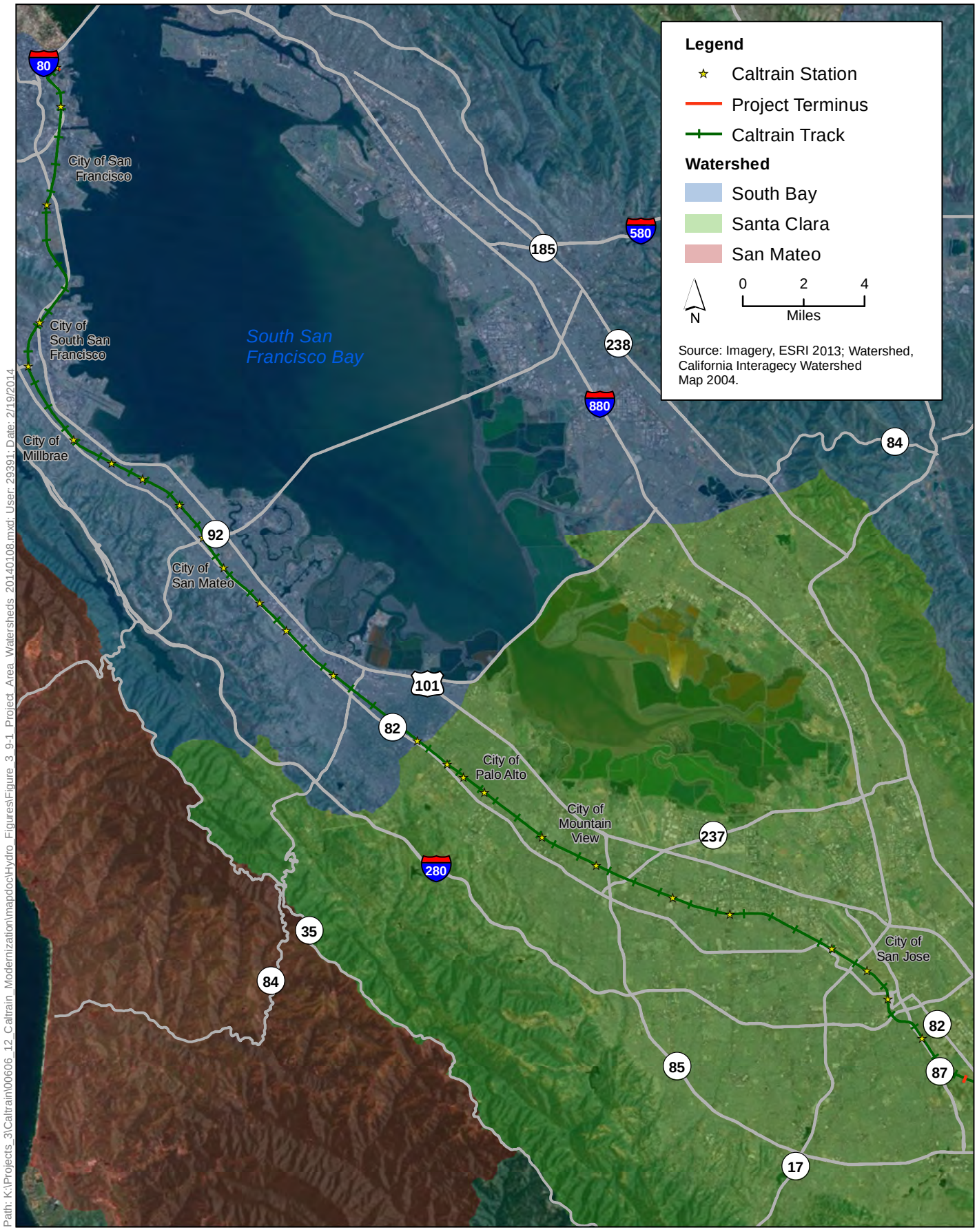

Figure 3.9-1
Project Area Watersheds
Peninsula Corridor Electrification Project

creek north of Westborough Boulevard in South San Francisco. South of the Colma Creek drainage basin, the alignment passes through heavily urbanized San Francisco Bay flatlands, bounded by San Francisco Bay to the east and mountainous terrain to the west. The alignment runs generally northwest-southeast and parallel to the San Francisco Bay shoreline. The hydrology can be characterized as a series of creeks, channels, and storm drains running generally east-west, allowing water from the mountains' eastern slopes to drain eastward to the Bay. This drainage system has been largely altered from its natural condition and is controlled by a system of storm drains and lined creek beds.

As shown in Figure 3.9-2a–c, the Proposed Project alignment crosses 30 major hydrological features. The alignment also crosses or runs adjacent to inlets of the San Francisco Bay and the Brisbane Lagoon. The streams and rivers crossed by the alignment, from north to south, are listed in Table 3.9-1.

Table 3.9-1. Hydrological Features in the Project Area from North to South

San Francisco 4th and King Station to Burlingame Station	Burlingame Station to Palo Alto Station	Palo Alto Station to Tamien Station
Mission Creek	San Mateo Creek	Matadero Creek
Islais Creek	Unnamed Drainage 5	Barron Creek
Unnamed Drainage 1	Laurel Creek	Adobe Creek
Brisbane Lagoon	Belmont Creek	Permanente Creek
Colma Creek	Pulgas Creek	Stevens Creek
Unnamed Drainage 2	Unnamed Drainage 6	Calabazas Creek
Unnamed Drainage 3	Cordilleras Creek	Saratoga Creek
Unnamed Drainage 4	Arrojo Ojo De Agua	San Tomas Aquinas Creek
Mills Creek	Unnamed Drainage 7	Los Gatos Creek
Easton Creek	San Francisquito Creek	Guadalupe River
Sanchez Creek		

Surface Water Quality

The San Francisco Bay Basin Plan specifies beneficial uses that apply to water bodies within the project area, as shown in Table 3.9-2 (San Francisco Bay Regional Water Quality Control Board 2011).

Table 3.9-2. Beneficial Uses for Surface Waters within the Project Area

Water Body	Designated Beneficial Uses
Central, Lower, and South San Francisco Bay	IND; PROC (Central San Francisco Bay only); COMM; SHELL; EST; MIGR; RARE; SPWN[a]; WILD; REC1; REC2; NAV
San Mateo Creek	FRSH; COLD[a]; RARE; SPWN; WILD; REC1[a]; REC2[a]
San Francisquito Creek	COLD; MIGR; SPWN; WARM; WILD; REC1[a]; REC2[a]
Matadero Creek	COLD; MIGR; SPWN; WARM; WILD; REC1; REC2
Permanente Creek	COLD; SPWN; WILD; REC1; REC2
Saratoga Creek	AGR; FRSH; GWR; COLD; WARM; WILD; REC1; REC2

KEY:

AGR: Agricultural Supply
COLD: Cold Freshwater Habitat
COMM: Ocean, Commercial, and Sport Fishing
EST: Estuarine Habitat
FRSH: Freshwater Replenishment
GWR: Groundwater Recharge
WILD: Wildlife Habitat
WARM: Warm Freshwater Habitat
IND: Industrial Service Supply
MIGR: Fish Migration
NAV: Navigation
RARE: Preservation of Rare and Endangered Species
Supply
REC1: Water Contact Recreation
REC2: Noncontact Water Recreation
SHELL: Shell Fish Harvesting
SPWN: Fish Spawning
PROC: Industrial Process Water Supply

Notes:
[a] Indicates a potential (rather than existing) beneficial use.

The 303(d)-listed impairments for the San Francisco Bay are shown in Table 3.9-3 and are based on the 2010 California Integrated Report (California State Water Resources Control Board 2011).

Table 3.9-3. Water Quality Impairments within the Project Alignment

Water Body	Listed Impairments Per 2006 303(d) List	Potential Sources	EPA TMDL Completion
San Francisco Bay	Chlordane	Nonpoint source	Est. 2013
	DDT (dichlorodiphenyltrichlorothane)	Nonpoint source	Est. 2013
	Dieldrin	Nonpoint source	Est. 2013
	Dioxin compounds (including 2,3,7,8-TCDD (tetrachlorodibenzodioxin)	Atmospheric deposition	Est. 2019
	Furan compounds	Atmospheric deposition	Est. 2019
	Invasive Species	Ballast water	Est. 2019
	Mercury	Atmospheric deposition, industrial point sources, municipal point sources, natural source, nonpoint source, resource extraction	2008
	PCBs and Dioxin-Like PCBs (polychlorinated biphenyls)	Unknown nonpoint source	2008
	Selenium[a]	Industrial point sources, exotic species, and natural sources	2010
	Trash	Illegal dumping, urban runoff/storm sewers	Est. 2021
Colma Creek	Trash	Illegal dumping, urban runoff/storm sewers	Est. 2021
Lower San Mateo Creek	Sediment Toxicity	Unknown	Est. 2021

Water Body	Listed Impairments Per 2006 303(d) List	Potential Sources	EPA TMDL Completion
Laurel Creek	Diazinon	Urban runoff/storm sewers	2007
San Francisquito Creek	Diazinon	Urban runoff/storm sewers	2007
	Sedimentation/siltation	Nonpoint source	Est. 2013
	Trash	Illegal dumping, urban runoff/storm sewers	Est. 2021
Matadero Creek	Diazinon	Urban runoff/storm sewers	2007
	Trash	Illegal dumping, urban runoff/storm sewers	Est. 2021
Permanente Creek	Diazinon	Urban runoff/storm sewers	2007
	Total Selenium	Unknown	Est. 2021
	Toxicity	Unknown	Est. 2021
	Trash	Illegal dumping, urban runoff/storm sewers	Est. 2021
Stevens Creek	Diazinon	Urban runoff/storm sewers	2007
	Water Temperature	Channelization, habitat modification, removal of riparian vegetation	Est. 2021
	Toxicity	Unknown	Est. 2021
	Trash	Illegal dumping, urban runoff/storm sewers	Est. 2021
Saratoga Creek	Diazinon	Urban runoff/storm sewers	2007
	Trash	Illegal dumping, urban runoff/storm sewers	Est. 2021
Calabazas Creek	Diazinon	Urban runoff/storm sewers	2007
Guadalupe River	Diazinon	Urban runoff/storm sewers	2007
	Mercury	Mine tailings	2008
	Trash	Illegal dumping, urban runoff/storm sewers	Est. 2021

Source: California State Water Resources Control Board 2011
[a] Limited to the Central and South San Francisco Bay
Est. = estimated completion date

The project area is located entirely within urban areas from San Francisco south to San Jose along the San Francisco Bay, and a majority of the ground surface is covered by pavement (roads and parking lots) and structures (residential and commercial buildings).

Street surfaces are the primary source of pollutants in stormwater runoff in urban areas. Constituents or pollutants in stormwater runoff (e.g., oil and grease, particulates, pesticides, herbicides, animal waste) vary with surrounding land uses, impervious surface area, and topography, as well as with the intensity and frequency of rainfall or irrigation. Stormwater runoff generated at the onset of the wet season, or the *first-flush* typically contains the highest pollutant concentrations. Other common sources of stormwater pollution in urban areas include construction sites, parking lots, large landscaped areas, and household and industrial sites (i.e., pollutants dumped into storm drains). Grading and earthmoving activities associated with new construction can accelerate soil erosion. Grease, oil, hydrocarbons, and metals deposited by vehicles and heavy equipment can accumulate on streets and paved parking lots and are carried into storm drains by runoff. In urban areas, trash and litter can collect in storm drain inlets and ultimately be discharged into nearby waterways. Trash can threaten aquatic life and recreational beneficial uses designated

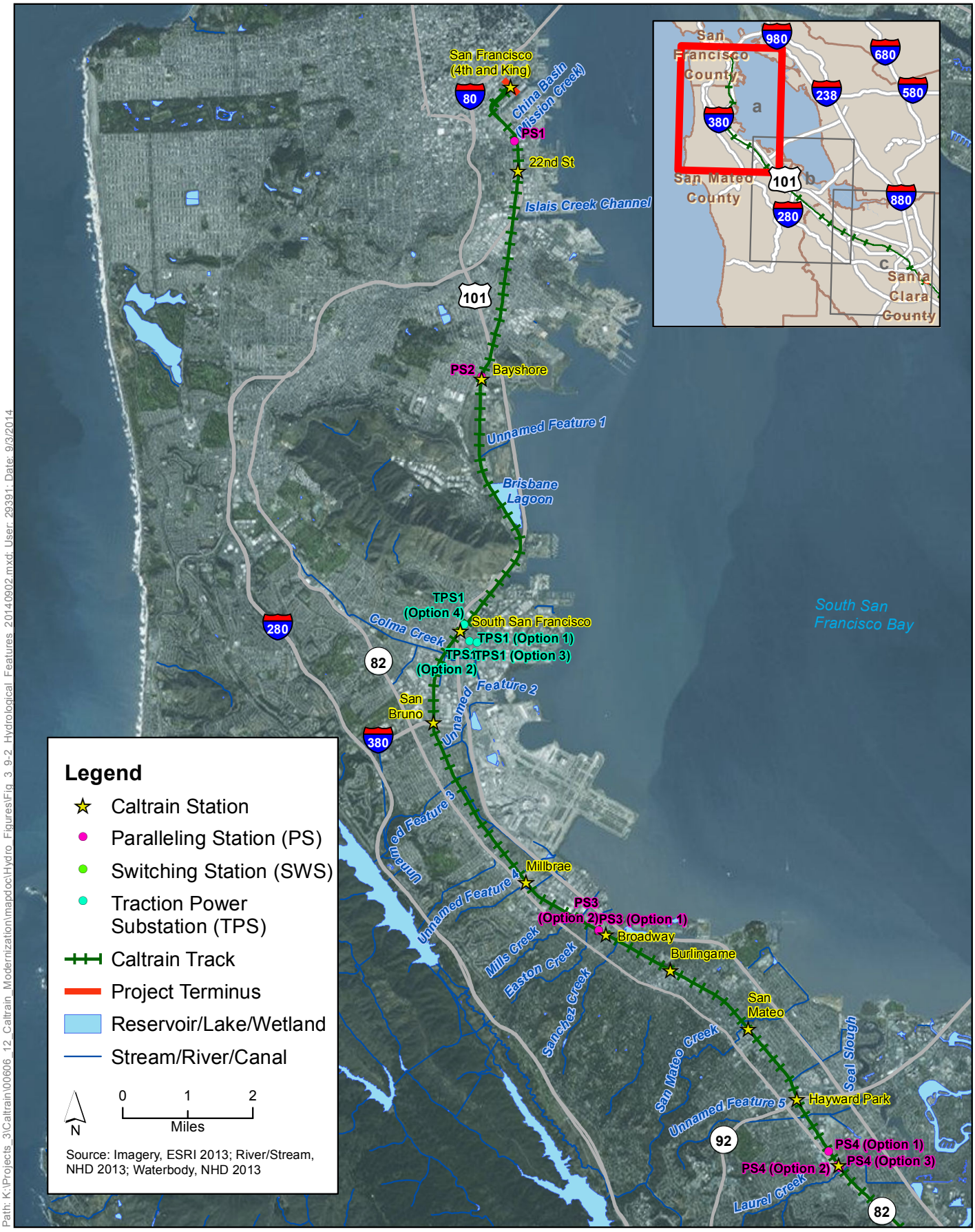

Figure 3.9-2a
Hydological Features within the Project Area
Peninsula Corridor Electrification Project

Note: This figure replaces Figure 3.9-2a from the Draft EIR

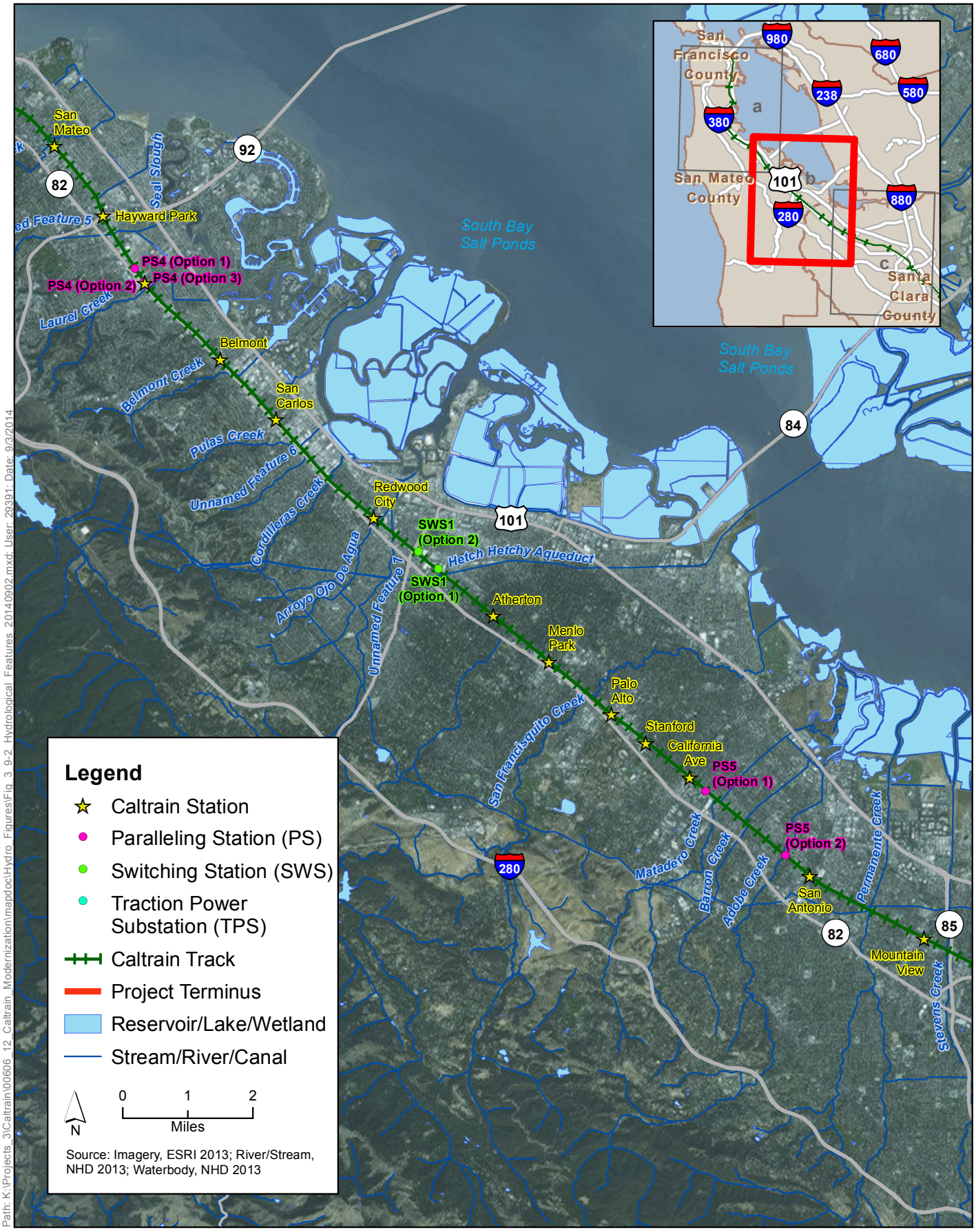

Figure 3.9-2b
Hydological Features within the Project Area
Peninsula Corridor Electrification Project

Note: This figure replaces Figure 3.9-2b from the Draft EIR

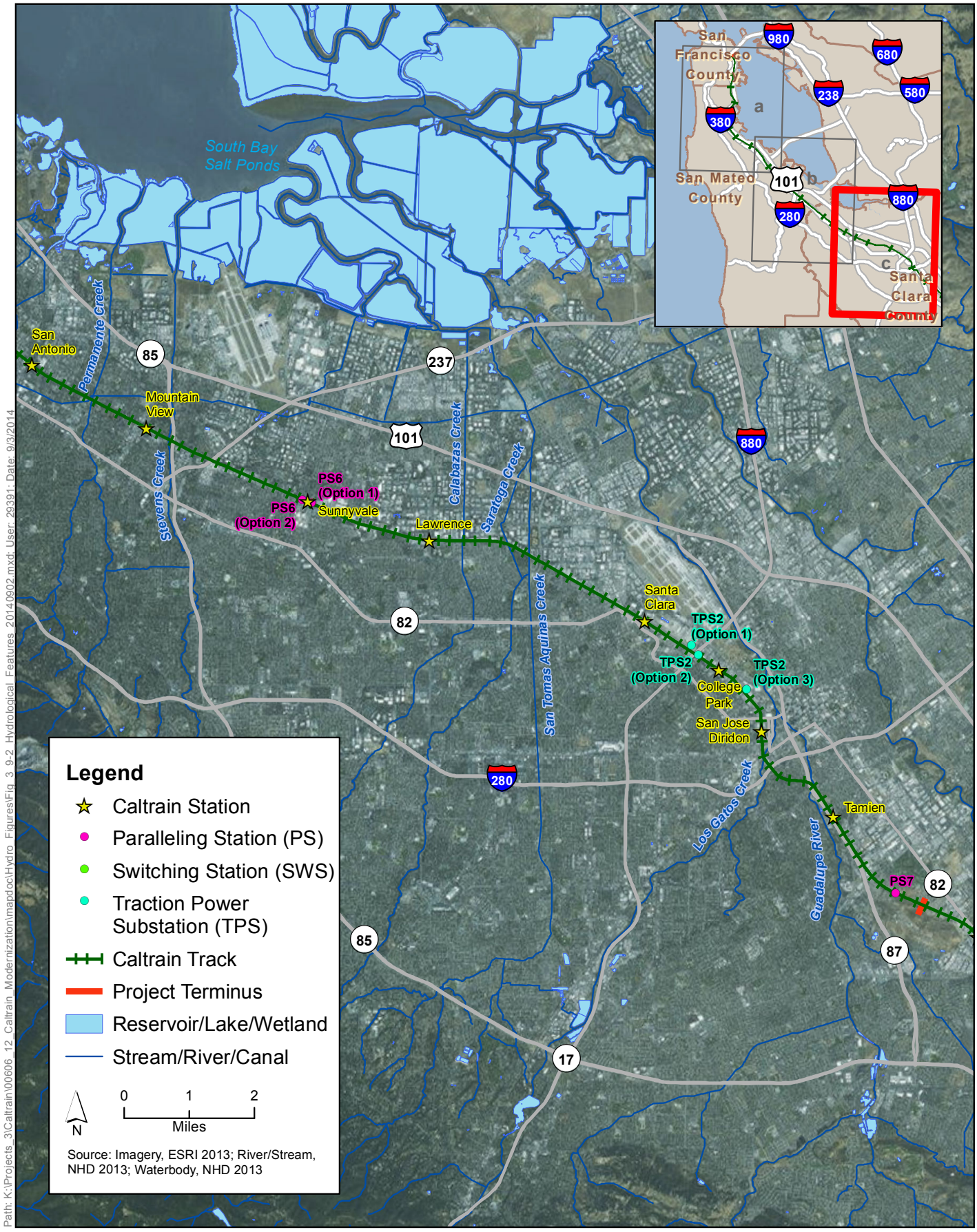

Figure 3.9-2c
Hydological Features within the Project Area
Peninsula Corridor Electrification Project

Note: This figure replaces Figure 3.9-2c from the Draft EIR

by the Basin Plan. Trash is listed as a 303(d) impairment in the San Francisco Bay (Table 3.9-3). Pesticides, herbicides, fungicides, and fertilizers used for landscape maintenance are washed into storm drains when irrigation exceeds the rate of soil infiltration and plant uptake, or when these chemicals are applied in excess. As shown in Table 3.9-3, chlordane, DDT (no longer permitted for use), and dieldrin are listed as 303(d) impairments in the San Francisco Bay. Paints, solvents, soap products, and other toxic materials may be inadvertently or deliberately deposited in storm drains in residential and industrial areas.

Groundwater

Hydrogeology

The Proposed Project would be located within the San Francisco Bay Hydrologic Region and spans six groundwater basins: Downtown San Francisco; Islais Valley; South San Francisco; Visitacion Valley; Westside; and Santa Clara Valley (California Department of Water Resources 2003) (Figure 3.9-3). Within the Santa Clara Valley basin, the Proposed Project lies within the San Mateo Plain and Santa Clara sub-basins. In general, the freshwater-bearing aquifers in the hydrologic region are relatively thin in the smaller basins, such as Downtown San Francisco, South San Francisco and Visitacion Valley, and moderately thick in the more heavily utilized basins, such as the Santa Clara Valley groundwater basins.

Groundwater use in the San Francisco Bay Hydrologic Region is not a large source of water supply. It accounts for approximately 5 percent (68,000 acre-feet) of the region's estimated average water supply for agricultural and urban uses, and accounts for less than 1 percent of statewide groundwater uses (California Department of Water Resources 2003). Groundwater levels within the project area are typically shallow due to the proximity to the San Francisco Bay.

Groundwater near the Caltrain corridor generally flows eastward toward San Francisco Bay. In the southern portions of South San Francisco and in San Bruno, groundwater is found throughout the year just a few feet below ground surface (bgs); during the rainy season, the level rises above the ground surface in many local depressions, leaving standing water in drainage ditches that can remain for months.

The hydrogeology between San Bruno and Menlo Park is controlled by the distribution of aquifers and aquitards within the alluvium, most of which are continuations of those of Santa Clara Valley. The depth of groundwater along this stretch of the corridor ranges between 10 and 20 feet bgs, although the water table below much of Atherton and Menlo Park is greater than 20 feet bgs.

Two regional aquifer zones have been noted in Santa Clara Valley: an upper aquifer zone and a lower aquifer zone. The upper aquifer zone is divided into several unconfined and confined aquifer systems that are separated by leaky or tight aquitards. For much of the baylands in the vicinity of the corridor, there is a leaky cap of clay approximately 20 feet thick, and the depth to first (shallowest) groundwater is approximately 10 feet bgs. The direction of groundwater flow is northerly and toward the Bay. The primary recharge for the aquifers occurs at the forebay area, located in the Santa Cruz Mountains along the western edge of the groundwater basin, by deep infiltration of stream flows and by artificial recharge from percolation ponds.

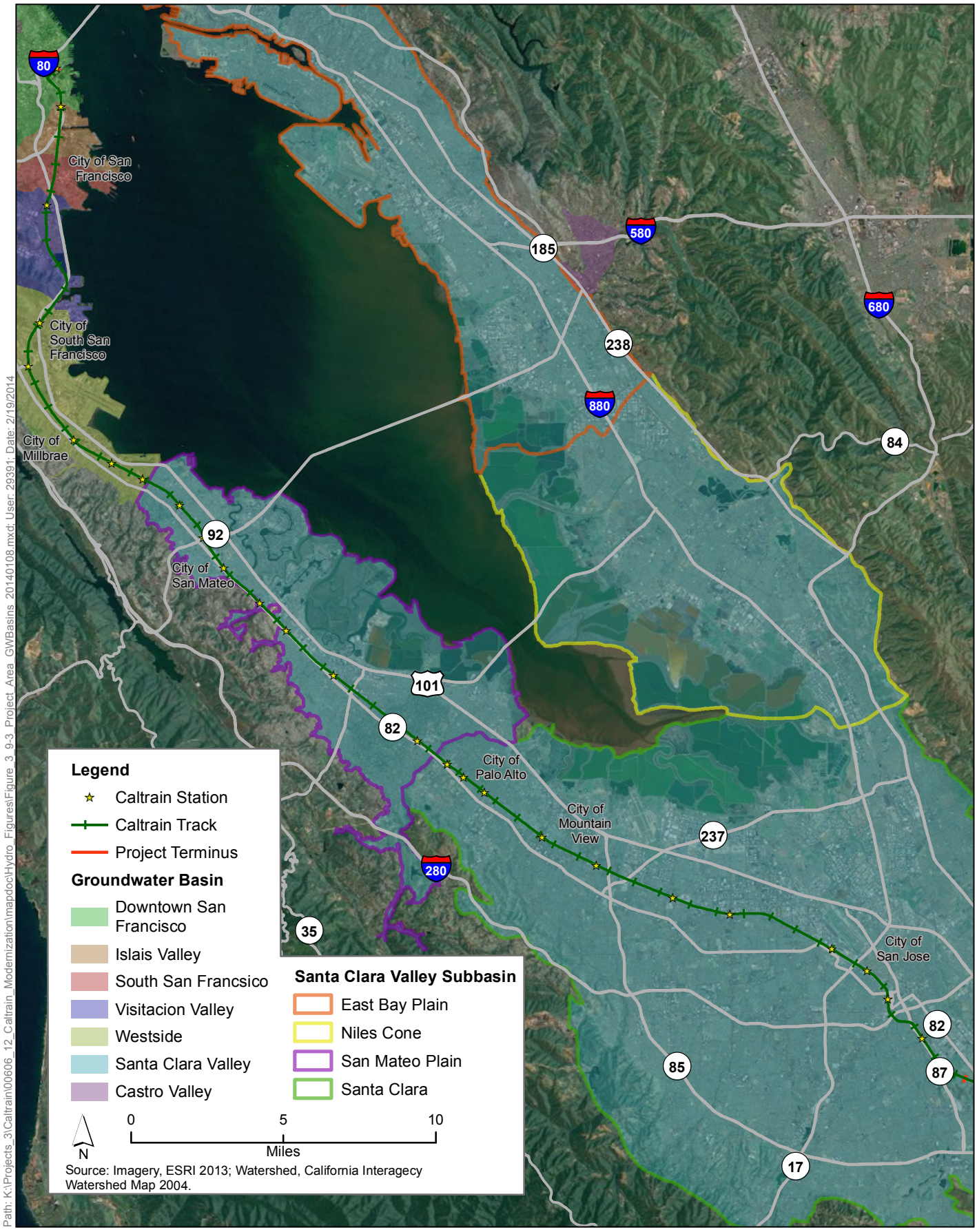

Figure 3.9-3
Groundwater Basins within the Project Area
Peninsula Corridor Electrification Project

Groundwater Quality

In general, groundwater quality throughout most of the San Francisco Bay Hydrologic Region is suitable for most urban and agricultural uses with only local impairments (California Department of Water Resources 2003). The primary constituents of concern in the six groundwater basins within which the project area is located are high total dissolved solids (TDS), chloride, nitrate, and organic compounds.

According to DWR's Groundwater Bulletin 118 (California Department of Water Resources 2003), the areas of high TDS and chloride concentrations are typically found in the San Francisco Bay Hydrologic Region's groundwater basins that are situated close to the San Francisco Bay, such as the northern Santa Clara Valley, Downtown San Francisco, and South San Francisco. Elevated nitrates are found in the Downtown San Francisco, South San Francisco, Visitacion Valley, Westside, and Santa Clara Valley basins. Releases of fuel hydrocarbons from leaking underground storage tanks and spills/leaks of organic solvents at industrial sites have caused minor to significant groundwater impacts in many basins throughout the region. Methyl tertiary-butyl ether and chlorinated solvent releases to soil and groundwater continue to be problematic (California Department of Water Resources 2003). Environmental oversight for many of these sites is performed either by local city and county enforcement agencies, the Regional Water Board, the Department of Toxic Substances Control, and/or the EPA. Table 3.9-4 identifies the designated beneficial uses identified for the six groundwater basins within which the project area is located.

Table 3.9-4. Designated Beneficial Uses for Groundwater in the Project Area

		Designated Beneficial Use[a, b]			
Groundwater Basin	County	MUN	PROC	IND	AGR
Downtown San Francisco	San Francisco	E	P	P	E
Islais Valley A [c]	San Francisco	P	E	E	P
South San Francisco	San Francisco	P	E	E	P
Visitacion Valley	San Francisco and San Mateo	P	E	E	P
Westside A[c]	San Francisco and San Mateo	E	P	P	E
Westside B[c]	San Francisco	P	P	P	E
Westside C[c]	San Mateo	E	P	P	E
Westside D[c]	San Mateo	E	E	E	P
Santa Clara Valley–San Mateo Plain subbasin	San Mateo	E	E	E	P
Santa Clara Valley–Santa Clara subbasin	San Mateo and Santa Clara	E	E	E	E

Source: San Francisco Bay Regional Water Quality Control Board 2011

[a] MUN = Municipal and domestic water supply; PROC = Industrial process water supply; IND = Industrial service water supply; and AGR = Agricultural water supply.

[b] E = Existing beneficial use; P = Potential beneficial use

[c] The existing and potential beneficial uses for groundwater basins listed in the 1995 Basin Plan were assigned to the new groundwater basins based on the geographic location of the old basins compared to the new basins. The basin names, such as Westside A, Westside B, etc., are informal names assigned by the State Water Board to preserve the beneficial use designations in the 1995 Basin Plan and do not represent sub-basins identified by the California Department of Water Resources.

Groundwater objectives consist primarily of narrative objectives combined with a limited number of numerical objectives. The primary groundwater objective is the maintenance of existing high quality groundwater. 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 San Francisco Bay Regional 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.

Current Flooding Risk

FIRMs prepared by FEMA and interim floodplain maps from the City of San Francisco (City of San Francisco 2008) were reviewed to identify the locations of current 100-year floodplains.

As shown in Figure 3.9-4 and Table 3.9-5, there are a number of areas along the track alignment that are subject to current risk of flooding in a 100-year flood event. In some cases, the tracks are elevated via berms, bridges or other structures, and therefore may not be prone to flood risk although immediately adjacent areas may be subject to flooding. Track elevations were used to determine whether 100-year base flood elevations (BFEs) would be high enough to reach the alignment. BFEs are not provided for some flood zones. Therefore, a method for inferring BFEs was used where BFES were not available. Although some elevated track segments within a 100-year flood zone were determined not to be prone to flood risk, areas surrounding the tracks could be flooded, and therefore access to the tracks may be compromised in these areas.

Potential Inundation due to Tsunami

Portions of lands adjacent to the San Francisco Bay are also at risk due to inundation from a Pacific tsunami. For the most part, the project area runs adjacent to the border of the San Francisco Bay and, as such, portions of the project area adjacent to San Francisco Bay are adjacent to or within a tsunami inundation area. Tsunami inundation maps of San Francisco, San Mateo, and Santa Clara Counties indicate that the portion of the project area most likely to be affected by tsunami inundation would be the northern portion in the following areas: where the track alignment parallels 7th Street, southwest of China Basin in San Francisco; at the land's end of the Islais Creek Channel; and southwest of the Brisbane Marina near Veterans Boulevard in South San Francisco (California Department of Conservation 2013); these areas fall within tsunami inundation areas.

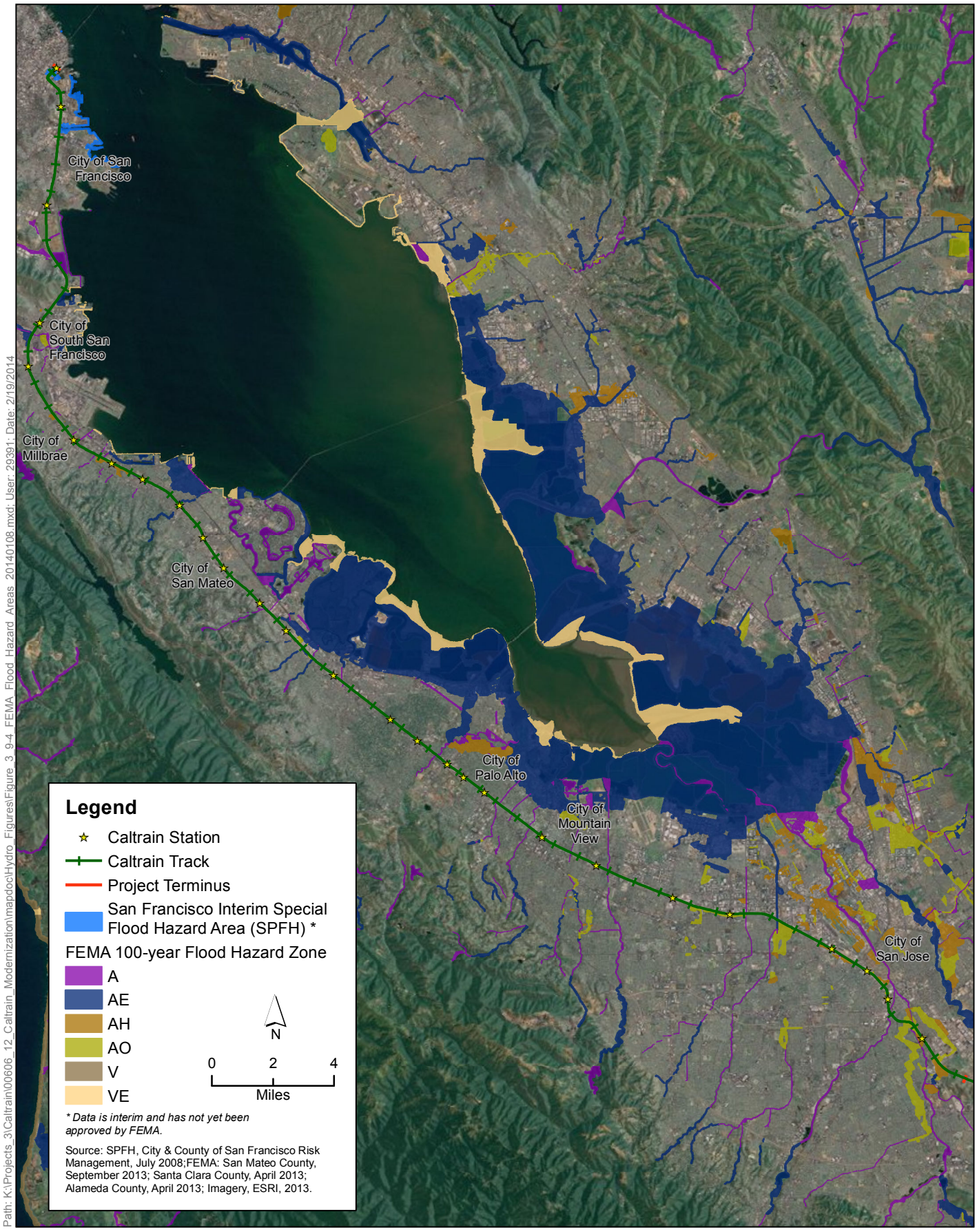

Figure 3.9-4
Flood Hazard Areas within the Project Area
Peninsula Corridor Electrification Project

Table 3.9-5. Current Portions of Caltrain ROW within FEMA-Designated 100-Year Floodplain

Location	Start MP	End MP	Track Elevation range (feet)[a]	Trackbed Elevation range (feet)[b]	Length of ROW vulnerable to Flooding (miles)	Estimated 100-year flood level(feet)	Potential Flood Risk? (Yes/No)[c]
San Francisco 4th and King Station	0.3	0.6	7.7–12.8	5.5–10.6	0.3	10 feet[d]	Yes
South San Francisco (Colma Creek to north of S. Linden Avenue)	9.8	10.1	12.8–14.5	10.6–12.3	0.3	12 feet	Yes
San Bruno	11.9	12.2	15.0–17.0	12.8–5.8	0.3	17	Yes
Millbrae	12.6	12.8	14.4–17.8	12.2–15.6	0.2	17	Yes
Burlingame (north of Broadway Avenue)	14.5	15.0	15.0–16.0	12.8–13.8	0.5	14	Yes
Sunnyvale[e] (S. Mary Avenue to Calabazas Creek)	37.8	41.3	56.0–97.0	53.8–94.8	3.5	57 to 97	Yes
Santa Clara (San Tomas Aquino Creek to south of Railroad Avenue)	42.3	43.1	55.5–58.0	53.3–55.8	0.8	54 to 55	Yes
Santa Clara/San Jose (South of De La Cruz Boulevard. to near Interstate 880)	44.6	45.3	64.0–67.3	61.8–65.1	0.7	63 to 65	Yes
San Jose (just south of Almaden Expressway)	50.1	50.2	132.9–133.3	130.7–131.1	0.1	131	Yes
TOTAL					**6.7**		
Subtotal (Riverine Flooding)					6.5		
Subtotal (Coastal Flooding)					0.2		

Source: Federal Emergency Management Agency Flood Insurance Rate Maps (areas other than San Francisco); City and County of San Francisco 2008.

[a] Tracks are elevated via berms, bridges and other structures in some locations and, therefore, may not be prone to flood risk even though adjacent areas are in 100-year flood zones. Track elevation ranges were approximated based on PCJPB 2012 Caltrain Trackcharts and Rail Corridor Infrastructure Assets. Vertical datum based on NAVD 88.

[b] Trackbed elevations assumed to be 2.2 feet less than track elevations.

[c] Potential flood risk identified if presumed trackbed elevation is less than flood elevation.

[d] There are no published FEMA maps for San Francisco, so San Francisco preliminary flooding maps (City and County of San Francisco 2008) were used. Flood elevations are the 100-year tide level identified for San Francisco Bay adjacent to the city and do not include wave runup.

[e] Shallow flooding along the Caltrain ROW and adjacent street

Potential Inundation due to Levee or Dam Failure

Based on FEMA mapping, some portions of the Caltrain ROW have the potential for flooding to be reduced because levees are present.

There are a number of dams located in Peninsula watersheds upstream of the Caltrain alignment with the potential to inundate portions of the Caltrain ROW. The primary risk of dam failure is due to seismic activity. All dam owners are required to manage their facilities in line with potential seismic risks by the California Department of Safety and Dams (DSOD). The potential inundation areas (per ABAG 1995) are as follows:

- Burlingame Dam and Crocker Dam: These two dams are in Hillsborough approximately 1.5–1.8 miles southwest of the Caltrain ROW. The potential inundation area along the Caltrain ROW due to failure of these dams would be in the city of Burlingame for several blocks south of Broadway.
- Crystal Springs Dam: This dam is approximately 3.3 miles southwest of the Caltrain ROW. The potential inundation area due to failure of this dam along the Caltrain ROW would be a large portion of the city of San Mateo as well as a small portion of Belmont.
- Laurel Creek Dam: This dam is approximately 1.5 miles southwest of the Caltrain ROW. The potential inundation area due to failure of this dam along the Caltrain ROW would be a small area in the southern part of San Mateo.
- Lower Emerald Dam: This dam is approximately 2.0 miles southwest of the Caltrain ROW. The potential inundation area due to failure of this dam would be a portion of Redwood City (between Woodside and Whipple Ave).
- Searsville, Felt, and Lagunita Dams: These dams are 4.5 miles, 3.2 miles, and 1.5 miles southwest of the Caltrain ROW, respectively. The Lagunita Dam previously held water for Lake Lagunita at Stanford for recreational and water supply purposes; however the lake area is only used to retain water for habitat purposes and thus contains far less water than it used to, on average. The potential inundation area due to failure of the Searsville, Felt, and Lagunita dams includes a southern portion of Menlo Park and a northern portion of Palo Alto.
- Lexington, Elsman, and Anderson Dams: These dams are 10 miles southwest, 12 miles southwest, and 2.2 miles east of the Caltrain ROW, respectively. The Anderson Dam is only 2.2 miles east of the Caltrain ROW in Morgan Hill but is approximately 15 miles from the nearest point of the Proposed Project in San Jose. The potential inundation area due to failure of these dams includes large portions south of and in downtown San Jose.

Future Flooding Risk with Sea Level Rise

Projected SLR as an effect of climate change will increase the areas of coastal flooding along the San Francisco Bay beyond that at present. Table 3.9-6 provides a summary of the SLR projections provided by state and BCDC guidance.

Table 3.9-6. State and Local Sea Level Rise Projections for areas within the Project Vicinity

	CO-CAT SLR guidance document (South of Cape Mendocino)			BCDC Report on Sea Level Rise		
Time Period	Feet[a]	Inches	Centimeters[a]	Feet	Inches[a]	Centimeters[a]
2000–2030	0.13 to 0.98	1.56 to 11.76	4 to 30	--	--	--
2000–2050 (mid-century)	0.39 to 2.00	4.68 to 24.00	12 to 61	1.30	16	40
2000–2100 (end of century)	1.38 to 5.48	16.56 to 65.76	42 to 167	4.58	55	140

Sources: CO-CAT 2013 for South of Cape Mendocino; San Francisco Bay Conservation and Development Commission 2011.

[a] Official projections reported in these units.

Table 3.9-7 shows the portion of the Caltrain ROW that would be subject to 100-year event coastal flooding based on approximately 50 cm and 150 cm SLR, respectively. Future flooding elevations for areas subject to coastal flooding were calculated using the current 100-year tide with the addition of the projected sea level rise in feet. Figure 3.9-5 also shows vulnerability along the corridor to inundation by averaging 100-high water levels at differing levels (0 cm, 50 cm, 100 cm, and 150 cm) of projected future SLR relative to the mean sea level in year 2000 (U.S. Geological Survey 2013). The 50 cm and 150 cm SLR scenarios shown in Figure 3.9-5 and Table 3.9-7 would be slightly less than the high end of the 2050 state projection range (61 cm) and the 2100 state projection range (167 cm) but slightly higher than the BCDC report on SLR projections for 2050 (50 cm) and 2100 (140 cm).

Table 3.9-7. Potential Vulnerability to Coastal Flooding with Sea Level Rise along the Caltrain Alignment (2050/2100)

Location	Start MP	End MP	Track Elevation (feet)[a]	Trackbed Elevation (feet)[b]	Distance (miles)	100-year tide (feet)[c]	Inferred Flood Risk[d]
Potential Vulnerability to Coastal Flooding with Mid-Century (2050) Sea Level Rise along the Caltrain Alignment (100-year tide, 50 cm SLR)							
San Francisco (4th and King and south)	0.2	0.9	7.7–13.9	5.5–11.7	0.6	11.7	Yes
Brisbane (north of Brisbane Lagoon)	5.8	5.9	13.5–13.9	11.3–11.7	0.1	11.7	Yes
South San Francisco (south of Colma Creek)	9.9	10.1	12.8–13.9	10.6–11.7	0.2	11.7	Yes
San Mateo (19th to 22nd Avenues)	19.2	19.5	13.3–13.9	11.1–11.7	0.6	11.7	Yes
TOTAL (for 2050 Scenario)					**1.5**		
Potential Vulnerability to Coastal Flooding with End of-Century (2100) Sea Level Rise along the Caltrain Alignment (100-year tide, 150 cm SLR)							
San Francisco (4th and King and south)	0.2	1.4	7.7–17.1	5.5–14.9	1.2	14.9	Yes
Brisbane (north of Brisbane Lagoon)	5.5	6.2	13.5–17.1	11.3–14.9	0.7	14.9	Yes
Brisbane/South San Francisco (Brisbane Lagoon to South San Francisco)	6.4	8.9	15.3–17.1	13.1–14.9	2.5	14.9	Yes
South San Francisco (Colma Creek and south)	9.8	10.3	12.8–17.1	12.6–14.9	0.5	14.9	Yes
San Bruno/Millbrae (near SFO)	11.7	12.8	15.2–17.1	13.0–14.9	1.1	14.9	Yes
Millbrae/Burlingame (Millbrae to south of Broadway)	13.4	15.7	14.4–17.1	12.2–14.9	2.3	14.9	Yes
San Mateo (12th Avenue to south of 25th Avenue)	18.6	19.8	13.3–17.1	11.1–14.7	1.2	14.9	Yes
Redwood City (Brewster Ave to south of Broadway)	25.2	25.6	15.9–17.1	13.7–14.9	0.4	14.9	Yes
TOTAL (for 2100 Scenario)					**9.9**		

[a] Track elevations determined per Table 3.9-5. As noted therein, there are many areas where the Caltrain tracks are elevated above adjacent ground and thus tracks may not be subject to flooding that will affect adjacent areas. However, access to tracks may be impeded in adjacent areas.

[b] Trackbed elevations assumed to be 0.8 feet less than track elevations.

[c] Future 100-year tide levels determined by adding 50 cm (20 inches) for the 2050 scenario and by adding 150 cm (59 inches) for the 2100 scenario to the current 100-year tide levels of approximately 10 feet for adjacent area of San Francisco Bay. Wave runup is not included.

[d] Potential flood risk determined by comparison of coastal flooding elevation to trackbed to estimate flood risk to track bed.

cm = centimeters

MP = milepost

SFO = San Francisco International Airport

SLR = sea level rise

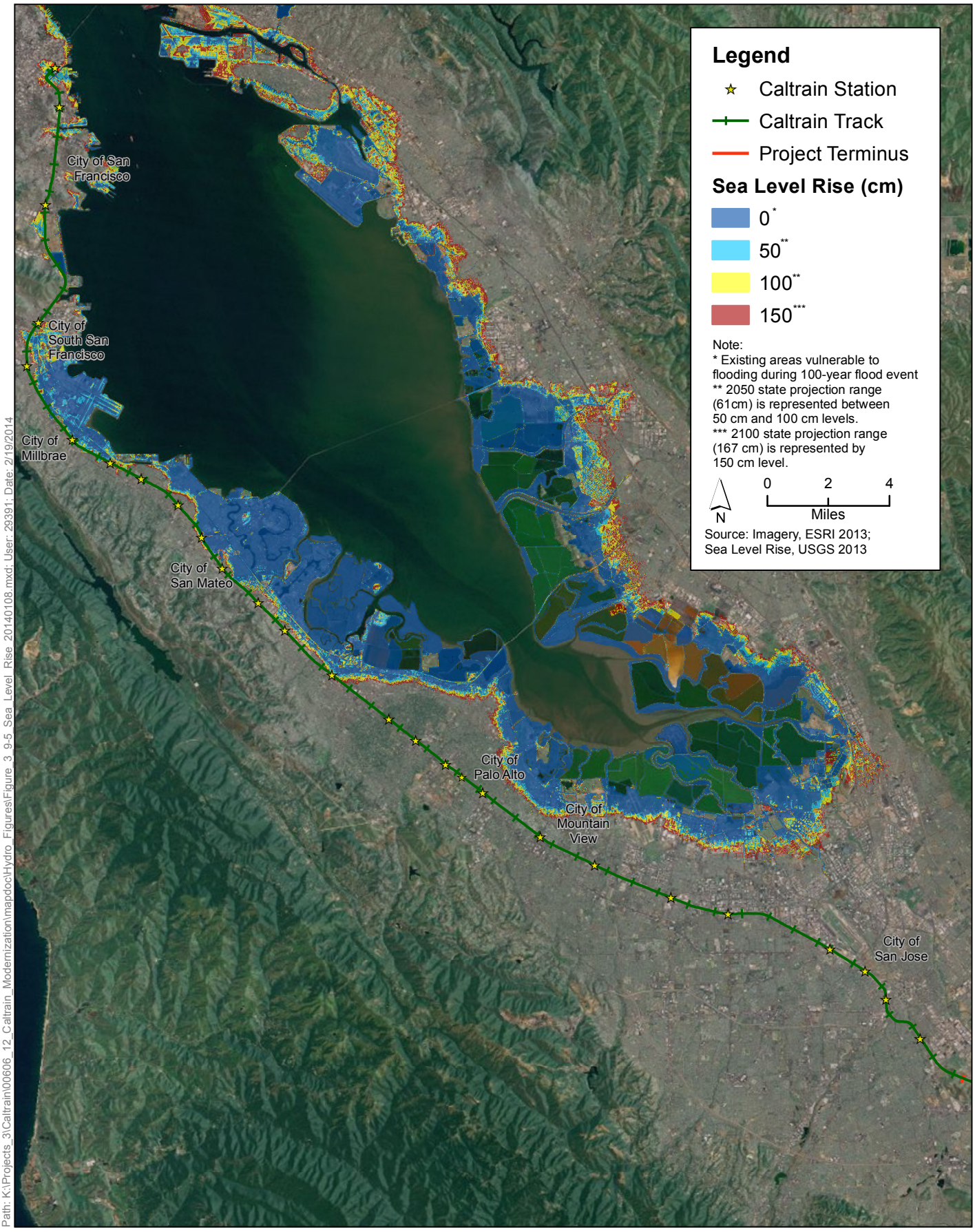

Figure 3.9-5
Vulnerability to inundation from a 100-year flood event at differing levels of projected future sea level rise
Peninsula Corridor Electrification Project

3.9.2 Impact Analysis

3.9.2.1 Methods for Analysis

Potential impacts resulting from implementing the Proposed Project were analyzed by comparing existing conditions, as described in the Environmental Setting, to conditions during construction and/or operation and maintenance of the Proposed Project. The analysis assesses the direct and indirect, short- and long-term impacts related to surface hydrology, flood hazards, groundwater recharge, and surface and groundwater quality as described below.

Surface Water Hydrology: The surface water hydrology impact analysis considered potential changes in the physical characteristics of water bodies, impervious surfaces, and drainage patterns throughout the project area as a result of project implementation.

Flood Hazards: The impact analysis for current flood risk was conducted using FEMA FIRMS (for areas other than San Francisco) and San Francisco Interim Floodplain Maps (for San Francisco) to determine whether the project area overlaps with existing current designated 100-year floodplains. In addition, USGS SLR mapping was consulted to determine whether the project area would be inundated by 100-year flood levels predicted taking into account potential mid- and end-of-century SLR (2050 and 2100, respectively). Because the USGS SLR mapping is more recent than those of BCDC, it was used for the purposes of the SLR vulnerability assessment.

Groundwater Recharge: Impacts on groundwater recharge were assessed by comparing existing sources of recharge versus recharge capabilities following project implementation. Recharge is determined by the ability of water to infiltrate into the soil. Although the precise extent of the groundwater aquifer is unknown within specific locations along the project area due to lack of data from DWR, this analysis assumes that groundwater exists within the entire project area.

Surface and Groundwater Quality: Impacts of the Proposed Project on surface water and groundwater quality were analyzed using existing information on existing water quality conditions. These conditions were then compared to conditions under the Proposed Project for potential project-related sources of water contaminants generated or inadvertently released during project construction (e.g., sediments, fuel, oil, concrete) and project operation. The potential for water quality objectives to be exceeded and beneficial uses to be compromised as a result of the Proposed Project is also considered.

3.9.2.2 Thresholds of Significance

In accordance with Appendix G of the State CEQA Guidelines, the Proposed Project would be considered to have a significant impact if it would result in any of the conditions listed below.

- Violate any water quality standards or WDRs, or otherwise substantially degrade water quality.
- Substantially deplete groundwater supplies or interfere substantially with groundwater recharge, resulting in a net deficit in aquifer volume or a lowering of the local groundwater table level (e.g., the production rate of pre-existing nearby wells would drop to a level that would not support existing land uses or planned uses for which permits have been granted).
- 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 that would result in substantial erosion or siltation onsite or offsite. Create or contribute runoff water that would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff.

- Place housing within a 100-year flood hazard area, or place structures that would impede or redirect flood flows within a 100-year flood hazard area, as mapped on a federal Flood Hazard Boundary or FIRM or other flood hazard delineation map.
- Expose people or structures to a significant risk of loss, injury, or death involving flooding, including flooding as a result of the failure of a levee or dam.
- Contribute to inundation by seiche, tsunami, or mudflow.

The State CEQA Guidelines do not currently provide any guidance concerning the evaluation of potential impacts related to SLR. As discussed in Section 3.7, *Greenhouse Gas Emissions and Climate Change*, the Proposed Project would result in a reduction of GHG emissions compared with existing emissions and to emissions under the No Project scenario and, thus, would help to reduce potential future effects of climate change. However, with prior and projected GHG emissions (regardless of efforts to control those emissions), substantial SLR is still expected due to projected global warming. Although the Proposed Project would not contribute to rising sea levels, the Caltrain alignment and new Proposed Project facilities could be affected by flooding associated with rising sea levels. Due to a number of recent appellate court rulings (most prominently *Ballona Wetlands Land Trust et al. v. City of Los Angeles* (2011) 201 Cal.App.4th 455 [*Ballona Wetlands*]), there is presently a question as to whether CEQA requires analysis of impacts of the environment (such as rising sea levels) on a project or not (as opposed to the impacts of a project on the environment, which is clearly required). This EIR errs on the side of caution in providing such an analysis of the potential impact of SLR on the Caltrain alignment and the Proposed Project. However, absent contrary appellate court rulings or California Supreme Court rulings, at this time such an analysis may not be strictly legally required.

3.9.2.3 Impacts and Mitigation Measures

Construction and operation of the Proposed Project may affect the existing water quality conditions of the hydrological features within the project alignment. The Proposed Project alignment crosses and runs alongside several creeks, rivers, and wetlands near the San Francisco Bay shoreline. The installation of OCS poles and overbridge protection barriers, as well as the construction of traction power substations, switching stations, and paralleling stations near these water bodies would have both direct impacts through exposure of surface and groundwater resources to additional pollutants, such as sediments, as well as indirect impacts from discharges into storm drains leading to surface water bodies, if measures are not taken to minimize these impacts.

Changes resulting from Project Variant 1 are described below each impact analysis.

Impact HYD-1a	Violate any water quality standards or WDRs, or otherwise substantially degrade water quality during project construction
Level of Impact	Significant
Mitigation Measure	HYD-1: Implement construction dewatering treatment, if necessary
Level of Impact after Mitigation	Less than significant

Construction grading and utility excavations at proposed traction power facility (TPF) sites could result in a short-term increase in the sediment load in stormwater during rainfall events. Although sediment from erosion is the pollutant most frequently associated with construction activity, other pollutants of concern are toxic chemicals from heavy equipment or construction-related materials. A typical construction site uses many chemicals or compounds including gasoline, oils, grease, solvents, lubricants, and other petroleum products. Many petroleum products contain a variety of toxic compounds and impurities and tend to form oily films on the water surface altering oxygen diffusion rates. Concrete, soap, trash, and sanitary wastes are other common sources of potentially harmful materials on construction sites. Washwater from equipment and tools and other waste dumped or spilled on the construction site can lead to seepage of pollutants into watercourses. Non-potable water sprayed for dust control and soil stability during construction can contain contaminants that infiltrate into soil and groundwater. Also, construction chemicals may be accidentally spilled into watercourses. The impact of toxic construction-related materials on water quality varies depending on the duration and timing of activities.

Installation of OCS poles would require soil excavation, which would potentially result in substantial soil disturbance, and could also increase sediment loads into nearby waterways. Additional sediment sources created during construction include soil stockpiles and soil tracked across construction areas, debris resulting from the installation of OCS pole foundations, erosion in areas where vegetation is cleared for OCS pole and catenary system placement, and soil transported by wind (from dry, exposed excavated areas). Surface waters could be affected by sediment and construction debris in stormwater runoff during construction at TPF locations and associated construction staging areas.

Because the Proposed Project would disturb more than 1 acre of land, a SWPPP would be required as part of compliance with the NPDES Construction General Permit. The purpose of a SWPPP is to reduce the amount of construction-related pollutants that are transported by stormwater runoff to surface waters. The SWPPP would emphasize standard temporary erosion control measures to reduce sedimentation and turbidity of surface runoff from disturbed areas with the project area and other BMPs to prevent and minimize the potential for other pollutants of concern to enter waterways. Use of non-potable water (i.e., from wastewater reclamation facilities and permitted groundwater wells) for dust control would not present a health or safety hazard if used in accordance with applicable State Department of Health, State Water Board Regional Water Board, and City Departments of Health and Public Works orders, standards and regulations (City of San Francisco 2008).

Construction dewatering in areas of shallow groundwater could be required during excavation required to install OCS poles and possibly during utility relocations and installation. In the event groundwater is encountered during construction, dewatering would be conducted locally, and according to methods described in Mitigation Measure HYD-1. Coverage under the Construction General Permit typically includes dewatering activities as authorized non-stormwater discharges provided that dischargers prove the quality of water to be sufficient and not affect beneficial uses.

However, the San Francisco Bay Regional Water Board will need to be notified if dewatering will occur and the contractor may be subject to dewatering requirements in addition to what's outlined in the Construction General Permit, including discharge sampling and reporting.

In addition to state dewatering requirements, discharges of non-sewage wastewater to the combined sewer system, including construction-related stormwater and groundwater produced during construction dewatering, are subject to City and County of San Francisco (CCSF) Industrial Waste Ordinance 199-77. The SFPUC Collection System Division must be notified of projects that require dewatering. Installation or modification of construction dewatering wells and soil borings, if required, will also be subject to CCSF Soil Boring and Well Regulation Ordinance, adopted as Article 12B of the San Francisco Health Code. The installation and use of soil borings and wells may affect the beneficial uses of San Francisco's aquifers, and shall be reviewed and approved by the San Francisco.

The Proposed Project would comply with the Construction General Permit, local stormwater ordinances, and other related requirements. In addition, if dewatering is required, Mitigation Measure HYD-1 would be implemented to comply with dewatering requirements. Therefore, potential water quality impacts, such as violations of water quality objectives or WDRs from construction activities, would be less than significant with implementation of Mitigation Measure HYD-1, if necessary.

Implementation of Project Variant 1, described in Chapter 2, *Project Description*, would not result in any changes to this impact analysis because it would have less construction overall than the Proposed Project.

Mitigation Measure HYD-1: Implement construction dewatering treatment, if necessary

If groundwater is encountered during excavation and trenching activities, then dewatering may be required. If dewatering activities require discharges to the storm drain system or other water bodies, the water shall be treated as necessary prior to discharge so that all applicable water quality objectives are met. As a performance standard, water treatment methods shall be selected to achieve the maximum removal of contaminants found in the groundwater and that represent the Best Available Technology (BAT) that is economically achievable. Implemented measures may include the retention of dewatering effluent until particulate matter has settled before it is discharged, the use of infiltration areas, filtration, or other means. The contractor shall perform routine inspections of the construction area to verify that the water quality control measures are properly implemented and maintained, conduct visual observations of the water (i.e., check for odors, discoloration, or an oily sheen on groundwater) and any other sampling and reporting activities prior to discharge. The final selection of water quality control measures shall be submitted to the Regional Water Board for approval prior to construction. If the groundwater is found to not meet water quality standards and the identified water treatment measures cannot ensure treatment to meet all receiving water quality standards, the water shall then be hauled offsite instead for treatment and disposal at an appropriate waste treatment facility permitted to receive such water.

Impact HYD-1b	Violate any water quality standards or WDRs, or otherwise substantially degrade water quality during project operation
Level of Impact	Less than significant

From a water quality perspective, the long-term effect of the Proposed Project would be beneficial compared to the existing system. Replacing existing diesel-powered locomotives with electric vehicles would eliminate a major diesel exhaust source, which otherwise results in dry deposition of pollutants that are later washed into the regional stormwater system. Additionally, with electric trains, there would not be the possibility of contamination while filling fuel tanks or from leaking diesel locomotive fuel tanks.

Because the new Electric Multiple Units (EMUs) would be electrically powered, the track runoff would carry less pollutants than at present and the operation of electrified trains and tracks would not be expected to introduce significant new pollutant sources. Additional sources, such as residual debris from track wear and trash, would be minimal and would be treated with good housekeeping practices, such as trash pick-up and sweeping at TPFs and along the tracks. Although approximately 25 percent of San Jose—San Francisco trains would still be diesel-locomotives, the Proposed Project would result in approximately 75 percent reduction in diesel pollutant loading to the corridor and the resultant benefits to receiving water bodies as well as the reduction in potential for diesel fuel spillage.

The TPFs would require maintenance activities and the storage of oil and other materials for equipment maintenance. For example, oil-filled transformers require the storage of chemicals, such as cleaning liquids and transformer oil for proper maintenance. The storage of such materials is regulated by existing state and federal law.

In addition, routine vegetation removal along the tracks and associated infrastructure may require the use of pesticides. As with Caltrain's current pesticide application practices, pesticides would be properly applied according to DPR regulations to ensure that waterways are not exposed. Hazardous materials, such as pesticides, wetting agents, and other chemicals would be stored in maintenance areas with secondary containment so as to prevent from potential spills in compliance with good housekeeping practices.

Stormwater management measures involve minimizing the alteration of existing drainage conditions and minimizing new sources of pollutants introduced to stormwater via implementation of good housekeeping practices. Stormwater runoff conditions would be similar to pre-project conditions due to the relatively minor land disturbance and increase in new impervious area. Therefore, overall drainage patterns would not be largely altered as part of the Proposed Project. The Project will continue to allow for infiltration of runoff due to the minimal area of new impervious surface from new infrastructure, such as TPF facilities and OCS pole pads. Ground surrounding new infrastructure will be left un-disturbed when possible. In addition, ~~A~~as discussed above, the Proposed Project would be located in areas that are exempt from local MS4 HMP requirements and, thus, the minor changes in impervious area are not expected to result in significant changes in flow in local waterways that would result in additional sediment loading.

The Proposed Project would comply with the municipal stormwater requirements, good housekeeping practices, and related requirements. Therefore, potential water quality impacts, such as violations of water quality objectives or WDRs from operation and maintenance activities, would be less than significant.

Implementation of Project Variant 1, described in Chapter 2, *Project Description*, would not result in any changes to this impact analysis because the only difference operationally with the Proposed Project is that it would have slightly less impervious space due to less foundations for OCS poles. The impervious area of PS7 would be the same as for the Proposed Project and the management of stormwater would be the same.

Impact HYD-2	Substantially deplete groundwater supplies or interfere substantially with groundwater recharge, resulting in a net deficit in aquifer volume or a lowering of the local groundwater table level
Level of Impact	Significant
Mitigation Measure	HYD-1: Implement construction dewatering treatment, if necessary
Level of Impact after Mitigation	Less than significant

Construction

As the OCS poles would have foundations 15–20 feet bgs, groundwater would be encountered in areas where the groundwater table is less than 15 feet bgs. In addition, utility relocation and installation may also encounter shallow groundwater. Shallow groundwater may be encountered in the vicinity of San Francisco Bay in San Francisco, San Mateo, and Santa Clara Counties. Impacts on groundwater would be limited to areas with high groundwater tables where construction-related dewatering would occur on a temporary, short ~~time~~ term (during construction) basis. There would also be potential to encounter groundwater during excavation in areas where depth to groundwater is unknown. In the event groundwater is encountered during construction, temporary dewatering would be conducted locally.

In areas where subsurface structures exist adjacent to or underneath the Caltrain ROW (i.e., BART alignment from San Bruno and Burlingame), groundwater intrusion effects during foundation drilling will be temporary and minimal because: 1) dewatering will be conducted where groundwater is encountered thus removing the potential for substantial intrusion in the open hole; 2) the foundation would be sealed once the pole is installed, thus removing the potential for intrusion following construction and 3) the areas where excavation would occur are very small (diameter of 3 feet for OCS poles) and thus any effect such as increased hydraulic pressure, on groundwater aquifers would be minimal.

Given the limited area of construction activity associated with the OCS foundation augering and potential utility relocations/installations, potential groundwater dewatering volumes would be limited and, thus, the Proposed Project would not substantially deplete groundwater supplies. In addition, groundwater within the project area is not a large source of water supply, one reason which is that much of it is saline due to the proximity to the San Francisco Bay. The Proposed Project would comply with the Construction General Permit and other related requirements, and would also implement Mitigation Measure HYD-1 concerning dewatering (see description above), if necessary. Therefore, potential impacts on groundwater resources would be less than significant with implementation of Mitigation Measure HYD-1, if necessary.

Implementation of Project Variant 1, described in Chapter 2, *Project Description*, would not result in any changes to this impact analysis because the only difference with the Proposed Project is that it would have slightly less construction due to 1.2 miles less of OCS poles.

Operations

Overall groundwater recharge in the vicinity would not be largely altered as part of the Proposed Project. The new TPFs would result in a range of 3,200 to 30,000 square feet of impervious surface surrounded by compacted ground and gravel. Although these areas may have minor local effects on groundwater recharge, overall groundwater recharge would be relatively unaffected by these new impervious surface areas. The OCS pole pads would result in very small new impervious areas (approximately 3 to 4 square feet each). Any new access roads required for the TPFs would be formed from compacted crushed rock or gravel overlaying a compacted sub-grade, there would be a minimal increase in impervious surface and negligible effects on groundwater recharge. Because these roads would be used infrequently and only by railroad workers for routine maintenance and inspection of the traction power substations, there would be no measurable increases in contaminant loads that would percolate into groundwater. The underground portions of the OCS poles and utilities would cover a small area (overall and locally) relative to other underground structures, would be sealed and thus are not expected to cause groundwater intrusion into BART facilities from shallow groundwater aquifers. In addition, the Proposed Project would not require the use of groundwater for project water supply.

The Proposed Project would not result in large areas of impervious surface and would not involve the use of groundwater for project operation and maintenance. Therefore, potential impacts on groundwater resources would be less than significant.

Implementation of Project Variant 1, described in Chapter 2, *Project Description*, would not result in any changes to this impact analysis because the only difference operationally with the Proposed Project is that it would have slightly less impervious space due to less foundations for OCS poles. The impervious area of PS7 would be the same as for the Proposed Project.

Impact HYD-3	Substantially alter the existing drainage pattern of the site or area, or substantially increase the rate or amount of surface runoff, in a manner that would cause substantial erosion or siltation onsite or offsite, exceed the capacity of existing or planned stormwater drainage systems, or provide substantial additional sources of polluted runoff
Level of Impact	Less than significant

Construction

Proposed Project construction activities would not involve the alteration of the course of a stream or river. No project construction activities would require in-water work. Overbridge protection barriers constructed at creek crossings would be installed on bridges. OCS poles and new TPFs would be constructed on land outside of waterways. In addition, drainage patterns would not be significantly altered during construction activities. Temporary alterations in terrain during the construction grading for TPFs would be minor, and negligible for all other project infrastructure. As described in Impact HYD-1a, any potential additional sources of polluted runoff would be addressed through compliance with the Construction General Permit, local stormwater ordinances, and other related requirements.

The Proposed Project would not involve in-water work, and potential alterations in drainage patterns would be temporary and minimal. Therefore, potential impacts on drainage patterns and stormwater runoff during project construction would be less than significant.

Implementation of Project Variant 1, described in Chapter 2, *Project Description*, would not result in any changes to this impact analysis because the only difference with the Proposed Project is that it would have slightly less construction due to 1.2 miles less of OCS poles. The variant locations of PS7 are not within any existing drainages that would be disturbed during construction.

Operations

Overall drainage patterns in the project area would not be largely altered as part of the Proposed Project. The additional impervious surface areas at the new TPFs and OCS pole pads would not significantly increase the rate or volume of surface runoff. Apart from the new TPFs and OCS pole pads, there would be no other new impervious area along the alignment. Drainage analyses would be conducted as part of Proposed Project design and measures would be implemented so as not to exceed existing storm system capacities.

The Proposed Project would not result in large areas of impervious surface and would be designed so as not to introduce large volumes of stormwater runoff into the storm sewer system. San Francisco has a combined sewer system, which is particularly sensitive to increases in storm flows. However, the Caltrain alignment is located along the bay shoreline, where storm drains lead directly to the bay as opposed to the combined sewer system. This factor, combined with minimal new impervious area and expected negligible increases in resulting storm flows, is not expected to affect storm water flow capacities. Therefore, stormwater flow capacities are not expected to be affected. As described in Impact HYD-1b, any potential additional sources of polluted runoff generated by project operation would be addressed through compliance with municipal stormwater requirements, good housekeeping practices, and related requirements. Therefore, potential impacts on drainage patterns and stormwater runoff during project operation and maintenance would be less than significant.

Implementation of Project Variant 1, described in Chapter 2, *Project Description*, would not result in any changes to this impact analysis because the only difference operationally with the Proposed Project is that it would have slightly less impervious space due to less foundations for OCS poles and the location of PS7 would be different. The variant locations of PS7 are not within any existing drainages.

Impact HYD-4	Place housing within a 100-year flood hazard area, or place structures that would impede or redirect flood flows within a 100-year flood hazard area, as mapped on a federal Flood Hazard Boundary or FIRM or other flood hazard delineation map
Level of Impact	Significant
Mitigation Measure	HYD-4: Minimize floodplain impacts by minimizing new impervious areas for TPFs or relocating these facilities
Level of Impact after Mitigation	Less than significant

Construction

Construction would result in only temporary occupancy of the Caltrain ROW and the two off-ROW traction power substation locations and would not redirect or increase flood flows. Short-term construction impacts would be minimized by scheduling activities in the floodplain during the dry season and by implementing erosion and other pollution control measures, as part of compliance

with the Construction General Permit. Thus construction impacts related to flooding would be less than significant.

There would be no changes to this analysis with Project Variant 1 as the Construction General Permit would equally apply.

Operation

The floodplain areas that would be affected by the Proposed Project are already occupied by active rail facilities or, in the case of the new traction power substations, are in areas of existing commercial and industrial development.

The potential TPF locations (including potential options) within the current FEMA designated 100-year flood zone are as follows:

- PS3 Option 1, in Burlingame near Broadway Avenue.
- PS6 Options 1 and 2, in Sunnyvale.
- TPS2, Option 3, in San Jose at the Central Equipment Maintenance Operations Facility (CEMOF).

PS3 Option 1 is located in a part of Burlingame subject to flooding, likely because of backwater effects from Mills Creek and/or Easton Creek which are located north of PS3 Option 1. PS3 Option 1 would be located about 1,000 feet south of Easton Creek and 2,500 feet south of Mills Creek. Easton Creek is deficient in capacity and results in flooding of residential and industrial areas during a moderate rainstorm and medium to high tides (City of Burlingame, n.d.). Mills Creek experiences frequent flooding during moderate rain storms due to undersized box culverts under Rollins Road and U.S. Highway 101. In addition, the low elevation of the Mills Creek embankment causes overtopping of the creek during moderate rain storm events (City of Burlingame, n.d.). The PS3 area is within the southern edge of the inundation area along the Caltrain ROW due to these two creeks and thus would not redirect flood flows. PS3 Option 1 would be approximately 40 feet by 80 feet (3,200 square feet, or <0.1 acre) and would be located in a previously cleared and graded area. As a result, the amount of infiltration at PS3 Option 1 is likely minimal. Given the small size of PS3 Option 1, and its location on the edge of the inundation zone on a previously graded area with limited existing infiltration, it is considered unlikely that PS3 Option 1 would contribute significantly to flooding. Nevertheless, Mitigation Measure HYD-4 would apply to this location in order to minimize the potential to contribute to flooding potential.

PS6 (both options) are located in an area shown as within the current 100-year floodplain. The area of flooding is shown as an elongated area of flooding along the Caltrain ROW itself. PS6 (Option 2) is located in an existing paved area; placement at this location would have no impact on flooding. PS6 (Option 1) is located in an unpaved area and thus, as discussed above for PS3, the addition of a small amount of impervious space is unlikely to contribute significantly to flooding, but Mitigation Measure HYD-4 would apply to the PS6 (Option 2) location to minimize the potential to contribute to flooding.

TPS2, Option 3 would be located at CEMOF in an area that is partially a parking lot and partially a graded dirt lot that is surrounded entirely by developed buildings and pavement. Flooding in this area appears to be local flooding, possibly due to a lack of adequate drainage to the Guadalupe River or issues with the Howard Street outfall (the river is approximately 1,500 feet to the east of the potential TPS2 location). TPS2, Option 3 would be approximately 150 feet by 200 feet (30,000 square feet, or 0.7 acre) and would be located in a previously cleared and graded and partially paved

area. As a result, the amount of infiltration at this potential location for TPS2 is likely minimal. In addition, as a backwater area, TPS2 would not redirect or block flood flows. Nevertheless, the increase in impervious space could contribute to expanded localized flooding. Mitigation Measure HYD-4 would apply to this location in order to minimize the potential to contribute to flooding potential.

Under Project Variant 1, described in Chapter 2, *Project Description*, there would be two potential locations for PS7 (Variant A and B), both of which are located within the mapped 100-year floodplain. However, both of the sites have ground elevations greater than 120 feet above MSL and the identified 100 year flood level is 115 to 117 feet above MSL and thus the sites are actually outside of the 100 year floodplain. Therefore, Project Variant 1 would not change the significance determination of this impact.

As shown in Figure 3.9-4, some of the alignment containing the new OCS poles would also be in the 100-year flood zone including near the Brisbane Lagoon, and at certain locations in South San Francisco, Millbrae, Burlingame, San Carlos, Sunnyvale, Santa Clara, and San Jose. The introduction of OCS poles would not affect flood storage capacity due to their limited size. For example, in a 1-mile two-track segment of the project route, there would be approximately 53 poles, each with an approximately 3 to 4-square-foot foundation for a total footprint of 178 square feet (~0.004 acre). In 1-mile of four-track segments, even assuming one OCS pole alignment per track (4-track areas are more likely to have headspans or portals), the total area of foundations would be only 356 square feet (~0.008 acre) As such, where OCS poles would be located within 100-year floodplains, they would constitute only minimal encroachment. Further, the poles would not redirect or divert flows. Therefore, the probability of substantial changes in flooding attributable to the encroachment of the poles is considered very low and less than significant.

Apart from physical encroachment of the floodplain at certain areas, the Proposed Project would not affect floodplain values. The majority of OCS poles would be located within existing railroad ROW; TPFs would be either within or in the immediate vicinity of existing railroad ROW or in commercial or industrial areas disconnected from their floodplains. No long-term impact on natural beauty, outdoor recreation, aquaculture, natural moderation of floods, or water quality is anticipated. The Proposed Project would electrify an existing rail line, which passes through or adjacent to several areas of 100-year floodplain and serves existing rail stations, each of which is located in an urban environment. Although the project alignment passes through floodplains, it is unlikely that the Proposed Project would induce any development in those floodplains. The Proposed Project would require only two traction power substations. All potential traction power substation locations are next to existing roadways and, thus, the provision of access would result in minimal increase in impervious surfaces and minimal reductions in flood capacity.

Overall, potential significant impacts are only expected at the TPFs located within 100-year floodplains. Mitigation Measure HYD-4 would reduce impacts at these locations to a less-than-significant level by further reducing the potential of these TPFs to contribute to localized flooding. Mitigation Measure HYD-4 is also recommended at TPFs not located within 100-year floodplains to minimize downstream flooding impacts, but is not required due to less- than- significant impacts relative to impacts on downstream flooding for these locations.

Mitigation Measure HYD-4: Minimize floodplain impacts by minimizing new impervious areas for TPFs or relocating these facilities

At PS3 (Option 1), PS6 (Option 1) and TPS2 (Option 3, at CEMOF), the design will minimize the amount of new impervious areas by using graveled or pervious pavement for all facility areas other than the foundations for new electric equipment and any other weight–bearing facilities. Currently unpaved areas not used to house new equipment shall remain unpaved or if paved shall use pervious pavement. At other paralleling stations, TPS1, and the switching station, the same measure is recommended, but not required.

~~As an option, PS3 could be moved slightly to the south~~ The JPB could select PS3 Option 2 (to the northeast) which would remove this facility from the 100-year floodplain and PS6 could be placed at the Option 2 ~~1~~, which is currently paved and then the requirements above would not apply. For TPS2, Caltrain could select one of the other options (Option 1 or Option 2), both of which are currently outside the 100-year floodplain.

Impact HYD-5	Expose people or structures to a significant risk of loss, injury, or death involving flooding, including flooding as a result of the failure of a levee or dam
Level of Impact	Significant
Mitigation Measure	HYD-5: Provide for electrical safety at TPFs subject to periodic or potential flooding
Level of Impact after Mitigation	Less than significant

Construction

Construction activities would be temporary and would not increase the potential for flooding.

Operation

Potential Flooding Impacts Related to New Electrical Infrastructure

As described above, several of the new TPFs are proposed within 100-year floodplains. Given the electrical equipment contained in new paralleling stations and traction power substations, flooding would pose electrical safety risks to these facilities and to any people near the facilities if flooding were to contact energized equipment. This is considered a significant impact. If these facilities are not relocated outside of the 100-year floodplain or at previously paved areas (pursuant to options in Mitigation Measures HYD-4), then Mitigation Measure HYD-5 is recommended to provide for safety of these new facilities and/or shutdown in the event of unavoidable flooding events.

Since under Project Variant 1, PS7 (Variant A and B) are located in the 100-year floodplain but at elevations above the 100-year flood level (as noted above), Project Variant 1 would not have any different impacts relative to the Proposed Project.

The OCS poles are energized, but the energized elements would be at least 15 feet above the ground. As such, even with potential periodic flooding of the tracks at certain locations, the energized elements would be elevated and would not be subject to flooding themselves.

Potential Flooding Impacts Related to Levee Failure

Numerous levees are located along the San Francisco Bay shoreline and along certain creeks to protect various residential, commercial and industrial areas from coastal and riverine flooding. Levees can fail due to earthquakes or storm events, if not properly maintained or reinforced to withstand potential stresses. In the event of levee failure, there could be flooding of several areas of the existing Caltrain alignment beyond those included in the current 100-year floodplain. This existing flooding potential due to levee failure would not be changed by the Proposed Project; however, the Proposed Project would introduce new electrical facilities that could be damaged or result in electrical safety risks in the event of flooding.

As described above, OCS energized elements would be elevated and thus would not be subject to flooding risks related to electrical safety and the OCS foundations would be sufficiently deep and strong to withstand flooding effects. Based on available FEMA mapping, PS6 (both options) are in areas protected by levees that might be subject to flooding in the event of levee failure (these locations are also in the current floodplain). It is possible that other facilities might be subject to flooding due to levee failure that are not shown in available FEMA mapping. Mitigation Measure HYD-5 is recommended to provide for safety of these new facilities and/or shutdown in the event of unavoidable flooding events. With this measure, electrical safety risks would be managed and new impacts due to the Proposed Project beyond current conditions would be less than significant in the event of flooding due to levee failure.

PS7 (Variant A and B) are not protected by levees and thus this impact determination would not change with Project Variant 1.

Potential Flooding Impacts Related to Dam Failure

As described above, there are a number of dams located in Peninsula watersheds upstream of the Caltrain alignment. The primary risk of dam failure is due to seismic activity. All dam owners are required to manage their facilities in line with potential seismic risks by the California Department of Safety and Dams (DSOD). For example, the Anderson Dam, south of San Jose, is presently managed by the Santa Clara Valley Water District (SCVWD) at lower reservoir levels due to recently identified seismic risks. Implementation of DSOD regulations reduce the likelihood of dam failure resulting in flooding of downstream areas. All of the dams in the area survived the 1989 Loma Prieta earthquake without failure; however the Elsmer Dam south of San Jose (also called the Austrain Dam) settled by 2.8 feet and its end moved 1.2 feet and the dam suffered a crack at its spillway. Although dam failure has not resulted from prior seismic events (the Crystal Springs dam also survived the much larger 1906 earthquake), there remains a possibility of local dam failure given the seismic character of the project alignment.

In the event of dam failure, portions of the existing Caltrain ROW could be inundated. This existing flooding potential due to dam failure would not be changed by the Proposed Project; however, the Proposed Project would introduce new facilities that could be damaged or result in electrical safety risks in the event of flooding.

As described above, OCS energized elements are elevated and thus would not be likely be subject to flooding risks as the OCS foundations are sufficiently deep and strong to withstand flooding effects. However, some of the new TPFs could be subject to flooding in the event of dam failure including PS5 (Option 2), TPS2 (all options) and possibly PS7. The likelihood of a dam failure resulting in actual inundation of the Caltrain ROW is low.

Mitigation Measure HYD-5 is recommended to provide for safety of these new facilities and/or shutdown in the event of unavoidable flooding events. With this measure, electrical safety risks would be managed and impacts would be less than significant in the event of flooding due to dam failure.

Both the potential locations for the PS7 Variant are in an area subject to dam failure flooding. If Project Variant 1 is selected, then Mitigation Measure HYD-5 would still need to be implemented and applied to the selected location for PS7. Therefore, Project Variant 1 would not change the significance determination of this impact.

Mitigation Measure HYD-5: Provide for electrical safety at TPFs subject to periodic or potential flooding

For new TPFs within the current 100-year floodplain (PS3 Option 1, TPS-2 Option 3, and PS6 – both options), the preferred method of avoiding damage would be to place all new electrical equipment on elevated pads above expected flood depths and/or protect such equipment with flood barriers. If equipment cannot be designed so that flood waters cannot contact the equipment, then sealed or capped moisture-resistant components are required. Ground Fault Circuit Interrupters (GCFIs) shall be utilized for all electrical circuits below the base flood elevation for the 100-year flood.

For all new traction power facilities subject to current flooding (for the current 100-year event), or with a potential for flooding due to levee or dam failure (PS3 [Option 1], PS5 [Option 2], PS6 [both options], TPS2 [all options] and possibly PS7 and PS7 Variant A and B, if selected), Caltrain shall develop emergency response procedures to provide electrical safety including system shutdown during projected flood events. Due to the potential for gaps in current FEMA mapping of areas subject to flooding due to levee failures, Caltrain shall also investigate potential flooding risks due to levee failures for all new TPFs and apply emergency shutdown requirements to all additional facilities identified as at risk of flooding due to potential levee failures.

Impact HYD-6	Contribute to inundation by seiche, tsunami, or mudflow
Level of Impact	Less than significant

Tsunami inundation maps of San Francisco, San Mateo, and Santa Clara Counties indicate that the portion of the project area most likely to be affected by tsunami inundation would be the northern portion of the alignment, as described in Section 3.9.1.2, *Environmental Setting, Current Flooding Risk*. The new Proposed Project infrastructure would be minimal in size and would not contribute to the effects of a tsunami event on the surrounding area and would not change or redirect flooding during a tsunami event. Thus, impacts related to contribution to tsunami inundation would be less than significant.

Seiches occur in an enclosed or partially enclosed body of water. The San Francisco Bay is a large and open body of water with no immediate risk of seiches—there would be minimal to no risk of damages associated with a seiche event in the project area. The project alignment is primarily in flat or gently sloping areas except where it is adjacent to San Bruno Mountain. At San Bruno Mountain, there is no known active landslide immediately adjacent to the project route. Further, the Proposed Project would not affect potential seiche or mudflow events in any way. Therefore, the Proposed Project would not contribute to any inundation impacts associated with seiche waves or mudflows.

Implementation of Project Variant 1, described in Chapter 2, *Project Description*, would not result in any changes to this impact analysis.

Impact HYD-7	Expose people or structures to a significant risk of loss, injury, or death involving flooding, including flooding as a result of SLR
Level of Impact	Significant
Mitigation Measure	HYD-7: Implement sea level rise vulnerability assessment and adaptation plan
Level of Impact after Mitigation	Potentially Significant and Unavoidable

SLR is a concern for the future, particularly in combination with future storm events and coastal flooding. A scenario with 100-year flood flows coincident with high tides taking into account SLR over a 50-year or 100-year horizon would dramatically increase the risk of flooding in the vicinity of the project area. The Proposed Project, the tracks, and associated facilities, are minimal in size relative to their surrounding areas and would not divert or increase flood risks relative to other adjacent areas associated with these events.

However, future SLR may result in worsened coastal flooding events that could affect new project facilities (i.e., traction power substations, switching station, and paralleling stations), existing facilities (tracks and stations), and service and riders on Caltrain. The concern is the impact of SLR on the Proposed Project (and existing facilities) as opposed to the impact of the Proposed Project on SLR (the project would help to reduce GHG emissions which would help to reduce the potential amount of SLR in combination with other global efforts to reduce such emissions). Given recent court rulings (including *Ballona Wetlands*), it is uncertain whether analysis of such "impacts of the environment on the project" are or are not required by CEQA. Caltrain is providing this analysis as if such analysis is required under CEQA as a conservative approach and for the purposes of public disclosure.

While the Proposed Project would not change the potential localized impacts of flooding associated with SLR when they would occur, the Proposed Project would introduce electrical infrastructure at risk of flooding impact and electrical safety risks associated with water contact. The OCS wires and energized elements would be at least 15 feet above the ground surface and, thus, would not be at risk of flooding, even with projected SLR ranges in the higher part of the range for 2100 (+ 5.5 feet). However, the TPFs would be at ground surface and thus those TPFs in areas subject to future coastal flooding may be exposed to mid-century (2050) and/or end-of-century (2100) SLR projections.

Based on USGS SLR mapping, coastal flooding exacerbated by SLR could affect PS3 after 2050 and TPS1 (all locations) between 2050 and 2100). Table 3.9-8 shows the potential for flooding (100-year event) with potential SLR at the new TPF locations. The majority of the City of Belmont is within FEMA-designated 500-year flood zone (Flood Zone X - an area with reduced flood risk due to levee). As shown in Figure 3.9-5, The JPB ROW crossing of Belmont Creek is the only portion of the JPB ROW within the City that is within FEMA-designed 100-year flood zone areas (Flood Zone A).

In addition, as shown in Table 3.9-7 and Figure 3.9-5, there are also approximately 1.5 miles of the Caltrain alignment trackbed (including the San Francisco 4th and King Station) that would be vulnerable to future flooding with 50 cm SLR. A total of 9.9 miles of the alignment (including the stations at 4th and King in San Francisco, Millbrae, Broadway station in Burlingame, Hayward Park and Redwood City) would be vulnerable to future flooding with 150 cm SLR. Both estimates are for 100-year tide events. The risk to existing Caltrain facilities is part of the environmental baseline and

is not caused by the Proposed Project. The Proposed Project would reduce GHG emissions and would help to reduce the effects of climate change (including SLR). However, new electrical facilities would be constructed in areas that could flood in the future when taking into account SLR that may occur regardless of the efforts of Caltrain and others to reduce GHG emissions in the long term.

Table 3.9-8. Potential Vulnerability for TPFs Subject to Mid-Century (2050) or End-of-Century (2100) Sea Level Rise Inundation

		Potential for Inundation in 100-year storm event			
Facility[a]	Location	Existing Conditions	50 cm SLR (~2050)[b]	150 cm SLR (2100)[c]	Description
PS1	San Francisco				No coastal flooding projected to occur.
PS2	San Francisco				No coastal flooding projected to occur.
TPS1	South San Francisco ~~(all options)~~ (Options 1, 2, and 3)			X	Potential coastal flooding between 2050 and 2100.
TPS1	South San Francisco (Option 4)				No coastal flooding projected to occur.
PS3	Burlingame (Option 1)	X	X	X	Within existing 100-year floodplain due to riverine flooding; coastal flooding expected to affect the site after 2050.
PS3	Burlingame (Option 2)		X	X	Not within existing 100-year floodplain; coastal flooding expected to affect the site after 2050.
PS4	San Mateo (~~both~~ all Options)				No coastal flooding projected to occur.
SWS1	San Mateo County (Option 1) Redwood City (Option 2)				No coastal flooding projected to occur.
PS5	Palo Alto (both options)				No coastal flooding projected to occur.
PS6	Sunnyvale (both options)	X	N/A	N/A	Within existing 100-year floodplain (non-coastal); would not be affected by future coastal flooding.
TPS2	San Jose (Option 1 & 2)				No coastal flooding projected to occur but Option 3 is located within existing 100-year floodplain due to localized drainage/flooding.
	San Jose (Option 3)	X	N/A	N/A	
PS7	San Jose				No coastal flooding projected to occur.

Sources: U.S. Geological Survey 2013, FEMA Firms (for existing flooding).
cm = centimeters
PS = Paralleling Station
SLR = sea level rise
SWS = Switching Station
TPS = Traction Power Substation
[a] Locations of proposed facilities are shown in Chapter 2, *Project Description*, Figure 2-2.
[b] Area subject to a rise in sea level equal to or greater than 50 cm (20 inches) (CA-CAT) with a 100-year storm event.
[c] Area subject to a rise in sea level greater than 150 cm (59 inches) with a 100-year storm event.[a]

Such inundation could result in damage to Caltrain facilities resulting in structural damage and service interruptions. To address these potential impacts, Mitigation Measure HYD-7, Implement sea level rise vulnerability assessment and adaptation plan, is recommended. With this measure, Caltrain will assess its vulnerability to future flooding with SLR and will partner with adjacent municipalities, flood districts, regional agencies, state agencies, and federal agencies in doing its fair share to help adapt to changing flood conditions over time. In most areas of the Caltrain alignment, the ROW is located inland of extensive developed areas closer to San Francisco Bay that contain residential, commercial, industrial, and infrastructure development that is even more vulnerable to SLR than the Caltrain ROW. As a result, it is expected that there will be combined efforts to protect such development and adapt over time to rising sea levels. In many cases, the actions taken to protect such development closer to the Bay will also protect the Caltrain alignment. However, in some locations, the optimal solution for protecting other development may not also provide flood protection for Caltrain facilities. Thus, Caltrain will need to partner with other entities to develop flood protection solutions that work optimally for multiple parties, while at the same time, Caltrain may need to provide individual solutions that work for its facilities. For example, the Caltrain alignment is directly adjacent to Mission Creek and Islais Creek in San Francisco as well as Brisbane Lagoon in Brisbane and a portion of San Francisco Bay in South San Francisco. In these areas, Caltrain may need to consider seawalls, elevated tracks, or other solutions to protect the alignment, depending on the actual extent of SLR and associated flooding.

Under CEQA, Mitigation Measure HYD-7 can only be required where new Proposed Project facilities would result in new safety risks in combination with sea level rise. However, given that sea level rise flooding could affect Caltrain system safety and operations, Mitigation Measure HYD-7 is recommended for all locations subject to coastal flooding now and in the future.

Potential adaptation solutions could include flood levees, seawalls, elevated tracks, and/or minor track realignment. In most locations, new levees or seawalls would be optimally placed closer to the Bay or along tidal channels rather than directly along the Caltrain alignment, given the need to protect other development subject to flooding between the Caltrain alignment and the Bay. At this time, the feasibility of implementing all measures necessary to avoid future inundation associated with 100-year floods influenced by SLR is not known given that assessment of such solutions will be an ongoing, long-term, and multi-agency process. As such, this impact is considered potentially significant and unavoidable at this time.

In addition, the construction of flood improvements necessary to protect the Caltrain alignment could result in secondary impacts on the environment. For the new electrification facilities potentially affected by coastal flooding in the future (PS3 (both options), TPS1 – ~~all~~ Options 1, 2, and 3), additional flood protection improvements are likely to be limited in character and have only limited secondary impacts. For example, PS3 is a small area (3,200 sf) adjacent to the existing railroad tracks that could be protected with floodwalls around new electrical equipment and/or new equipment could be elevated over time to above potential flood depths. TPS1 would be a larger facility (30,000 sf), but is located in a developed industrial/commercial area. Construction of a levee or flood walls or equipment elevation would result in some construction impacts, but operationally would have few impacts on the environment once completed.

Potential improvements to address flooding along the Caltrain ROW itself or to address regional flooding impacts (including adjacent residential, commercial, and industrial areas along with the Caltrain ROW) could be more extensive than that needed to just protect new Proposed Project electrical equipment. Because the specific solutions have not been identified, the following is a

general summary of potential impacts that could result from new levees, seawalls, elevated tracks, and/or track realignment needed to address flooding along the Caltrain ROW and in adjacent areas.

- Aesthetics—New flood protection facilities such as levees or seawalls could change existing visual aesthetics, require removal of vegetation or other aesthetic features and/or block existing views. Elevation of tracks or track realignment could also increase impacts on aesthetic by making the train more visible from adjacent areas.
- Air Quality—Construction of new flood protection facilities would result in criteria pollutant emissions but there would be no operational emissions except for maintenance activities.
- Biological Resources—Construction of new flood protection facilities could affect biological resources found within project footprints and/or require diversion of water flows which could affect stream or coastal habitats.
- Cultural and Paleontological Resources—Construction of new flood protection facilities could disturb cultural or paleontological resources if found at construction sites. No effects from operation would be expected.
- EMI/EMF—No impacts related to EMI/EMF would be expected.
- Geology, Soils and Seismicity—New facilities may be placed in areas subject to seismic shaking, liquefaction or expansive soils, but design measures exist to protect flood protection facilities from such risk.
- GHG Emissions—Construction of new flood protection facilities would result in additional GHG emissions.
- Hazards and Hazardous Materials—Construction of new flood protection facilities would encounter existing contaminated soils or groundwater which would have to be properly contained and disposed of at appropriate facilities. Construction use of fuels and other materials would also need to be controlled.
- Hydrology and Water Quality—Construction of new flood protection facilities could divert flood flows and would need to be designed to avoid diverting floodwaters from one location only to increase flooding at other adjacent areas. Construction would need to be managed to address erosion, sedimentation, and other water quality effects.
- Land Use and Recreation—Construction of new flood protection facilities could require displacement of existing uses and/or directly or indirectly affect recreational facilities.
- Noise and Vibration—Construction of new flood protection facilities would result in noise and vibration during construction activities. There would be no operational noise impacts of levees for floodwalls unless such facilities would redirect other sources of noise by reflection to sensitive receptors. If elevating of tracks were proposed, train noise could affect larger areas containing sensitive receptors.
- Population and Housing—Construction of new flood protection facilities may require displacement of existing homes.
- Public Services and Utilities—Construction of new flood protection facilities would need to safely identify, avoid and/or relocate existing utilities.

- Transportation and Traffic—Construction of new flood protection facilities could result in temporary impacts on traffic and transportation systems during construction. New facilities may also require roadway or access changes which could affect local circulation.

While flood protection measures for regional protection including the Caltrain ROW itself could have potentially significant secondary environmental impacts, such improvements are not related to the Proposed Project. The secondary environmental impacts of flood protection measures for PS3 (both options) and TPS1 (Options 1, 2, and 3), which are the only new Proposed Project facilities that would be newly affected by coastal flooding resultant from sea level rise, would be limited to the PS3 and TPS1 sites. The secondary environmental effects of construction of additional flood facilities would likely be similar to that disclosed in this EIR for the initial site construction. However, it would be premature to predict the exact character of such secondary effects until such a time as designs are proposed. Thus, it would be speculative to make any conclusions about the significance of such potential secondary environmental effects at this time.

Implementation of Project Variant 1, described in Chapter 2, *Project Description*, would not result in any changes to this impact analysis because it would introduce no new facilities subject to flooding associated with sea level rise.

Mitigation Measure HYD-7: Implement sea level rise vulnerability assessment and adaptation plan

The JPB will use State of California Sea Level Rise guidance (CO-CAT 2013), the California Adaptation strategy, as well as guidance from other agencies [i.e., BCDC]), for the development of the vulnerability assessment and adaptation plan. Under CEQA, this assessment and plan is only mandatory for the new facilities associated with the Proposed Project However, it is recommended that the JPB include analysis of all existing and new facilities subject to potential coastal flooding with predicted sea level rise.

Sea Level Rise Vulnerability Assessment

The analysis in the EIR considers potential vulnerability based on broad USGS mapping of potential inundation areas using specific SLR increments. This preliminary assessment shall be supplemented by a more detailed evaluation of future flood risks taking into account the following.

- The range of SLR predictions based on current state guidance.
- The specific elevations of Caltrain facilities.
- Hydraulic connection of Caltrain facilities to San Francisco Bay and tidal channels.
- Protectiveness of other structures (levees, seawalls, other development) between Caltrain facilities and San Francisco Bay and tidal channels.

The vulnerability assessment shall describe the scenarios under which Caltrain facilities could become subject to flooding, the estimated duration of such flooding, and the potential damage that may result from such flooding scenarios.

The JPB shall complete the vulnerability assessment within 5 years of project approval (nominally early 2020 ~~end of 2019~~, assuming project approval in early 2015 ~~late 2014~~). The JPB shall share the results of its vulnerability assessment with other local agencies potentially affected by sea level rise along the Caltrain corridor.

Sea Level Rise Adaptation Plan

Based on the vulnerabilities identified, the JPB shall prepare an SLR Adaptation Plan identifying measures that will be taken to protect the new project facilities as well as the existing Caltrain facilities from potential damage due to future flooding from SLR. The JPB will coordinate with other entities with facilities close to the San Francisco Bay with an equal or greater SLR vulnerability, such as cities along the northern portion of the route (San Francisco, Brisbane, South San Francisco, San Bruno, Millbrae, Burlingame, San Mateo, Belmont, San Carlos and Redwood City), the San Francisco International Airport, the California Department of Transportation (U.S. Highway 101 and Interstate 380), the Bay Area Rapid Transit District, VTA, SFMTA, and other agencies.

The requirements for development and implementation of this plan and updating over time are as follows.

- 2016: The JPB shall complete the first SLR Adaptation Plan within 2 years of project approval (nominally end of 2016, assuming project approval in late 2014) including the following.
    - Review available scientific information on SLR data and projections for the subsequent 50 years. Where data and projections indicate different rates of SLR than previously applied, the JPB will adjust the vulnerability assessment and flood design criteria to reflect a median-point of then-current projections.
    - Review JPB system vulnerability for the subsequent 50 years in light of available data at that time and the adjusted flood design criteria.
    - Prepare a plan identifying improvements to meet the flood design criteria, as feasible and unconstrained by surrounding development not owned by JPB. The plan of improvements will be designed to meet the flood design criteria as predicted for the next 10 years and updated every 10 years thereafter.
    - The plan may include projects that the JPB implements on its own or in concert with other parties. The plan may also rely on flood improvements implemented separate from the JPB but that will also provide flooding benefits for Caltrain facilities provided such plans have a realistic funding and implementation schedule.
    - Where the JPB is a lead for improvements needed to address flooding risks expected within the next 10 years, the JPB shall complete all necessary environmental clearances and shall adopt such improvements as part of JPB's capital funding plans and identify funding sources for their implementation.
    - The goal for all improvements is to provide 100-year flood protection for Caltrain facilities from coastal flooding at all times, wherever feasible. Where that is not feasible, the JPB shall identify alternative means to provide for safe system operations in the event of flooding.
    - Identify opportunities for partnership with other local and regional parties for SLR adaptation or where regional efforts will address flooding risks to Caltrain facilities.
- 2021 (and every 5 years thereafter): The JPB shall update the Adaptation Plan meeting the requirements described above.

- Ongoing: Where JPB's adaptation options are constrained because of adjacent infrastructure (such as adjacent roadways and structures not owned by JPB), JPB will work with adjacent landowners and infrastructure managers to identify opportunities to improve rail system protection in concert with other local or regional parties.