SEISMIC UPGRADE OF BAY DIVISION PIPELINES NOS. 3 AND 4 AT HAYWARD FAULT

Draft Environmental Impact Report

Planning Department Case No. 2006.1388E
State Clearinghouse No. 2008042007

December 2009

City and County of San Francisco
San Francisco Planning Department

Important Dates:

DEIR Publication Date:	December 23, 2009
DEIR Public Comment Period:	December 24, 2009 to February 8, 2010
DEIR Public Hearing Dates:	January 26, 2010, Fremont January 28, 2010, San Francisco

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TO: Distribution List for the Seismic Upgrade of BDPL Nos. 3 and 4 at Hayward Fault Project Draft EIR

FROM: Bill Wycko, Environmental Review Officer

SUBJECT: Request for the Final Environmental Impact Report for the Seismic Upgrade of BDPL Nos. 3 and 4 at Hayward Fault Project (Planning Department File No. 2006.1388E)

This is the Draft of the Environmental Impact Report (EIR) for the Seismic Upgrade of BDPL Nos. 3 and 4 at Hayward Fault Project. A public hearing will be held on the adequacy and accuracy of this document. After the public hearing, our office will prepare and publish a document titled "Comments and Responses," which will contain a summary of all relevant comments on this Draft EIR and our responses to those comments. It may also specify changes to this Draft EIR. Those who testify at the hearing on the Draft EIR will automatically receive a copy of the Comments and Responses document, along with notice of the date reserved for certification; others may receive a copy of the Comments and Responses and notice by request or by visiting our office. This Draft EIR together with the Comments and Responses document will be considered by the Planning Commission in an advertised public meeting and will be certified as a Final EIR if deemed adequate.

After certification, we will modify the Draft EIR as specified by the Comments and Responses document and print both documents in a single publication called the Final EIR. The Final EIR will add no new information to the combination of the two documents except to reproduce the certification resolution. It will simply provide the information in one document, rather than two. Therefore, if you receive a copy of the Comments and Responses document in addition to this copy of the Draft EIR, you will technically have a copy of the Final EIR.

We are aware that many people who receive the Draft EIR and Comments and Responses have no interest in receiving virtually the same information after the EIR has been certified. To avoid expending money and paper needlessly, we would like to send copies of the Final EIR in Adobe Acrobat format on a compact disk (CD) to private individuals only if they request them. Therefore, if you would like a copy of the Final EIR, please fill out and mail the postcard provided inside the back cover to the Major Environmental Analysis division of the Planning Department within two weeks after certification of the EIR. Any private party not requesting a Final EIR by that time will not be mailed a copy.

Thank you for your interest in this project.

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ACRONYMS AND ABBREVIATIONS

°C	degrees Celsius
AB	Assembly Bill
ABAG	Association of Bay Area Governments
AC Transit	Alameda County Transit
ACCMA	Alameda County Congestion Management Agency
ACFCWCD	Alameda County Flood Control and Water Conservation District
ACPWA	Alameda County Public Works Agency
ACWD	Alameda County Water District
ADRR	archaeological data recovery report
AEER	archaeological evaluation and effects report
AEP	archaeological evaluation plan
AMP	archaeological monitoring plan
APE	Area of Potential Effect
ARDTP	archaeological research design and treatment plan
ASCE	American Society of Civil Engineers
ASP	archaeological survey plan
ATCM	Airborne Toxic Control Measure
BAAB	Bay Area Air Basin
BAAQMD	Bay Area Air Quality Management District
BART	Bay Area Rapid Transit
BAWSCA	Bay Area Water Supply and Conservation Agency
BDPL	Bay Division Pipelines
BMP	best management practice
BP	Before Present
ca.	circa
Cal EPA	California Environmental Protection Agency
Cal-OSHA	California Occupational Safety and Health Administration
Caltrans	California Department of Transportation
C-APE	CEQA Area of Potential Effect
CARB	California Air Resources Board
CBC	California Building Code
CCR	California Code of Regulations
CCSF	City and County of San Francisco
CDFG	California Department of Fish and Game
CDHS	California Department of Health Services
CEC	California Energy Commission
CEQA	California Environmental Quality Act
CESA	California Endangered Species Act
CFR	Code of Federal Regulations
cfs	cubic feet per second
CGS	California Geological Society
CH4	methane
CIWMB	California Integrated Waste Management Board

CMP	corrugated metal pipe
CNDDB	California Natural Diversity Database
CNEL	Community Noise Equivalent Level
CNPS	California Native Plant Society
CO	carbon monoxide
CO_2	carbon dioxide
Corps	U.S. Army Corps of Engineers
CPUC	California Public Utilities Commission
CWA	Clean Water Act
dB	decibel
dBA	A weighted decibel
dbh	diameter at breast height
DPM	diesel particulate matter
DTSC	California Department of Toxic Substances Control
DWR	California Department of Water Resources
EIR	environmental impact report
ERO	Environmental Review Officer
ESLs	Environmental Screening Levels
FEMA	Federal Emergency Management Agency
FESA	Federal Endangered Species Act
FMMP	California Department of Conservation's Farmland Mapping and Monitoring Program
g	gravity
GHGs	greenhouse gases
GIS	geographic information system
gpm	gallons per minute
H2O	water vapor
HCP	habitat conservation plan
HPTP	historic properties treatment plan
I-680	Interstate 680
I-880	Interstate 880
in/sec	inches per second
kV	kilovolt
kWh	kilowatt-hours
Ldn	day/night noise level
Leq	steady state energy level
MBTA	Migratory Bird Treaty Act
MCL	Maximum Contaminant Level
Mg	magnesium
mg/L	milligrams per liter
mgd	million gallons per day
MLD	Most Likely Descendant
MMRP	mitigation monitoring and reporting program
MRZ	Mineral Resource Zone
msl	mean sea level
Mw	moment magnitude
N/A	Not Applicable
N2O	nitrous oxide
NAAQS	national ambient air quality standards
NAHC	California Native American Heritage Commission
NHPA	National Historic Preservation Act
NMFS	National Marine Fisheries Service
NO2 or NOx	nitrogen oxide

NOP	notice of preparation
NPDES	National Pollutant Discharge Elimination System
NPS	National Park Service
NRCS	Natural Resources Conservation Service
NWIC	Northwest Information Center
O3	ozone
OAP	Ozone Attainment Plan
OHP	California Office of Historic Preservation
OPR	Governor's Office of Planning and Research
OSHA	federal Occupational Safety and Health Administration
PCCP	prestressed concrete cylinder pipe
PEIR	Program Environmental Impact Report
PG&E	Pacific Gas and Electric
PM10 and PM2.5	particulate matter
ppm	parts per million
ppv	peak particle velocity
PRC	Public Resources Code
PRG	Preliminary Remediation Goals
PRPA	Paleontological Resources Preservation Act
PSI	pounds per square inch
RCCP	reinforced concrete cylinder pipe
RCRA	Resource Conservation and Recovery Act
ROG	reactive organic gases
ROW	right-of-way
RWQCB	Regional Water Quality Control Board
SAAQS	state ambient air quality standards
SB	Senate Bill
SCADA	Supervisory Control and Data Acquisition
SDWA	Safe Drinking Water Act
SFDE	San Francisco Department of the Environment
SFPUC	San Francisco Public Utilities Commission
SHPO	State Historic Preservation Officer
SIP	State Implementation Plan
SO2	sulfur dioxide
SOP	standard operating procedures
STLC	soluble threshold limit concentration
SVP	Society of Vertebrate Paleontology
SWIS	Solid Waste Information System
SWPPP	Stormwater Pollution Prevention Plan
SWRCB	State Water Resources Control Board
TCLP	Toxicity Characteristic Leaching Procedure
TMDL	total maximum daily load
TPZ	tree protection zone
TTLC	Total Threshold Limit Concentration
U.S. EPA	United States Environmental Protection Agency
USC	United States Code
USD	Union Sanitary District
USFWS	U.S. Fish and Wildlife Service
USGS	United States Geological Society
VOC	volatile organic compound
WDR	Waste Discharge Requirements
WET	California Waste Extraction Test
WSIP	Water System Improvement Program

GLOSSARY

100-year flood – A flood that has a 1-percent chance of being equaled or exceeded in any given year.

Actuator – Device used to open or close or control valves when valves are remotely located (eg, on pipelines).

Alluvium – Consists of unconsolidated mixtures of gravel, sand, clay, and silt typically deposited by streams.

Alquist-Priolo Earthquake Fault Zone – The Alquist-Priolo Earthquake Fault Zoning Act was passed in 1972 to mitigate the hazard of surface faulting to structures for human occupancy. In accordance with this act, the state geologist established regulatory zones called "earthquake fault zones" around the surface traces of active faults and published maps showing these zones. Within these zones, buildings for human occupancy cannot be constructed across the surface trace of active faults. Each earthquake fault zone extends approximately 200 to 500 feet on either side of the mapped fault trace.

Aquifer – Permeable subsurface materials (soil, sediments, and rock) that contain groundwater. Aquifers may be large or small, local or regional, shallow or deep, and confined or unconfined, depending on the subsurface geologic conditions. The permeable materials that surround an unconfined aquifer allow the water table to fluctuate in response to recharge (precipitation in the wet season) and discharge (evapotranspiration in the dry season). A confined aquifer is contained within impermeable materials and, as a result, the water table does not fluctuate.

Articulated vault – A vault consisting of several segments held together by joints.

A-weighted decibel (dBA) – Since the human ear is not equally sensitive to all sound frequencies within the entire spectrum, human response is factored into sound descriptions in a process called "A-weighting," expressed as "dBA." The dBA, or A-weighted decibel, refers to a scale of noise measurement that approximates the range of sensitivity of the human ear to sounds of different frequencies.

Ball joint – Allows two pipeline segments to bend relative to one-another.

Beneficial use – Those uses of water as defined in the State of California Water Code (Chapter 10 of Part 2 of Division 2), including but not limited to agricultural, domestic, municipal, industrial, power generation, fish and wildlife habitat, recreation, and mining.

Biological Opinion – Document issued under the authority of the Federal Endangered Species Act stating the U.S. Fish and Wildlife Service and/or the National Marine Fisheries Service findings as to whether a federal action is likely to jeopardize the continued existence of a threatened or endangered species or result in the destruction or adverse modification of critical habitat.

Blind flange – A flange used to close the end of a pipe.

Bulkhead - A structure or partition to resist pressure or to shut off water, fire, or gas.

Cast-in-place drilled-hole secant pile walls - A secant pile wall consists of a single line of alternating drilled, reinforced- and unreinforced-concrete piles. Alternating unreinforced piles are constructed and allowed to set for a short period of specified time. Subsequently, a reinforced-concrete pile is constructed between the previously drilled piles by cutting through a section of the previously constructed concrete piles.

Cathodic protection – A method used to "electrically" halt the oxidation process on both bare and coated pipelines. Passive cathodic protection uses anodes, which are connected to the pipeline and designed to corrode, instead of the pipeline corroding.

Chloramine/chloraminated – Chloramine is a chemical disinfecting agent comprised of a combination of chlorine and ammonia. Water that has been disinfected with chloramines is "chloraminated."

Chlorination – A disinfection process that involves the addition of free chlorine, whether as chlorine gas or liquid sodium hypochlorite.

Coffer dam – A temporary dam constructed of earth, sheet piling or other material to enclose a work area and permit the removal of water.

Colluvium – A loose deposit of rock debris accumulated through the action of gravity at the base of a cliff or slope.

Community Noise Equivalent Level (CNEL) – Because community receptors are more sensitive to unwanted noise intrusion during the evening and at night, state law requires that, for planning purposes, an artificial dBA increment be added to "quiet time" noise levels to form a 24-hour noise descriptor called the Community Noise Equivalent Level (CNEL). CNEL adds a 5-dBA "penalty" during the evening hours (7:00 p.m. to 10:00 p.m.) and a 10-dBA penalty during the night hours (10:00 p.m. to 7:00 a.m.).

Corrosion – the deterioration of materials caused when metals react with the environment (air, water, minerals in the soil). The most commonly known form of corrosion is rust (the oxidation of iron).

Corrugated-metal pipe – A galvanized light gauge metal pipe which is ribbed to improve its strength.

Cultural resource – A fragile and nonrenewable remain of human activity that is valued by or significantly representative of a culture or that contains significant information about a culture.

Cultural resources encompass archaeological, traditional, and build environment resources, including landscapes or districts, sites, buildings, structures, objects, or cultural practices that are usually greater than 50 years of age and possess architectural, historic, scientific, or other technical value.

Culvert – A culvert is a covered structure that conveys a flow under a road, railroad or other obstruction. Culverts are mainly used to divert stream or rainfall runoff to prevent erosion or flooding on highways.

Cumulatively considerable – A CEQA term used to indicate that the incremental effects of a project are significant when viewed in connection with the effects of past, present, and probable future projects.

Cut and fill – The process of earth grading by excavating part of a higher area and using the excavated material for fill to raise or level the surface of an adjacent lower area.

Day-night noise level (Ldn) – Another 24-hour noise descriptor, called the day-night noise level (Ldn), is similar to CNEL. While both add a 10-dBA penalty to all nighttime noise events between 10:00 p.m. and 7:00 a.m., Ldn does not add the evening 5-dBA penalty. In practice, Ldn and CNEL usually differ by less than 1 dBA at any given location for transportation noise sources.

Discharge – The flow of surface water in a stream or canal or the outflow of groundwater from a flowing artesian well, ditch, or spring. Also refers to the discharge of liquid effluent from a facility, or to chemical emissions into the air through designated venting mechanisms.

Disinfection– Disinfection is the treatment process used to inactivate and destroy disease-causing bacteria, viruses, and other waterborne microorganisms.

Dissolved oxygen (DO) – The oxygen freely available in water, which is vital to fish and other aquatic life and for the prevention of odors. DO levels are considered an important indicator of a water body's ability to support desirable aquatic life. Secondary and advanced waste treatment are generally designed to ensure adequate DO in waste-receiving waters.

Disturbance – Any event or series of events that disrupt ecosystem, community, or population structure and alter the physical environment.

Easements – An easement is a non-possessory interest to use real property in possession of another person for a stated purpose.

Ecosystem – A geographically identifiable area that encompasses unique physical and biological characteristics. It is the sum of the plant community, animal community, and environment in a particular region or habitat.

Endangered species – Any species or subspecies of bird, mammal, fish, amphibian, reptile, or plant that is in serious danger of becoming extinct throughout all or a significant portion of its range. Federally endangered species are officially designated by the U.S. Fish and Wildlife Service or the National Marine Fisheries Service and published in the Federal Register. Species may also be listed under the California Endangered Species Act by the Department of Fish and Game.

Expansive soils – These types of soils are characterized by their ability to undergo significant volume change (shrink and swell) due to variations in soil moisture content.

Fault creep – Movement along a fault that does not entail earthquake activity.

Fault trace – A fault trace is the expression of a fault at the ground surface where fault movement can occur.

Flow – The volume of water passing a given point per unit of time. Peak flow is the maximum instantaneous flow in a specified period of time.

Fluvial – Of or found in a river.

Fugitive dust – "Fugitive" emissions generally refer to those emissions that are released to the atmosphere by some means other than through a stack or tailpipe.

Gasket – A seal consisting of a ring for packing pistons or sealing a pipe joint.

Greenhouse gas – The gases present in the atmosphere which reduce the loss of heat into space and therefore contribute to global temperatures through the greenhouse effect.

Groundwater recharge – Inflow to aquifers from precipitation, infiltration, through-flow, and/or other means that replaces groundwater lost through pumping or other forms of discharge. The process of water being added to the saturated zone *or* the volume of water added by this process.

Habitat – The specific area or environment in which a particular type of animal or plant lives.

Hazardous materials – Defined in Section 25501(h) of the California Health and Safety Code, are materials that, because of their quantity, concentration, or physical or chemical characteristics, pose a substantial present or potential hazard to human health and safety or to the environment if released to the workplace or environment. Hazardous materials have been and are commonly used in commercial, agricultural, and industrial applications as well as in residential areas to a limited extent.

Hazardous waste – Any material that is relinquished, recycled, or inherently waste-like. Title 22 of the California Code of Regulations, Division 4.5, Chapter 11 contains regulations for the classification of hazardous wastes. A waste is considered a hazardous waste if it is toxic (causes human health effects), ignitable (has the ability to burn), corrosive (causes severe burns or damage to materials), or reactive (causes explosions or generates toxic gases) in accordance with the criteria established in Article 3. Article 4 lists specific hazardous wastes, and Article 5 identifies specific waste categories, including Resource Conservation and Recovery Act (RCRA) hazardous wastes, non-RCRA hazardous wastes, extremely hazardous wastes, and special wastes.

Heritage trees – Large, old, or historically important trees that receive protection on a local basis.

Hydrology – The science that deals with the waters above and below land surfaces; their occurrence, circulation, and distribution, both in time and space; their biological, chemical, and physical properties; and their reaction with their environment, including their relation to living beings.

Juvenile – A young or sexually immature animal.

Lateral spreading – A phenomenon where large blocks of intact, nonliquefied soil move downslope on a liquefied substrate of large aerial extent

Leq – Time variations in noise exposure are typically expressed in terms of a steady-state energy level (called Leq) that represents the acoustical energy of a given measurement. Leq (24) is the steady-state energy level measured over a 24-hour period.

Liquefaction – A phenomenon in which saturated granular sediments temporarily lose their shear strength during periods of earthquake-induced, strong groundshaking. The susceptibility of a site to liquefaction is a function of the depth, density, and water content of the granular sediments and the magnitude of earthquakes likely to affect the site.

Level of service – As used in this PEIR, level of service is used as a tool to measure to operating condition and performance ability of water supply facilities and related infrastructure[1].

Maximum contaminant level (MCL) – The MCL is the highest level of a contaminant that is allowed in drinking water. The MCL is set as close to the maximum contaminant level goal (MCLG – see below) as is economically or technically feasible. While the MCL is higher than the MCLG, it is considered protective of human health.

Mitigation – One or all of the following: (1) Avoiding an impact altogether by not taking a certain action or parts of an action; (2) minimizing impacts by limiting the degree or magnitude of an action and its implementation; (3) rectifying an impact by repairing, rehabilitating, or restoring the affected environment; (4) reducing or eliminating an impact over time by preservation and maintenance operations during the life of an action; and (5) compensating for an impact by replacing or providing substitute resources or environments.

Modeling – A tool used to mathematically represent a process which could be based upon empirical or mathematical functions. Models can be computer programs, spreadsheets, or statistical analyses.

Moment magnitude - An earthquake is classified by the amount of energy released, expressed as the magnitude of the earthquake. Traditionally, magnitudes have been quantified using the Richter scale. Seismologists have begun using a moment magnitude (Mw) scale because it provides a more accurate measurement of the size of major and great earthquakes.

Oscillation – The rate of oscillation of sound waves is the amount of fluctuation between two values.

Permitted hazardous materials uses – Facilities that use hazardous materials or handle hazardous wastes but comply with current hazardous materials and hazardous waste regulations.

[1] In many EIRs, level of service (abbreviated as LOS) is used in the traffic analysis as a qualitative description of transportation infrastructure's performance based on average delay per vehicle, vehicle density, or volume-to-capacity ratios. This type of analysis is not relevant to the WSIP PEIR traffic impacts.

Piezometer – A piezometer is a small diameter observation well used to measure the groundwater level in aquifers. Similarly, it may also be a standpipe, tube, vibrating wire piezometer or manometer used to measure the pressure of a fluid at a specific location in a column.

Prestressed-concrete cylinder pipe – A prestressed concrete cylinder pipe has the following two general types of construction: (1) a steel cylinder with a concrete core (Lined-Cylinder Pipe), or (2) a steel cylinder embedded in a concrete core (Embedded-Cylinder Pipe).

PPV – To assess the potential for structural damage associated with vibration, the vibratory ground motion in the vicinity of the affected structure is measured in terms of peak particle velocity (PPV) in the vertical and horizontal directions (vector sum), typically in units of inches per second (in/sec).

Propagation – To move or transmit something forward in space, especially as a light or sound wave.

Predation – The act of preying on another animal or animals.

Program Environmental Impact Report – One type of environmental review document identified under the California Environmental Quality Act that may be used to evaluate a plan or program that has multiple components (projects and actions) or to address a series of actions that are related.

Pull box – A box with a removable cover for access, which is installed at a junction where two conduits meet. The box is intended to reduce strain on the wires, which can be pulled straight through one conduit into the box and reinserted and pulled through the next section of conduit. Pull boxes are used where support for the conduits is necessary.

Rearing – The amount of time that juvenile fish spend feeding in nursery areas of rivers, lakes, streams, and estuaries before migration, or the care and support for young fish.

Regional water system – The entire SFPUC water system starting at Hetch Hetchy Reservoir and ending in San Francisco; the regional system includes all facilities serving the SFPUC wholesale and retail customers, except for the retail customers in San Francisco. The SFPUC regional water system consists of a complex network of facilities covering a geographic range of about 160 miles, from the Sierra Nevada on the east to San Francisco on the west. The regional water system crosses seven counties—Tuolumne, Stanislaus, San Joaquin, Alameda, Santa Clara, San Mateo, and San Francisco. The regional water system includes over 280 miles of pipelines, over 60 miles of tunnels, 11 reservoirs, 5 pump stations, and 2 water treatment plants.

Reinforced-concrete cylinder pipe – A reinforced-concrete cylinder pipe is a composite structure and specially designed to use the best features of both concrete and reinforcement. The concrete is designed for the compressive force and the reinforcement for the tensile force.

Reservoir – An artificially impounded body of water.

Riparian – The land adjacent to a natural watercourse such as a river or stream. Riparian areas support vegetation that provides important wildlife habitat, as well as important fish habitat when sufficient to overhang the bank.

Salmonid – Salmon or trout.

Sedimentation – The deposition of material suspended in a stream system, whether in suspension (suspended load) or on the bottom (bedload).

Seep – A place where groundwater flows slowly to the surface and often forms a pool or a small spring.

Seiche – Earthquake-induced oscillating waves in an enclosed water body.

Sensitive receptors – A land use that is sensitive or more vulnerable to (i.e., "receives") effects of noise, air quality, or a specified resource than the general population.

Serpentine – A metamorphic mineral altered from limestone or basic igneous rocks such as olivine and amphibole. One form of serpentine-chrysolite-is a common source of asbestos.

Siltation – Sediment influx from either erosion or from sediment carried into a water body by inflowing rivers and tributaries.

Slip joint – Allows a pipeline to compress or extend in length.

Spawning – Laying (and fertilizing) eggs in the process of reproduction.

Special-status species – Several species known to occur within the general region of the program area are accorded "special status" because of their recognized rarity or vulnerability to habitat loss or population decline. Some of these species receive specific protection in federal and/or state endangered species legislation. Others have been designated as "sensitive species" or "species of special concern" on the basis of adopted policies of federal, state, or local resource agencies. These species are referred to collectively as "special-status species."

Spill sites – Locations where a spill of hazardous materials has been reported to the state or federal regulatory agencies.

Splice (a cable) – A permanent or semi-permanent connection between two conductors or cables.

Subsidence – The lowering of the land surface in response to groundwater pumping.

Surface water – All water that is naturally open to the atmosphere (i.e., rivers, lakes, reservoirs, ponds, streams, impoundments, seas, estuaries, etc.).

Suspended particulates (PM10 and PM2.5) – Particulate matter is a class of air pollutants that consists of solid and liquid airborne particles in an extremely small size range. Particulate matter is measured in two size ranges: PM10 for particles less than 10 microns in diameter, and PM2.5 for particles less than 2.5 microns in diameter.

Swales – Areas where winter rain collects but does not stand as long as in vernal pools.

Threatened species – Legal status afforded to plant or animal species that are likely to become endangered within the foreseeable future throughout all or a significant portion of their range, as determined by the U.S. Fish and Wildlife Service or the National Marine Fisheries Service.

Threshold damage vibration – The highest vibration amplitude at which no cosmetic, minor, or major damage occurs, which includes "threshold cracks" or "hair-sized" cracks in room walls that occur at the lowest vibration amplitudes.

Trenchless construction – The use of a boring machine or auger to drill a horizontal hole, pushing an outer casing through the hole, and installing the pipeline within the casing.

Tunnel Safety Order – The California Tunnel Safety Orders (California Administrative Code, Title 8, Subchapter 20, Article 8) require the Division of Industrial Safety to classify all tunnels or portions of tunnels into one of the following classifications before a public works project can be put out to bid:

- *Nongassy*, the classification assigned when there is little likelihood of encountering gas during the construction of the tunnel.
- *Potentially gassy*, the classification assigned when there is a possibility that flammable gas or hydrocarbons will be encountered during construction of the tunnel.
- *Gassy*, the classification assigned when it is likely gas will be encountered, or if monitoring indicates the presence of hazardous gases at a concentration greater than 5 percent of the lower explosive limit.
- *Extrahazardous*, the classification assigned to tunnels when the Division finds that there is a serious danger to the safety of employees, flammable gas or petroleum vapors emanating from the strata have been ignited in the tunnel, or monitoring indicates the presence of hazardous gases at a concentration greater than 20 percent of the lower explosive limit.

Ultramafic rocks – These rock units are formed in high-temperature environments well below the surface of the earth.

Valve – Any device that shuts off, starts, regulates, or controls the flow of a fluid. There are many types of valves, including:

- *blowoff valve,* used to drain a pipeline
- *isolation valve,* used to isolate one segment of a pipeline from another segment
- *crossover valve,* used to switch flow from one pipeline to another
- *vacuum valve,* used to regulate air pressure within a pipeline

Valve lots/valve house – A structure that encloses electrical and mechanical equipment and other related facilities uses to regulate, direct, and control flow of water.

Vernal pools – Seasonal wetlands formed in gently undulating or rolling topography where the soil is underlain by a slowly permeable claypan or hardpan.

Waters of the United States – A broad federal definition that describes Corps jurisdiction over deep-water habitats and special aquatic sites, including wetlands, as follows:

a. The territorial seas with respect to the discharge of fill material.

b. Coastal and inland waters, lakes, rivers, and streams that are navigable waters of the United States, including their adjacent wetlands.

c. Tributaries to navigable waters of the United States, including wetlands.

d. Interstate waters and their tributaries, including adjacent wetlands.

All other waters of the United States not identified above, such as isolated wetlands and lakes, intermittent streams, prairie potholes, and other waters that are not a part of a tributary system to interstate waters or navigable waters of the United States, the degradation or destruction of which could affect interstate commerce.

Watershed – A region or area bounded peripherally by a water parting and draining ultimately to a particular watercourse or body of water.

Wetland – A zone periodically or continuously submerged or having high soil moisture, which has aquatic and/or riparian vegetation components, and is maintained by water supplies significantly in excess of those otherwise available through local precipitation.

Wye – A Y-shaped fitting with three openings used to create branch lines. Allows one pipe to be joined to another.

CHAPTER 1
Executive Summary

1.1 Introduction

Bay Division Pipelines (BDPL) Nos. 3 and 4 are two of the San Francisco Public Utilities Commission's (SFPUC) four major regional transmission pipelines that deliver water from the SFPUC regional water system and Alameda Creek watershed facilities to the San Francisco Bay Area. These two parallel pipelines extend 34 miles around the south end of San Francisco Bay, almost entirely as buried underground pipeline. BDPL Nos. 3 and 4 then converge at the Stanford Tunnel in Palo Alto. BDPL Nos. 3 and 4 reconnect with BDPL Nos. 1 and 2 at the Pulgas Portal entrance to Pulgas Tunnel just west of Redwood City (SFPUC, 2004).

The proposed project would affect only a portion of BDPL Nos. 3 and 4 in Fremont where the pipelines cross the Hayward fault. Because of this fault crossing, a sizeable earthquake on the Hayward fault could rupture one or both of these pipelines, causing localized flooding and damage to adjacent infrastructure and residences, as well as affecting water service to SFPUC customers in the East and South Bays, the Peninsula, and San Francisco. The proposed Seismic Upgrade of BDPL Nos. 3 and 4 at Hayward Fault Project includes construction of a new parallel pipeline, referred to as BDPL No. 3X, and improvements to the existing BDPL No. 4 to increase delivery reliability where these pipelines cross the Hayward fault.

1.2 Overview of SFPUC Regional Water System

The Bay Division Pipelines are part of the SFPUC regional water system, and the information in this section about the water system provides background and context for the proposed project. The City and County of San Francisco (CCSF), through the SFPUC, owns and operates a regional water system that extends from the Sierra Nevada to San Francisco and serves retail and wholesale customers in San Francisco, San Mateo, Santa Clara, Alameda, and Tuolumne Counties. The regional water system consists of water conveyance, treatment, and distribution facilities, and delivers water to retail and wholesale customers. The regional system includes over 280 miles of pipelines, over 60 miles of tunnels, 11 reservoirs, 5 pump stations, and 2 water treatment plants. The SFPUC currently delivers an annual average of about 265 million gallons per day (mgd) of water to its customers. The source of the water supply is a combination of local supplies from streamflow and runoff in the Alameda Creek watershed and the San Mateo and Pilarcitos Creek watersheds (together referred to as the Peninsula watershed), augmented with imported supplies from the Tuolumne River watershed. Local watersheds provide about 15 percent of total supplies, and the Tuolumne River provides the remaining 85 percent.

The SFPUC serves about one-third of its water supplies directly to retail customers, primarily in San Francisco, and about two-thirds of its water supplies to wholesale customers by contractual agreement. The wholesale customers are largely represented by the Bay Area Water Supply and Conservation Agency (BAWSCA), which consists of 27 customers.[1] Some of these wholesale customers have other sources of water in addition to what they receive from the SFPUC regional water system, while others rely completely on the SFPUC for supply.

1.2.1 SFPUC Water System Improvement Program

On October 30, 2008, the SFPUC approved the Water System Improvement Program (also known as the "Phased WSIP") with the objective of repairing, replacing, and seismically upgrading the system's aging pipelines, tunnels, reservoirs, pump stations, and storage tanks (SFPUC, 2008; SFPUC Resolution No. 08-0200). The WSIP improvements span seven counties—Tuolumne, Stanislaus, San Joaquin, Alameda, Santa Clara, San Mateo, and San Francisco (see SFPUC Resolution No. 08-0200).

The WSIP will improve the regional water system with respect to water quality, seismic response, and water delivery based on a planning horizon through the year 2030. With respect to water supply, the WSIP is designed to meet water delivery needs in the SFPUC service area through the year 2018. The overall goals of the WSIP for the regional water system are to:

- Maintain high-quality water
- Reduce vulnerability to earthquakes
- Increase water delivery reliability
- Meet customer water supply needs
- Enhance sustainability
- Achieve a cost-effective, fully operational system

The San Francisco Planning Department prepared a Program Environmental Impact Report (PEIR) in compliance with the California Environmental Quality Act (CEQA) to address the potential environmental impacts of the WSIP. The San Francisco Planning Commission certified the WSIP PEIR on October 30, 2008 (San Francisco Planning Department, 2008; San Francisco Planning Commission Motion No. 17734). The PEIR included a project-level evaluation of the environmental impacts of the WSIP water supply strategy and systemwide operations and a program-level evaluation of the environmental impacts of the WSIP facility improvement projects.

The proposed project is part of the WSIP. Although it was included as a WSIP facility improvement project in the Draft PEIR published in June 2007 and would contribute to the SFPUC's ability to meet the WSIP goals, the San Francisco Planning Department determined prior to certification of the PEIR that, based on more detailed project information, the proposed project could appropriately proceed with environmental review independent of the PEIR. The

[1] The Cordilleras Mutual Water Association is also a wholesale customer receiving water from the SFPUC, but it is not a BAWSCA member and not shown in Figure 2-2. It is a small water association serving 18 single-family homes located in San Mateo County.

project was determined to have "independent utility" from the overall program analyzed in the PEIR for the following reasons:

(1) The purpose of the project is to reduce the risk of pipeline failure in a major seismic event, and the project would serve this function and is necessary regardless of whether any other WSIP project is constructed.

(2) The construction of the project would not increase the normal operating capacity of the system because the new BDPL No. 3X functionally replaces the existing segment of BDPL No. 3; after construction, the existing segment of BDPL No. 3 would be abandoned; the new BDPL No. 3X would be the same diameter, or less, than the existing BDPL No. 3.

(3) Construction of the project would not change the manner in which water is dispersed, increase the storage capacity of the system, or increase or alter the nature of any treatment capacity of the system.

(4) The project does not commit the SFPUC to any other WSIP project.

(5) Any potential cumulative impacts associated with this project are addressed in this EIR.

(6) The performance specifications and design parameters applicable to the proposed project are independent of the PEIR analysis and any outcomes of the PEIR.

Thus, this EIR is part of a separate CEQA environmental review process, independent from the WSIP PEIR. However, this EIR relies on the WSIP PEIR as a key source of information about SFPUC facilities and operations. And, to the extent that they overlap in timing and geography with the proposed project, the WSIP facility improvement projects are evaluated in this EIR's cumulative impact analysis (see Chapter 6, Other CEQA Topics).

1.3 Background and Project Objectives

In 2007, the SFPUC constructed the North and South Shutoff Stations on BDPL Nos. 3 and 4 on either side of the Hayward fault, allowing the SFPUC to shut down the pipelines that run between the two stations in the event of a seismic event on the Hayward fault. While construction of the North and South Shutoff Stations has substantially reduced the anticipated physical damage to the adjacent area from a breakage of BDPL Nos. 3 and 4, the regional water system would not meet the SFPUC's adopted level-of-service goals without the construction of additional improvements under the proposed project.

Improvements under the proposed project would be constructed primarily to reduce the vulnerability of BDPL Nos. 3 and 4 to earthquake damage, thereby increasing the delivery reliability where these pipelines cross the Hayward fault. Specific objectives are to:

- Reduce the potential effects of a catastrophic failure of BDPL Nos. 3 and 4 where they cross the Hayward fault in order to protect these vital lifelines (Mission Boulevard, I-680, and the new BDPL No. 3X).

- Design the proposed BDPL No. 3X to be functional within 24 hours of a seismic event.

- Deliver basic service to the East/South Bays, Peninsula, and San Francisco within 24 hours of a major earthquake. Basic service is defined as average winter-month usage, and the performance objective for the Bay Division regional system (described in Chapter 2, Section 2.1.3, Bay Division Regional Water System Facilities) is 229 mgd. The performance objective is to provide delivery to at least 70 percent of the turnouts (i.e., water-diversion connecting points from the regional system to customers) in each region, with 104, 44, and 81 mgd delivered to the East/South Bays, Peninsula, and San Francisco regions, respectively.

- Design and upgrade facilities to meet average-day demand for the Bay Division regional system of up to 300 mgd within 30 days of a major earthquake.

1.4 Summary of Project Description

The post-earthquake level of service goals for the project can be met as long as BDPL No. 3 remains in service after a major earthquake on the Hayward fault. Therefore, the proposed project, located near the intersection of Interstate 680 (I-680) and Mission Boulevard, in Fremont, California, includes construction of a new 2,360-foot-long pipeline parallel to BDPL No. 3 between the North and South Shutoff Stations—referred to as BDPL No. 3X—that would include design features to reduce the vulnerability of the pipeline to earthquakes. Reinforcements would also be made to BDPL No. 4 to strengthen the pipeline at the fault crossings to control where failure would occur in the event of an earthquake, thereby minimizing damage to BDPL No. 3X and the surrounding area in the event of pipeline failure. The project would improve the SFPUC's ability to maintain an adequate water supply to downstream water users following a major earthquake on the Hayward fault and would enable the SFPUC to meet its adopted systemwide goals for seismic reliability for the regional water system.

Three traces[2] of the Hayward fault cross BDPL Nos. 3 and 4 near the intersection of I-680 and Mission Boulevard. These traces are referred to as Trace A, Trace B, and Trace C. Proposed improvements at each of these crossings, as well as the construction schedule and operations and maintenance of the pipelines, are discussed below.

1.4.1 Proposed BDPL No. 3X

1.4.1.1 Proposed BDPL No. 3X Crossing at Trace A

BDPL No. 3 crosses Trace A of the Hayward fault beneath I-680. At this location, a 78-inch-diameter welded-steel pipe (BDPL No. 3X) would be installed on pipe support skids through the existing 114-inch-diameter, 440-foot-long corrugated-metal pipe casing segment, which was originally installed by the California Department of Transportation (Caltrans) during construction of I-680 in 1969. If inspection of the corrugated-metal pipe casing indicates it is not suitable for housing the new BDPL No. 3X at this location, then trenchless construction (using a boring machine or auger to drill a horizontal hole, pushing an outer casing through the hole, and installing the pipeline within the casing) could be used to install the new pipeline beneath I-680. By employing one of these two methods, the pipeline could be upgraded at this fault crossing

[2] A fault trace is the expression of a fault at the ground surface where fault movement can occur.

without disrupting traffic on I-680. The wall thickness of BDPL No. 3X would be augmented from 1 inch to 1 ¼ inch through this zone to increase the strength of the pipeline.

1.4.1.2 Proposed BDPL No. 3X Crossing at Trace B

The existing BDPL No. 3 crosses Trace B of the Hayward fault beneath Mission Boulevard. At this crossing, the proposed BDPL No. 3X would pass beneath Mission Boulevard and would be housed in a 300- to 400-foot, underground, articulated concrete vault constructed of individual segments. These segments would be designed to move relative to each other and "break up" in a controlled manner, which would protect the pipeline from the effects of varying pressures from the surrounding soil and provide space for the pipeline to move during an earthquake. The pipeline diameter would be reduced to 72 inches within this vault. Two ball joints (allowing pipeline rotation) and one slip joint (allowing pipeline compression) would be installed in the pipeline within the vault to allow the pipe to move in response to movement on the fault. To accommodate traffic while constructing the vault below the northbound diamond I-680 on-ramp and Mission Boulevard, the SFPUC would construct a series of temporary bridges across these busy thoroughfares to allow for the continued use of these roadways during project construction.

1.4.1.3 Proposed BDPL No. 3X Crossing at Trace C

BDPL Nos. 3 and 4 cross Trace C near the cul-de-sac at the end of Tissiack Place. At this crossing, the proposed BDPL No. 3X would be constructed of 78-inch-diameter welded-steel pipe, and the wall thickness would be augmented to 1 ¼ inch through this zone to increase the strength of the pipeline. The new BDPL No. 3X would be installed using the open-trench method at this location.

1.4.2 BDPL No. 3

Approximately 2,360 feet of the existing 78-inch-diameter BDPL No. 3 would be abandoned between the North and South Shutoff Stations once the proposed BDPL No. 3X is operational. Pipe abandonment would occur by capping the pipeline segment at the two points of connection. However, the existing pipeline would still be used to provide drainage should BDPL No. 4 rupture at Trace B of the Hayward fault, as described below.

1.4.3 BDPL No. 4 Upgrades

Improvements to the existing BDPL No. 4 would be made to control the location of pipeline failure in the event of a major earthquake on the Hayward fault and to prevent damage to the proposed BDPL No. 3X should BDPL No. 4 fail.

1.4.3.1 BDPL No. 4 Crossing Trace A

Based on an engineering analysis of BDPL No. 4, no improvements are required on BDPL No. 4 at Trace A of the Hayward fault.

1.4.3.2 BDPL No. 4 Crossing Trace B

At Trace B, improvements would be made to ensure that breakage of BDPL No. 4 would occur within the existing slip-joint vault, primarily by encasing portions of the 96-inch-diameter BDPL No. 4 in concrete on either side of the slip-joint vault. This improvement would strengthen BDPL No. 4 outside of the vault and direct earthquake forces to the segment of pipeline within the slip-joint vault where breakage would occur. To accommodate drainage from a break of BDPL No. 4 in the vault, a new 24-inch drain to the Agua Caliente Creek culvert would be constructed, and the existing BDPL No. 3 would be perforated along the length of the vault (after the pipeline is taken out of service). The perforated BDPL No. 3 would act as a conduit for excess water from BDPL No. 4 and would drain to Agua Fria Creek. The existing aluminum panel roof of the vault would be replaced with pressure-activated "blowoff" panels to direct excess leakage into surface drainage created to direct water from BDPL No. 4 into the Mission Boulevard storm drain system.

1.4.3.3 BDPL No. 4 at Crossing Trace C

At Trace C, a 400-foot, 90-inch-diameter, 1-inch-thick steel liner would be inserted into the existing 96-inch-diameter BDPL No. 4, and the space between the liner and the pipeline would be completely filled with a low-strength concrete material. Alternatively, if it is determined that sliplining would not adequately accommodate fault movement at Trace C, the entire 400 feet of pipeline could be replaced with a new 1-inch-thick steel pipe at this location.

1.4.5 Project Construction

Construction is scheduled to begin in the spring of 2012 and continue through the spring of 2014, but could begin as early as winter 2011. Nighttime construction would be required for approximately 17 nights over approximately 11 months, during installation and removal of the temporary bridges to avoid causing major traffic disruptions during traffic relocation activities, installation of the cast-in-place drilled-hole secant pile walls, and construction or removal of the temporary bridges across the I-680 on-ramps and Mission Boulevard. All other construction would be conducted on weekdays between 7 a.m. and 7 p.m., Saturdays between 9 a.m. and 6 p.m., and occasionally on Sundays.

1.4.6 Operations and Maintenance

Following construction of the proposed BDPL No. 3X and modifications to BDPL No. 4, pipeline operations would be the same as existing operations, with the exception of new discharges of accumulated groundwater and system water from the articulated vault and modified slip-joint vault. Pipeline maintenance would be performed as identified under the WSIP maintenance plan which is currently under development. This plan will outline inspection as well as minor and major maintenance activities for the regional water system following completion of the WSIP facility improvement projects.

1.5 Summary of Impacts and Mitigation Measures

Table 1.1 (at the end of this chapter) summarizes the impacts and mitigation measures for the proposed project. Because operation of BDPL Nos. 3X and 4 following completion of the project would be almost the same as existing operations, there would be few impacts related to project operation. These operational impacts as well as potentially significant and significant impacts arising from temporary construction activities are briefly summarized in this section. With the exception of the significant and unavoidable impacts described below, all other significant impacts identified in this EIR would be reduced to less-than-significant levels through implementation of the identified mitigation measures.

- **Land Use and Land Use Planning:** Significant and unavoidable impacts on the existing land use character of the project vicinity related to noise from increased traffic on detour routes at night, daytime construction noise and haul and delivery truck noise, and nighttime noise and vibration from construction on approximately 17 nights over 11 months.

- **Aesthetics:** Impacts to scenic vistas, scenic resources, or the visual character of the surroundings as a result of visibility of construction sites and disturbance of construction areas.

- **Cultural Resources:** Permanent impacts on documented archaeological resources located in the vicinity of the project area. Impacts on archaeological and paleontological resources caused by earthmoving activities in an area of high archaeological sensitivity and in geological formations characterized as having a high potential to yield paleontological resources.

- **Transportation and Circulation:** Temporary increases in traffic volumes along detour routes (if the Mission Boulevard and I-680 on-ramp closures were to remain in place past prescribed times). Temporary hazards for bicyclists and pedestrians, and impaired emergency access during construction. Cumulative impacts related to increases in traffic and traffic hazards would also be potentially significant when the project's traffic impacts are considered in combination with the potentially cumulative projects with overlapping project schedules.

- **Noise:** Significant and unavoidable impacts due to construction and haul and delivery truck noise; traffic noise along detour routes at night; nighttime and Sunday construction outside the local ordinance time limits; and disturbance due to temporary construction-related vibration at night. Significant impacts related to construction-related vibration during the day.

- **Air Quality:** Violation of air quality standards and emissions of fugitive dust. Significant and unavoidable impacts related to combustion emissions during construction and construction-related emissions of diesel particulate matter. Cumulative impacts related to combustion emissions of criteria pollutants would also be significant and unavoidable when the project's emissions are considered in combination with potentially cumulative projects.

- **Utilities and Service Systems:** Temporary damage to or disruption of utilities during relocation or protection of conflicting utilities during construction. Adverse effects associated with compliance with the solid waste diversion goal established by the California Integrated

Waste Management Act and City of Fremont, unless waste diversion measures such as source reduction, recycling, and composting are implemented.

- **Biological Resources:** Impacts on jurisdictional waters of the United States and Central Coast riparian scrub along Agua Fria Creek. Potential impacts related to mortality or habitat loss for special-status animal species that could occur within the project area, and potential impacts on riparian and/or aquatic resources from treated water discharges. Removal of up to 44 trees protected under the City of Fremont Tree Protection Ordinance.

- **Geology and Soils:** Potential impacts related to long-term soil erosion.

- **Hydrology and Water Quality:** Potential water quality impacts related to erosion or a release of hazardous materials during construction, water quality effects from discharges of groundwater produced during dewatering, and potential flooding effects from discharges of groundwater and approximately 6.2 million gallons of treated water during construction.

- **Hazards and Hazardous Materials:** Potential exposure of workers, the public, and the environment to contaminated soil during project construction and the potential to interfere with an adopted emergency response plan or emergency evacuation plan. Potential release of hazardous materials from construction equipment. Cumulative impacts related to impairment or interference with implementation of an adopted emergency plan would also be potentially significant when the project's impacts are considered in combination with the potentially cumulative projects with overlapping project schedules.

Mitigation measures identified in Chapter 5 of this EIR would reduce all but eight of the potentially significant or significant impacts listed above to a less-than-significant level. Of the significant impacts listed in this EIR, eight impacts are identified as *significant and unavoidable* for the project as proposed:

- Land use disruptions and changes in the character of the existing vicinity due to construction noise associated with heavy equipment and haul and delivery traffic as well as noise associated with increased traffic on detour routes and temporary nighttime construction noise and vibration (Impact LU-1)

- Construction noise associated with heavy equipment (Impact NO-1)

- Noncompliance with Fremont Municipal Code time limits due to nighttime and occasional Sunday construction activities (Impact NO-2)

- Temporary noise disturbance due to haul and delivery truck traffic during the day as well as nighttime deliveries, and along detour routes due to road closures at night (Impact NO-3)

- Disturbance due to temporary construction-related vibration during the nighttime (Impact NO-4)

- Construction-related combustion emissions of criteria pollutants (Impact AQ-1)

- Construction-related emissions of diesel particulate matter (Impact AQ-2)

- Cumulative impacts related to combustion emissions of criteria pollutants (Impact C-AQ).

Mitigation measures would reduce construction noise adjacent to receptors, but noise levels would exceed the speech interference criterion at houses within 50 feet of construction activities even after implementation of mitigation measures, resulting in a significant and unavoidable impact related to noise and land use disruption (Impacts LU-1 and NO-1). Further, nighttime noise levels could exceed the sleep interference criterion at nearby residences. Impacts related to compliance with the Fremont Municipal Code are significant because some construction activities would take place during the nighttime (approximately 17 times over 11 months during installation and removal of the temporary bridges on Mission Boulevard and the I-680 on-ramps), and construction would occasionally occur on Sundays, a significant and unavoidable impact (Impact NO-2). Noise from haul and truck traffic would increase noise levels above ambient noise at nearby receptors, and nighttime deliveries and increased traffic along detour routes during the nighttime hours in residential neighborhoods would exceed the sleep interference criterion; however, there is no feasible mitigation to reduce noise levels and no feasible alternative detour route that would avoid residential neighborhoods, resulting in a significant and unavoidable impact related to noise and land use disruption (Impacts LU-1 and NO-3). Mitigation measures would require the SFPUC and its contractor to restrict vibrations at nearby residences, but these measures do not guarantee that nighttime vibration levels would remain below the annoyance threshold at night (Impact NO-4), resulting in a significant and unavoidable impact. Implementation of mitigation measures would reduce emissions from construction equipment exhaust. However, mitigated nitrogen oxide (NO_X) levels would still remain above the Bay Area Air Quality Management District's proposed significance threshold for NO_X, resulting in a significant and unavoidable impact (Impact AQ-1). Depending on the final BAAQMD guidelines, construction-related emissions of diesel particulate matter may also result in significant and unavoidable impacts (Impact AQ-2). Cumulative impacts related to combustion emissions of criteria pollutants would also remain significant and unavoidable (Impact C-AQ).

1.6 Summary of Project Alternatives

Four alternatives, including the No Project Alternative are evaluated in Chapter 7 of this EIR:

- Alternative 1: No Project Alternative
- Alternative 2: Alternate Location – South Alignment
- Alternative 3: Alternate Design – New 48-inch BDPL No. 3X and Improvements to BDPL Nos. 3 and 4

These alternatives were selected and analyzed according to CEQA Guidelines Section 51526.6(a). Along with the No Project Alternative, Alternatives 2 and 3 represent a reasonable range of alternatives to the proposed project that would feasibly attain most of the project's basic objectives and would avoid or substantially lessen any significant adverse environmental effects of the project. The selected alternatives were based on engineering options previously considered by the SFPUC, as well as an assessment of alternative pipeline routes performed as part of the CEQA analysis of the project. Only one of the engineering alternatives to the proposed project (Alternative 6 - new 48-inch BDPL No. 3X and improvements to BDPL Nos. 3 and 4) would meet the basic goals of the proposed project and be feasible to implement. Therefore, this alternative was evaluated as an alternative to the project, and the remaining engineering alternatives were not evaluated as alternatives to the project.

The CEQA Guidelines require the identification of an environmentally superior alternative (Section 15126.6[e]). If the "no project" alternative is the environmentally superior alternative, then the EIR must also identify an environmentally superior alternative among the other alternatives (Section 15126.6[e]).

Based on the evaluation presented in Chapter 7, the proposed project is considered the environmentally superior alternative. Although there would be significant and unavoidable impacts related to noise and disruption of land uses due to daytime use of heavy equipment, daytime haul and delivery truck traffic, nighttime construction and deliveries, increased nighttime traffic on detour streets in residential neighborhoods, temporary disturbance from construction-related vibration at night, compliance with noise ordinance time limits, and construction-related emissions of criteria air pollutants as well as diesel particulate matter, the proposed project would involve construction in a substantially smaller area than the alternate location alternative and would have a substantially shorter duration and would result in fewer impacts related to residential land use disruption, air quality, generation of construction-related waste, construction-related erosion, discharges of treated water, and disruption of emergency response services. While there would be a tradeoff between the longer, wider-ranging effects that would occur with the alternate location alternative and the shorter, more intense construction effects that would occur with the proposed project, the proposed project would have less overall environmental effects when taken as a whole. The proposed project could disrupt a documented archaeological site, whereas the alternate location alternative could avoid this site. However, it is possible that potential impacts on archaeological resources could not be entirely avoided given the archaeological sensitivity of the area. Additionally, the proposed project includes mitigation that requires recovery and recordation of archaeological resources from the documented site, which would help preserve these resources.

The longer duration of traffic impacts on Mission Boulevard and the northbound I-680 loop on-ramp related to the Alternate Design – New 48-inch BDPL No. 3X and Improvements to BDPL Nos. 3 and 4 alternative would result in greater impacts than the temporary and infrequent significant and unavoidable noise impacts related to nighttime construction under the proposed project.

1.7 Other CEQA Topics

Implementation of the project would not remove an obstacle to growth, or directly or indirectly foster economic or population growth or the construction of housing, as discussed in Chapter 6, Other Topics Required by CEQA. Therefore, the project would not have a growth-inducing impact. Potentially significant cumulative impacts, also discussed in Chapter 6, are identified in Section 1.5, Summary of Impacts and Mitigation Measures, above.

1.8 Areas of Controversy and Issues to Be Resolved

The San Francisco Planning Department's Major Environmental Analysis Division published a Notice of Preparation (NOP) to prepare an EIR on the Seismic Upgrade of BDPL Nos. 3 and 4 at Hayward Fault project on March 29, 2008. Comments submitted during the NOP review period and scoping meeting (held on April 21, 2008) raised issues regarding the proposed project, including issues related to the scope and content of the Draft EIR. Appendix A further describes the scoping process and summarizes the public comments received. Public comments on the NOP raised the following issues:

- Potential adverse effects on Alameda County Water District (ACWD) facilities
- Groundwater quality effects related to potential damage to existing monitoring and cathodic protection wells within the project area and potential effects of groundwater dewatering on ACWD groundwater supplies
- The need to quantify the likelihood and consequences of failure of BDPL Nos. 3 and 4
- Traffic and noise effects related to project implementation and the need for a public communication plan
- Disclosure of the project's fair-share contribution, financing, scheduling, and implementation responsibilities, including monitoring and traffic mitigation fees
- The need to address Caltrans encroachment permit requirements
- Potential cumulative impacts related to Caltrans projects in the area and required coordination with the Caltrans project manager
- Impacts on cultural resources
- Impacts on affected customers related to shutdowns of the water supply system
- The quality of SFPUC water
- The need to accelerate the project schedule

The above issues are discussed in the relevant sections of Chapter 5, Environmental Setting and Impacts. Section 5.8, Utilities and Service Systems, addresses potential effects on ACWD facilities. Section 5.11, Hydrology and Water Quality, evaluates potential effects on ACWD groundwater supplies. Chapter 3, Project Description, and Chapter 7, Alternatives, address the likelihood and consequences of a failure of BDPL Nos. 3 and 4. Section 5.2, Land Use and Land Use Planning, Section 5.5, Transportation and Circulation, and Section 5.6, Noise, discuss traffic and noise effects on land uses as well as the need for a public communications plan. Chapter 3, Project Description, addresses the project's fair-share contribution, financing, scheduling, and implementation responsibilities, including monitoring and traffic mitigation fees. Chapter 3, Project Description, and Section 5.5, Transportation and Circulation, discuss Caltrans encroachment permitting requirements. Section 6.2, Cumulative Impacts, evaluates cumulative traffic impacts. Section 5.4, Cultural Resources, addresses cultural resource impacts. Chapter 3, Project Description, discusses shutdowns of the regional water system, water quality, and the project schedule.

1.9 References

San Francisco Public Utilities Commission (SFPUC), *Regional Water System Facility Data Sheets, Transmission System Training*. Water Supply and Treatment Division, Policies and Procedures Training Program, September 29, 2004.

San Francisco Public Utilities Commission (SFPUC), SFPUC Resolution 08-200, Water System Improvement Program California Environmental Quality Act Findings: Findings of Fact, Evaluation of Mitigation Measures and Alternatives, and Statement of Overriding Considerations, October 2008.

TABLE 1.1
SUMMARY OF IMPACTS AND MITIGATION MEASURES

IMPACT	Significance Determination Before Mitigation	Significance Determination After Mitigation
Section 5.2: Land Use and Land Use Planning		
Impact LU-1: Temporary impacts related to disruption of existing land uses and effects on the existing character of the project vicinity during construction.	S	SU
Mitigation Measures		
M-LU-1: Neighborhood Notice		
M-TR-1: Traffic Control Plan.		
M-NO-1a: Noise Control Plan.		
M-NO-1b: Temporary Noise Barriers or Enclosures.		
M-NO-1c: Setback Restrictions.		
M-NO-1d: Nighttime Restrictions on Construction Activities.		
M-NO-3: Haul and Delivery Truck Operation Limits.		
M-NO-4a: Vibration Limits		
M-AQ-1a: BAAQMD Dust Control Measures		
Impact LU-2: Temporary impacts related to displacement of existing land uses and effects on the existing character of the project vicinity during construction.	LS	-
Mitigation Measures		
None required.		
Section 5.3: Aesthetics		
Impact AE-1: Construction-related impacts on scenic vistas, scenic resources, or the visual character of the surroundings.	S	LS
Mitigation Measures		
M-HY-1: Construction Water Quality Best Management Practices		
Impact AE-2: Temporary construction-related sources of light and glare.	LS	–
Mitigation Measures		
None required.		
Impact AE-3: Permanent impacts on scenic vistas, scenic resources, or the visual character of a community.	LS	–
Mitigation Measures		
None required.		
Section 5.4: Cultural Resources		
Impact CP-1: Impacts on the historical significance of an individual facility, historic district, or a contributor to a historic district.	LS	–
Mitigation Measures		
None required.		

TABLE 1.1 (Continued)
SUMMARY OF IMPACTS AND MITIGATION MEASURES

IMPACT	Significance Determination Before Mitigation	Significance Determination After Mitigation
Section 5.4: Cultural Resources (cont.)		
Impact CP-2: Impacts on unknown and known prehistoric and historic-period archaeological resources.	S	LS
Mitigation Measures		
M-CP-2a: Archaeological Research Design and Treatment Plan and Archaeological Data Recovery Report for CA-ALA-576.		
M-CP-2b: Extended Archaeological Survey for Areas Outside of CA-ALA-576.		
M-CP-2c: Archaeological Evaluation Plan and Archaeological Evaluation and Effects Report.		
M-CP-2d: Archaeological Monitoring Plan and Accidental Discovery Measures.		
Impact CP-3: Impacts on paleontological resources.	PS	LS
Mitigation Measures		
M-CP-3a: Worker Training		
M-CP-3: Paleontological Resources Monitoring.		
Impact CP-4: Impacts on human remains.	PS	LS
Mitigation Measures		
M-CP-4: Human Remains and Associated or Unassociated Funerary Objects.		
Section 5.5: Transportation and Circulation		
Impact TR-1: Short-term increased traffic volumes and delays on roadways due to temporary reduction in roadway capacity.	S	LS
Mitigation Measures		
M-TR-1: Traffic Control Plan.		
Impact TR-2: Short-term increased traffic volumes and delays on roadways due to construction-related vehicle trips.	LS	–
Mitigation Measures		
None required.		
Impact TR-3: Short-term increased potential traffic safety hazards for vehicles, bicyclists, and pedestrians on public roadways due to construction-related vehicle trips and construction within roadways.	S	LS
Mitigation Measures		
M-TR-1: Traffic Control Plan.		
Impact TR-4: Short-term impaired access to adjacent roadways and land uses for both general and emergency response traffic as well as for bicyclists and pedestrians due to construction within roadways.	S	LS
Mitigation Measures		
M-TR-1: Traffic Control Plan.		

TABLE 1.1 (Continued)
SUMMARY OF IMPACTS AND MITIGATION MEASURES

IMPACT	Significance Determination Before Mitigation	Significance Determination After Mitigation
Section 5.5: Transportation and Circulation (cont.)		
Impact TR-5: Short-term displacement of on-street parking due to temporary increased parking demand or construction within roadways.	LS	–
Mitigation Measures		
None required.		
Impact C-TR: Cumulative impacts related to increases in traffic and traffic hazards, access, and parking.	PS	LS
Mitigation Measures		
M-C-TR: SFPUC Project Construction Traffic Coordinator.		
Section 5.6: Noise		
Impact NO-1: Disturbance from temporary construction-related noise increases.	S	SU
Mitigation Measures		
M-NO-1a: Noise Control Plan		
M-NO-1b: Temporary Noise Barriers or Enclosures.		
M-NO-1c: Setback Restrictions.		
M-NO-1d: Nighttime Restrictions on Construction Activities.		
Impact NO-2: Consistency with Fremont Municipal Code time limits.	S	SU
Mitigation Measures		
None required.		
Impact NO-3: Temporary noise disturbance along construction haul routes and detour routes due to road closures.	S	SU
Mitigation Measures		
M-NO-3: Haul and Delivery Truck Operation Limits.		
Impact NO-4: Disturbance due to construction-related vibration.	S	SU
Mitigation Measures		
M-NO-4a: Vibration Limits.		
M-NO-4b: Pre-Construction Building Crack Survey		
Section 5.7: Air Quality		
Impact AQ-1: Construction emissions of criteria pollutants.	S/S*	LS/SU*
Mitigation Measures		
M-AQ-1a: BAAQMD Dust Control Measures.		
M-AQ-1b: BAAQMD Exhaust Control Measures.		
M-AQ-1c: Additional Exhaust Control Measures		

TABLE 1.1 (Continued)
SUMMARY OF IMPACTS AND MITIGATION MEASURES

IMPACT	Significance Determination Before Mitigation	Significance Determination After Mitigation
Section 5.7: Air Quality (cont.)		
Impact AQ-2: Exposure to diesel particulate matter during construction.	LS/PS*	–/SU*
Mitigation Measures		
M-AQ-2: Use of Soot Filters		
Impact AQ-3: Odors generated during project construction or operation.	LS/LS*	–/–*
Mitigation Measures		
None required.		
Impact AQ-4: Greenhouse gas (GHG) emissions and conflicts with applicable plans, policies, or regulations adopted for the purpose of reducing GHG emissions.	LS/LS*	–/–*
Mitigation Measures		
None required.		
Impact C-AQ: Cumulative impacts related to violations of air quality standards, increases in emissions of criteria pollutants, exposure of sensitive receptors to pollutants, and greenhouse gas emissions.	S/S*	LS/SU*
Mitigation Measures		
M-AQ-1a: BAAQMD Dust Control Measures.		
M-AQ-1b: BAAQMD Exhaust Control Measures.		
M-AQ-1c: Additional Exhaust Control Measures		
Section 5.8: Utilities and Service Systems		
Impact UT-1: Relocation or temporary damage to or disruption of existing regional or local public utilities.	PS	LS
Mitigation Measures		
M-UT-1a: Preconstruction Utility Identification and Coordination.		
M-UT-1b: Protection of Other Utilities During Construction.		
M-UT-1c: Advance Notification.		
M-UT-1d: Emergency Response Plan and Notification.		
Impact UT-2: Reduction in solid waste landfill capacity.	LS	–
Mitigation Measures		
None required.		
Impact UT-3: Impacts related to compliance with federal, state, and local statutes and regulations related to solid waste.	S	LS
Mitigation Measures		
M-UT-3: Waste Management Plan.		

TABLE 1.1 (Continued)
SUMMARY OF IMPACTS AND MITIGATION MEASURES

IMPACT	Significance Determination Before Mitigation	Significance Determination After Mitigation
Section 5.9: Biological Resources		
Impact BI-1: Impacts on wetlands, aquatic resources, and riparian habitats.	S	LS
Mitigation Measures		
M-BI-1: Protection and Compensation for Temporary Loss of Jurisdictional Waters and Riparian Habitat.		
M-HY-1: Construction Water Quality Best Management Practices		
Impact BI-2: Impacts on special-status species—direct mortality and/or habitat effects.	S	LS
Mitigation Measures		
M-BI-2a: Protection Measures for Key Special-Status Species and Other Species of Concern		
M-BI-2b: Avoidance and Minimization Measures for California Red-Legged Frog		
M-BI-2c: Avoidance and Minimization Measures for Nesting Raptors and Migratory Birds		
M-BI-2d: Avoidance and Minimization Measures for Western Burrowing Owls		
M-BI-2e: Mitigation for San Francisco Dusky-Footed Woodrat Middens.		
Impact BI-3: Pipeline and trench dewatering effects on riparian habitat and/or aquatic resources.	S	LS
Mitigation Measures		
M-HY-1: Construction Water Quality Best Management Practices.		
Impact BI-4: Conflicts with local policies or ordinances protecting biological resources.	S	LS
Mitigation Measures		
M-BI-4a: Tree Replacement/Compensation.		
M-BI-4b:Tree Protection Measures.		
Section 5.10: Geology and Soils		
Impact GE-1: Erosion and loss of topsoil.	PS	LS
Mitigation Measures		
M-HY-1: Construction Water Quality Best Management Practices.		
Impact GE-2: Slope instability during construction.	LS	–
Mitigation Measures		
None required.		
Impact GE-3: Substantial alteration of topography.	LS	–
Mitigation Measures		
None required.		

TABLE 1.1 (Continued)
SUMMARY OF IMPACTS AND MITIGATION MEASURES

IMPACT	Significance Determination Before Mitigation	Significance Determination After Mitigation
Section 5.10: Geology and Soils (cont.)		
Impact GE-4: Surface fault rupture.	LS	–
Mitigation Measures		
None required.		
Impact GE-5: Seismically induced groundshaking.	LS	–
Mitigation Measures		
None required.		
Impact GE-6: Seismically induced ground failure, including liquefaction and settlement.	LS	–
Mitigation Measures		
None required.		
Impact GE-7: Seismically induced landslides and other slope failures.	LS	–
Mitigation Measures		
None required.		
Impact GE-8: Expansive or corrosive soils.	LS	–
Mitigation Measures		
None required.		
Section 5.11: Hydrology and Water Quality		
Impact HY-1: Degradation of water quality as a result of erosion and sedimentation or a hazardous materials release during construction.	S	LS
Mitigation Measures		
M-HY-1: Construction Water Quality Best Management Practices.		
Impact HY-2: Depletion of groundwater resources.	LS	–
Mitigation Measures		
None required.		
Impact HY-3: Degradation of water quality and flooding due to discharges during dewatering of trenches.	S	LS
Mitigation Measures		
M-HY-1: Construction Water Quality Best Management Practices.		
M-HY-3: Coordination with Alameda County Flood Control and Water Conservation District and City of Fremont		

TABLE 1.1 (Continued)
SUMMARY OF IMPACTS AND MITIGATION MEASURES

IMPACT	Significance Determination Before Mitigation	Significance Determination After Mitigation
Section 5.11: Hydrology and Water Quality (cont.)		
Impact HY-4: Erosion, degradation of water quality, and flooding due to construction-related discharges of treated water (from pipelines).	PS	LS
Mitigation Measures		
M-HY-3: Coordination with Alameda County Flood Control and Water Conservation District and City of Fremont		
Impact HY-5: Damage to existing piezometer and cathodic protection wells, creating a potential conduit for pollutants to enter the underlying groundwater aquifer.	LS	--
Mitigation Measures		
None required.		
Section 5.12: Hazards and Hazardous Materials		
Impact HZ-1: Potential to encounter hazardous materials in soil and groundwater and interference with groundwater remediations.	PS	LS
Mitigation Measures		
M HZ-1a: Update Environmental Database Review		
M-HZ-1b: Perform Sampling		
M-HZ-1c: Hazardous Spoils Disposal Plan		
M-HZ-1d: Health and Safety Plan		
Impact HZ-2: Gassy conditions in tunnels.	LS	–
Mitigation Measures		
None required.		
Impact HZ-3: Accidental hazardous materials release from construction equipment.	PS	LS
Mitigation Measures		
M-HY-1: Construction Water Quality Best Management Practices.		
Impact HZ-4: Impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan.	S	LS
Mitigation Measures		
M-TR-1: Traffic Control Plan.		
Impact HZ-5: Risk of fires during construction.	LS	–
Mitigation Measures		
None required.		

TABLE 1.1 (Continued)
SUMMARY OF IMPACTS AND MITIGATION MEASURES

IMPACT	Significance Determination Before Mitigation	Significance Determination After Mitigation
Section 5.12: Hazards and Hazardous Materials (cont.)		
Impact C-HZ: Cumulative impacts related to a release of hazardous materials into the environment and impairment or interference with implementation of an adopted emergency plan.	PS	LS
Mitigation Measures		
M-C-TR: SFPUC Project Construction Traffic Coordinator.		
Section 5.13: Mineral and Energy Resources		
Impact ME-1: Construction-related fuel, water, and energy use.	LS	–
Mitigation Measures		
None required.		

LS = Less than Significant impact
PS = Potentially Significant impact
S = Significant impact
SU = Significant and Unavoidable impact, even with mitigation incorporated
– = Mitigation not required
* Significance determination under existing BAAQMD CEQA Guidelines / significance determination under proposed BAAQMD CEQA Guidelines (see Section 5.7, Air Quality)

CHAPTER 2
Introduction and Background

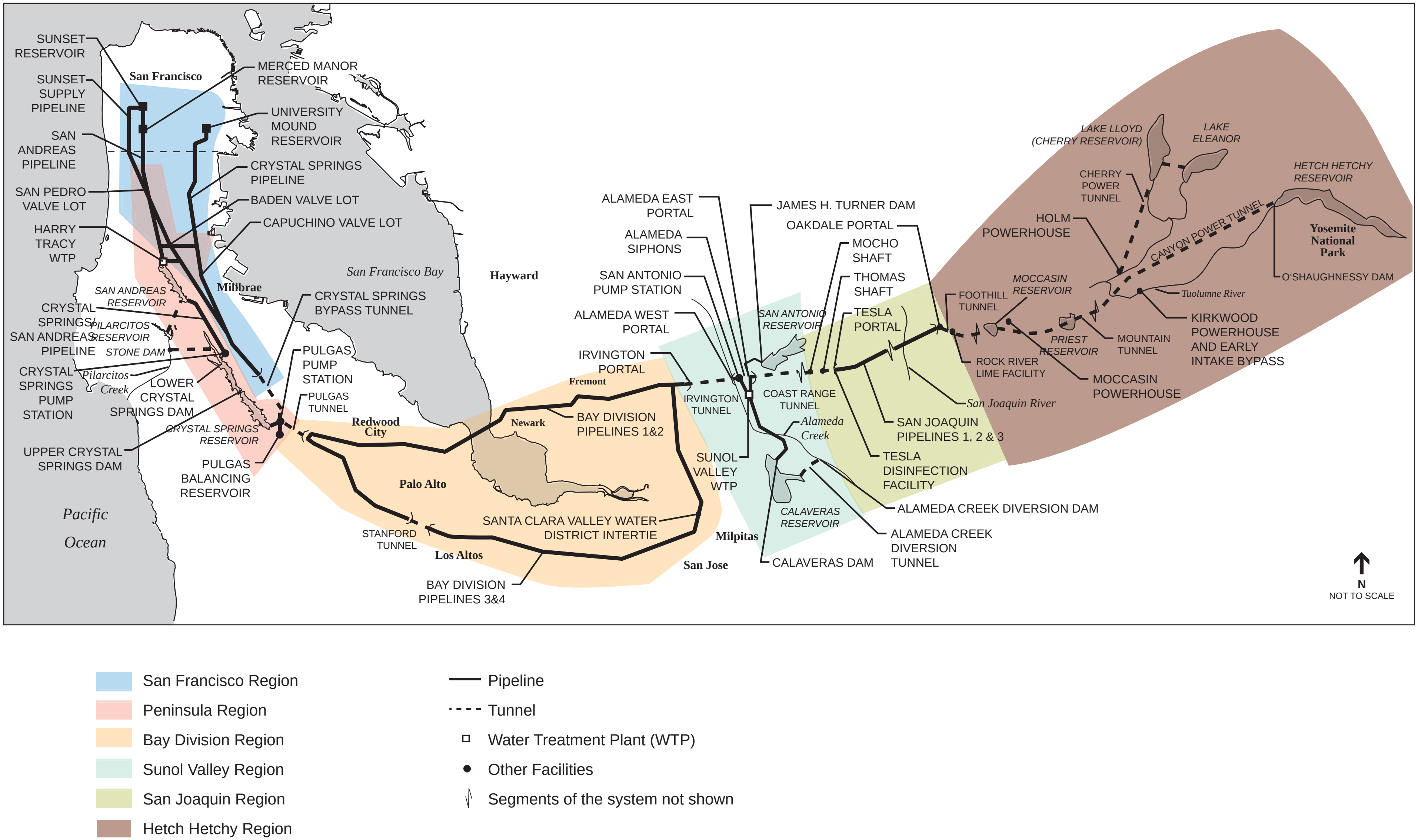
The San Francisco Public Utilities Commission (SFPUC) is proposing to implement the Seismic Upgrade of Bay Division Pipelines (BDPL) Nos. 3 and 4 at the Hayward Fault Project ("proposed project" or "project") to improve the seismic and hydraulic reliability of the SFPUC's regional water system. The project includes installation of approximately 2,360 feet of replacement pipeline for a section of BDPL No. 3 and improvements to BDPL No. 4 where the existing BDPL Nos. 3 and 4 cross the Hayward fault in Fremont, California. The proposed replacement pipeline, BDPL No. 3X, would be designed to accommodate movement along the Hayward fault and prevent pipeline failure during a seismic event. Improvements to BDPL No. 4 would seismically strengthen the pipe to control where failure would occur and prevent damage to the new BDPL No. 3X.

2.1 Project Background

2.1.1 SFPUC Regional Water System Overview

The City and County of San Francisco (CCSF), through the SFPUC, owns and operates a regional water system that extends from the Sierra Nevada to San Francisco and serves drinking water to 2.4 million people in San Francisco, San Mateo, Santa Clara, Alameda, and Tuolumne Counties. The regional water system consists of water conveyance, treatment, and distribution facilities, and delivers water to retail and wholesale customers. The existing regional system includes over 280 miles of pipelines, over 60 miles of tunnels, 11 reservoirs, 5 pump stations, and 2 water treatment plants. The SFPUC currently delivers an annual average of about 265 million gallons per day (mgd) of water to its customers. The source of the water supply is a combination of local supplies from streamflow and runoff in the Alameda Creek watershed and in the San Mateo Creek and Pilarcitos Creek watersheds (referred to together as the Peninsula watersheds), which is augmented with imported supplies from the Tuolumne River watershed. Local watersheds provide about 15 percent of total supplies and the Tuolumne River provides the remaining 85 percent. **Figure 2.1** illustrates the general location of the SFPUC regional system and water supply watersheds.

The SFPUC serves about one-third of its water supplies directly to retail customers, primarily in San Francisco, and about two-thirds of its water supplies to wholesale customers by contractual agreement. The wholesale customers are largely represented by the Bay Area Water Supply and



SOURCE: SFPUC

Seismic Upgrade of BDPL Nos. 3 and 4 at Hayward Fault

Figure 2.1
SFPUC Regional Water System

Conservation Agency (BAWSCA), which consists of 27 total customers, shown on **Figure 2.2**.[1] Some of these wholesale customers have other sources of water in addition to what they receive from the SFPUC regional water system, while others rely completely on the SFPUC for supply.

2.1.2 Assembly Bill 1823

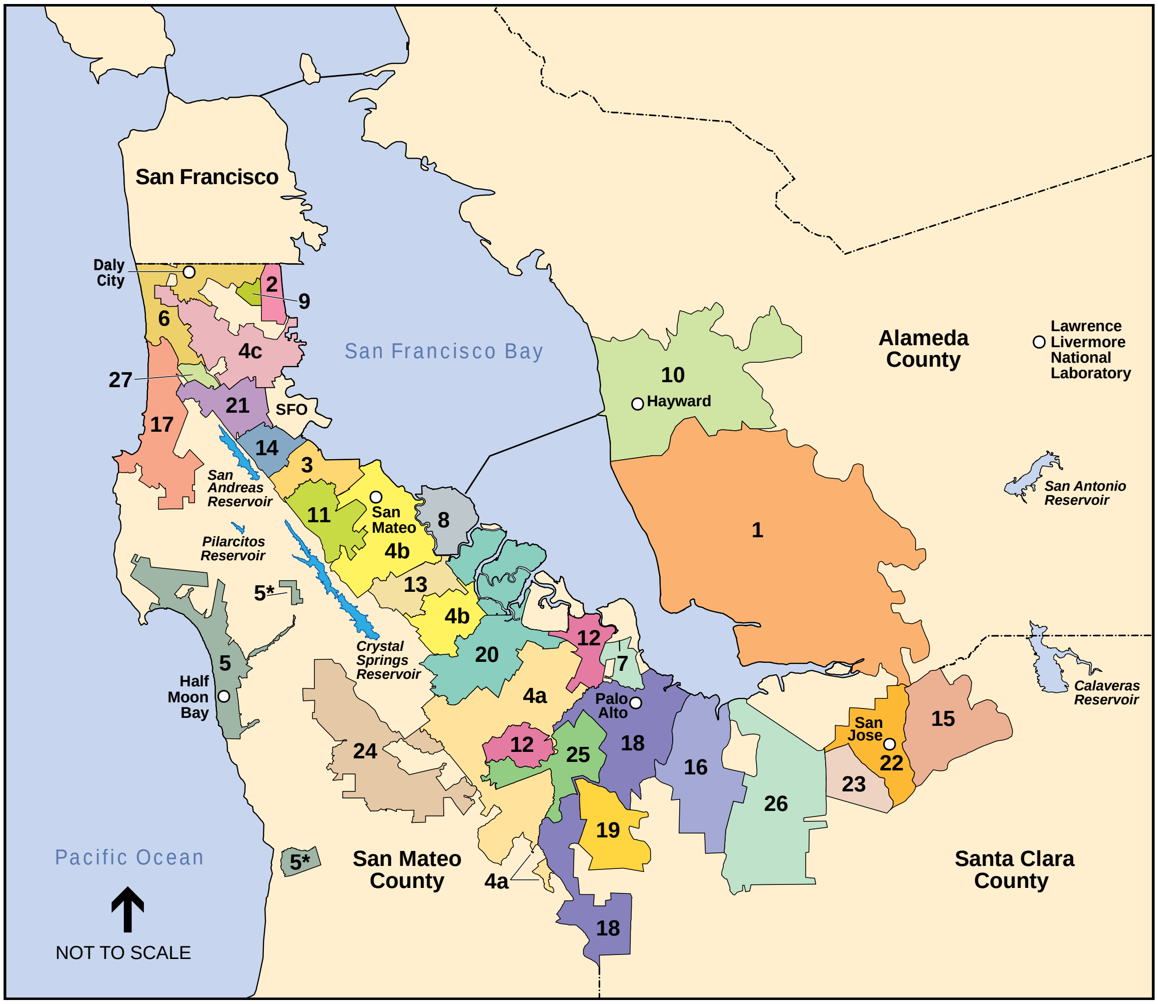
Adopted in 2002, California Assembly Bill 1823, known as the Wholesale Regional Water System Security and Reliability Act, is an act to add and repeal Division 20.5 of the California Water Code, which governs regional water systems. It imposes various requirements on wholesale regional water systems and applies directly to the CCSF and the SFPUC's regional water system. The bill includes numerous stipulations, including the following requirements for the CCSF: to adopt a capital improvement program by February 1, 2003; to adopt an emergency response plan by September 1, 2003; to distribute available water during any interruption to customers on an equitable basis; to continue operating reservoirs in Tuolumne County in a manner that ensures that the generation of hydroelectric power will not cause any reasonably anticipated adverse impact on water service; and to assign higher priority to water delivery to the Bay Area than to hydroelectric power generation.

The act includes the Water First Policy (Water Code Section 73504[b]), which states:

> In order to supply adequately, dependably, and safely the requirements of all users of water, the city shall continue its practice of operating the reservoirs in the Counties of Tuolumne and Stanislaus in a manner that ensures the generation of hydroelectric power will not cause any reasonably anticipated adverse impact on water service. The city shall assign higher priority to delivery of water to the Bay Area than to the generation of electric power, unless the Secretary of the Interior, in writing, notifies the city that doing so would violate the Raker Act (63 Public Law 41).

The act identified specific projects to be included in the program, including the proposed project, along with a requirement that a schedule be submitted to the DHS by March 2003 showing that projects representing 50 percent of the costs would be completed on or before 2010, and 100 percent of the projects would be completed on or before 2015. The SFPUC met this requirement and has submitted subsequent revisions to the original capital improvement program, which has now been renamed the Water System Improvement Program (SFPUC, 2005; SFPUC, 2006).

1 The Cordilleras Mutual Water Association is also a wholesale customer receiving water from the SFPUC, but it is not a BAWSCA member and not shown in Figure 2-2. It is a small water association serving 18 single-family homes located in San Mateo County.



Legend

(Wholesale customers and members of Bay Area Water Supply and Conservation Agency)

1 Alameda County Water District
2 City of Brisbane
3 City of Burlingame
4a CWS – Bear Gulch
4b CWS – Mid-Peninsula
4c CWS – South San Francisco
5 Coastside County Water District
6 City of Daly City
7 City of East Palo Alto
8 Estero Municipal Improvement District
9 Guadalupe Valley Municipal Improvement District
10 City of Hayward
11 Town of Hillsborough
12 City of Menlo Park
13 Mid-Peninsula Water District
14 City of Millbrae
15 City of Milpitas
16 City of Mountain View
17 North Coast County Water District
18 City of Palo Alto
19 Purissima Hills Water District
20 City of Redwood City
21 City of San Bruno
22 City of San Jose (North)
23 City of Santa Clara
24 Skyline County Water District
25 Stanford University
26 City of Sunnyvale
27 Westborough Water District

***** Portions of Coastside County Water District not served by the SFPUC regional water system.

NOTE: For the purposes of this EIR, the California Water Service (CWS) Company is a single wholesale customer with three different water service districts.

SOURCE: BAWSCA, 2006

Seismic Upgrade of BDPL Nos. 3 and 4 at Hayward Fault

Figure 2.2
SFPUC Water Service Area -
San Francisco and SFPUC Wholesale Customers

2.1.3 SFPUC Water System Improvement Program

On October 30, 2008, the SFPUC approved the Water System Improvement Program (also known as the "Phased WSIP") with the objective of repairing, replacing, and seismically upgrading the system's aging pipelines, tunnels, reservoirs, pump stations, and storage tanks (SFPUC, 2008; SFPUC Resolution No. 08-0200). The WSIP improvements span seven counties—Tuolumne, Stanislaus, San Joaquin, Alameda, Santa Clara, San Mateo, and San Francisco (see SFPUC Resolution No. 08-0200).

The WSIP will improve the regional water system with respect to water quality, seismic response, and water delivery based on a planning horizon through the year 2030. With respect to water supply, the WSIP is designed to meet water delivery needs in the SFPUC service area through the year 2018. The overall goals of the WSIP for the regional water system are to:

- Maintain high-quality water
- Reduce vulnerability to earthquakes
- Increase water delivery reliability
- Meet customer water supply needs
- Enhance sustainability
- Achieve a cost-effective, fully operational system

The San Francisco Planning Department prepared a Program Environmental Impact Report (PEIR) in compliance with the California Environmental Quality Act (CEQA) to address the potential environmental impacts of the WSIP. The San Francisco Planning Commission certified the WSIP PEIR on October 30, 2008 (San Francisco Planning Department, 2008b; San Francisco Planning Commission Motion No. 17734). The PEIR included a project-level evaluation of the environmental impacts of the WSIP water supply strategy and systemwide operations and a program-level evaluation of the environmental impacts of the WSIP facility improvement projects.

The proposed project is one of the WSIP projects. Although it was included as a WSIP facility improvement project in the Draft PEIR published in June 2007 and would contribute to the SFPUC's ability to meet the WSIP goals, the San Francisco Planning Department determined prior to certification of the PEIR that, based on more detailed project information, the proposed project could appropriately proceed with environmental review independent of the PEIR (SFPUC, 2008a). The project was determined to have "independent utility" from the overall program analyzed in the PEIR for the following reasons:

(1) The purpose of the project is to reduce the risk of pipeline failure in a major seismic event, and the project would serve this function and is necessary regardless of whether any other WSIP project is constructed.

(2) The construction of the project would not increase the normal operating capacity of the system because the new BDPL No. 3X functionally replaces the existing segment of BDPL No. 3; after construction, the existing segment of BDPL No. 3 would be abandoned; the new BDPL No. 3X would be the same diameter, or less, than the existing BDPL No. 3.

(3) Construction of the project would not change the manner in which water is dispersed, increase the storage capacity of the system, or increase or alter the nature of any treatment capacity of the system.

(4) The project does not commit the SFPUC to any other WSIP project.

(5) Any potential cumulative impacts associated with this project are addressed in this EIR.

(6) The performance specifications and design parameters applicable to the proposed project are independent of the PEIR analysis and any outcomes of the PEIR.

Thus, this EIR is part of a separate CEQA environmental review process, independent from the WSIP PEIR. However, this EIR relies on the WSIP PEIR as a key source of information about SFPUC facilities and operations. And, to the extent that they overlap in timing and geography with the proposed project, the WSIP facility improvement projects are evaluated in this EIR's cumulative impact analysis (see Chapter 6, Other CEQA Topics).

2.1.4 Bay Division Regional Water System Facilities

The proposed project is located along the SFPUC's regional water system in the City of Fremont in Alameda County. The BDPL Nos. 3 and 4 traverse the SFPUC's Bay Division Region, described below.

The regional water system begins at the Hetch Hetchy Reservoir and O'Shaughnessy Dam, which are located in Yosemite National Park on the main stem of the Tuolumne River in the Sierra Nevada. From Hetch Hetchy Reservoir, the water is transported westward to the Irvington Tunnel through a series of aqueducts, tunnels, and treatment facilities. The Irvington Tunnel transmits the water through the East Bay Hills to the Irvington Portal in Fremont. The Irvington Portal connects to four Bay Division Pipelines (BDPL Nos. 1, 2, 3, and 4), which consist of two sets of two parallel pipelines constructed in 1925, 1936, 1952, and 1973, respectively, that constitute the Bay Division Region. BDPL Nos. 1, 2, 3, and 4 serve multiple purposes: providing water to customers in the East Bay, South Bay, and Peninsula through turnouts along the pipelines; conveying water to users in the northern Peninsula and in San Francisco; and transmitting water to Crystal Springs Reservoir to supplement local storage in the Bay Area. Numerous valve lots along the pipelines allow for flow control.

The BDPL Nos. 1 and 2 are 22 miles long and pass through the cities of Fremont and Newark, cross San Francisco Bay at the Dumbarton Strait, and continue through East Palo Alto, Redwood City, Menlo Park, and Atherton; they include about 3,000 feet of submarine pipeline that passes under the bay, as well as aboveground pipeline supported on a pipe bridge over water or on a trestle over the land and marsh along the bay margin.

The BDPL Nos. 3 and 4 extend 34 miles around the south end of San Francisco Bay, almost entirely as buried underground pipeline. These two pipelines pass through the cities of Fremont, Milpitas, San Jose, Santa Clara, Sunnyvale, Mountain View, Los Altos, Palo Alto, Menlo Park, Atherton, Woodside, and Redwood City. BDPL Nos. 3 and 4 converge for approximately

1,360 feet of tunnel at the Stanford Tunnel in Palo Alto. BDPL Nos. 3 and 4 reconnect with BDPL Nos. 1 and 2 at the Pulgas Portal entrance to Pulgas Tunnel just west of Redwood City (SFPUC, 2004). The proposed project would affect only a portion of BDPL Nos. 3 and 4 in Fremont; a more detailed description of the affected portions of the existing BDPL Nos. 3 and 4 is provided in Chapter 3, Project Description.

2.2 Purpose of this EIR

The San Francisco Planning Department is the lead agency for implementation of CEQA for all projects sponsored by the CCSF, including those projects sponsored by the SFPUC. The San Francisco Planning Department has prepared this EIR on the SFPUC's proposed Seismic Upgrade of BDPL Nos. 3 and 4 at Hayward Fault Project. This document presents a project-level analysis of potential environmental impacts of the proposed project.

This EIR has been prepared in compliance with CEQA (California Public Resources Code [PRC], Section 21000 et seq.), CEQA Guidelines (Title 14, California Code of Regulations, Section 15000 et seq.), and Chapter 31 of the CCSF Administrative Code. CEQA requires the preparation of an EIR when a project could significantly affect the physical environment. This EIR includes a description of the project and the environmental setting, identifies potential physical environmental impacts associated with project construction and operation, lists mitigation measures for impacts found to be significant, identifies environmental impacts determined to be significant and unavoidable, and compares and evaluates a reasonable range of project alternatives. Significance criteria used to evaluate each environmental topic analyzed in this EIR are defined in the beginning of each impact analysis section in Chapter 5.

2.3 Public Outreach

2.3.1 Notice of Preparation

In accordance with Section 15082 of the CEQA Guidelines, the San Francisco Planning Department, as lead agency, sent a notice of preparation (NOP) to approximately 600 local, state, and federal agencies, regional and local interest groups, and property owners to begin the formal CEQA scoping process (a copy of the NOP is available in **Appendix A**). The scoping period began on March 29, 2008 with the issuance of the NOP, and San Francisco Planning Department accepted written comments through the end of the comment period on April 28, 2008. The NOP included a preliminary discussion of the potential environmental impacts of the project in the following resource areas: biological resources; cultural resources; geology and soils; hydrology and water quality; noise; and transportation and circulation. The NOP and other information related to the proposed project were posted on the San Francisco Planning Department's website (http://www.sfgov.org/site/planning_index.asp) and were placed in the legal classified section of the *San Francisco Chronicle* and the *Fremont Argus* newspapers.

2.3.2 Public Scoping Meeting

The San Francisco Planning Department held a public scoping meeting at the Fremont Main Library in Fremont, California on April 21, 2008. Legal notices of the scoping meeting were placed in the legal classified section of the *San Francisco Chronicle* and the *Fremont Argus* newspapers to inform the general public of the scoping meeting.

The purpose of the meeting was to receive public input regarding the scope of the EIR analysis. Attendees were provided with an opportunity to voice comments or concerns on potential effects of the project.

2.3.3 Public and Agency Comments on NOP

The scoping process provided an opportunity for governmental agencies and the public to provide comments on the issues and scope of the EIR; a scoping report summarizing the public scoping process and the comments received in response to the NOP is included in Appendix A. Ten members of the public attended the public scoping meeting. The San Francisco Planning Department received additional comments in the form of letters, faxes, and emails. The primary environmental concerns raised during the scoping period are summarized in **Table 2.1**, which also references the EIR sections where the comments are addressed.

2.3.4 Draft EIR

This document constitutes the Draft EIR. It describes the proposed Seismic Upgrade of BDPL Nos. 3 and 4 at Hayward Fault Project and the environmental setting for the project, evaluates project impacts, identifies mitigation measures for impacts found to be potentially significant or significant, and presents an analysis of project alternatives. This EIR is an informational document that does not, in and of itself, determine whether a project will be approved; rather, it is intended to aid the planning and decision-making process by disclosing the physical environmental effects of the project and identifying possible ways of reducing or avoiding its potentially significant or significant impacts.

Significance criteria have been developed for each environmental issue analyzed in this EIR and are defined at the beginning of each impact analysis section. Impacts are analyzed and the significance of the impact is categorized as follows:

- No impact
- Less than significant
- Potentially significant before mitigation/less than significant with mitigation
- Significant before mitigation/less than significant with mitigation
- Significant, unavoidable

TABLE 2.1
SUMMARY OF SCOPING COMMENTS

Commenter	Summary of Comment	Addressed in the EIR
Alameda County Water District (ACWD)	The EIR should address and include measures to minimize impacts to the ACWD water distribution facilities where they cross the existing BDPL Nos. 3 and 4.	Section 5.8, Utilities and Service Systems
	The CEQA process should include coordination with the ACWD to ensure that impacts on ACWD facilities are minimized and appropriate measures are identified in the EIR.	Section 5.8, Utilities and Service Systems
	The EIR should address the requirement for ACWD drilling permits.	Section 5.11, Hydrology and Water Quality
	The EIR should address wells within the project area (including monitoring wells and cathodic protection wells), well protection measures, and applicable regulatory and permitting requirements.	Section 5.11, Hydrology and Water Quality
	The EIR should address dewatering activities related to excavation and potential impacts on groundwater supplies that are used as a local drinking supply. Alternative designs should be evaluated to minimize the amount of groundwater dewatering, and mitigation measures should be proposed to replace all significant losses of ACWD water supplies.	Section 5.11, Hydrology and Water Quality
	Potentially significant impacts associated with installation and destruction of dewatering wells should be addressed in the EIR.	Section 5.11, Hydrology and Water Quality
Bay Area Water Supply and Conservation Agency	The EIR should clarify the need for the proposed project by quantifying the likelihood and consequences of failure of BDPL Nos. 3 and 4 at the fault crossing.	Chapter 3, Project Description Chapter 7, Alternatives
	The EIR should include a description of the role of BDPL Nos. 3 and 4 in delivery of water from the Calaveras Reservoir.	Chapter 2, Introduction and Background
	The EIR should identify specific public communication plans to inform those in the vicinity of the project of noise, traffic, and other potential effects.	Section 5.2, Land Use and Land Use Planning Section 5.5, Transportation and Circulation Section 5.6, Noise
	The EIR should indicate whether the project would result in construction phase shutdowns of the regional water system, including the duration of the shutdowns and mitigation for affected customers.	Chapter 3, Project Description
California Department of Transportation	The EIR should address the project's fair share contribution, financing, scheduling, and implementation responsibilities as well as lead agency monitoring for all mitigation measures.	Chapter 3, Project Description
	The EIR should include a current archaeological records search from the Northwest Information Center of the California Historical Resources Information System prior to issuance of the required encroachment permit. In addition, a cultural resource study may be required.	Section 5.4, Cultural Resources
	The EIR should address cumulative projects and implementation of the project should be coordinated with the Caltrans project manager.	Section 6.2, Cumulative Impacts
	The EIR should address Caltrans encroachment permit requirements.	Chapter 3, Project Description Section 5.5, Transportation and Circulation

TABLE 2.1 (Continued)
SUMMARY OF SCOPING COMMENTS

Commenter	Summary of Comment	Addressed in the EIR
Wynn Greich A.T.O.W.N	The commenter states that the project time line should be accelerated.	Chapter 3, Project Description
	The commenter remarks that SFPUC water quality is poor.	Chapter 3, Project Description
No name provided	The commenter asks if there will be disruptions to the water supply or a decrease in water pressure.	Chapter 3, Project Description
Katherine Combs	The commenter indicates that the project time line should be accelerated.	Chapter 3, Project Description
Mike Francois	The commenter remarks that SFPUC water quality is poor.	Chapter 3, Project Description

2.3.5 Public Review of the Draft EIR and Comments and Responses

This document is being circulated to local, state, and federal agencies and to interested organizations and individuals who may wish to review and comment on the document. Publication of this Draft EIR marks the beginning of a 45-day public review period, during which the San Francisco Planning Department will accept comments on the EIR. During this 45-day review period, the San Francisco Planning Department will also conduct two public hearings to receive comments on the EIR. These hearings are scheduled on January 26, 2010, in Fremont and on January 28, 2010, in San Francisco. The San Francisco Planning Department will address written and oral comments received on this EIR in a Comments and Responses document, which will be distributed to all persons and entities that submit comments on the EIR as well as to those decision-makers with authority over the EIR and the project. The Comments and Responses document, together with this Draft EIR, will constitute the Final EIR.

2.3.6 Final EIR

The San Francisco Planning Commission will consider the Final EIR for certification at a public hearing and will certify the EIR if it determines that it fulfills CEQA requirements. Once the EIR has been certified, the SFPUC may proceed with consideration of whether to approve the project. CEQA and the CEQA Guidelines require the SFPUC to consider the Final EIR and adopt findings in connection with approval of a project if the certified EIR identifies significant environmental effects.

2.3.7 Mitigation Monitoring and Reporting

Pursuant to CEQA and the CEQA Guidelines, lead agencies are required to adopt, at the time of project approval, a mitigation monitoring and reporting program (MMRP) for any mitigation measures which it has adopted and made conditions of approval in order to mitigate or avoid significant effects on the environment. This Draft EIR identifies and presents mitigation measures that will be used to create the MMRP. Measures adopted by the SFPUC at the time of project approval will be included in the MMRP.

2.4 Organization of the Draft EIR

This EIR is organized into eight chapters, as discussed below:

- **Chapter 1, Executive Summary.** This chapter presents a summary of the proposed project, identifies potentially significant environmental impacts and mitigation measures, and describes the alternatives considered in this EIR. It also identifies areas of controversy and issues to be resolved.

- **Chapter 2, Introduction and Background.** This chapter provides project background information and describes the purpose and organization of the EIR, as well as its preparation, review, and certification processes.

- **Chapter 3, Project Description.** This chapter presents the proposed project description, including project objectives, a summary of project components, and information about project construction. The chapter also lists required permits and approvals.

- **Chapter 4, Plans and Policies.** This chapter describes land use plans and policies and the manner in which they apply to the project, and discusses the project's consistency with those plans.

- **Chapter 5, Environmental Setting and Impacts.** This chapter is subdivided into sections for each environmental resource topic. Each section describes the environmental and regulatory setting, significance criteria, and approach to the analysis for that resource topic; it also presents an analysis of potential environmental impacts and the project-specific mitigation measures that have been developed to address significant and potentially significant impacts.

- **Chapter 6, Other Topics Required by CEQA.** This chapter identifies the significant environmental effects that cannot be avoided if the proposed project is implemented, significant irreversible impacts, cumulative impacts, and growth-inducing effects.

- **Chapter 7, Alternatives.** This chapter describes the alternatives to the proposed project and compares their impacts to those of the proposed project. This chapter also summarizes the alternatives that were considered but screened from further analysis.

- **Chapter 8, EIR Preparers and Persons and Organizations Contacted.**

- **Appendix A, Scoping Report.** This appendix includes the scoping report for the Draft EIR. The scoping report describes the public scoping effort conducted in March and April 2008 and summarizes the public and regulatory agency comments received during scoping process. The Notice of Preparation for this Draft EIR is included as an appendix to the Scoping Report.

- **Appendix B, Transportation and Circulation Technical Backup Documentation.** This appendix includes documentation of the information that was used in the traffic analyses presented in Section 5.5, Transportation and Circulation.

- **Appendix C, URBEMIS 2007 Model Output.** This appendix includes the output of the URBEMIS Computer Model that was used to estimate project-related criteria pollutant emissions presented in Section 5.7, Air Quality.

- **Appendix D, SCREEN3 Model Output.** This appendix includes the output of the SCREEN3 Computer Model that was used to estimate cancer risks from exposure to project-related diesel particulate matter emissions, discussed in Section 5.7, Air Quality.

2.5 References

San Francisco Planning Department, *Program Environmental Impact Report for the San Francisco Public Utilities Commission's Water System Improvement Program*, October 2008.

San Francisco Public Utilities Commission (SFPUC), *Regional Water System Facility Data Sheets, Transmission System Training.* Water Supply and Treatment Division, Policies and Procedures Training Program, September 29, 2004.

San Francisco Public Utilities Commission (SFPUC), Water System Improvement Program prepared for the Programmatic Environmental Impact Report, February 28, 2005.

San Francisco Public Utilities Commission (SFPUC), Assembly Bill 1823, Notice of Changes to Water System Improvement Program, January 2006.

San Francisco Public Utilities Commission (SFPUC), Memo Supporting Independent Utility, March 20, 2008a.

San Francisco Public Utilities Commission (SFPUC), SFPUC Resolution 08-200, Water System Improvement Program California Environmental Quality Act Findings: Findings of Fact, Evaluation of Mitigation Measures and Alternatives, and Statement of Overriding Considerations, October 2008b.

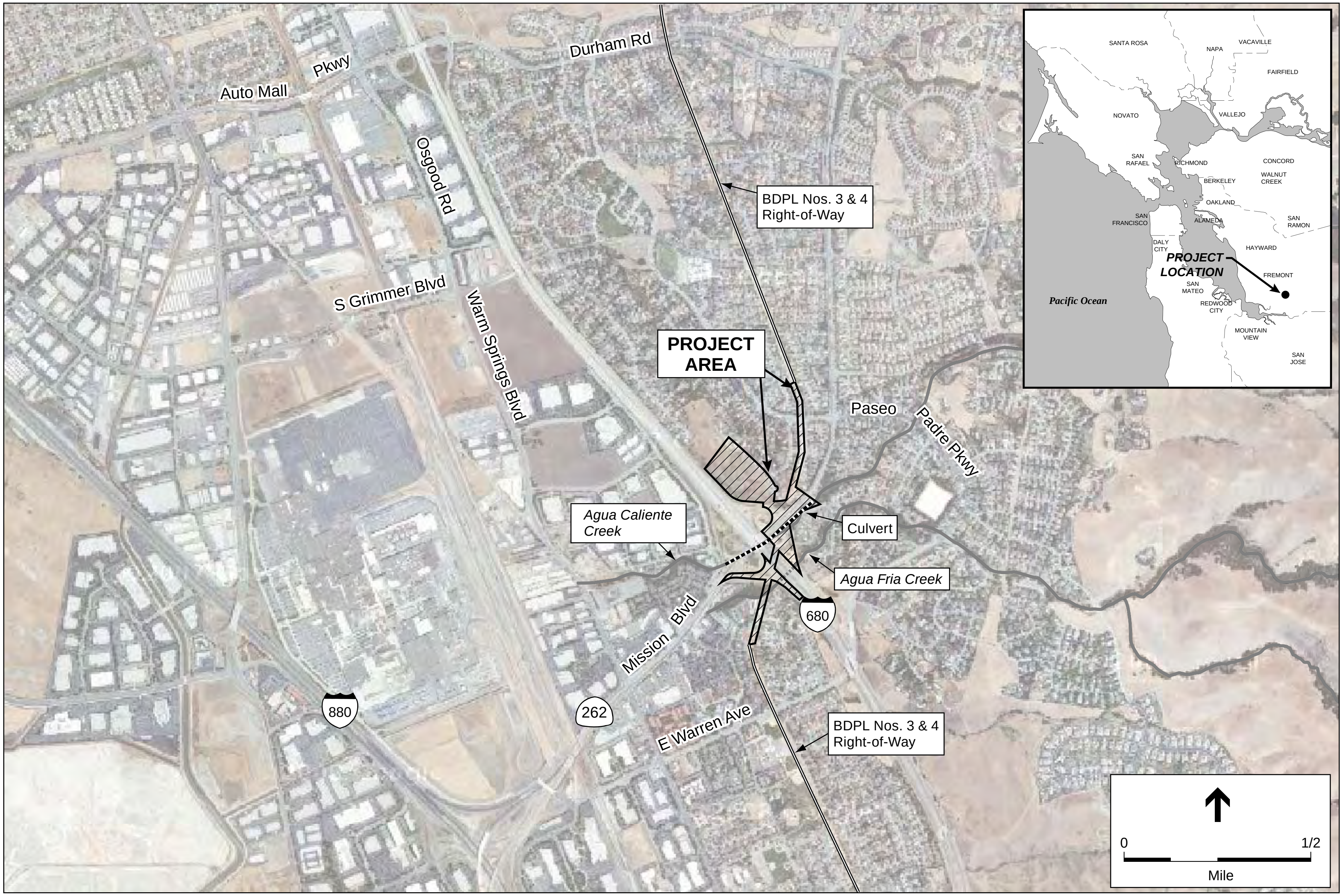
CHAPTER 3
Project Description

This chapter describes the Seismic Upgrade of Bay Division Pipelines (BDPL) Nos. 3 and 4 at Hayward Fault Project (the "project" or "proposed project") proposed by the San Francisco Public Utilities Commission (SFPUC). This description includes the project's background, location, objectives, project components, construction methods, and construction schedule. The chapter also discusses the regulatory actions and approvals required for project implementation.

3.1 Overview and Background

BDPL Nos. 3 and 4 are two of the SFPUC's four major regional transmission pipelines that deliver water from the Hetch Hetchy system and Alameda Creek watershed facilities to the San Francisco Bay Area. These two parallel pipelines extend 34 miles through the South Bay, from Fremont to just west of Redwood City (see Chapter 2, Introduction and Background, Figure 2.1), crossing the Hayward fault in Fremont. Because of this crossing, a sizeable earthquake on the Hayward fault could rupture one or both of these pipelines, causing localized flooding and damage to adjacent infrastructure and residences as well as affecting water service to SFPUC customers in the East and South Bays, the Peninsula, and San Francisco.

The SFPUC has determined that the post-earthquake level of service goals for the project can be met as long as BDPL No. 3 remains in service after a major earthquake on the Hayward fault. Therefore, the proposed project, located at the intersection of Interstate 680 (I-680) and Mission Boulevard, in Fremont, California (**Figure 3.1**) includes construction of a new pipeline parallel to BDPL No. 3—referred to as BDPL No. 3X—that would include design features to reduce the vulnerability of the pipeline to earthquakes. The project would improve the SFPUC's ability to maintain an adequate water supply to downstream water users following a major earthquake on the Hayward fault and would enable the SFPUC to meet its adopted systemwide goals for seismic reliability for the regional water system. Reinforcements would also be made to BDPL No. 4 to strengthen the pipeline at the fault crossings in order to control where failure would occur in the event of an earthquake, thereby minimizing damage to BDPL No. 3X and the surrounding area in the event of pipeline failure. The U.S. Geological Survey (USGS) estimates that there is a 63 percent probability of a strong earthquake (magnitude 6.7 or higher) occurring in the San Francisco Bay Area in the 30-year period between 2003 and 2032, with a 31 percent chance of such an earthquake within the Rodgers Creek–Hayward fault system (WGCEP, 2008). BDPL No. 3 and No. 4 cross the southern segment of the Hayward fault, which extends about 32 miles between Oakland on the north and the Warm Springs District of Fremont on the south.



SOURCE: ESA+Orion

Seismic Upgrade of BDPL Nos. 3 and 4 at Hayward Fault

Figure 3.1
Project Location and Area

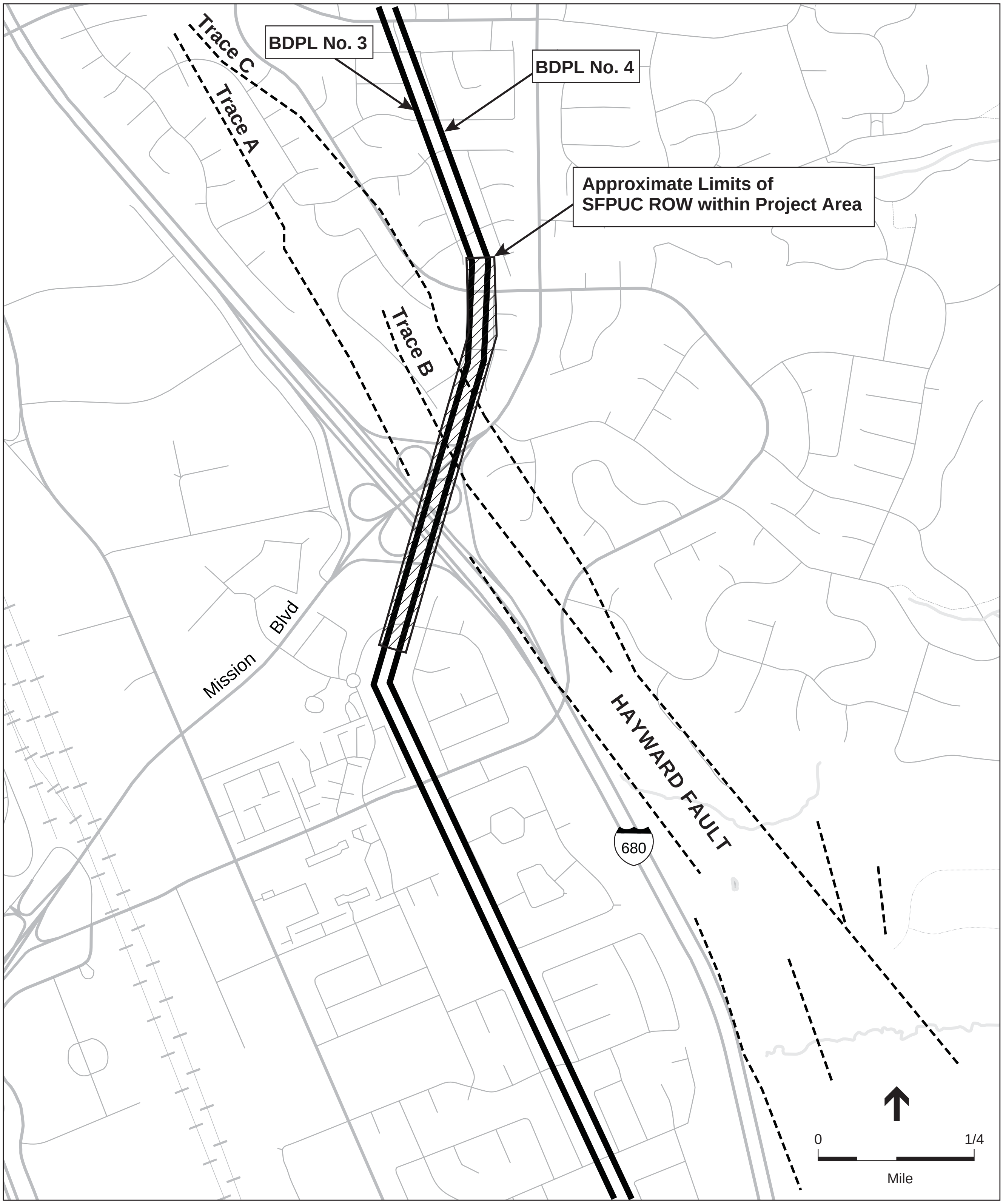
Based on a site-specific seismic investigation, the probable earthquake on the south section of the fault would have a moment magnitude[1] of 6.9 (WIP, 2004). Without additional seismic improvements, there is a high probability (over 91 percent) that BDPL Nos. 3 and 4 would break due to both horizontal and vertical fault offset in the event of a major earthquake on the Hayward fault (URS, 2008a). A rupture of the pipeline at this location would most likely result in flood damage, public safety hazards, and loss of potable water supply to downstream customers for domestic consumption, commercial uses, hospitals, and firefighting purposes. Additionally, both I-680 and Mission Boulevard could be damaged by horizontal and vertical fault offset, and severe erosion from flooding as a result of pipeline rupture could further damage and/or potentially cause the closure of Mission Boulevard, I-680, and local roadways.

Three traces[2] of the Hayward fault cross BDPL Nos. 3 and 4 near the intersection of I-680 and Mission Boulevard (**Figure 3.2**). Fault movement could occur on any of these traces—either slowly due to fault creep (slow and relatively constant movement along the fault) or suddenly due to fault rupture during an earthquake, thereby damaging or rupturing the pipelines. Only Trace B appears to exhibit fault creep. The estimated creep rate on this trace over the last 40 years is 0.13 feet per decade; over the last 9 years, the creep rate would equate to 0.20 feet per decade (WLA, 2008). Sudden rupture could occur on any of the three fault traces.

The existing facilities related to BDPL Nos. 3 and 4 within the project area are shown on **Figure 3.3**. In 2007, the SFPUC constructed the North and South Shutoff Stations on either side of the Hayward fault. These shutoff stations allow the SFPUC to shut down the pipelines that run between the two stations in the event of a seismic event near the project site; if either BDPL No. 3 or No. 4 were to break, the pipelines could be closed within 30 to 60 minutes, thereby restricting the amount of water that would be released. While construction of the North and South Shutoff Stations has substantially reduced the anticipated physical damage to the adjacent area from pipeline breakage, the regional water system would not meet the SFPUC's adopted level-of-service goals (described in Chapter 2, Introduction and Background) of delivering basic service within 24 hours of a major earthquake and average-day demand of up to 300 million gallons per day (mgd) within 30 days after a major earthquake without construction of the proposed project. Service to downstream customers would be disrupted if both pipelines were to rupture and would be significantly reduced if even one of the two pipelines were to rupture.

[1] An earthquake is classified by the amount of energy released, expressed as the magnitude of the earthquake. Traditionally, magnitudes have been quantified using the Richter scale. Seismologists have begun using a moment magnitude (Mw) scale because it provides a more accurate measurement of the size of major and great earthquakes.

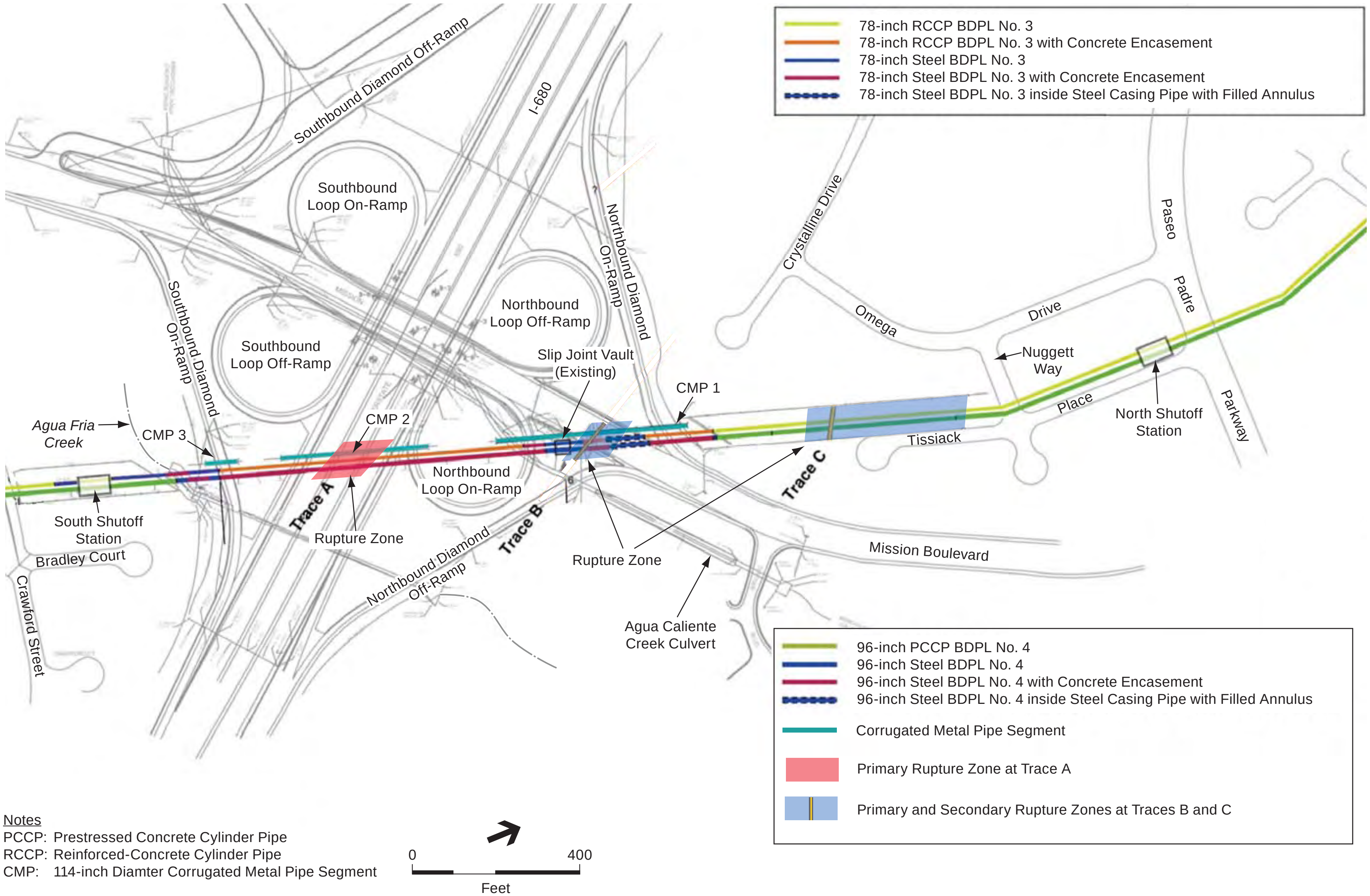
[2] A fault trace is the expression of a fault at the ground surface where fault movement can occur.



SOURCE: URS, 2008a

Seismic Upgrade of BDPL Nos. 3 and 4 at Hayward Fault

Figure 3.2
Traces A, B, and C of
the Hayward Fault



Notes
PCCP: Prestressed Concrete Cylinder Pipe
RCCP: Reinforced-Concrete Cylinder Pipe
CMP: 114-inch Diamter Corrugated Metal Pipe Segment

SOURCE: URS, 2008a

Figure 3.3
Existing Facilities

3.2 Project Location

BDPL Nos. 3 and 4 cross the Hayward fault in the city of Fremont, near the intersection of I-680 and Mission Boulevard (Figure 3.1 and Figure 3.3). The sections of the pipeline to be upgraded are located within the 80-foot SFPUC right-of-way (ROW) between the South and North Shutoff Stations. The project area for the proposed project, shown on Figure 3.1, includes the section of ROW where pipeline would be upgraded as well as areas that would be used for staging and construction worker parking. Within the project area, the pipelines cross I-680, three I-680 on-ramps, Mission Boulevard, Agua Caliente Creek (contained within an underground concrete culvert), and Agua Fria Creek (a "natural" section of creek that crosses the ROW). The SFPUC ROW passes through residential areas on both the north and south ends of the project area.

3.3 Project Goals and Objectives

3.3.1 Relationship to Water System Improvement Program Goals

As described in Chapter 2, Introduction and Background, the proposed project is part of the SFPUC's adopted Water System Improvement Program (WSIP) (SFPUC Resolution No. 08-0200). With the exception of the water supply goal, the overall WSIP goals and objectives (also refer to Table 2.1 in Chapter 2) are based on a planning horizon through 2030. The water supply goal to meet delivery needs in the SFPUC service area is based on a planning horizon through 2018. The overall goals of the WSIP for the regional water system are to:

- Maintain high-quality water
- Reduce vulnerability to earthquakes
- Increase water delivery reliability
- Meet customer water supply needs
- Enhance sustainability
- Achieve a cost-effective, fully operational system

The proposed project would reduce the regional water system's vulnerability to earthquakes and increase water delivery reliability and would therefore contribute to the SFPUC's ability to meet the WSIP goals.[3]

3.3.2 Project Objectives

The primary objectives of the proposed project are to reduce the vulnerability of the BDPL Nos. 3 and 4 to earthquake damage and to increase delivery reliability where these pipelines cross the Hayward fault. Specific objectives are to:

- Reduce the potential effects of a catastrophic failure of BDPL Nos. 3 and 4 where they cross the Hayward fault in order to protect these vital lifelines (Mission Boulevard, I-680, and the new BDPL No. 3X).

[3] See Section 2.1.3, SFPUC Water System Improvement Program, in Chapter 2 for a discussion of the project's independent utility.

- Design the proposed BDPL No. 3X to be functional within 24 hours of a seismic event.
- Deliver basic service to the East/South Bays, Peninsula, and San Francisco within 24 hours of a major earthquake. Basic service is defined as average winter-month usage, and the performance objective for the Bay Division regional system (described in Chapter 2, Section 2.1.3, Bay Division Regional Water System Facilities) is 229 mgd. The performance objective is to provide delivery to at least 70 percent of the turnouts (i.e., water-diversion connecting points from the regional system to customers) in each region, with 104, 44, and 81 mgd delivered to East/South Bays, Peninsula, and San Francisco regions, respectively.
- Design and upgrade facilities to meet average-day demand for the Bay Division regional system of up to 300 mgd within 30 days of a major earthquake.

3.4 Proposed Project

3.4.1 Site Description

Within the project area (traveling from south to north), the BDPL Nos. 3 and 4 ROW crosses Agua Fria Creek, I-680 and associated on-ramps, Agua Caliente Creek, and Mission Boulevard. Where the ROW crosses Agua Fria Creek, the creek flows in a shallow, natural creek bed with a 150-foot-wide riparian zone. Where the ROW crosses I-680, access to and from I-680 is provided via four loop on- and off-ramps and four diamond on- and off-ramps (Figure 3.3). The freeway on-ramps crossed by the ROW include the northbound diamond on-ramp, northbound loop on-ramp, and southbound diamond on-ramp. Where the ROW crosses Mission Boulevard, there are two eastbound and two westbound lanes of traffic separated by a raised median. Where the ROW crosses Agua Caliente Creek, the creek is contained in an 8-foot-high by 10-foot-wide concrete culvert, approximately 15 to 20 feet below ground level, which parallels Mission Boulevard (Figure 3.1).

When the I-680 freeway was originally constructed in 1969, the California Department of Transportation (Caltrans) installed three 114-inch-diameter segments of corrugated-metal pipe (CMP1, CMP2, and CMP3, as shown on Figure 3.3) beneath the freeway and the associated on-ramps to facilitate the future installation of new BDPL pipeline segments with minimal disruption of I-680 and the on- and off-ramps.

The northern end of the ROW in the project area is adjacent to Tissiack Place for approximately 1,000 feet, within a single-family residential neighborhood. The southern end of the project site at the South Shutoff Station (at Crawford Street near Bradley Court) is located near a mix of single-family homes, condominiums, and a hotel complex.

3.4.2 Existing Facilities

BDPL No. 3, built between 1952 and 1956, is a 78-inch-diameter pipe constructed primarily of reinforced-concrete cylinder pipe (RCCP) between the North and South Shutoff Stations, although some sections beneath Agua Fria Creek and across Trace B of the Hayward fault are constructed of welded steel. BDPL No. 4, built between 1967 and 1973, is a 96-inch-diameter pipe constructed of prestressed-concrete cylinder pipe (PCCP) and welded steel. Portions of both pipelines are lightly encased in concrete to add strength, and a portion of BDPL No. 4 is constructed within an existing steel pipe. The construction materials for each pipeline are shown on Figure 3.3. Both pipelines are below ground within the project area.

In both pipelines, the RCCP and PCCP segments are joined with a rubber gasket connection that allows the pipe segments to rotate in the event of fault offset. With sufficient offset, the pipelines would pull apart at these gasketed connections if the offset elongated the pipes, or would crush if the offset compressed them. A slip joint was installed on both pipelines in 1995 immediately south of the Trace B crossing (Figure 3.3) to accommodate fault creep at this location. Both pipelines dip approximately 15 feet beneath Agua Fria Creek. There are 15 blowoff valves and air release valves on BDPL Nos. 3 and 4 between the North and South Shutoff Stations. Each valve is accessed through a (typically) 6-foot-diameter manhole that extends 2 feet above the ground.

BDPL No. 3 was inspected in 2006, at which time longitudinal cracks were found in the interior of many of the RCCP portions of the pipeline; however, the inspectors determined that these cracks are unlikely to affect the strength of the pipelines in the event of an earthquake. At the time of the inspection, the lining of the BDPL No. 3 steel pipe showed distress, likely due to compressive offset as a result of fault creep, but there were no obvious signs of pipe deformation at Traces A and C (URS, 2008a). The existing slip joint on BDPL No. 3 was reset in January 2006 and can likely accommodate ongoing fault creep, but would probably fail in the event of sudden movement associated with fault rupture on Trace B of the Hayward fault that could exceed the limits of the slip joint.

The BDPL No. 4 slip joint shows signs of movement since its installation near Trace B of the Hayward fault in 1995, and since that time the slip joint has been reset. Inspection of the slip joint in 2004 indicated that the joint would likely fail in the event of sudden movement on Trace B of the Hayward fault. The lining of the steel pipe at Trace B shows distress, but there were no obvious signs of pipe deformation at Traces A and C (URS, 2008a).

3.4.2.1 Shutoff Stations

In 2007, the SFPUC constructed the North and South Shutoff Stations on BDPLs No. 3 and No. 4 on either side of the Hayward fault to provide a means for shutting down one or both pipelines should a rupture occur. These stations, shown on Figure 3.3, each consists of a 42-inch crossover valve and four 78-inch isolation valves (two on each pipeline) that enable the pipelines to be isolated quickly in the event of failure. The isolation valves allow the pipeline to be isolated in the event of a failure, and are operated with hydraulic actuators that can be remotely activated. The crossover valves allow water to be routed from one BDPL to the other in the event that only one of the pipelines rupture, and are operated with electric actuators that that can be remotely activated. Additionally, both BDPL No. 3 and No. 4 were replaced with new 78-inch-diameter welded-steel pipe within and 40 to 50 feet beyond each end of the shutoff stations. Once remotely activated, it would take approximately 30 to 60 minutes for the isolation valves to fully close.

3.4.2.2 Groundwater Piezometers and Cathodic Protection Wells

There are three groundwater piezometers[4] (installed by the SFPUC) within the BDPL Nos. 3 and 4 ROW and several cathodic protection wells[5] located within the project area (ACWD, 2009) (see Figure 5.11-1, in Section 5.11, Hydrology and Water Quality, for locations). The piezometers (UB-2, UB-5, and UB-8) are 100 feet deep and are used to monitor groundwater levels to determine the design and dewatering requirements for the project. There is a cluster of three Alameda County Water District (ACWD) cathodic protection wells (No. 5, No. 6, and No. 7) that are 12 feet deep, and two Briar Court Association cathodic protection wells (No. 1 and No. 2) that are 150 feet deep located near the intersection of Curtner Road and Mission Boulevard.

3.4.3 Proposed Facilities

Improvements under the proposed project include construction of a new BDPL No. 3X between the two shutoff stations (with seismic design features at each fault trace crossing to prevent rupture of the pipeline in the event of a major earthquake on the Hayward fault); abandonment of the existing BDPL No. 3 between the North and South Shutoff Stations once the new BDPL No. 3X is operational; and seismic improvements to BDPL No. 4 to control where breakage would occur and prevent damage to BDPL No. 3X should BDPL No. 4 rupture. The abandoned portion of BDPL No. 3 would remain in place, and would be used to provide drainage should BDPL No. 4 rupture at Trace B of the Hayward fault as discussed below. These improvements are summarized briefly below and are shown on **Figure 3.4**.

3.4.3.1 Proposed BDPL No. 3X

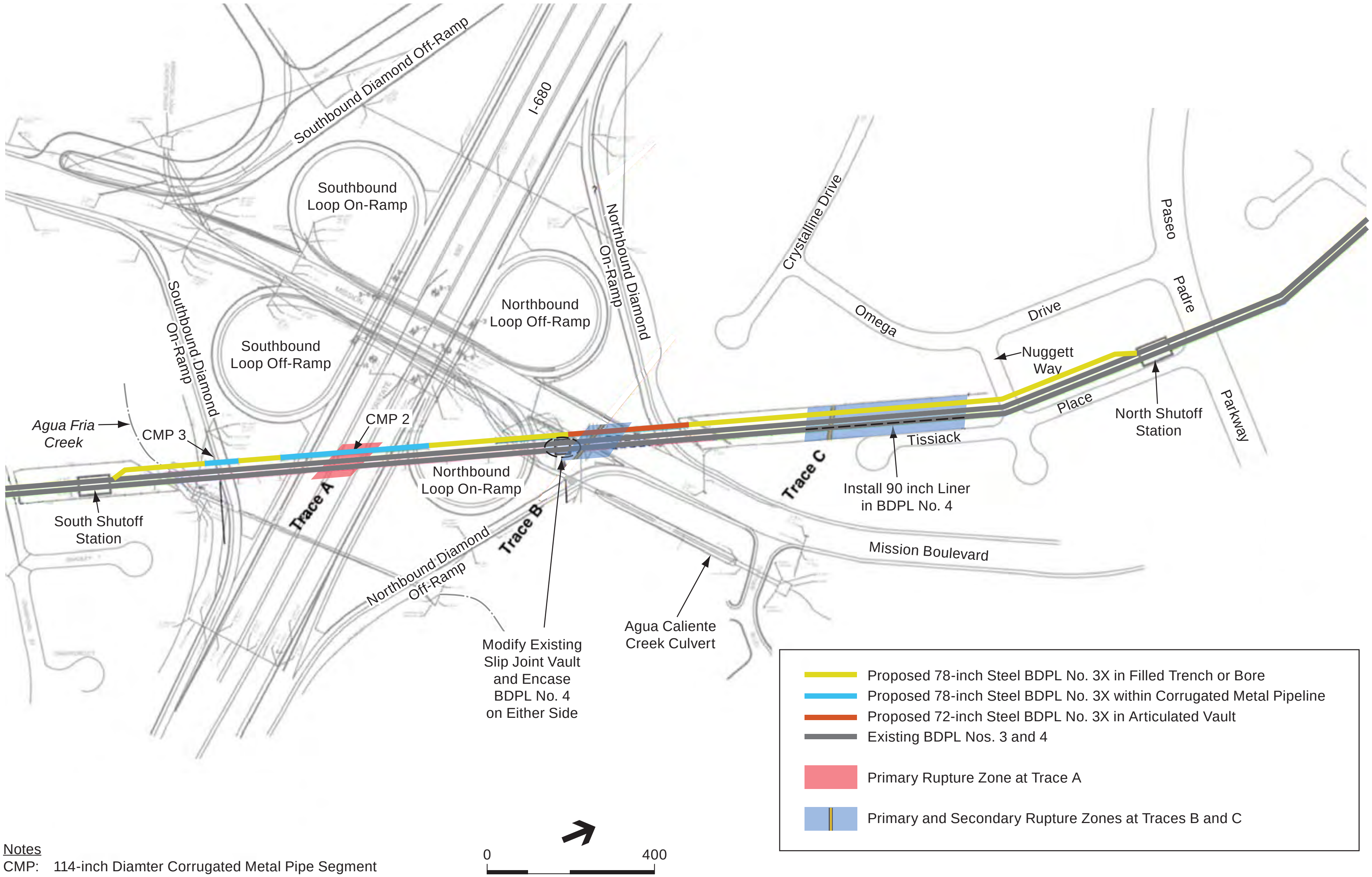
The proposed BDPL No. 3X would run parallel to the existing BDPL No. 3, for approximately 2,360 feet, from the South Shutoff Station to the North Shutoff Station. BDPL No. 3 would continue to provide water throughout the construction of BDPL No. 3X, except during the pipe shutdown period described in Section 3.5.9, Planned Shutdowns and Operations During Construction, and would be abandoned once BDPL No. 3X is operational. The proposed BDPL No. 3X (and surrounding structures, if applicable) would be designed to address specific concerns at each of the fault trace crossings, as described below. All new facilities except access manholes and structures would be constructed below ground. A detailed description of the proposed facilities is provided below.

Proposed BDPL No. 3X Crossing at Trace A

BDPL No. 3 crosses Trace A of the Hayward fault beneath I-680 (Figure 3.4). At this location, a 78-inch-diameter welded-steel pipe (BDPL No. 3X) would be installed on pipe support skids through the existing 114-inch-diameter, 440-foot-long corrugated-metal pipe casing segment CMP2,

4 A piezometer is a groundwater monitoring well used to monitor groundwater levels.

5 Cathodic protection wells are used to prevent the corrosion of metal in underground pipelines. These wells use a "sacrificial" metallic anode that is designed to corrode in place of the pipeline. These types of wells do not involve the extraction of groundwater.



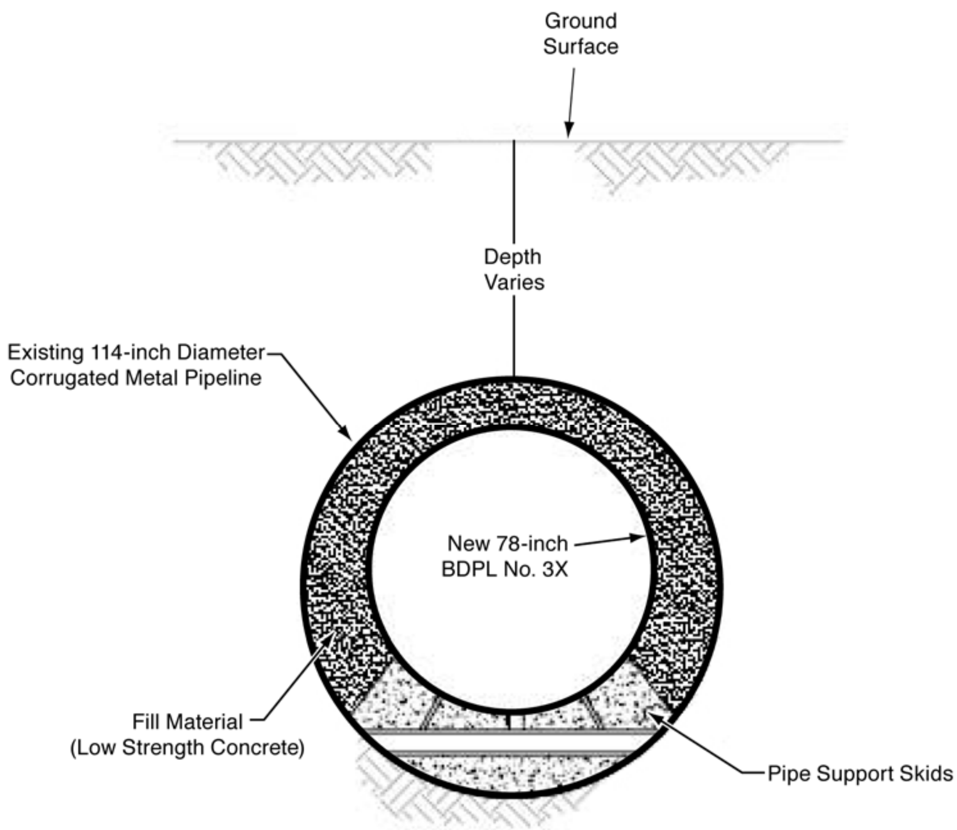
Notes
CMP: 114-inch Diamter Corrugated Metal Pipe Segment

SOURCE: URS, 2008a

Seismic Upgrade of BDPL Nos. 3 and 4 at Hayward Fault

Figure 3.4
Proposed Facilities

which was originally installed by Caltrans during construction of I-680 in 1969 (see **Figure 3.5**). The wall thickness of BDPL No. 3X would be augmented from 1 inch to 1 ¼ inch through this zone to increase the strength of the pipeline. The remaining space between the existing corrugated-metal casing and new 78-inch-diameter steel pipe would be filled with low-strength concrete. If inspection of the corrugated-metal pipe casing indicates it is not suitable for housing the new BDPL No. 3X at this location, then trenchless construction (the use of a boring machine or auger to drill a horizontal hole, pushing an outer casing through the hole, and installing the pipeline within the casing, as described below) would be used to install the new pipeline beneath I-680. By employing one of these two methods (using the existing corrugated-metal pipe insert as a casing for the new BDPL No. 3X, or installing the pipeline by trenchless construction techniques), the pipeline could be upgraded at this fault crossing without disrupting traffic on I-680.



Seismic Upgrade of BDPL Nos. 3 and 4 at Hayward Fault

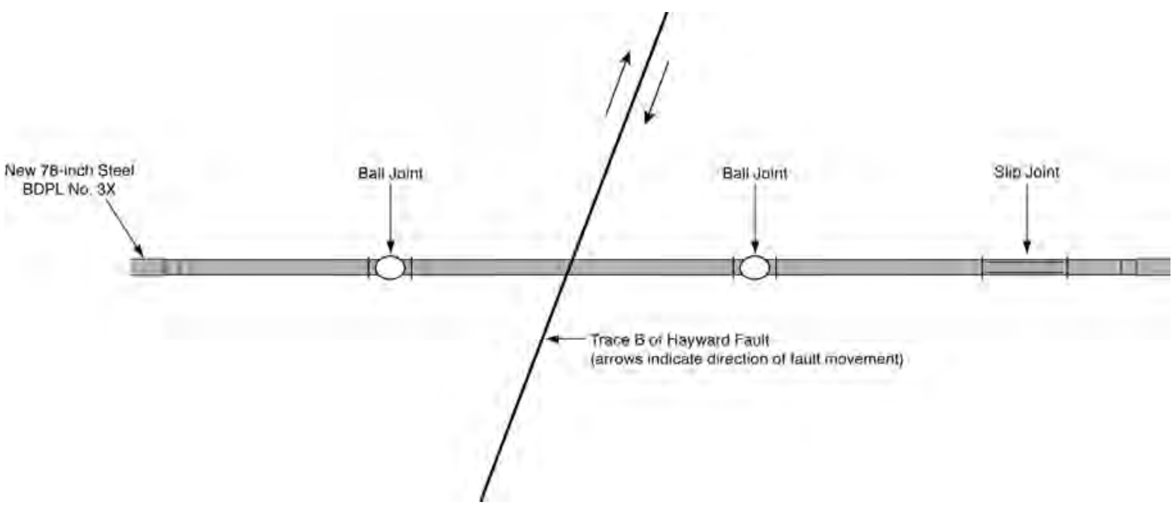
SOURCE: URS, 2008a

Figure 3.5
Configuration of New BDPL No. 3X
within Corrugated Metal Pipe Segment

Proposed BDPL No. 3X Crossing at Trace B

The existing BDPL No. 3 crosses Trace B of the Hayward fault beneath Mission Boulevard (Figure 3.4). At this crossing, the proposed BDPL No. 3X would pass beneath Mission Boulevard and would be housed in an underground, articulated concrete vault constructed of individual segments. These segments would be designed to move relative to each other and "break up" in a controlled manner, which would protect the pipeline from the effects of varying pressures from the surrounding soil and provide space for the pipeline to move during an earthquake. The articulated concrete vault would be designed to accommodate fault creep and offset at this location and would be roughly 20 feet wide, 20 feet tall, and 300 to 400 feet long. To accommodate traffic while constructing the vault and the new BDPL No. 3X below Mission Boulevard and the northbound diamond on-ramp to I-680, the SFPUC would construct a series of temporary bridges across these busy thoroughfares to allow for the continued use of the roadways during project construction (described in more detail below under the heading Project Construction). The north end of the new vault would be located just north of the northbound diamond on-ramp. For a 300-foot vault, the south end would be located just south of the existing slip-joint vault described below. If a 400-foot-long vault is constructed, the south end of the vault would be located just south of the northbound loop on-ramp to I-680.

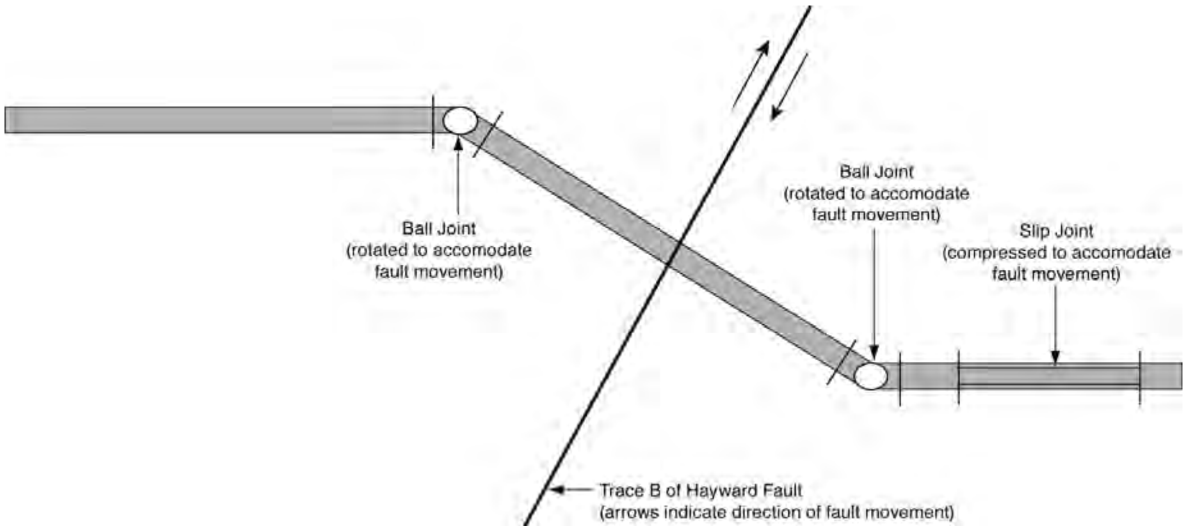
Two ball joints (allowing pipeline rotation) and one slip joint (allowing pipeline compression) would be installed in the pipeline within the vault to allow the pipe to move in response to movement on the fault. This configuration is illustrated on **Figure 3.6**. The ball joints would be installed on either side of the primary rupture zone for Trace B of the Hayward fault and would rotate in response to movement on the fault, allowing the pipeline to move on either side of the primary rupture zone without breaking, as illustrated in **Figure 3.7**. The new slip joint would be installed north of the two ball joints and would allow the pipeline to compress in response to movement on the fault without breaking. Inside the vault, the pipeline diameter would decrease from 78 to 72 inches via reducers (couplings used to connect pipelines of different diameters) to accommodate the diameter of the ball joints and slip joint, and guides would be used on either side of the slip joint to keep this portion of the pipeline in alignment during fault movement.



Seismic Upgrade of BDPL Nos. 3 and 4 at Hayward Fault

SOURCE: SFPUC; ESA+Orion

Figure 3.6
Generalized Plan View of the New BDPL No. 3X
Configuration within Articulated Vault
Before an Earthquake



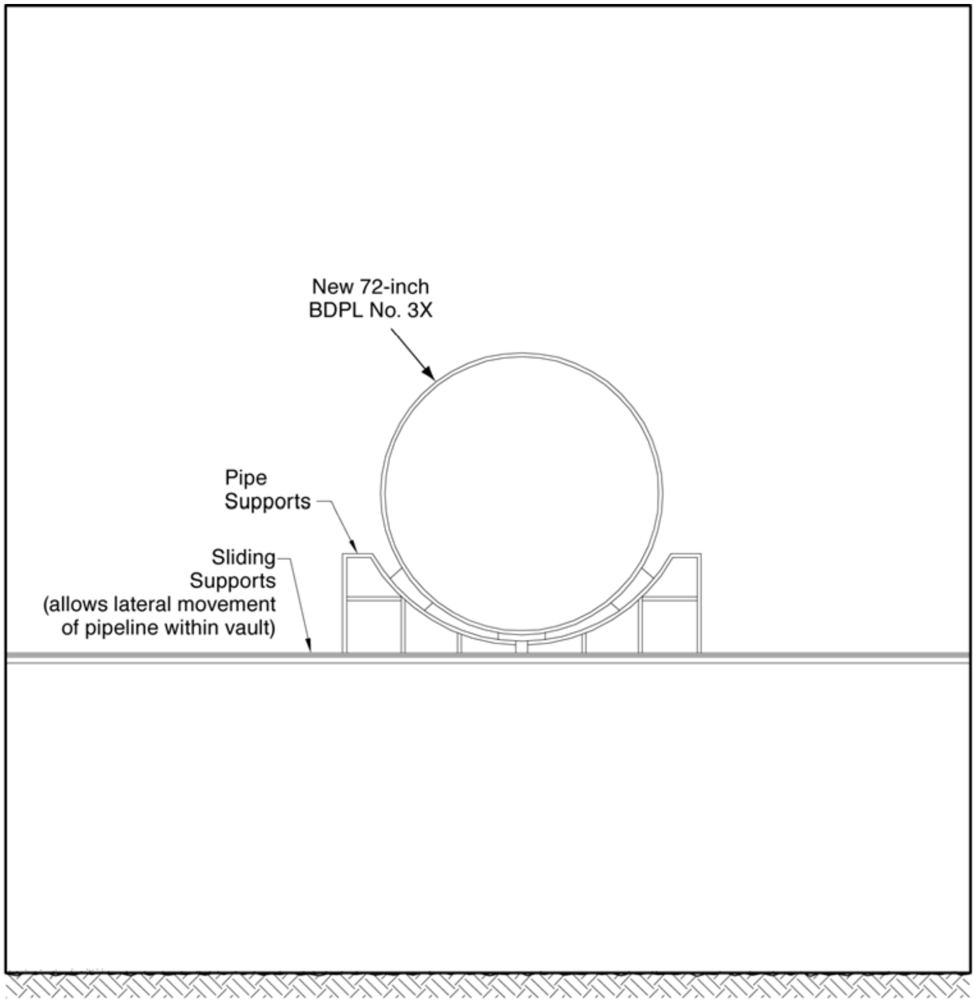
Seismic Upgrade of BDPL Nos. 3 and 4 at Hayward Fault

SOURCE: SFPUC; ESA+Orion

Figure 3.7
Generalized Plan View of the New BDPL No. 3X
Configuration within Articulated Vault
After an Earthquake

The vault is shown in cross section in **Figure 3.8**. Within the vault, the pipeline would be supported on pipe supports with sliding supports that would further allow the pipeline to move within the vault in response to movement on the fault. The vault would be constructed with sufficient space on either side of the pipeline to allow access for repairs and maintenance. Access to the vault for periodic inspection and maintenance would be provided via two manhole access structures, one at each end of the vault. The access structures would likely be located just north of Mission Boulevard at the north end and between the northbound loop on-ramp and Mission Boulevard on the south end. The south access structure would be approximately 13 feet by 7 feet, and the north access structures would be approximately 22 feet by 20 feet, protruding roughly 2 ½ feet above grade.

The SFPUC has determined that following a seismic event, leaks of up to 1,000 gallons per minute could occur in this segment of BDPL No. 3X (URS, 2008a). The vault drainage system would be designed to drain water resulting from leaks from the ball joints or slip joint (following a strong seismic event), as well as groundwater that could accumulate within the vault. Water from this vault would be discharged to the underlying Agua Caliente culvert via a drain pipe connected to the southern (downhill) end of the vault. A permanent pump might be required to maintain drainage from the vault. Proposed security measures for the vault include an access control system, intrusion detection system, closed-circuit television video surveillance, and manhole/vault security systems. Lock and key is proposed for new manholes. No new permanent fencing is proposed.



SOURCE: URS, 2008a

Seismic Upgrade of BDPL Nos. 3 and 4 at Hayward Fault

Figure 3.8
Generalized Cross-Section of Articulated Vault

Proposed BDPL No. 3X Crossing at Trace C

BDPL Nos. 3 and 4 cross Trace C at the north end of the project area near the cul-de-sac at the end of Tissiack Place (Figure 3.4). At this crossing, the proposed BDPL No. 3X would be constructed of 78-inch-diameter welded-steel pipe, and the wall thickness would be augmented to 1 ¼ inch through this zone to increase the strength of the pipeline. The new BDPL No. 3X would be installed using the open-trench method at this location; the pipe would be wrapped in frictionless material to allow movement and slippage in response to movement on the fault, and then the trench would be backfilled.

Proposed BDPL No. 3X Blowoff Valves and Air Release Valves

Two blowoff valves and four air release valves would be installed on the proposed BDPL No. 3X, similar to the blowoff valves and air release valves on the existing BDPL Nos. 3 and 4. The blowoff valves, used to drain the proposed BDPL No. 3X, would be installed in low points of the new pipeline. One would be located between Mission Boulevard and the northbound I-680 loop on-ramp, and the other would be located near Agua Fria Creek, north of the South Shutoff Station. The air valves would be used to regulate air pressure within the pipeline. Two would be located adjacent to the blowoff valves; one would be located immediately west of Mission Boulevard and the northbound I-680 on-ramp, adjacent to two existing manhole structures on BDPL Nos. 3 and 4; and one would be located between the southbound I-680 on-ramp and southbound I-680, adjacent to two existing air release valves on BDPL Nos. 3 and 4.

The blowoff valves and air release valves would be accessed via six access manholes approximately 6 feet in diameter and protruding roughly 2 ½ feet above grade, similar to the existing manholes described above. The section of pipe where these features are to be installed would be encased in reinforced concrete to support the manhole structures and protect the pipeline from overlying loads (weight).

New BDPL No. 3X Corrosion Control

Pipeline corrosion is the deterioration of materials caused when the pipe metal reacts with the environment (air, water, minerals in the soil) and the iron contained in the pipe is oxidized, which can potentially lead to "pitting" and eventual failure of the pipeline. External corrosion occurs due to environmental conditions on the outside of the pipe, such as the natural chemical interaction between the exterior surface of the pipeline and the surrounding soil and groundwater. To prevent exterior corrosion, the surface of a pipeline is typically coated in order to prevent the surrounding soil and groundwater from directly contacting the steel pipe, thus preventing the oxidation process. Internal corrosion can occur from contact of the pipe with the material carried within the pipeline and can similarly be prevented by lining the interior of the pipeline. Corrosion can also occur at pipeline connections where new pipelines are connected to existing pipelines.

A combination of coating, lining, mechanical isolation, and passive cathodic protection would be used to protect the proposed BDPL No. 3X from corrosion. The coating and lining of the pipelines would be made of materials that would halt the external and internal corrosion process by protecting the pipeline from corrosive elements. The proposed BDPL No. 3X would be mechanically isolated from the existing pipeline through specialized connections at the north and south points of connection to prevent corrosion where BDPL No. 3X would be connected to the existing BDPL No. 3.

Cathodic protection is a method used to "electrically" halt the oxidation process on both bare and coated pipelines. This method uses anodes, which are connected to the pipeline and designed to corrode, instead of the pipeline corroding. Anodes are generally made of metal alloys such as zinc, magnesium, and aluminum, which are more susceptible to corrosion than steel. Several groups of "anode beds" would be placed along the length of the new pipeline. These anode beds would consist of a group of 6 to 10 anodes, approximately 10 inches in diameter and 5 feet long, installed within soil and buried approximately 5 feet below ground surface. All materials used in the pipelines and valves would be compatible with the chemicals used for disinfection in the regional water system.

Points of Connection between BDPL No. 3X and BDPL No. 3

To ensure continued water service to SFPUC customers, the existing BDPL No. 3 would remain in service during the proposed construction period, with the exception of a two-month shutdown, described in Section 3.5.9, Planned Shutdowns and Operations During Construction, to install valving to facilitate the future connection of the proposed BDPL No. 3X. To facilitate this process, a new wye (a pipeline fitting that can be used to connect a new pipe to an existing pipe while still allowing flow through the existing pipe) and two valves would be installed on BDPL No. 3 at the north point of connection (just south of the North Shutoff Station) and at the south point of connection (just north of the South Shutoff Station) during the shutdown period. During construction, the valve that is in line with the existing BDPL No. 3 would be kept open, and the new valve on the future BDPL No. 3X connection would be kept closed. As an additional safety feature, the future connection point for BDPL No. 3X would be capped with a blind flange, or steel plate, to ensure that leakage would not occur before the proposed BDPL No. 3X is completely connected. Upon the completion of construction, flow would be redirected to the proposed BDPL No. 3X by opening the valve on that line and closing the valve on the existing BDPL No. 3. One shutdown would be required for approximately two months to allow for installation of the new wyes and valves.

3.4.3.2 BDPL No. 3

Approximately 2,360 feet of the existing 78-inch-diameter BDPL No. 3 would be abandoned between the North and South Shutoff Stations once the proposed BDPL No. 3X is operational. Pipe abandonment would occur by capping the pipeline segment between the two points of connection. However, the existing pipeline would still be used to provide drainage should BDPL No. 4 rupture at Trace B of the Hayward fault, as described below.

3.4.3.3 BDPL No. 4 Upgrades

Improvements to the existing BDPL No. 4 would be made to control the location of pipeline failure in the event of a major earthquake on the Hayward fault and to prevent damage to the proposed BDPL No. 3X should BDPL No. 4 fail.

BDPL No. 4 Crossing Trace A

Based on an engineering analysis of BDPL No. 4 (G&E, 2008), no improvements would be required on BDPL No. 4 at Trace A of the Hayward fault.

BDPL No. 4 Crossing Trace B

At Trace B, improvements would be made to promote the breakage of BDPL No. 4 within the existing slip-joint vault (described above and shown on Figure 3.4), primarily by encasing portions of the 96-inch-diameter BDPL No. 4 in concrete on either side of the existing slip-joint vault. The only portions that would be encased are those that have not been previously encased.

This improvement would strengthen BDPL No. 4 outside of the vault and direct earthquake forces to the segment of pipeline within the slip-joint vault. A new, longer slip joint might also be installed within the vault to accommodate movement on the fault and reduce the potential for breakage due to fault offset.

If BDPL No. 4 were to break in an earthquake, the release rate from the pipeline would be approximately 300,000 gallons per minute over the 30 to 60 minutes that would be required to close the north and south shutoff valves. To accommodate this drainage, a new 24-inch drain to the Agua Caliente Creek culvert would be constructed, and the existing BDPL No. 3 would be perforated along the length of the vault (after the pipeline is taken out of service). The perforated BDPL No. 3 would act as a conduit for excess water from BDPL No. 4 and would drain to Agua Fria Creek and to the Agua Caliente culvert through a new 78-inch-diameter pipe connection. The existing aluminum panel roof of the vault would be replaced with pressure-activated "blowoff" panels to allow excess leakage to flow into surface drainage created to direct water from BDPL No. 4 and into the Mission Boulevard storm drain system. The vault drainage system would also drain water resulting from leaks from the slip joint (following a strong seismic event), as well as groundwater that could accumulate within the vault. A permanent pump might be required to maintain drainage from the vault.

BDPL No. 4 at Crossing Trace C

At Trace C, a 400-foot, 90-inch-diameter, 1-inch-thick steel liner would be inserted into the existing 96-inch-diameter BDPL No. 4, and the space between the liner and the pipeline would be completely filled with a low-strength concrete material. Alternatively, if it is determined that this method would not adequately accommodate fault movement at Trace C, the entire 400 feet of pipeline could be replaced with a new 1-inch-thick steel pipe at this location. These improvements would be constructed during the two-month shutdown of BDPL No. 4, as described in Section 3.5.9, Planned Operations and Shutdowns During Construction.

3.5 Project Construction

3.5.1 Installation of Proposed BDPL No. 3X

The limits of proposed construction activities extend approximately 3,800 linear feet along the SFPUC's existing 80-foot-wide pipeline ROW for BDPL Nos. 3 and 4; the estimated total disturbance area is 29 acres, including four construction staging areas that would be established adjacent to and outside of the ROW (**Figure 3.9**). Installation of the proposed BDPL No. 3X would require construction activities along the entire 2,360-foot segment of pipeline to be replaced. Construction would include pipeline installation within existing corrugated-metal pipes, open-trench excavation, and cut-and-cover excavation, as described below. Trenchless or open-trench excavation, also described below, could be used to cross Agua Fria Creek at the south end of the project area.

For the purpose of this EIR, the pipeline alignment between the North and South Shutoff Stations has been divided into the eight construction zones, starting at the South Shutoff Station and moving north, depending on the method(s) of construction to be used. **Table 3.1** summarizes the proposed construction activities and construction equipment required in each construction zone, as well as for project mobilization and utility relocation. Because construction activities are similar in several zones, Table 3.1 groups each zone by type of construction activity. The table provides the estimated duration of construction in each zone, and the preliminary construction schedule for these activities is discussed in Section 3.5.15, below.

In addition, several existing utilities that cross the proposed BDPL No. 3X alignment would require abandonment, relocation, or protection during construction. These utilities are listed in **Table 3.2** and described below. They would be relocated or protected in coordination with the utility owners. Improvements to BDPL No. 4 would be made in the vicinity of the existing slip-joint vault in Zone 5 and at the Trace C crossing in Zone 8. In all zones, excavation sidewalls would be shored or sloped for safety and protection of adjacent structures, including the existing BDPL Nos. 3 and 4.

3.5.1.1 Zone 1 – Southern Point of Connection and Agua Fria Creek Crossing

Southern Point of Connection

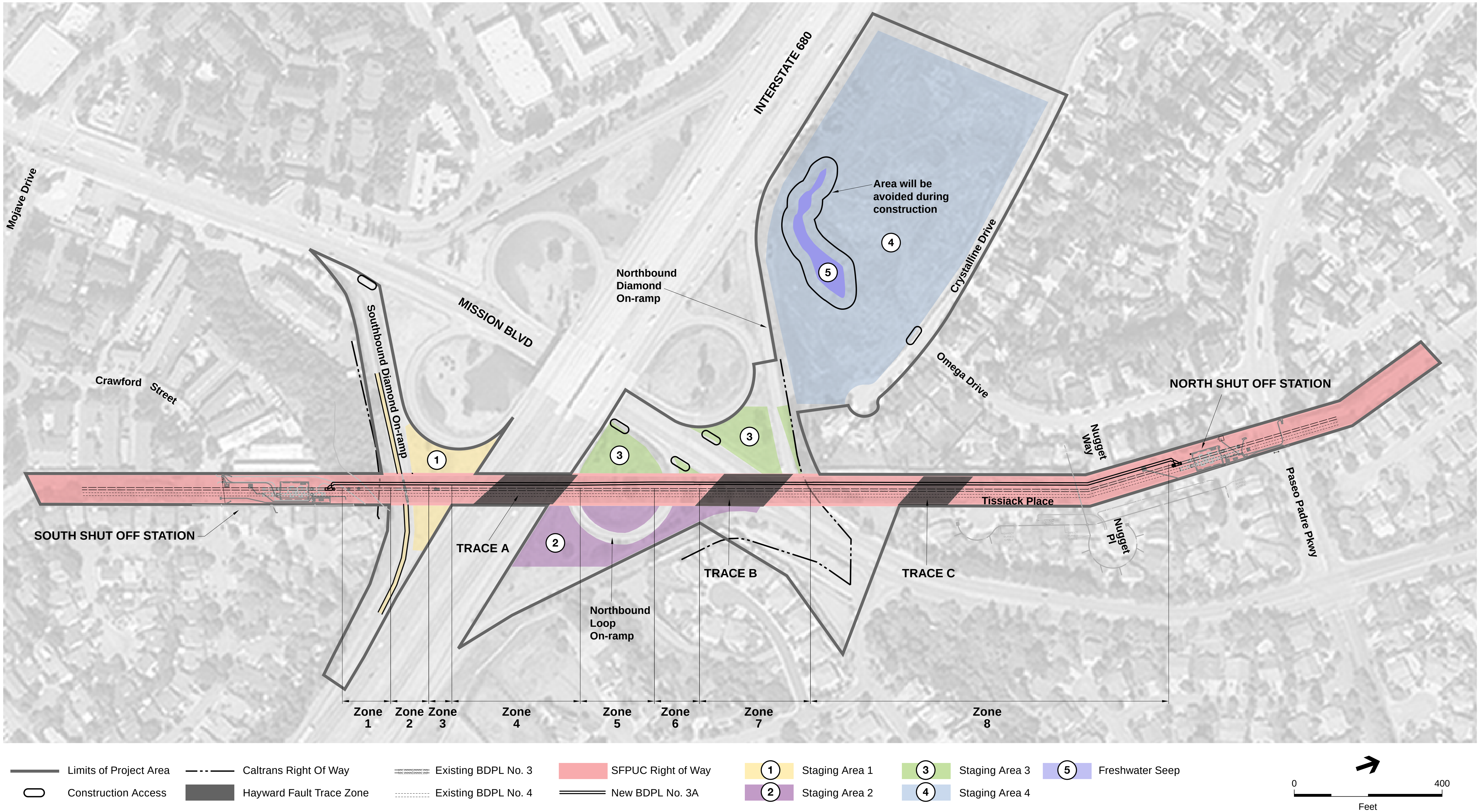
As described above, a new wye and valves would be constructed at the southern point of connection to the existing BDPL No. 3 in Zone 1. Soil would be excavated from a minimum 51- by 30-foot area to a depth of 25 feet to expose BDPL No. 3, and an additional 24-foot by 10.5-foot area would be excavated to a depth of 25 feet for pipeline installation.

The wye and valves would be installed during the planned shutdown of BDPL No. 3 in November and December of 2012, as described in Section 3.5.9, Planned Operations and Shutdowns During Construction, below. During this shutdown, the segment of BDPL No. 3 between the North and South Shutoff Stations would be completely drained through the existing blowoff valve immediately north of the South Shutoff Station to accommodate the installation of the wye and valves.

Once the valves are in place, they would be configured to allow water flow through BDPL No. 3, and the pipeline would be placed back in operation for the remainder of the construction period. When construction of the proposed BDPL No. 3X is complete, the valves would be reconfigured to direct flow through the new pipeline, and the existing BDPL No. 3 would be abandoned by capping the pipeline segment between the two points of connection.

Agua Fria Creek Crossing

The new BDPL No. 3X would be constructed across Agua Fria Creek in Zone 1 via trenchless construction (Option A) or open-trench excavation (Option B). Trenchless construction requires the use of a horizontal boring machine or auger to drill a hole beneath the creek and a hydraulic jack to push an outer casing through the hole. As the boring progresses, the outer casing is pushed into the hole, and the pipeline is installed, in segments, in the casing. A drive pit is required on one side of the crossing to house the driving equipment, and a receiving pit is required on the opposite side.



SOURCE: GlobeXplorer; URS, 2008a

Seismic Upgrade of BDPL Nos. 3 and 4 at Hayward Fault

Figure 3.9
Project Area (Including Staging Areas)

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TABLE 3.1
SUMMARY OF PROPOSED CONSTRUCTION ACTIVITIES

Pipeline Segment/ Staging Area	Construction Task	Estimated Construction Duration	Approximate Construction Area	Approximate Depth of Excavation / Quantity of Excavation and Fill[b]	Estimated Construction Equipment (Quantity)	Construction Timing (hours/days)
Mobilization and Preparation						
Areawide	Mobilization and Site Preparation	2 months	Areawide	N/A	• Delivery truck (10) • Pickup (10) • Mobile office (4) • Dozer (1) • Backhoe (1) • Forklift (1) • Loader (1) • Dump truck (3) • Water truck (1) • Pump and hoses (2) • Compactor (1) • Paver (1) • Roller (1)	Weekdays 7 a.m. to 7 p.m. Saturday 9 a.m. to 6 p.m. Occasional Sundays
Construction Zones 6, 7, and 8	Utilities relocation	Varies	Varies	Varies	• Crane (1) • Backhoe (1) • Forklift (1) • Welding set (1) • Generator (1) • Concrete truck (1) • Loader (1) • Dump truck (2) • Water truck (1) • Pump and hoses (2) • Compactor (1) • Pickup (4)	Weekdays 7 a.m. to 7 p.m. Saturday 9 a.m. to 6 p.m. Occasional Sundays
INSTALLATION OF BDPL NO. 3X						
Construction Zones 1 and 8 – Points of connection						
Zone 1	Install wye and valves on BDPL No. 3X	3 months	Southern point of connection 1,782 sq. ft.	Depth: 25 ft. Excavation: 1,650 cy Fill: 891 cy Spoil: 759 cy Structural fill: 872 cy	• Crane (2) • Backhoe (2) • Forklift (2) • Generator (2) • Pickup (4) • Welding set (2) • Ventilation equipment	Weekdays 7 a.m. to 7 p.m. Saturday 9 a.m. to 6 p.m. Occasional Sundays
Zone 8	Install wye and valves on BDPL No. 3X	3 months	Northern point of connection 1,530 sq. ft.	Depth: 21 ft. Excavation: 1,190 cy Fill: 538 cy Spoil: 652 cy Structural fill: 538 cy		

TABLE 3.1 (Continued)
SUMMARY OF PROPOSED CONSTRUCTION ACTIVITIES

Pipeline Segment/ Staging Area	Construction Task	Approximate Construction Duration	Approximate Construction Area	Approximate Depth of Excavation / Quantity of Excavation and Fill[b]	Estimated Construction Equipment (Quantity)	Construction Timing (hours/days)
Construction Zone 1 – Agua Fria Creek crossing						
Zone 1 – Trenchless (Option A)[a]	Creek crossing by trenchless construction methods	4 months	Driving pit 3,750 sq. ft.	Depth: 30 ft. Excavation: 4,167 cy Fill: 2,569 cy Spoil: 1,597 cy Structural fill: 1,597 cy	• Crane (2) • Backhoe (2) • Forklift (1) • Loader (1) • Dump truck (3) • Water truck (2) • Pump and hoses (2) • Compactor (1) • Winch (2) • Hydraulic jacks (2) • Pickup (4) • Welding set • Ventilation equipment	Weekdays 7 a.m. to 7 p.m. Saturday 9 a.m. to 6 p.m. Occasional Sundays
			Boring N/A	Depth: N/A Excavation: 242 cy Fill: 0 cy Spoil: 242 cy Structural fill: 0 cy		
			Receiving pit 800 sq. ft.	Depth: 30 ft. Excavation: 889 cy Fill: 548 cy Spoil: 341 cy Structural fill: 341 cy		
Zone 1 – Open-cut excavation (Option B)[a]	Creek crossing by open-cut excavation	3 months	1,250 sq. ft.	Depth: 30 ft Excavation: 1,660 cy Fill: 1,135 cy Spoil: 525 cy Structural fill: 390 cy	• Crane (1) • Backhoe (2) • Forklift (1) • Trench shield (1) • Loader (1) • Dump truck (2) • Water truck (1) • Pump and hoses (2) • Compactor (1) • Pickup (4) • Concrete pump truck • Welding set • Ventilation equipment	Weekdays 7 a.m. to 7 p.m. Saturday 9 a.m. to 6 p.m. Occasional Sundays

TABLE 3.1 (Continued)
SUMMARY OF PROPOSED CONSTRUCTION ACTIVITIES

Pipeline Segment/ Staging Area	Construction Task	Approximate Construction Duration	Approximate Construction Area	Approximate Depth of Excavation / Quantity of Excavation and Fill[b]	Estimated Construction Equipment (Quantity)	Construction Timing (hours/days)
Construction Zones 2 and 4 – Placement of pipe through corrugated-metal pipe or by trenchless methods						
Zone 2 – Place pipe in existing CMP (Option A)[a]	Place BDPL No. 3X in CMP3	1 month	Southern CMP3 pit 420 sq. ft.	Depth: 13 ft. Excavation: 202 cy Fill: 23 cy Spoil: 179 cy Structural fill: 179 cy	• Crane (1) • Backhoe (1) • Forklift (1) • Loader (1) • Dump truck (1) • Water truck (1) • Pump and hoses (1) • Compactor (1) • Winch (1) • Pickup (4) • Welding set • Ventilation equipment	Weekdays 7 a.m. to 7 p.m. Saturday 9 a.m. to 6 p.m. Occasional Sundays
Zone 4 (Trace A) – Place pipe in existing CMP (Option A)[a]	Place BDPL No. 3X in CMP2	2 months	N/A (CMP pits are part of open-cut excavation in Zones 3 and 5)	N/A (CMP pits are part of open-cut excavation in Zones 3 and 5)		
Zone 2 – Trenchless (Option B)[a]	Install BDPL 3X by trenchless construction methods	2 ½ months	Driving pit 3,750 sq. ft.	Depth: 25 ft. Excavation: 3,472 cy Fill: 1,875 cy Spoil: 1,791 cy Structural fill: 1,597 cy	• Crane (2) • Backhoe (2) • Forklift (1) • Loader (1) • Dump truck (3) • Water truck (2) • Pump and hoses (2) • Compactor (1) • Winch (2) • Hydraulic jacks (2) • Pickup (4) • Welding set • Ventilation equipment	Weekdays 7 a.m. to 7 p.m. Saturday 9 a.m. to 6 p.m. Occasional Sundays
			Boring N/A	Depth: N/A Excavation: 194 cy Fill: 0 cy Spoil: 194 cy Structural fill: 0 cy		
			Receiving pit N/A – the receiving pit from Zone 1 would be used	Depth: N/A Excavation: N/A Fill: N/A Spoil: N/A Structural fill: N/A		
Zone 4 – Trenchless (Option B)	Install BDPL 3X by trenchless construction methods	7 ½ months	Driving pit 3,750 sq. ft.	Depth: 30 ft. Excavation: 4,167 cy Fill: 2,569 cy Spoil: 1,597cy Structural fill: 1,597 cy		

TABLE 3.1 (Continued)
SUMMARY OF PROPOSED CONSTRUCTION ACTIVITIES

Pipeline Segment/ Staging Area	Construction Task	Approximate Construction Duration	Approximate Construction Area	Approximate Depth of Excavation / Quantity of Excavation and Fill[b]	Estimated Construction Equipment (Quantity)	Construction Timing (hours/days)
Construction Zones 2 and 4 – Placement of pipe through corrugated-metal pipe or by trenchless methods (cont.)						
Zone 4 – (cont.) Trenchless (Option B)[a]			Boring N/A	Depth: N/A Excavation: 648 cy Fill: 0 cy Spoil: 648 cy Structural fill: 0 cy		
			Receiving pit 800 sq. ft.	Depth: 30 ft. Excavation: 889 cy Fill: 548 cy Spoil: 341 cy Structural fill: 341 cy		
Construction Zones 3, 5, and 8 – Open-cut excavation						
Zone 3	Place BDPL No. 3X in open cut	1 month	641 sq. ft.	Depth: 35 ft. Excavation: 830 cy Fill: 557 cy Spoil: 273 cy Structural fill: 273 cy	• Crane (1) • Backhoe (2) • Forklift (1) • Trench shield (1) • Loader (1) • Dump truck (2) • Water truck (2) • Pump and hoses (2) • Compactor (1) • Pickup (4) • Welding set • Ventilation equipment	Weekdays 7 a.m. to 7 p.m. Saturday 9 a.m. to 6 p.m. Occasional Sundays
Zone 5	Place BDPL No. 3X in open cut	1 month	1,838 sq. ft.	Depth: 18 ft. Excavation: 1,225 cy Fill: 442 cy Spoil: 783 cy Structural fill: 783 cy		
Zone 8 (Trace C)	Place BDPL No. 3X in open cut	3 months	10,154 sq. ft.	Depth: 13 to 27 ft. Excavation: 5,603 cy Fill: 1,279 cy Spoil: 4,324 cy Structural fill: 4,324 cy		

TABLE 3.1 (Continued)
SUMMARY OF PROPOSED CONSTRUCTION ACTIVITIES

Pipeline Segment/ Staging Area	Construction Task	Approximate Construction Duration	Approximate Construction Area	Approximate Depth of Excavation / Quantity of Excavation and Fill[b]	Estimated Construction Equipment (Quantity)	Construction Timing (hours/days)
Construction Zones 6 and 7 – Cut-and-cover excavation						
Zone 6	Install and remove temporary bridge at northbound loop on-ramp	2 months (install) 1 months (remove)	N/A	N/A	• Crane (2) • Drill rig (1) • Backhoe (2) • Forklift (2) • Generator (3) • Concrete truck (3) • Loader (2) • Dump truck (3) • Water truck (1) • Pump and hoses (2) • Concrete pump (1) • Grout pump (1) • Baker tank (2) • Compactor (1) • Pickup (4) • Welding set (3) • Ventilation equipment	Weekdays 7 a.m. to 7 p.m. Saturday 9 a.m. to 6 p.m. Weekday and Weekend Evenings Midnight to 6 a.m. Occasional Sundays
	Place BDPL No. 3X in open excavation	2 months	1,365 sq. ft.	Depth: 15 ft. Excavation: 758 cy Fill: 177 cy Spoil: 581 cy Structural fill: 581 cy	• Crane (2) • Backhoe (2) • Forklift (2) • Generator (3) • Concrete truck (6) • Loader (2) • Dump truck (3) • Water truck (1) • Pump and hoses (3) • Concrete pump (1) • Grout pump (1) • Pickup (4) • Welding set (3) • Ventilation equipment	Weekdays 7 a.m. to 7 p.m. Saturday 9 a.m. to 6 p.m. Occasional Sundays
Zone 7 (Trace B)	Install and remove temporary bridges at Mission Boulevard and northbound diamond on-ramp	8 months (install) 2 months (remove)	N/A	N/A	• Crane (2) • Drill rig (1) • Backhoe (2) • Forklift (2) • Generator (3) • Concrete truck (3) • Loader (2)	Weekdays 7 a.m. to 7 p.m. Saturday 9 a.m. to 6 p.m. Weekday and Sunday Evenings

TABLE 3.1 (Continued)
SUMMARY OF PROPOSED CONSTRUCTION ACTIVITIES

Pipeline Segment/ Staging Area	Construction Task	Approximate Construction Duration	Approximate Construction Area	Approximate Depth of Excavation / Quantity of Excavation and Fill[b]	Estimated Construction Equipment (Quantity)	Construction Timing (hours/days)
Construction Zones 6 and 7 – Cut-and-cover excavation (cont.)						
Zone 7 (Trace B) (cont.)					• Dump truck (3) • Water truck (1) • Pump and hoses (2) • Concrete pump (1) • Grout pump (1) • Baker tank (2) • Compactor (1) • Pickup (4) • Welding set (3) • Ventilation equipment	10 p.m. to 6 a.m. Saturday Evenings 11 p.m. to 7 a.m. Occasional Sundays
	Construct articulated vault beneath Mission Boulevard	12 to 14 months	12,000 sq. ft.	Depth: 23 to 30 ft. Excavation: 11,555 cy Fill: 0 cy Spoil: 11,555 cy Structural fill: 5,629 cy	• Crane (2) • Backhoe (2) • Forklift (2) • Generator (3) • Concrete truck (6) • Loader (2) • Dump truck (3) • Water truck (1) • Pump and hoses (3) • Concrete pump (1) • Grout pump (1) • Pickup (4) • Welding set (3) • Ventilation equipment	Weekdays 7 a.m. to 7 p.m. Saturday 9 a.m. to 6 p.m. Occasional Sundays
BDPL NO. 4 Improvements						
Zone 6	Modifications to existing slip-joint vault	1 month	N/A	N/A	• Impact breaker (1) • Backhoe (1) • Forklift (1) • Loader (1) • Dump truck (2) • Water truck (1) • Pump and hoses (1) • Compactor (1) • Concrete truck (2) • Concrete pump (1) • Pickup (4) • Ventilation equipment	Weekdays 7 a.m. to 7 p.m. Saturday 9 a.m. to 6 p.m. Occasional Sundays

TABLE 3.1 (Continued)
SUMMARY OF PROPOSED CONSTRUCTION ACTIVITIES

Pipeline Segment/ Staging Area	Construction Task	Approximate Construction Duration	Approximate Construction Area	Approximate Depth of Excavation / Quantity of Excavation and Fill[b]	Estimated Construction Equipment (Quantity)	Construction Timing (hours/days)
BDPL No. 4 Improvements (cont.)						
Zone 6	Encase BDPL No. 4 at Trace B	1 month	1,800 sq. ft.	Depth: 20 ft. Excavation: 1,332 cy Fill: 533 cy Spoil: 799 cy Structural fill: 576 cy	• Crane (1) • Backhoe (1) • Forklift (1) • Generator (1) • Concrete truck (1) • Loader (1) • Dump truck (1) • Water truck (1) • Pump and hoses (2) • Compactor (1) • Pickup (4) • Welding set (1) • Ventilation equipment	
Zone 8 – Slip line (Option A)[a]	Improvements to BDPL No. 4 at Trace C	2 months	600 sq. ft.	Depth: 15 ft. Excavation: 334 cy Fill: 66 cy Spoil: 266 cy Structural fill: 196 cy		
Zone 8 – Open-cut excavation (Option B)[a]	Place new segment of BDPL No. 4 in open cut	2 months	4,800 sq. ft.	Depth: 15 ft. Excavation: 2,800 cy Fill: 750 cy Spoil: 2,050 cy Structural fill: 2,050 cy	• Crane (1) • Backhoe (2) • Forklift (1) • Trench shield (1) • Loader (1) • Dump truck (2) • Water truck (2) • Pump and hoses (2) • Compactor (1) • Pickup (4) • Welding set • Ventilation equipment	Weekdays 7 a.m. to 7 p.m. Saturday 9 a.m. to 6 p.m. Occasional Sundays

NOTES:

[a] There are two construction options for pipeline installation in this construction zone. Construction scenarios for options related to the BDPL No. 3X crossing of Agua Fria Creek (Zone 1) are discussed in Section 3.5.1.1, and construction scenarios for Zones 2 and 4 are discussed in Section 3.5.1.2. Construction scenarios for improvements to BDPL No. 4 in Zone 8 are discussed in Section 3.5.2.2. This table presents construction information to support the impact analysis for both scenarios.

[b] Fill refers to soil placed back in the excavation, spoil refers to soil remaining from an excavation after backfilling is complete, and structural fill refers to new material added to an excavation for structural purposes.

ft. = feet
cy = cubic yard
sq. ft. = square feet

SOURCES: URS, 2008a; URS, 2009; M. Lee Corporation, 2009

TABLE 3.2
AFFECTED UTILITIES AND APPROACH TO RELOCATION/PROTECTION

Location	Affected Utilities	Approach to Relocation/Protection
Construction Zone 2	Caltrans 18-inch storm drain line	None required, because the pipeline runs above the vertical alignment of the new BDPL No. 3X, but the pipeline would be protected during construction to prevent damage.
Construction Zone 4	Electrical conduit	None required, because this line runs 15 feet above CMP2 and is located 50 feet from the nearest excavation.
	Caltrans irrigation lines	Replace lines in-kind.
Construction Zone 5	Caltrans irrigation lines	Replace lines in-kind.
Construction Zone 6	Caltrans irrigation lines	Replace lines in-kind.
Construction Zone 7	Caltrans/City of Fremont storm drain system	Modifications to accommodate temporary roadways; relocation or construction of new storm drain pipes and inlets as well as protection or covering of existing storm drain inlets and piping. Modifications could include temporary relocation and/or construction of new storm drain pipes and inlets.
	Union Sanitary District 10-inch sanitary sewer line	Remove existing 10-inch line that conflicts with proposed alignment, construct a new 10-inch line around the articulated vault, and reconnect to existing sanitary sewer lines on either side of the SFPUC right-of-way. The new sewer line would be installed below the new BDPL No. 3X and the existing BDPL No. 4.
	Alameda County Water District 30-inch and 12-inch water lines	Remove the existing 30-inch and 12-inch water lines that conflict with the proposed alignment, construct new pipelines around the articulated vault, and reconnect to existing water lines on either side of the SFPUC right-of-way.
	PG&E 6-inch steel gas line	Temporarily cut and cap the gas line outside of construction limits and remove as necessary to accommodate construction of new BDPL No. 3X and articulated vault. Replace in-kind upon completion of construction. Only temporary interruption of service would be required to make the changes.
	PG&E 2-inch electrical line	De-energize line, install underground pull boxes, make temporary power connections, demolish affected portion, and replace above BDPL No. 3X when construction is complete. Only temporary interruption of service would be required to make these changes.
	AT&T communications line	Relocate approximately 5 to 8 feet from its current position and temporarily support/hang from supports above the construction work area. Possibly remove or alter the existing concrete conduit box and manholes and splice the cable.
	City of Fremont street lighting	De-energize the lighting and remove the portion that conflicts with BDPL No. 3X construction. Replace after construction is completed. The City of Fremont or the construction contractor would provide temporary lighting, similar to existing street lighting, during construction.
	Caltrans Agua Caliente Creek culvert	No relocation required, but modifications to the culvert would be made to allow the existing slip-joint vault, proposed articulated vault, and perforated BDPL No. 3 to drain to the culvert.

TABLE 3.2 (Continued)
AFFECTED UTILITIES AND APPROACH TO RELOCATION/PROTECTION

Location	Affected Utilities	Approach to Relocation/Protection
Construction Zone 8	Union Sanitary District 8-inch sanitary sewer line at Nugget Way	Pipeline would remain in service and be protected during construction because the sanitary sewer line runs beneath the existing BDPL No. 3 and No. 4 and the proposed depth of excavation for the new BDPL No. 3X.
	PG&E 2-inch plastic gas line	The gas line would be supported in place during construction. However, if removal is necessary to accommodate construction of new BDPL No. 3X, the gas line would be replaced in-kind upon completion of construction, and PG&E would provide a nearby natural gas truck for the approximately two-month period when this line would be disconnected to avoid interruption of service to customers.
	PG&E 2-inch electrical line	De-energize line, install two new underground pull boxes, and demolish the portion that conflicts with the BDPL No. 3X construction. Replace above the new BDPL No. 3X when construction is complete. The backup option is to de-energize this line and support the electrical line in place during construction.
	AT&T communications line	The AT&T line would be placed in a split duct and suspended in place during construction. Upon completion of construction, the split duct would either be replaced with solid conduit or encased in concrete.

SOURCE: URS, 2008a.

If trenchless construction is used, an 84- to 96-inch outer casing would be used to bore the initial hole and the proposed 78-inch-diameter BDPL No. 3X would be installed within this casing. The space between the two pipes would then be filled with a cement grout or a similar backfill material. The driving pit, to be located between the southern point of connection to BDPL No. 3 and Agua Fria Creek, would house the driving equipment and would be approximately 125 feet long by 30 feet wide. The receiving pit, to be located on a relatively steep slope between Agua Fria Creek and the south side of the I-680 southbound on-ramp and soundwall, would be approximately 40 feet long by 20 feet wide. Both pits would be excavated to a depth of approximately 30 feet. Shoring would be used to support the excavation sidewalls, and inclined piles would be constructed at the back (north) end of the driving pit to support the driving equipment. Excess soil produced during the trenchless operations would be removed from the driving pit. Upon completion of pipeline installation, the southern driving pit would be backfilled. The trenchless crossing could be considered a tunnel in accordance with the Tunnel Safety Orders (8 CCR 8422, et seq.) administered by the California Department of Industrial Relations, Division of Industrial Safety (see Section 5.12, Hazards and Hazardous Materials).

The driving pit would extend approximately 30 feet into the riparian corridor of Agua Fria Creek on the south side of the creek, and the receiving pit would extend approximately 10 feet into the corridor on the north side of the creek. The riparian habitat is classified as "other waters of the United States" (see Section 5.9, Biological Resources). Installation of BDPL No. 3X using trenchless construction methods across Agua Fria Creek would require the removal of approximately five red willow trees which are native to California and are located in the BDPL Nos. 3 and 4 ROW (see Section 5.9, Biological Resources).

If open-cut excavation is used, a 142-foot-long by 10.5-foot-wide and 30-foot-deep trench would be excavated across the creek and adjacent riparian corridor. If construction occurs when there is flow in the creek, Agua Fria Creek would be dewatered via a temporary dewatering system that would be built to create a dry work area during construction. This system would likely entail constructing a sandbag cofferdam around the work site together with a flume pipe to sustain downstream flow at all times. Control measures would be implemented to prevent downstream pollution and sedimentation and to maintain the natural flow and temperature of the stream downstream of the construction area.

Once the trench is excavated and the pipeline has been installed, the steel pipe would be encased in an 8-inch-thick reinforced-concrete encasement; the trench would be backfilled with excavated soil from the trench and compacted to near existing density; and the piles would be removed. If open-cut excavation is used, approximately 0.4 acre of riparian habitat classified as other waters of the United States would be affected and approximately 26 trees would be removed, including 13 red willows, 9 arroyo willows, 3 Northern California black walnut trees, and 1 blue elderberry tree, all of which are native to California and are located in the BDPL Nos. 3 and 4 ROW (see Section 5.9, Biological Resources). Groundwater piezometer UB-8 (described above in Section 3.4.2.2, Groundwater Piezometers and Cathodic Protection Wells) would also require abandonment prior to construction in this zone (see Section 5.11, Hydrology and Water Quality).

3.5.1.2 Zone 2 – Placement of Pipe through Corrugated-Metal Pipe or by Trenchless Methods

Affected Utilities

The 18-inch Caltrans storm sewer line in this zone runs above the proposed BDPL No. 3X, and would be protected during construction to prevent damage.

Construction of Proposed BDPL No. 3X

In Zone 2, the proposed BDPL No. 3X would be constructed on supports that would be installed inside the existing corrugated-metal pipeline segment CMP3 beneath the southbound diamond on-ramp to I-680 and associated soundwall (Option A in Table 3.1). Access to the southern end of CMP3 would be provided through the excavation at the north end of Zone 1, and access at the northern end of the segment would be provided through a 40-foot-long by 10.5-foot-wide pit excavated to a depth of 13 feet at the north end of CMP3. Following excavation for access, the existing redwood bulkheads on either end of the corrugated-metal pipeline (used to protect the ends of the existing CMP segments) would be removed, and BDPL No. 3X would be welded to pipeline supports within the corrugated-metal pipeline. After pipeline installation, the space between the new BDPL No. 3X and the existing CMP3 would be filled with low-strength concrete. Once pipeline installation is complete, the southern excavation would be backfilled.

If CMP3 is found to be unsuitable for installation of the proposed BDPL No. 3X, repairs to the corrugated-metal pipeline could be made, or the BDPL No. 3X could be installed using trenchless construction, similar to the process described above for the Agua Fria Creek crossing (Option B in

Table 3.1). For trenchless construction, the driving pit—to be located between the southbound diamond on-ramp and I-680—would be approximately 125 feet by 30 feet and excavated to a depth of 25 feet. Trenchless operations in this zone would be performed using the receiving pit constructed in Zone 1, which would be located on a relatively steep slope between Agua Fria Creek and the south side of the I-680 southbound on-ramp and soundwall. Upon completion of pipeline installation, both pits would be backfilled. The trenchless crossing could be considered a tunnel in accordance with the Tunnel Safety Orders (8 CCR 8422, et seq.) administered by the California Department of Industrial Relations, Division of Industrial Safety (see Section 5.12, Hazards and Hazardous Materials).

3.5.1.3 Zone 3 – Open-Cut Excavation

Open-cut excavation would be performed to install the proposed BDPL No. 3X in Zone 3, across the Caltrans landscaped area to the west of I-680. In this zone, the excavation trench would be approximately 60 feet long by 10.5 feet wide and 35 feet deep. After pipeline installation, the trench would be backfilled with sand to 12 inches above the crown of the pipeline, and the remaining depth would be backfilled with excavated soil from the trench and compacted to near existing density. In areas with poor soil conditions for supporting pipelines, alternative backfill materials could be used. In some cases, frictionless wrapping material could be used on the pipeline to promote free movement in the event of movement on the fault.

3.5.1.4 Zone 4 – Placement of Pipe through Corrugated-Metal Pipe or by Trenchless Methods

In Zone 4, the proposed BDPL No. 3X would be constructed through the existing corrugated-metal pipeline segment CMP2 beneath I-680 or by using trenchless construction methods if the corrugated-metal pipeline segment is not suitable for installation of the new pipeline.

Affected Utilities

During construction of the new pipeline in Zone 4, Caltrans irrigation lines could be affected, as shown in Table 3.2. Affected lines would be removed and replaced in-kind at the end of construction.

Construction of Proposed BDPL No. 3X

In Zone 4, the proposed BDPL No. 3X would be constructed on supports that would be installed inside of the existing corrugated-metal pipeline segment CMP2 beneath I-680 and the northbound loop on-ramp (Option A in Table 3.1).

Access would be provided via pits excavated in both Zones 3 and 5 on either side of CMP2. Following excavation for access, the existing redwood bulkheads on either end of the corrugated-metal pipeline would be removed, and the proposed BDPL No. 3X would be welded to pipeline supports within the corrugated-metal pipeline. After pipeline installation, the space between the proposed BDPL No. 3X would be filled with low-strength concrete. Once pipeline installation is complete, the southern excavation for the corrugated-metal pipeline segment would be backfilled. The northern excavation would be backfilled after pipeline installation is completed in Zone 5.

If CMP2 is found to be unsuitable for installation of the proposed BDPL No. 3X, repairs to the corrugated-metal pipeline could be made or BDPL No. 3X could be installed using trenchless construction methods, similar to the process described above for the Agua Fria Creek crossing (Option B in Table 3.1). For trenchless methods, the driving pit—to be located between the southbound diamond on-ramp and I-680—would be approximately 125 feet long by 30 feet wide. The receiving pit, to be located within the northbound loop on-ramp, would be approximately 40 feet long by 20 feet wide. Both pits would be excavated to a depth of 30 feet. Upon completion of pipeline installation, both pits would be backfilled. The trenchless crossing could be considered a tunnel in accordance with the Tunnel Safety Orders (8 CCR 8422, et seq.) administered by the California Department of Industrial Relations, Division of Industrial Safety (see Section 5.12, Hazards and Hazardous Materials).

3.5.1.5 Zone 5 – Open-Cut Excavation

Open-cut excavation would be performed to install the new BDPL No. 3X in Zone 5, across the Caltrans landscaped area to the east of I-680. Two trees in this zone would be removed, including one Lombardy poplar and one coast live oak, both of which are located in the BDPL Nos. 3 and 4 ROW (see Section 5.9, Biological Resources).

Affected Utilities

During construction of the new pipeline in Zone 5, Caltrans irrigation lines would be affected in the landscaped area between the southbound diamond on-ramp and I-680, as shown in Table 3.2. Affected lines would be removed and replaced in-kind at the end of construction.

Construction of Proposed BDPL No. 3X

In this zone, the excavation trench would be approximately 75 feet long by 10.5 feet wide and 18 feet deep. Following pipeline installation, the trench would be backfilled with sand to 12 inches above the crown of the pipeline, and the remaining depth would be backfilled with excavated soil from the trench and compacted to near existing density. In areas with poor soil conditions for supporting pipelines, alternative backfill materials could be used. In some cases, frictionless wrapping material could be used on the pipeline to promote free movement in the event of movement on the fault.

3.5.1.6 Zone 6 – Cut-and-Cover Excavation

Cut-and-cover excavation would be employed for construction of the new BDPL No. 3X where it crosses the I-680 northbound loop on-ramp. Because the excavation would cross the on-ramp, it would be necessary to install a temporary bridge to avoid substantial disruption of traffic. Three trees in the vicinity of the existing slip-joint vault would be removed, including two coast live oaks and one Peruvian/California pepper tree, all of which are located in the BDPL Nos. 3 and 4 ROW (see Section 5.9, Biological Resources). Groundwater piezometer UB-5 (described above in Section 3.4.2.2, Groundwater Piezometers and Cathodic Protection Wells) would also require abandonment prior to construction in this zone (see Section 5.11, Hydrology and Water Quality).

Affected Utilities

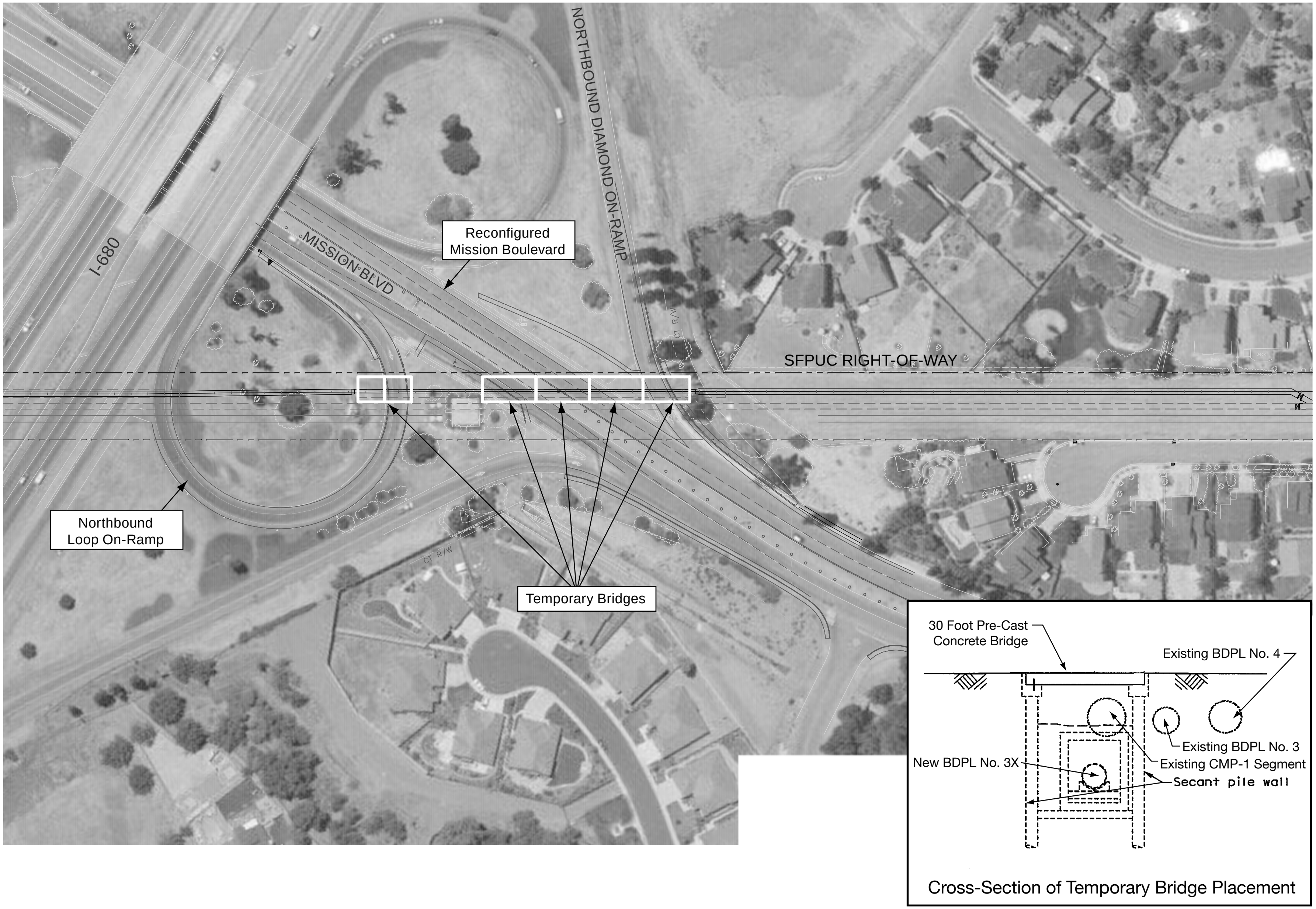
As shown in Table 3.2, affected utilities in this zone include the Caltrans irrigation system, which would be removed and replaced in-kind.

Temporary Bridges and Traffic Management

A temporary precast-concrete bridge would be constructed over the I-680 northbound loop on-ramp to allow traffic flow across this roadway during construction, and it would remain in place for approximately two months. To facilitate traffic flow during construction of the primary bridge, an intermediate temporary bridge would be constructed to the south of the existing on-ramp (see **Figure 3.10**), and temporary lanes would be added for access to the intermediate bridge. The bridges would be flush with the existing road and supported on cast-in-place drilled-hole secant pile walls[6] installed to support the excavation sidewalls and temporary bridges (see inset to Figure 3.10). At the completion of construction, the temporary bridges would be removed and the on-ramp would be restored to its original condition.

Temporary closure of the northbound loop on-ramp could be required for up to four nights to facilitate traffic relocation activities, installation of the cast-in-place drilled-hole secant pile walls, and construction or removal of the temporary bridges. These closures would include two nights during the two-month period for bridge installation and two nights during the one-month period for removal of the bridges. The SFPUC would schedule the closures for low travel periods (between midnight and 6 a.m. on weekday and weekend evenings) to avoid major traffic disruptions. During these closures, the SFPUC would establish a detour along Warm Springs Boulevard on the west side of I-680 to provide a connection from Mission Boulevard to northbound I-680 via the Durham Road interchange (**Figure 3.11**). Prior to any lane closure, the contractor would be required to submit a traffic control plan identifying the detour route and specifying a detailed contingency plan to ensure that the roadway is opened by the designated time. During nighttime construction, temporary construction lighting would be used to illuminate the work area (see Section 3.5.12, Construction Equipment, for a description of this temporary lighting).

[6] A secant pile wall consists of a single line of alternating drilled, reinforced- and unreinforced-concrete piles. Alternating unreinforced piles are constructed and allowed to set for a short period of specified time. Subsequently, a reinforced-concrete pile is constructed between the previously drilled piles by cutting through a section of the previously constructed concrete piles.



SOURCE: URS, 2008a

Seismic Upgrade of BDPL Nos. 3 and 4 at Hayward Fault

Figure 3.10
Final Configuration of Mission Boulevard and I-680 On-Ramps During Construction

SOURCE: GlobeXplorer; ESA

Seismic Upgrade of BDPL Nos. 3 and 4 at Hayward Fault

Figure 3.11
Detour Route for I-680 Northbound Diamond and Loop On-Ramp Closures

Construction of Proposed BDPL No. 3X

Excavation for the proposed BDPL No. 3X in Zone 6 would begin once the temporary bridges are in place on the I-680 northbound loop on-ramp. The excavation trench would be approximately 130 feet long by 10.5 feet wide and 15 feet deep. The trench would be backfilled with sand to 12 inches above the crown of the pipeline, and the remaining depth would be backfilled with soil excavated from the trench and compacted to near existing density. If the 400-foot articulated vault is constructed, the southern end would be constructed in this zone. Construction of the vault is described below.

3.5.1.7 Zone 7 – Cut-and-Cover Excavation

The 300- to 400-foot-long articulated vault would be constructed in Zone 7 using cut-and-cover excavation. Because the excavation would cross Mission Boulevard and the I-680 northbound diamond on-ramp, temporary bridges would be installed on these roadways to avoid substantial disruption of traffic.

Affected Utilities

As shown in Table 3.2, affected utilities include:

- Caltrans/City of Fremont storm drain system
- 10-inch Union Sanitary District (USD) sanitary sewer lines
- 30-inch and 12-inch ACWD water lines
- 6-inch PG&E gas line
- 2-inch PG&E electrical line
- AT&T communications line
- Caltrans Agua Caliente Creek culvert
- City of Fremont street lighting

The ACWD water lines and the 10-inch USD sanitary sewer line that cross the BDPL Nos. 3 and 4 ROW would be removed and relocated. New pipelines would be constructed around the new articulated vault and reconnected to existing water lines on either side of the ROW. The PG&E gas and electrical lines would be temporarily removed and replaced in-kind at the completion of construction. Modifications would be made to the pipes and inlets of the Caltrans/City of Fremont storm drainage system to accommodate the temporary bridges needed to maintain traffic flow on Mission Boulevard and the I-680 on-ramps. The existing AT&T line would be relocated approximately 5 to 8 feet from its current position and temporarily supported/hung from supports above the construction work area. Removal or alteration of the existing 2-foot by 3-foot cement conduit boxes and manholes, and splicing the existing cable to the new cable could also be required for the line crossing Mission Boulevard. City of Fremont street lighting would be de-energized, and the portion that conflicts with the BDPL No. 3X construction would be demolished and replaced at the end of construction. The City of Fremont or the construction contractor would provide temporary street lighting, similar to existing street lighting, during construction. The Agua Caliente Creek culvert runs beneath the proposed BDPL No. 3X and would not be affected by construction of the pipeline. However, the culvert would be modified to accommodate drainage from the existing slip-joint vault and the articulated vault constructed at the Trace B crossing, as described below.

Temporary Bridges and Traffic Management

Temporary precast-concrete bridges would be constructed over Mission Boulevard and the I-680 northbound diamond on-ramp to allow traffic flow across these roadways during construction. To maintain traffic flow on Mission Boulevard, the temporary bridges would be constructed in several phases over a period of nine months, and the bridges would be in place in their final configuration for a total of approximately nine months. The configuration of the temporary bridges is shown on Figure 3.10. For the I-680 northbound diamond on-ramp, a temporary traffic lane would be required along the north side of the existing northbound I-680 diamond on-ramp to facilitate traffic flow while the temporary bridge is under construction. On Mission Boulevard, the temporary bridge would be sequentially constructed in segments, and traffic would be shifted during installation to eliminate the need to close Mission Boulevard. Upon completion of the temporary bridges, the surface roadway would be restored to its preconstruction elevation, normal traffic flow (at reduced speeds) would be restored on Mission Boulevard, and traffic would traverse the temporary bridges for the duration of construction (approximately nine months).

The bridges would be flush with the existing road and supported on cast-in-place drilled-hole secant pile walls installed to support the excavation sidewalls and temporary bridges. At the completion of construction, the temporary bridges would be removed and Mission Boulevard and the northbound diamond on-ramp would be restored to their original condition. The sequence for removal would be approximately the reverse of that used for installation. Bridge installation and removal is described in more detail in Section 5.5, Transportation and Circulation.

Temporary closure of the northbound diamond on-ramp could be required for up to four nights to facilitate traffic relocation activities, installation of the cast-in-place drilled-hole secant pile walls, and construction or removal of the temporary bridges. These closures would include two nights during the three months for bridge installation and two nights during the two months for bridge removal. The SFPUC would schedule the closures for low travel periods (10 p.m. to 6 a.m. on weekday and weekend evenings) to avoid major disruptions of traffic. During these closures, the SFPUC would establish a detour along Warm Springs Boulevard on the west side of I-680 to provide a connection from Mission Boulevard to northbound I-680 via the Durham Road interchange (Figure 3.11). Prior to any lane closure, the contractor would be required to submit a traffic control plan identifying the detour route and specifying a detailed contingency plan to ensure that the roadway is opened by the designated time. During nighttime construction, temporary construction lighting would be used to illuminate the work area (see Section 3.5.12, Construction Equipment, for a description of this temporary lighting).

During construction and removal of the temporary bridge on Mission Boulevard, single lanes would be closed on Mission Boulevard where this street crosses the ROW. To minimize traffic disruptions, the SFPUC would schedule these single-lane closures for low travel periods (11 p.m. to 6 a.m. for eastbound Mission Boulevard and 10 p.m. to 6 a.m. for westbound Mission

Boulevard on weekday and Sunday evenings, and 12 midnight to 7 a.m. for eastbound Mission Boulevard and 10 p.m. to 7 a.m. for westbound Mission Boulevard on Saturday evenings. Complete closure of Mission Boulevard could also be required for up to nine nights during an 11-month period (including 9 months for bridge installation and 2 months for bridge removal) to facilitate traffic relocation activities, installation of the cast-in-place drilled-hole secant pile walls, and construction or removal of the temporary bridges. The SFPUC would schedule these closures during low travel periods (11 p.m. to 6 a.m. on weekday and weekend evenings and 12 midnight to 7 a.m. on Saturday evenings) to avoid major traffic disruptions.

During these closures, the SFPUC would establish detours to route traffic around the closed portion of Mission Boulevard and provide access to I-680. From Mission Boulevard, westbound traffic on the east side of I-680 would be detoured north on Paseo Padre Parkway, west on Durham Road and Auto Mall Parkway, and south on Warm Springs Boulevard (**Figure 3.12**). Eastbound traffic on the west side of I-680, including traffic from the areas between Warm Springs Boulevard and I-680, would be detoured from Mission Boulevard, north on Warm Springs Boulevard and east on Auto Mall Parkway and Durham Road to Mission Boulevard (**Figure 3.13**). Southbound traffic on I-680 during closure of eastbound Mission Boulevard, and northbound traffic on I-680 needing to access eastbound or westbound Mission Boulevard during full closure of Mission Boulevard would also be directed to use these detour routes to access Mission Boulevard. During full closures, local access would be provided for businesses on Mission Boulevard between Paseo Padre Parkway on the east and Warm Springs Boulevard on the west. Eastbound motorists exiting the Extended Stay Motel (on the south side of Mission Boulevard between Mohave Drive and I-680) would be directed to use the existing opening in the median on Mission Boulevard (just east of the motel's driveway) to make U-turns onto westbound Mission Boulevard, and then to follow the prescribed detour route to access eastbound Mission Boulevard. During nighttime construction, temporary construction lighting would be used to illuminate the work area (see Section 3.5.12, Construction Equipment, for a description of this temporary lighting).

Construction of Articulated Vault and Placement of Proposed BDPL No. 3X

Excavation for the proposed articulated concrete vault would begin once the temporary bridges are in place. This activity would involve removing the existing corrugated-metal pipe segment CMP1 and associated redwood bulkheads and excavating a trench approximately 300 to 400 feet long, 30 feet wide, and 28 feet deep. The new articulated vault would be constructed within the excavation, under the temporary bridge structures, without affecting the traffic above. Inside the vault, the new pipeline would be installed on sliding supports, and the slip joint and ball joints would be connected (Figure 3.6). The articulated vault would be constructed with a 24-inch drain line to direct both leakage from the pipeline as well as groundwater infiltration to the Agua Caliente Creek culvert. Depending on the final construction plans, the articulated vault could be considered a tunnel in accordance with the Tunnel Safety Orders (8 CCR 8422, et seq.) administered by the California Department of Industrial Relations, Division of Industrial Safety (see Section 5.12, Hazards and Hazardous Materials). The final determination would be made by the Division of Industrial Safety.

SOURCE: GlobeXplorer; ESA + Orion

Seismic Upgrade of BDPL Nos. 3 and 4 at Hayward Fault

Figure 3.12
Detour Route for Westbound Mission Boulevard Closures

SOURCE: GlobeXplorer; ESA + Orion

Seismic Upgrade of BDPL Nos. 3 and 4 at Hayward Fault

Figure 3.13
Detour Route for Eastbound Mission Boulevard Closures

3.5.1.8 Zone 8 – Open-Cut Excavation and Point of Connection

Open-cut excavation would be employed to install the proposed BDPL No. 3X in Zone 8 from Mission Boulevard to the northern point of connection, across Nugget Way. Five Lombardy poplars in this construction zone would be removed, all of which are located in the BDPL Nos. 3 and 4 ROW (see Section 5.9, Biological Resources). Groundwater piezometer UB-2 (described above in Section 3.4.2.2, Groundwater Piezometers and Cathodic Protection Wells) would also require abandonment prior to construction in this zone (see Section 5.11, Hydrology and Water Quality).

Affected Utilities

As shown in Table 3.2, affected utilities in this zone include:

- 2-inch plastic PG&E gas line
- 2-inch PG&E electrical line
- 8-inch USD sanitary sewer line
- AT&T communications line

The PG&E gas line would be supported in-place during construction. In the event that the "support in place" option is not possible, removal of this gas line would require a gas truck for up to two months to provide a continued supply of natural gas to affected customers from the time the line is cut until it is replaced. The portion of the PG&E electrical line that conflicts with the BDPL No. 3X construction would be demolished and replaced after construction is complete. The backup option would be to de-energize the line and support it in place during construction.

The USD sanitary sewer line beneath the existing BDPL Nos. 3 and 4 would be protected during construction. The AT&T conduit would be placed into a split duct and suspended in place during construction. Upon completion of construction, the split duct would either be replaced with a solid conduit or encased in concrete.

Construction of Proposed BDPL No. 3X

In this zone, the excavation trench would be approximately 970 feet long by 10.5 feet wide and 13 to 27 feet deep. After pipeline installation, the trench would be backfilled with sand to 12 inches above the crown of the pipeline, and the remaining depth would be backfilled with excavated soil from the trench and compacted to near existing density.

Northern Point of Connection

Similar to the southern point of connection, a new wye and valves would be constructed at the northern point of connection to the existing BDPL No. 3 in Zone 8. Soil would be excavated from a minimum 51- by 30-foot area to a depth of 21 feet to expose BDPL No. 3. The configuration of the wye and valves and the timing of installation are described above under the heading Zone 1 – Southern Point of Connection and Agua Fria Creek Crossing.

3.5.2 BDPL No. 4 Improvements

Improvements to BDPL No. 4 would include modifications to the existing slip-joint vault and pipeline. These improvements would be constructed during the planned shutdown of BDPL No. 4, which is estimated to take place in January and February of 2013, as described in Section 3.5.9, Planned Operations and Shutdowns During Construction, below.

3.5.2.1 Zone 6 – Modifications to Slip-Joint Vault and Upgrades to BDPL No. 4

The modifications to the existing slip-joint vault for BDPL No. 4 would require:

- Removal of the metal roof of the vault
- Demolition of the west concrete wall enclosing BDPL No. 3
- Construction of a new wall between the existing BDPL Nos. 3 and 4
- Installation of panels to allow leakage from BDPL No. 4 to flow into onsite drainage in the event the pipeline breaks (the panels would replace the roof of the vault)
- Installation of an access hatch and security screen
- Enlargement of the openings to the vault where BDPL No. 4 enters and exits the vault in order to accommodate movement of the pipeline
- Installation of a 24-inch drain connecting to the Agua Caliente Creek culvert

In addition, it might be necessary to regrade the curbs and gutters of the storm drain system on Mission Boulevard, which would facilitate flows in the event that BDPL No. 4 ruptured at this location.

BDPL No. 4 would be strengthened on either side of the existing slip-joint vault by excavating a 45-foot-long by 20-foot-wide trench to a depth of 20 feet on either side of the vault to expose the pipeline and encasing it in concrete. The trench would then be backfilled with granular material to 12 inches above the crown of the pipeline, and the remaining depth would be backfilled with excavated soil from the trench and compacted to near existing density. The 24-inch drain would be used to direct leakage away from BDPL No. 4 as well as groundwater infiltration to the Agua Caliente Creek culvert.

As described above, once BDPL No. 3 is taken out of service, the segment of BDPL No. 3 adjacent to the slip-joint vault would be perforated so that it would act as a conduit for leakage in the event of a break in BDPL No. 4. Perforation would be accomplished by a crew working from inside the pipeline. A 72-inch-diameter pipe connection may also be constructed from the existing BDPL No. 3 to the Agua Caliente culvert to drain away leakage from a BDPL No. 4 rupture.

3.5.2.2 Zone 8 – Upgrades to BDPL No. 4 at Trace C

BDPL No. 4 would be upgraded at Trace C of the Hayward fault by performing “sliplining” on an approximately 400-foot section of the pipeline (Option A in Table 3.1). The sliplining process would involve excavating two 25-foot-long by 12-foot-wide pits to a depth of 15 feet on either end of this section of BDPL No. 4 to expose the pipeline. A piece of the existing BDPL No. 4 would be removed at each end, and a smaller-diameter pipe (90-inch-diameter – 1 inch thick) would be advanced through the larger-diameter pipe. Subsequent sections would be welded together and advanced to the desired length. Grout would be injected into the space between the two pipelines after the final pipe segments have been welded together. The grout would consist of a low-strength material designed to prevent damage to the pipeline in the event of offset at this trace of the Hayward fault.

As a possible alternative (Option B in Table 3.1), 400 feet of the pipeline would be removed and replaced with new 96-inch-diameter, 1-inch-thick steel pipe, which would require excavation along the entire length of pipeline to be replaced and removal of the old pipeline. If this method is used, the excavated trench would be approximately 400 feet long by 12 feet wide and 10 to 15 feet deep. Under either alternative, the excavations would be backfilled with granular material to 12 inches above the crown of the pipeline, and the remaining depth would be backfilled with soil excavated from the trench and compacted to near existing density.

These improvements would be constructed during the planned shutdown of BDPL No. 4, which is estimated to take place in January and February of 2013, as discussed in Section 3.5.9, below.

3.5.3 Temporary Work Areas and Easements

Construction activities would generally be conducted within the SFPUC's existing 80-foot ROW and Caltrans' easement for I-680 and Mission Boulevard. An encroachment permit from Caltrans would be required for construction of the proposed improvements adjacent to I-680 and its associated on-ramps as well as within the Caltrans easement, including access to and from the construction site. Potential Staging Area 4 and part of Staging Area 3 (Figure 3.9), north of the northbound diamond on-ramp, are located on private property and would need to be designated as construction easements prior to project implementation. These staging areas are described below. Parking would be provided within the project area, although some construction parking could occur on neighborhood streets on both the north end (Tissiack Way area) and at the south end (Mohave Drive area) of the ROW. During peak construction activities, offsite parking could also be required, and if necessary, the SFPUC or its construction contractor would transport workers to the construction area via a shuttle. Some, but not all, of the utility owners have revocable SFPUC permits for utilities that cross the SFPUC ROW; the SFPUC would coordinate with each utility owner prior to relocation of the utilities.

3.5.4 Staging Areas

As shown on Figure 3.9, the following four staging areas are located both inside of the SFPUC ROW as well as outside of it, within the Caltrans easement or on private property:

- Staging Area 1 – including the triangular area between the southbound diamond on-ramp and I-680 south of Trace A, located within the SFPUC ROW and Caltrans easement

- Staging Area 2 – including the area within and east of the northbound loop on-ramp cloverleaf, bounded by the northbound diamond off-ramp, I-680, and the BDPL Nos. 3 and 4 ROW, located within the SFPUC ROW and Caltrans easement
- Staging Area 3 – includes a portion of the area within the northbound loop on-ramp cloverleaf as well as an area to the east of Mission Boulevard. This staging area is bounded by the northbound diamond on-ramp and is located within the SFPUC ROW and Caltrans easement, and partially on private property
- Staging Area 4 – including the area to the east of Mission Boulevard, bounded by Crystalline Drive and the northbound diamond on-ramp, located on private property

It would be necessary to grade each staging area to prepare it for use, and some trees would need to be removed, as discussed below.

3.5.4.1 Staging Area 1

Staging Area 1, located in the triangular area to the southwest of I-680 and north of the southbound diamond on-ramp, is required for construction activities in Zones 2, 3 and 4, including pits to access CMP2 and CMP3 or the trenchless pits in these zones. Most of the heavy equipment, including cranes and excavators, would be stored and operated within the landscaped area outside of the ROW. Construction activities and stockpiling of pipe and materials would take place in the SFPUC ROW and Caltrans easements, as space allows, provided that the contractor places mats to distribute the load over the pipelines, and that there is sufficient soil cover over the pipelines for pipes to be stored there. Two coast live oak trees could require removal in this staging area (see Section 5.9, Biological Resources).

3.5.4.2 Staging Areas 2 and 3

Staging Areas 2 and 3 would be established within the I-680/Mission Boulevard interchange to facilitate construction of the new articulated concrete vault in Zone 7. Most of the heavy equipment, including cranes and excavators, would be stored and operated within the interchange area. Construction activities and materials stockpiling would take place in the SFPUC ROW and Caltrans easements, and partially within private property in Staging Area 3. Three Lombardy poplars and one Peruvian/California pepper trees would require removal in these staging areas (see Section 5.9, Biological Resources).

3.5.4.3 Staging Area 4

Staging Area 4, located on private property, is a potential staging area that could be established just west of Mission Boulevard. This potential staging area is bounded by the northbound diamond on-ramp and Crystalline Drive, behind private property. The SFPUC might construct a temporary access road to this staging area from the ROW to the east side of the staging area, paralleling the northbound diamond on-ramp. Construction of this road would require removal of seven Lombardy poplars (see Section 5.9, Biological Resources). The staging area would be accessed from Crystalline Drive (on the north side of the staging area). For the purposes of this analysis, it is assumed that this staging area would be used during construction. Approximately 0.3 acre of a freshwater seep located within this area, including a buffer zone extending 30 feet from the outward limit of wetland vegetation, would be fenced off from the surrounding staging area, and grading or material storage within the freshwater seep boundary and buffer zone would be prohibited (see Figure 3.9 and Section 5.9, Biological Resources).

3.5.4.4 Additional Staging Areas

The entire SFPUC ROW between the North and South Shutoff Stations would be used for staging, including supply/equipment storage and soil stockpiling. Additional staging and parking areas for construction vehicles might be required in the ROW extending north of the North Shutoff Station, beyond Paseo Padre Parkway to Cayuga Way (between Cherokee Lane and Cheyenne Place); and south of the South Shutoff Station, approximately 480 feet south of Crawford Street. These areas are included in the project area and would be accessed from the closest road or other parts of the ROW.

3.5.5 Site Access and Truck Routes

Primary access points to the project area would be located at the I-680 and Mission Boulevard interchange, and in the vicinity of the North and South Shutoff Stations. Access routes include the following:

- **I-680 and Mission Boulevard interchange vicinity:** Access to the I-680 and Mission Boulevard interchange from the I-680 corridor and I-880 corridor would be via Mission Boulevard. Turnout lanes would be provided along Mission Boulevard, and possibly the freeway ramps, to accommodate construction vehicles entering and exiting the construction area, including staging areas. To avoid crossing traffic, vehicles would be allowed to enter and exit at these access points by making right turns only. The City of Fremont has designated Mission Boulevard as a truck route (City of Fremont, 2000).

- **Tissiack Place or North Shutoff Station vicinity:** Access from the I-680 corridor or I-880 corridor to the Tissiack Place/North Shutoff Station vicinity would be via Mission Boulevard to Paseo Padre Parkway to Omega Drive to Nugget Way to Tissiack Place.

- **Crawford Street or South Shutoff Station vicinity:** Access from the I-680 corridor or I-880 corridor to the Crawford Street/South Shutoff Station would be via Mission Boulevard to Mojave Drive to Crawford Street.

If Staging Area 4 is used, access to the staging area would be provided in the vicinity of the Crystalline Drive and Omega Drive intersection, although a temporary access road could be built from the ROW to the east end of the staging area, paralleling the northbound diamond on-ramp, as discussed above.

3.5.6 Excavation and Stockpiling of Soil

Excavated soil from the construction of BDPL No. 3X and improvements to BDPL No. 4 would likely be stockpiled along the west side of the proposed pipeline, within the existing SFPUC ROW, for use in backfilling the pipeline excavation. Soil for offsite disposition would be directly off-hauled. No active stockpiling would occur over the existing BDPL Nos. 3 and 4 due to load issues. The four staging areas (described above and shown on Figure 3.9) might also be used for soil stockpiling, in which case the soil would be transported back to the excavation area for backfilling after construction of the pipeline is completed.

3.5.7 Fill Placement

The estimated cut and fill quantities for the entire project would be approximately 41,600 cubic yards and 13,300 cubic yards, respectively, resulting in approximately 28,300 cubic yards of soil requiring offsite placement. As further discussed in Section 5.12, Hazards and Hazardous Materials, a Phase I environmental site assessment for the proposed pipeline alignment (AEW, 2009) indicated that the excavated soil has a low potential to contain hazardous materials, and the geotechnical investigation (WIP, 2004) indicated that the soil would likely be suitable for reuse as construction fill or could be disposed of at a conventional disposal facility.

If reuse of the soil as construction fill or for other purposes is not viable, then the soil would be disposed of at a conventional disposal site, such as the Altamont Landfill and Resource Recovery facility in Livermore, which is approximately 35 miles from the project site. The landfill is able to accept clean excavated materials through 2029, which coincides with the project schedule, and, as of 2005, this facility had a remaining capacity of nearly 46 million cubic yards (CIWMB, 2009).

3.5.8 Removal of Construction and Demolition Debris

Construction debris produced during construction of the proposed project would include redwood bulkheads from either side of each corrugated-metal pipe segment, corrugated-metal pipe segments, pipeline segments removed for construction of the new wyes and valves on BDPL No. 3 and improvements to BDPL No. 4, concrete debris from modifications to the existing slip-joint vault, asphalt and road construction materials, and general construction debris. The SFPUC intends to reuse or recycle 100 percent of asphalt and concrete and 50 percent of remaining debris, and any waste that could not be reused or recycled would be disposed of at a conventional disposal facility such as the Altamont Landfill and Resource Recovery facility in Livermore (see above).

3.5.9 Planned Shutdowns and Operations During Construction

It would be necessary to shut down BDPL No. 3 to construct the connections of the new and existing pipelines, and shut down BDPL No. 4 to construct the proposed improvements. BDPL No. 3 would be taken out of service for approximately two months during the installation of the connections, and BDPL No. 4 would be taken out of service for approximately two months during the concrete encasement construction and sliplining. These shutdowns would be coordinated with the overall SFPUC WSIP shutdown schedule (anticipated to be during November and December

2012 for BDPL No. 3 and January and February 2013 for BDPL No. 4). With implementation of the standard SFPUC procedures described below, there would be no interruption of service for downstream water customers during these shutdowns.

For each shutdown, the SFPUC would notify affected residents, municipalities, townships, and agencies of the shutdown schedule several weeks in advance. The SFPUC's Water Supply & Treatment Division would ensure that individual customers have an alternative water supply (usually through existing turnouts that are provided on both BDPL Nos. 3 and 4 pipelines) and would test all valves that need to be operated to ensure they are working properly. Once it has been established that the water supply to customers would not be interrupted, the SFPUC would close the turnout valves on the pipeline, open the crossover valves to allow water to bypass the shutdown pipe, and then close the isolation valves on both sides of the pipeline being shut down. The proposed BDPL No. 3X construction would take place while the existing BDPL Nos. 3 and 4 remain in service.

3.5.10 Construction-Related Discharges of Water

Construction would require discharges of water related to:

- Maintaining the excavations free of groundwater
- Draining BDPL Nos. 3 and 4 to facilitate work on the pipelines
- Disinfecting BDPL Nos. 3, 3X, and 4

These discharges are described below.

3.5.10.1 Groundwater Dewatering Discharges

In 2003, the water table was measured at depths of 12 feet to 39 feet below ground surface within the project area, with groundwater levels generally decreasing in elevation from north to south (WIP, 2004). More recent groundwater monitoring identified stabilized groundwater levels at depths between 13 and 41 feet below ground surface (URS, 2008b). Based on these results, groundwater dewatering could be required in Zone 3 and in the pits excavated in Zone 1 for the trenchless construction across Agua Fria Creek. Excavations in Zones 5 and 8 would be near the water table and could also require dewatering. Dewatering could be accomplished by pumping directly from the excavation or through dewatering wells installed in support of construction. Groundwater collected from excavations in Zones 3, 5, and 8 would be discharged to the local storm drain or sewer system or Aqua Caliente Creek. For the trenchless pits in Zone 1, groundwater would be discharged to Agua Fria Creek or to local storm drains.

All discharges would be conducted in a manner that avoids downstream erosion and other water quality impacts (such as turbidity issues), and would comply with applicable discharge regulations and requirements of the City of Fremont and/or the San Francisco Bay Regional Water Quality Control Board (RWQCB) (see Section 5.11, Hydrology and Water Quality, for further discussion of regulatory requirements).

3.5.10.2 Pipeline Dewatering Discharges

Dewatering of the existing BDPL No. 3 between the North and South Shutoff Stations would be required during installation of the interconnections, and dewatering of the same segment of the existing BDPL No. 4 would be required during construction of the concrete encasement and sliplining. These one-time discharges would involve discharge of approximately 606,000 gallons of chloraminated water from BDPL No. 3 and 916,000 gallons of chloraminated water from BDPL No. 4 via the existing blowoff valves immediately north of the South Shutoff Station.

Water from the individual pipeline segments would be discharged to Agua Fria Creek through the existing blowoff valves and dechlorinated before discharging to the creek. Draining, dechlorination, and pumping of each pipeline segment would last approximately four days or less. As mentioned above, all discharges would be conducted in a manner that avoids downstream erosion and other water quality impacts and would comply with applicable discharge regulations and requirements of the City of Fremont, the Alameda County Flood Control and Water Conservation District (ACFCWCD), and/or the RWQCB.

3.5.10.3 Pipeline Disinfection

Prior to returning BDPL No. 3 to service after installation of the interconnections, returning BDPL No. 4 into service after construction of the proposed improvements, and placing the proposed BDPL No. 3X into service, the pipelines would be disinfected, flushed, and tested for bacteria. Disinfection would involve flushing the pipelines with highly chlorinated water and discharging the chlorinated water through existing blowoff valves. The discharge would be dechlorinated before discharging to the creek. The volume of water discharged for disinfection of BDPL No. 3 and 3X would be approximately 2 million gallons and the volume of water discharged for disinfection of BDPL No. 4 would be approximately 2.6 million gallons. Disinfection and flushing of each pipeline segment would require approximately four days or less. As mentioned above, all discharges would be conducted in a manner that avoids downstream erosion and other water quality impacts and would comply with applicable discharge regulations and requirements of the City of Fremont, ACFCWCD, and/or RWQCB.

3.5.11 Project Workforce

It is estimated that construction within each construction zone would require up to two construction crews at one time and the size of the crews would range from 6 to 12 workers. Construction of the articulated vault in Zone 7 would require one crew of 12 workers for approximately 23 months, the maximum workforce required in any of the construction zones. Construction could occur simultaneously in one or more zones, and based on the preliminary construction schedule, the peak construction period would likely occur for one week in December 2012 when construction would take place concurrently in Zones 1, 2, 6, 7, and 8 (utilizing Staging Areas 1, 2, 3, and 4). During this period, up to four crews of 6 workers, four crews of 8 workers, and one crew of 12 workers would be working at one time. The exact timing of peak construction could change depending on the actual implementation schedule for the project, but the above scenario represents the most likely scenario to occur with respect to overlapping construction activities.

3.5.12 Construction Equipment

Table 3.1 lists the construction equipment that could be required in each construction zone. As shown in the table, the equipment needed for soil excavation and placement of the new pipeline would generally include cranes, backhoes, forklifts, dozers, loaders, dump trucks, concrete trucks, grout pumps, water trucks, pumps, welding equipment, compactors, and delivery trucks. Generators could be needed to supply power. Construction equipment specific to trenchless operations would also be required at the driving pits, and a winch would be required for the receiving pits, as well as for installation of the new pipeline through the existing corrugated-metal pipe segments under I-680 and the southbound on-ramp. In Zones 6 and 7, a drill rig and augers would be required to install the secant pile wall. Ventilation equipment would be required for all aspects of the pipe installation, as required for welding operations. Pavers and rollers would be used to restore the roadways after construction is completed.

Nighttime construction in Zones 6 and 7 would require temporary construction lighting to illuminate the work area. Prior to construction, the SFPUC or contractor would prepare a construction lighting plan that includes locations and methods to minimize light spillover to adjacent residential areas.

3.5.13 SFPUC Standard Construction Measures

The SFPUC has established Standard Construction Measures (SFPUC, 2007) that would be implemented as part of all WSIP projects. The main objective of these measures is to reduce impacts on existing resources to the extent feasible through such activities as early identification of sensitive environmental resources in the WSIP project areas and notification of potentially affected businesses, owners, and residents in areas adjacent to the WSIP projects regarding the nature, extent, and duration of construction activities. The SFPUC project manager, environmental project manager, and contract manager would ensure that the project contains uniform provisions to address these issues.

3.5.14 Greenhouse Gas Reduction Actions

The SFPUC would implement the following greenhouse gas (GHG) reduction actions as part of the proposed project and would include the following measures in all contractor specifications for the project. In addition to having other environmental benefits, these measures would help reduce GHG emissions.

1. The SFPUC will require that all contractors maintain tire inflation to the manufacturers' inflation specifications.

2. The SFPUC will implement a construction worker education program for the proposed project.

3.5.15 Construction Schedule

Construction is scheduled to begin in the spring of 2012 and continue through the spring of 2014, but could begin as early as winter 2011. During the approximately 27-month construction period, construction could be conducted concurrently in two or more of the construction zones, depending on the construction phasing. Nighttime construction would be required in Zones 6 and 7 on weekday and weekend nights, for up to a total of 17 nights, during installation and removal of the temporary bridges to avoid causing major traffic disruptions during traffic relocation activities, installation of the cast-in-place drilled-hole secant pile walls, and construction or removal of the temporary bridges across the I-680 on-ramps and Mission Boulevard. Because construction activities would overlap in both Zones 6 and 7, the 17 nights of nighttime construction would occur over approximately 11 months. Approximately nine of these nights will require closure of Mission Boulevard and approximately eight nights will require closure of the I-680 northbound loop and diamond on-ramps. All other construction would be conducted on weekdays between 7 a.m. and 7 p.m. and Saturdays between 9 a.m. and 6 p.m., with occasional construction activities occurring on Sundays.

3.6 Operations and Maintenance

Following construction of the proposed BDPL No. 3X and modifications to BDPL No. 4, pipeline operations would be the same as existing operations, and pipeline maintenance would be performed as identified under the WSIP maintenance plan and asset management strategy, which is currently under development. This plan will outline inspection as well as minor and major maintenance activities for the regional water system following completion of the WSIP facility improvement projects. Under the proposed project, both the articulated vault and new slip-joint vault would include minor discharges of accumulated groundwater. After a seismic event, these joints could leak at rates of up to 1,000 gallons per minute until repaired. Water from both vaults would be discharged to Agua Caliente Creek via new connections constructed in each vault.

The SFPUC would periodically monitor the new pipeline and seismic improvements according to the WSIP inspection schedule. The new steel BDPL No. 3X would be inspected approximately every 20 years. The prestressed-concrete cylinder pipe segments of BDPL No. 4 would be inspected every 5 to 10 years, and the reinforced-concrete cylinder pipe segments would be inspected every 10 to 20 years. More frequent inspections of these segments could be specified on the basis of the most recent inspection results. Blowoff valves and vacuum valves would be exercised once a year. Line valves would be exercised every two years, and the slip joints on BPDL No. 4 would be inspected every five years. The slip joints would be adjusted as needed to even out displacement across the Hayward fault. In addition, the pipe, pipe supports, and ball joints on BDPL No. 3X within the articulated vault would be inspected every one to two years.

3.7 Required Permits and Approvals

The San Francisco Planning Department is the CEQA lead agency for the project. Certification of the Final EIR by the San Francisco Planning Commission is required by CEQA prior to project approval by the SFPUC. In addition to complying with CEQA, the project would require a series of approvals and permits prior to construction, including encroachment permits from Caltrans as well as environmental permits related to construction activities through or beneath Agua Fria Creek, a Section 106 permit for construction activities that may impact an archaeological site, and permits for the management of construction-related stormwater and other water discharges. It would also be necessary to obtain temporary easements for construction activities on privately owned properties and agreements with utility companies for relocation of underground utilities that cross the SFPUC ROW, and Caltrans would require a transportation management plan and a cooperative agreement with the SFPUC. These permitting and approval requirements are discussed below.

Further regulatory approvals could be required in the event that local county, state, or federal agencies determine that specific construction activities require additional permits or approvals.

3.7.1 Federal Approvals and Permits

Clean Water Act, Section 404 Permit from the U.S. Army Corps of Engineers (Corps): Open-cut excavation to install the proposed BDPL No. 3X beneath Agua Fria Creek would require a permit from the Corps under Section 404 of the Clean Water Act for the placement of dredge or fill material within potential “waters of the United States.” It is likely that the Corps would authorize the proposed activities under its Nationwide Permit program because permanent impacts resulting from the project would total less than 0.5 acre (see Section 5.9, Biological Resources).

Federal Endangered Species Act, Section 7 Consultation with the U.S. Fish and Wildlife Service (USFWS): The Corps is required to consult with the USFWS as part of Section 404 permitting if a proposed project’s activities could affect federally threatened or endangered species. The project could result in the “take”[7] of federally listed wildlife or plant species and/or their habitat, and thus consultation under Section 7 of the Federal Endangered Species Act could be required (see Section 5.9, Biological Resources).

National Historic Preservation Act, Section 106: Due to the need to obtain a Corps permit, construction activities that may affect an identified archaeological site in the project area would require compliance with Section 106 of the National Historic Preservation Act (see Section 5.4, Cultural Resources).

7 “Take” is defined as harassing, harming, pursuing, hunting, shooting, wounding, killing, trapping, capturing, collecting, or attempting to engage in any such conduct.

3.7.2 State Approvals and Permits

Lake or Streambed Alteration Agreement, California Fish and Game Code Section 1602, from the California Department of Fish and Game (CDFG): This permit is required when a proposed project's activities would alter the bed or bank of any stream or lake. Trenchless or open-cut excavation for installation of the proposed BDPL No. 3X beneath Agua Fria Creek would require a Lake or Streambed Alteration Agreement (see Section 5.9, Biological Resources).

California Endangered Species Act, Section 2080.1 Consistency Determination, California Fish and Game Code Section 2050 et seq.: Under Section 2080.1, the CDFG may rely upon an incidental take permit or incidental take statement issued by the USFWS if the authorization also covers a state-listed species.

Encroachment Permit from Caltrans: This permit is required when a proposed project's activities include any crossing of highways in California and the encroachment of a pipeline within, under, or over state highway ROWs. The proposed project would pass under I-680 and Mission Boulevard in Fremont, and would include construction beneath roadways operated by Caltrans under an easement granted by the SFPUC in 1970. The SFPUC could need an encroachment permit from Caltrans in order to cross these major traffic routes and to perform construction activities underneath these roadways, as well as for access to and from the project site. Caltrans would also require that the SPFUC prepare a transportation management plan for traffic control during construction. The SFPUC signed a Cooperative Agreement with Caltrans on February 19, 2009 that outlines the review process by Caltrans, required submittals, formatting of documents, payments between the two agencies, and maintenance responsibilities during design, construction, and post-construction (Caltrans and CCSF, 2009). The SFPUC and Caltrans have had preliminary discussions regarding possible post-construction joint use and maintenance of the Caltrans ROW within the project area. If the project is approved, the parties may further consider such an agreement (see Section 5.5, Transportation and Circulation). A permit from Caltrans may also be required for connection of the modified slip joint vault, articulated vault, and the perforated BDPL No. 3 to the Agua Caliente Creek culvert beneath I-680.

Clean Water Act, Section 401 Permit, Water Quality Certification from the San Francisco Bay RWQCB: This certification is required when a proposed project's construction may result in the discharge of dredge or fill material to a water body. The federal Section 404 permit would be subject to Section 401 Water Quality Certification (see Section 5.11, Hydrology and Water Quality).

Clean Water Act, Section 402 Permits, **National Pollutant Discharge Elimination System, from the State Water Resources Control Board (SWRCB) and San Francisco Bay RWQCB:** The proposed project would disturb approximately 29 acres of land and would thus be subject to the National Pollutant Discharge Elimination General Permit for Storm Water Discharges Associated with Construction and Land Disturbance Activities from the RWQCB (SWRCB Order No. 2009-0009-DWQ, NPDES No. CAS000002). The permitting process includes filing a Notice of Intent to the SWRCB and obtaining a Waste Discharge ID number. Additionally, a stormwater pollution prevention plan is required as part of the General Construction Permit. Construction-related discharges of stormwater and groundwater produced during excavation dewatering would be subject to this permit (see Section 5.11, Hydrology and Water Quality).

In addition, discharges of water from the regional water system would be subject to RWQCB Order No. R2-2008-0102, which regulates discharges of altered water from the SFPUC drinking water transmission system. Discharges that would be subject to this permit include potable water from emptying BDPL Nos. 3 and 4 between the North and South Shutoff Stations, and water used to disinfect these pipelines and the new BDPL No. 3X prior to putting these pipelines into service (see Section 5.11, Hydrology and Water Quality).

3.7.3 Local City, County, and Utility Approvals and Permits

Road Encroachment Permit from the City of Fremont: The City of Fremont would require traffic and parking permits for use of local streets and could require an encroachment permit for work within Mission Boulevard. In addition, the City of Fremont would review the detour plans for any proposed full closure of Mission Boulevard or the I-680 northbound loop and diamond on-ramps (see Section 5.5, Transportation and Circulation).

Utility Arrangements with Utility Owners: The SFPUC would enter into agreements with utility owners for the relocation, replacement, or protection of their underground utilities that cross the BDPL Nos. 3 and 4 ROW where project construction would occur (see Section 5.8, Utilities and Service Systems).

Encroachment Permit from the ACFCWCD: In accordance with the Alameda County Flood Control Ordinance, the ACFCWCD would require an encroachment permit for any construction within or discharge to one of its flood control or storm drainage facilities under its jurisdiction (see Section 5.11, Hydrology and Water Quality), including Agua Fria and Agua Caliente Creeks.

Well Installation and Destruction Permit from the ACWD: The ACWD would require permits for the abandonment of three existing piezometers in the project area, and for the installation of dewatering wells if such wells are required for excavation dewatering (see Section 5.11, Hydrology and Water Quality).

3.7.4 San Francisco Approvals

San Francisco Planning Commission: The Planning Commission would be responsible for certifying the Final EIR.

SFPUC: The SFPUC would review and consider the certified Final EIR prior to deciding whether to approve the project, and, if the project is approved, would adopt CEQA findings and a mitigation monitoring and reporting program. The SFPUC would also approve contracts for the construction of the project.

San Francisco Board of Supervisors: The Board of Supervisors would consider any appeals of the Planning Commission's certification of the Final EIR. The Board would also appropriate funding for implementation of the project, including general obligation bond monies and annual budget appropriations.

3.7.5 Other Actions

In addition to the federal, state, and local permits and approvals described above, implementation of the project would require temporary construction easements from private landowners for use of Staging Area 4 and a portion of Staging Area 3.

3.8 References

Alameda County Water District (ACWD), *Nearby Wells Report – Wells within 0.50 miles of 5S/1W-13K and 5S/1W-24B*, January 9, 2009.

AEW Engineering, Inc., *Regulatory Agency Database, Aerial Photograph, and Historic Map Review Report, Seismic Upgrade of BDPL Nos. 3 and 4 at Hayward Fault Project, Alameda County, California*, February 2009.

California Department of Transportation and the City and County of San Francisco (Caltrans and CCSF), *Cooperative Agreement, District Agreement No. 4-2200,* February 19, 2009.

California Integrated Waste Management Board (CIWMB), Solid Waste Information System (SWIS) Solid Waste Facility/Site Search. Available online at http://www.ciwmb.ca.gov/SWIS/Search.aspx. Accessed September 24, 2009.

City of Fremont, City of Fremont Truck Routes, Adopted by City Council on April 26, 1988, Amended by City Council on January 11, 2000. Map prepared by R. Chan on July 16, 2004.

G&E Engineering Systems, Inc., *Tech Memo 2, Concrete Box Analyses, Trace B Inertial Analyses, Trace A, C Analyses, BDPL 4 Analyses, Ball and Slip Joint Specs*, October 4, 2008.

M. Lee Corporation, *Seismic Upgrade of Bay Division Pipelines Nos. 3 & 4 at Hayward Fault Construction Schedule, Based on 35% Design dated 05/01/2009*. May 19, 2009.

San Francisco Public Utilities Commission (SFPUC), *Standard Measures to be Included in Construction Contracts and Project Implementation,* from Susan Leal, General Manager, and Tony Irons, Deputy General Manager, to Michael Carlin, Tom Franza, Barbara Hale, Harlan Kelly, Julie Labonte, Irina Torrey, Ivy Fine, and Tony Winnicker, February 7, 2007.

URS Corporation, *Final Conceptual Engineering Report, Seismic Upgrade of Bay Division Pipelines No. 3 and No. 4 at the Hayward Fault,* October 14, 2008a.

URS Corporation, *Bay Division Pipelines 3 & 4 Hayward Fault Crossing Geotechnical Report, Fremont, CA,* December 5, 2008b.

URS Corporation, *Cut and Fill Calculations,* February 24, 2009.

Working Group for California Earthquake Probabilities (WGCEP), *The Uniform California Earthquake Rupture Forecast, Version 2 (UCERF 2)*. USGS Open File Report 2007-1437, CGS Special Report 203, SCEC Contribution #1138, 2008.

Water Infrastructure Partners (WIP), *Geotechnical Investigation, Seismic Upgrade of BDPL Nos. 3 and 4 at the Hayward Fault Zone Crossing*, May 18, 2004.

William Lettis & Associates, Inc. (WLA), *Memo on Fault Displacement Values for BDPL No. 3 Design Criteria*, July 31, 2008.

CHAPTER 4

Plans and Policies

4.1 Overview

Pursuant to the California Environmental Quality Act (CEQA) Guidelines Section 15125(d), this chapter describes land use plans and policies and the manner in which they apply to the Seismic Upgrade of BDPL Nos. 3 and 4 at Hayward Fault Project ("proposed project" or "project") (Section 4.2), and then discusses the project's consistency with applicable plans (Section 4.3).

As described in Chapter 3, Section 3.7, Required Permits and Approvals, the San Francisco Planning Commission is the agency responsible for certifying the environmental impact report (EIR) for the proposed project. The San Francisco Public Utilities Commission (SFPUC) is responsible for adopting the CEQA findings and deciding whether to approve the project. Plans and policies addressed in this chapter include:

- **City and County of San Francisco (CCSF).** San Francisco General Plan, Accountable Planning Initiative, and San Francisco Sustainability Plan.

- **SFPUC.** Water Enterprise Environmental Stewardship Policy, Right of Way Integrated Vegetation Management Policy, Right of Way Encroachment Policy, and Peninsula and Alameda Watershed Management Plans.

- **Local Agencies.** Fremont General Plan.

Permit requirements are described in Chapter 3, Project Description (Section 3.7). In some cases, these requirements include permits to be obtained from local jurisdictions for specific activities or to comply with specific ordinances. Sections 5.2 through 5.13 of this EIR describe pertinent resource-specific plans and policies (e.g., air quality management plans are discussed in Section 5.7, Air Quality; consistency with local tree ordinances are discussed in Section 5.9, Biological Resources).

4.2 Plans and Policies Relevant to the Project

4.2.1 City and County of San Francisco Plans and Policies

The proposed project is located in the incorporated city of Fremont in Alameda County. The CCSF land use plans and policies are primarily applicable to projects within the jurisdictional boundaries of San Francisco, although in some cases they may apply to projects outside of

San Francisco. The SFPUC is guided by the San Francisco City Charter, along with other San Francisco plans and policies. These plans include the San Francisco General Plan, as amended, which sets forth the city's comprehensive, long-term planning land use policy; the Accountable Planning Initiative, which establishes Priority Policies to guide decision-makers in balancing the objectives of the San Francisco General Plan; and the San Francisco Sustainability Plan, which addresses the long-term sustainability of the city. In addition, the SFPUC has adopted its own plans and policies to further direct its project-related activities: the Water Enterprise Environmental Stewardship Policy, which establishes the long-term management direction for CCSF-owned lands within the Tuolumne River, Alameda Creek, and Peninsula watersheds; the Alameda and the Peninsula Watershed Management Plans, which provide a policy framework for the SFPUC to make decisions about activities that are appropriate on watershed lands; the Right of Way Integrated Vegetation Management Policy, which addresses vegetation management within the SFPUC ROW; and the Right of Way Encroachment Policy, which clarifies how the CCSF will handle encroachments by others onto its ROWs. All of these plans and policies, as they apply to the proposed project, are described below.

4.2.1.1 Extraterritorial Lands

San Francisco City Charter, Section 8B.121, Public Utilities Commission

The CCSF has authority (San Francisco City Charter, Section 4.112) over the management, use, and control of land it owns outside of the city, subject to the SFPUC's exclusive charge of the construction, management, use, and control of city water supplies and utilities (San Francisco Charter, Section 8B.121). Accordingly, the CCSF considers its own plans and policies related to its extraterritorial lands, as applicable.

California Government Code Section 53090 et seq., Regulation of Local Agencies

California Government Code Section 53090 et seq. provides that the SFPUC receives intergovernmental immunity from the zoning and building laws of other cities and counties. The SFPUC, however, seeks to work cooperatively with local jurisdictions where CCSF-owned facilities are sited outside of San Francisco to avoid conflicts with local plans and building and zoning codes. Also, the SFPUC is required under Government Code Section 65402(b) to inform local governments of its plans to construct projects on, or acquire or dispose of, its extraterritorial property. The local governments then have a 40-day review period in which to determine project consistency with their general plans. Under this requirement, the cities' or counties' determinations of consistency would be advisory to the SFPUC rather than binding.

4.2.1.2 San Francisco General Plan

The San Francisco General Plan (CCSF, 1988), as amended, sets forth the comprehensive long-term land use policy for the CCSF. One of general plan's basic goals is "coordination of the growth and development of the city with the growth and development of adjoining cities and counties and of the San Francisco Bay Region." The general plan consists of 10 issue-oriented plan elements: Air Quality, Arts, Commerce and Industry, Community Facilities, Community

Safety, Environmental Protection, Housing, Recreation and Open Space, Transportation, and Urban Design. Plan elements relevant to the proposed project are briefly described below.

- **Air Quality Element.** This element promotes clean air planning through objectives and policies that ensure compliance with air quality regulations.

- **Commerce and Industry Element.** This element guides decisions related to economic growth and change in San Francisco. The three goals of the element—continued economic vitality, social equity (with respect to employment opportunities), and environmental quality—address citywide objectives as well as those of San Francisco's major economic sectors.

- **Community Safety Element.** This element addresses potential geologic, structural, and nonstructural hazards to CCSF-owned structures and critical infrastructure, with the goal of protecting human life and property from such hazards.

- **Environmental Protection Element.** This element addresses the impact of urbanization on the natural environment by promoting the protection of plant and animal life and freshwater sources and addressing San Francisco's responsibility to provide a permanent clean water supply to meet present and future needs and maintain an adequate water distribution system.

- **Urban Design Element.** This element promotes the preservation of landmarks and structures with notable historic, architectural, or aesthetic value, and seeks to balance development with the natural environment and visual features.

4.2.1.3 Accountable Planning Initiative

In November 1986, San Francisco voters approved Proposition M, the Accountable Planning Initiative, which added Section 101.1 to the City Planning Code to establish eight Priority Policies as a preamble to the San Francisco General Plan. The Priority Policies serve as the basis upon which inconsistencies in the general plan are resolved and state that:

1. Neighborhood-serving retail uses be preserved and enhanced and future opportunities for resident employment in and ownership of such businesses enhanced

2. Housing and neighborhood character be conserved and protected in order to preserve the cultural and economic diversity of the neighborhoods

3. The City's supply of affordable housing be preserved and enhanced

4. Commuter traffic not impede the Muni transit service or overburden streets or neighborhood parking

5. A diverse economic base be maintained by protecting industrial and service sectors from displacement by commercial office development, and future opportunities for resident employment and ownership in these sectors be enhanced

6. The City achieve the greatest possible preparedness to protect against injury and loss of life in an earthquake

7. Landmarks and historic buildings be preserved

8. Parks and open space and their access to sunlight and vistas be protected from development

4.2.1.4 San Francisco Sustainability Plan

The San Francisco Board of Supervisors endorsed the Sustainability Plan (CCSF, 1997) in 1997, although the Board has not committed the CCSF to perform the actions addressed in the plan. The plan serves as a blueprint for sustainability, with many of its individual proposals requiring further development and public comment. The plans underlying goals are to maintain the physical resources and systems that support life in San Francisco and to create a social structure that will allow such maintenance. It is divided into 15 topic areas: 10 that address specific environmental issues (air quality; biodiversity; energy, climate change and ozone depletion; food and agriculture; hazardous materials; human health; parks, open spaces, and streetscapes; solid waste; transportation; and water and wastewater). Five of these areas are broader in scope and cover many issues, including the economy and economic development; environmental justice; municipal expenditures; public information and education; and risk management. Each topic area has a set of indicators to be used over time to determine whether San Francisco is moving in a direction that supports sustainability for each particular area.

4.2.2 SFPUC Plans and Policies

4.2.2.1 Water Enterprise Environmental Stewardship Policy

Adopted in June 2006, the Water Enterprise Environmental Stewardship Policy established the long-term management direction for CCSF-owned lands and natural resources affected by operation of the SFPUC water system within the Tuolumne River, Alameda Creek, and Peninsula watersheds (SFPUC, 2006). It also addresses ROWs and properties in urban surroundings under SFPUC management. The policy includes the following:

- The SFPUC will proactively manage the watersheds under its responsibility in a manner that maintains the integrity of the natural resources, restores habitats for native species, and enhances ecosystem function.

- To the maximum extent practicable, the SFPUC will ensure that all operations of the SFPUC water system (including water diversion, storage, and transport); construction and maintenance of infrastructure; land management policies and practices; purchase and sale of watershed lands; and lease agreements for watershed lands protect and restore native species and the ecosystems that support them.

- The SFPUC will manage ROWs and properties in urban surroundings under its management in a manner that protects and restores habitat value where available and encourages community participation in decisions that significantly interrupt or alter current land use in these parcels.

The implementation strategy of the stewardship policy includes: (1) implementing and updating the SFPUC's watershed management plans for the Alameda and Peninsula watersheds; (2) developing conservation plans for the Alameda and Peninsula watersheds; (3) developing and implementing the Watershed and Environmental Improvement Program; (4) integrating this policy into the Water System Improvement Program (WSIP) and individual infrastructure projects, including the proposed project; and (5) ensuring the policy guides the development of the project description, alternatives, and mitigation measures for SFPUC projects during environmental review.

4.2.2.2 Right of Way Integrated Vegetation Management Policy

In February 2007, the SFPUC adopted the Right of Way Integrated Vegetation Management Policy (SFPUC, 2007a) to manage vegetation that poses a threat or hazard to the operation, maintenance, or infrastructure of any of its water distribution and collection systems. The roots of large woody vegetation can corrode the outer casements of transmission pipelines. Trees and other vegetation directly adjacent to pipelines can make emergency and annual maintenance difficult, hazardous, and expensive, and can threaten public safety. Fire danger within the SFPUC ROW is also a concern; the SFPUC is required to comply with local fire ordinances, which require the identification, reduction, and management of existing vegetation to prevent potential disruption of fire-protection services. The elements of the SFPUC vegetation management policy address the management and removal of vegetation, annual grasses, and weeds within the SFPUC ROW and the management and removal of vegetation and trees on land leased or permitted by the SFPUC. With some exceptions, the SFPUC vegetation management policy restricts most tree species from remaining or being planted within 25 feet of the edge of a pipeline, and prohibits certain tree species, including willow and black walnut, on any ROW property. This policy also seeks to reduce and eliminate, as much as practicable, the use of herbicides on vegetation within the ROW.

4.2.2.3 Right of Way Encroachment Policy

In February 2007, the SFPUC approved a revised encroachment policy that clarifies how it will handle encroachments by others into its ROWs (SFPUC, 2007b). The policy guides and outlines the procedures for prioritizing and implementing encroachment removal efforts, focusing specifically on encroachments that would:

- Endanger water, sewer, or electrical transmission lines and appurtenances
- Impair access to facilities for emergency repair, maintenance, or operational activity
- Be detrimental to the efficient and effective maintenance of limited vegetation in the ROW in accordance with the SFPUC vegetation management policy described above
- Obstruct the inspection and monitoring of equipment or the collection of land survey, corrosion control, and water quality data
- Increase the SFPUC's liability

4.2.2.4 Alameda and Peninsula Watershed Management Plans

To provide a policy framework for the SFPUC to make decisions about activities that are appropriate on watershed lands, the SFPUC has adopted management plans for CCSF-owned lands in the Alameda and Peninsula watersheds. The watershed management plans (WMPs) provide goals, policies, and management actions that address watershed activities and reflect the unique qualities of the watersheds. The WMPs are also intended for use by the SFPUC as watershed management implementation guidelines. CCSF-owned watershed lands are managed by the SFPUC Natural Resources Division, Watershed Resource Management Section. None of the proposed improvements are located within the plan boundaries of the Alameda or Peninsula WMPs. Thus, these plans are not applicable to the proposed project.

4.2.3 Other Local Plans and Policies

This section describes the land use plans and policies of the City of Fremont that are relevant to the proposed project. Plans and policies that apply to unincorporated Alameda County are not discussed because the project would not involve construction or operations activities on any unincorporated Alameda County lands.

The proposed project would be located within the planning area of the Fremont General Plan (City of Fremont, 1991), which governs land use planning in Fremont. The SFPUC is not legally bound by the land use plans and policies of the Fremont General Plan; however, these plans and policies are discussed in this section to the extent that they provide land use planning and information relevant to evaluating the project with respect to specific significance criteria under CEQA, which requires an analysis of the compatibility of a proposed project with certain aspects of local land use plans and policies adopted for the purpose of avoiding or mitigating an environmental effect. These significance criteria are listed below along with the location in this document where the reader can find the impact evaluation. Impact significance is determined based on whether the project would:

- Result in the loss of availability of a locally important mineral resource recovery site delineated in a local general plan, specific plan, or other land use plan (analyzed in Section 5.13, Mineral and Energy Resources)

- Conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance (analyzed in Section 5.9, Biological Resources)

- Conflict with the provisions of an adopted habitat conservation plan, natural community conservation plan, or other approved local, regional, or state habitat conservation plan (analyzed in Section 5.9, Biological Resources)

- Conflict with adopted policies, plans, or programs supporting alternative transportation (e.g., conflict with policies promoting bus turnouts, bicycle racks, etc.), or cause a substantial increase in transit demand that cannot be accommodated by existing or proposed transit capacity or alternative travel modes (analyzed in Section 5.5, Transportation and Circulation)

- Expose people to or generate noise levels in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies (analyzed in Section 5.6, Noise)
- Conflict with or obstruct implementation of the applicable air quality plan (analyzed in Section 5.7, Air Quality)
- For a project located within an area covered by an airport land use plan (or, where such a plan has not been adopted, within two miles of a public airport or public use airport), expose people residing or working in the project area to excessive noise levels (not applicable, see Section 5.6, Noise)
- Be out of compliance with federal, state, and local statutes and regulations related to solid waste (analyzed in Section 5.8, Utilities and Service Systems)
- Conflict with existing zoning for agricultural use or a Williamson Act contract (not applicable, see Section 5.1.1, Scope of Analysis)[1]

Additionally, the factors listed below affect the application of the City of Fremont plans and policies to the proposed project.

Local Agency Project Approval. Project construction would require coordination with the City of Fremont with regard to parking, traffic, and work within the streets, and an encroachment permit could be required from the City of Fremont Public Works Department for the use of city streets and for traffic management.

Building and Zoning Ordinances. Building and zoning ordinances are the most specific expressions of general plan goals, objectives, and policies. State law and judicial interpretations of state law (California Government Code Section 53090 et seq.) mutually exempt cities and counties from complying with each other's building and zoning ordinances. The SFPUC, which is part of the CCSF, is therefore exempt from complying with the building and zoning ordinances of other cities and counties. This same state law also exempts public utilities and special-purpose local agencies (such as water districts) from complying with local building and zoning ordinances when locating or constructing facilities for the production, generation, storage, treatment, or transmission of water.

Local Government Notification and Consistency Determination Requirements. As discussed above in Section 4.2.1.1, Extraterritorial Lands, Government Code Section 65402(b) requires that the SFPUC inform cities and counties of its plans to construct projects on, or acquire or dispose of, extraterritorial property within their jurisdictions. Pursuant to that section, the SFPUC would be required to notify the City of Fremont of its plans to construct the project or acquire land associated with the project prior to construction and implementation. After notification, the City of Fremont would have 40 days to determine if the project is consistent with its general plan. Although any consistency determinations by the City of Fremont would be advisory to the

1 Under a Williamson Act (Land Conservation Act of 1965) contract, the landowner agrees to limit the use of the land to agriculture and compatible uses for a period of at least 10 years. In return, the land is taxed at a rate based on the agricultural production of the land, rather than its real estate market value.

SFPUC rather than binding, the SFPUC seeks to work cooperatively with local jurisdictions to avoid conflicts with local land use plans and building and zoning codes.

4.2.3.1 Fremont General Plan

The Fremont General Plan (City of Fremont, 1991) sets forth the long-term land use policy for Fremont. The Fremont General Plan includes policies that address environmental resources, including the siting of utilities to avoid or minimize damage from seismic and geologic hazards; protection of sensitive wildlife habitats and plants; erosion and stormwater quality controls; preservation of utility ROWs for open space or recreation; preservation of historic and archaeological resources; air quality controls, such as dust abatement measures during construction; and noise controls, such as noise suppression techniques during construction activities and in new structures as well as compliance with noise ordinances during facility operations. As described above, all of these topics are addressed in the pertinent sections in Chapter 5, Environmental Setting and Impacts. Fundamental goals of the Fremont General Plan include:

- Maintaining the unique and diverse characteristics of the city of Fremont, including those of the individual neighborhoods
- Protecting the city's open space character and natural features
- Retaining diversity in housing, recreational, cultural, employment, transportation, and shopping opportunities for current and future residents
- Maintaining a diversified industrial and commercial base to meet the employment needs of the city's present and future residents
- Managing and equitably distributing public services throughout the city
- Promoting alternative modes of transportation to reduce dependency on the automobile
- Maintaining parks and recreational facilities
- Preserving historic and archaeological sites throughout the city
- Asserting the city as a leader in regional issues

The City of Fremont is currently conducting a comprehensive general plan update. The last comprehensive update was adopted in 1991 with a planning horizon of 2010. The update process requires several years to complete, and currently calls for a planning horizon of 2030. As of October 2009, the Draft 2030 Fremont General Plan was not available for public review. Until the update is approved and adopted by the City Council, the plans and policies of the 1991 Fremont General Plan remain in effect. With respect to the proposed project, the general plan policies call for applying the public use designation for new facilities on land owned by utilities or local water districts.

According to the Fremont General Plan, the portion of the project area south of Mission Boulevard and east of I-680 is located within the Base of the Hills subarea of the Hill Planning Area. The land use plan for most of the Hill Planning Area is regulated by two Hill Area Initiatives that were adopted in 1981 and 2002, respectively. The Hill Area Initiatives provide special protection for Fremont's eastern hillsides in three major ways: (1) setting larger minimum parcel sizes; (2) changing development standards and restrictions; and (3) changing allowable uses. However, none of the development provisions of the Hill Area Initiatives apply to the Base of the Hills subarea (City of Fremont, 2009).

4.3 Plan Consistency Evaluation

The evaluation of plan consistency is based on the applicability of relevant land use plans and policies to the project as they relate to:

- The underlying goals of the San Francisco General Plan and Sustainability Plan; the Priority Policies of the San Francisco Accountable Planning Initiative; the principal goals of the Water Enterprise Environmental Stewardship Policy; and Right of Way Integrated Vegetation Management Policy.
- Plans and policies of the Fremont General Plan.

As stated above, the San Francisco General Plan and Sustainability Plan are primarily applicable to projects located in San Francisco; however, they may also be applicable to projects on SFPUC extraterritorial land.

For these plans, a determination of consistency was made as required by Section 15125(d) of the CEQA Guidelines. However, because the policy language found in a land use plan is susceptible to varying interpretations, it is often difficult to determine whether a proposed project is consistent or inconsistent with such policies. Furthermore, because land use plans often contain numerous policies emphasizing differing legislative goals, a project may be consistent with a general plan, taken as a whole, even though it may appear to be arguably inconsistent with specific policies within the plan. The board or commission that enacted the plan or policy generally determines the meaning of such policies; these interpretations prevail if they are "reasonable," even though other reasonable interpretations are also possible. In light of these considerations, the consistency evaluation in this EIR represents the best attempt to advise the decision-makers as to whether the project is consistent with applicable land use plans and policies. Direct and indirect physical impacts resulting from project implementation are not addressed in this chapter, but in the appropriate technical sections of the EIR.

The project's consistency with plans and policies of the CCSF, SFPUC, and City of Fremont is discussed below.

4.3.1 Consistency with San Francisco Plans and Policies

4.3.1.1 San Francisco General Plan

The San Francisco General Plan sets forth the City and County of San Francisco's comprehensive, long-term land use policy and, as such, is primarily applicable to projects within the City and County's jurisdictional boundaries. The proposed project, which is located outside the City and County boundaries, involves seismic improvements to BDPL Nos. 3 and 4 and increased delivery reliability where these pipelines cross the Hayward fault. It is designed to minimize interruptions of water delivery during and following a seismic event and ensure a seismically reliable water system. Thus, the project would support the health and safety of the communities in the project area as well as the health and safety of SFPUC water customers. The project would not affect land uses within the boundaries of the City and County of San Francisco and, overall, would be consistent with the spirit and intent of the San Francisco General Plan.

Any conflict between the project and San Francisco General Plan policies that relates to physical environmental issues are discussed in Sections 5.2 through 5.13. The compatibility of the project with San Francisco General Plan policies that do not relate to physical environmental issues will be considered by decision-makers as part of their decision whether to approve or disapprove the proposed project. Any potential conflicts identified as part of the process would not alter the physical environmental effects of the proposed project.

4.3.1.2 Accountable Planning Initiative

Of the eight Priority Policies set forth in Section 101.1 of the City Planning Code, only the sixth policy, which requires earthquake preparedness, is relevant to the proposed project. One of the primary goals of the proposed project is to reduce the vulnerability of BDPL Nos. 3 and 4 to earthquake damage and increase the seismic and delivery reliability of the regional water system. This would be achieved by making improvements that meet current seismic standards and by establishing and implementing a defined level of service response after a major earthquake. Overall, the proposed project is consistent with the Accountable Planning Initiative.

4.3.1.3 San Francisco Sustainability Plan

The Sustainability Plan addresses San Francisco's long-term environmental sustainability. The proposed project would be consistent with the goals of the Sustainability Plan because it would maintain the physical resources and systems that support life in San Francisco and would increase the reliability of water supply to the city during earthquakes or other situations that could cause system damage or failure.

4.3.2 Consistency with SFPUC Plans and Policies

4.3.2.1 Water Enterprise Environmental Stewardship Policy

The proposed project could affect the integrity of natural resources, habitats for native species, and ecosystems in the project area. Section 5.9, Biological Resources, identifies measures to protect and restore natural resources and habitats. Additionally, the implementation strategy of the Stewardship Policy specifically requires the integration of the policy into individual projects under the SFPUC's proposed WSIP, which includes the proposed project. With implementation of the mitigation measures identified in this EIR, the proposed project would be consistent with the system sustainability goals of the Water Enterprise Environmental Stewardship Policy.

4.3.2.2 Right of Way Integrated Vegetation Management Policy

As described in Section 5.9, Biological Resources, trees located within the SFPUC ROW for BDPL Nos. 3 and 4 would not be replaced within the ROW in accordance with the Right of Way Integrated Vegetation Management Policy. Rather, they would be replaced in an appropriate location outside the ROW in the same general vicinity. Therefore, the proposed project would be consistent with this policy.

4.3.2.3 Right of Way Encroachment Policy

Section 5.8, Utilities and Service Systems, addresses potential conflicts with other agencies' utilities that are located within the BDPL Nos. 3 and 4 ROW. As discussed in Section 5.8, the SFPUC would enter into agreements with the utility owners for utility protection and relocation. In addition, implementation of mitigation measures identified in Section 5.8 would ensure that potential impacts related to the endangerment of water, sewer, or electrical transmission lines and appurtenances would be less than significant. Thus, the project would be consistent with the Right of Way Encroachment Policy.

4.3.3 Consistency with Land Use Plans and Policies of the City of Fremont

As discussed above, the SFPUC is not legally bound by the land use policies of other local governments. Determinations of project consistency with the Fremont General Plan would be made by the City of Fremont following preparation of this EIR, and through notification by the SFPUC pursuant to state law.

Consistency with the social resource goals of the Fremont General Plan is addressed by evaluating the proposed project's environmental impacts and identifying feasible measures and alternatives to avoid or substantially lessen these impacts. Such impacts and mitigations are discussed in the individual resource sections within Chapter 5, Environmental Setting and Impacts. Although the project would result in short-term construction impacts—including construction-related traffic disruptions; construction-related effects on local traffic conditions; impacts related to compliance with solid waste statutes and regulations; and temporary impacts on riparian habitat, waters of the United States, and special-status species—the project would mitigate these impacts in the long term and restore biological habitat, as discussed in Sections 5.5, Transportation and Circulation; 5.8, Utilities and Service Systems; and 5.9, Biological Resources. In addition, project implementation could result in direct impacts on paleontological resources and archaeological resources. However, as discussed in Section 5.4, Cultural Resources, the project would mitigate these impacts by implementing a data recovery and treatment plan for known archaeological resources in the project area and implementing additional measures for previously unidentified archaeological and paleontological resources. These measures would be conducted to monitor construction activities in areas with a high sensitivity for archaeological and paleontological resources, evaluate the significance of any resources discovered during construction, and implement data recovery and treatment protocols if previously unidentified resources are encountered.

Most of the environmental impacts due to the proposed project would be associated with the construction phase and could be mitigated to less-than-significant levels. While impacts related to temporary disruption of land uses, construction noise, compliance with Fremont Noise Ordinance time limits, haul and delivery truck noise, temporary noise disturbance along detour routes due to road closures at night, disturbance due to construction-related vibration during the nighttime, and construction-related emissions of criteria pollutants would remain significant and unavoidable, these impacts would occur during construction only and mitigation measures would be implemented to substantially lessen these effects (see Sections 5.6, Noise, and 5.7, Air Quality). Overall, the proposed project would be consistent with the current Fremont General Plan.

4.4 References

City and County of San Francisco (CCSF), *San Francisco General Plan*. 1988, amended through 1996. Available online at: www.sfgov.org/site/planning_index.asp?id=41423.

City and County of San Francisco (CCSF), *Sustainability Plan for the City of San Francisco*. 1997. Available online at: www.sustainable-city.org.

City of Fremont, 1991. *Fremont General Plan*. Amended through December 2005.

City of Fremont, City of Fremont website, Measure T Information. Available online: http://www.ci.fremont.ca.us/Construction/MeasureTInformation. Accessed March 13, 2009.

San Francisco Public Utilities District (SFPUC), Water Enterprise Environmental Stewardship Policy. June 27, 2006. SFPUC website: http://sfwater.org/detail.cfm/MC_ID/20/MSC_ID/357/C_ID/3159. Accessed November 29, 2006.

San Francisco Public Utilities Commission (SFPUC), Right of Way Vegetation Management Policy. February 2007a.

San Francisco Public Utilities Commission (SFPUC), Right of Way Encroachment Policy. February 2007b.

CHAPTER 5
Environmental Setting and Impacts

5.1 Overview

This chapter provides a project-level impact analysis of the physical environmental effects of implementation of the Seismic Upgrade of Bay Division Pipeline Nos. 3 and 4 (BDPL Nos. 3 and 4) at Hayward Fault Project ("proposed project" or "project") as described in Chapter 3, Project Description.

5.1.1 Scope of Analysis

Chapter 5 is organized by environmental resource topic as follows:

Chapter 5 Sections	
5.1 Overview	5.8 Utilities and Service Systems
5.2 Land Use and Land Use Planning	5.9 Biological Resources
5.3 Aesthetics	5.10 Geology and Soils
5.4 Cultural Resources	5.11 Hydrology and Water Quality
5.5 Transportation and Circulation	5.12 Hazards and Hazardous Materials
5.6 Noise	5.13 Mineral and Energy Resources
5.7 Air Quality	(References included under each section)

Each section of Chapter 5 contains the following elements, based on the CEQA Guidelines and Chapter 31 of the City and County of San Francisco Administrative Code:

- **Setting** – This subsection describes the existing physical environment conditions in the vicinity of the project with respect to each resource topic at an appropriate level of detail to allow the reader to understand the impact analysis.

- **Regulatory Framework** – This subsection discusses the existing laws and regulations that apply to protection of the environmental resource, and identifies the governmental agencies responsible for enforcement relevant to the proposed project.

- **Impacts** – This subsection evaluates the potential for the proposed project to adversely affect the physical environment described in the setting. The significance criteria for evaluating environmental impacts are defined at the beginning of each impact analysis section, along with an "Approach to Analysis" discussion, which explains how the significance criteria are applied in evaluating the project. The conclusion of each impact analysis is expressed in terms of the impact significance, which is discussed further in Section 5.1.2.

- **Mitigation Measures** – This subsection includes the mitigation measures identified for all of the impacts found to be significant or potentially significant, consistent with the CEQA Guidelines, which state that an EIR "shall describe all feasible measures which could minimize significant adverse impacts…"

According to CEQA Guidelines Section 15128, effects determined not to be significant do not need to be discussed in detail in an EIR. In the course of this evaluation, the San Francisco Planning Department determined that the proposed project would have no impact on several resources, including population and housing, wind and shadow, recreation, public services, and agriculture; these resource topics are discussed below. The remaining resource topics are discussed in Sections 5.2 through 5.13. These sections address the impacts related to each significance criteria, and those found to be not applicable or to have no impact are discussed in the approach to analysis section for each resource topic.

5.1.1.1 Population and Housing

The proposed project would not result in population growth, but would support the health and safety of the existing population. It would be constructed entirely within the existing BDPL Nos. 3 and 4 right-of-way (ROW) and operated by existing SFPUC personnel, with no additional staffing required. No existing housing units or people would be displaced, and there would be no additional demand for housing. Therefore, the project would have no impacts related to population and housing.

5.1.1.2 Wind and Shadow

The project's major components, including pipelines and vaults, would be buried underground, and thus would have no effect on wind or shadow in the project area. Therefore, the project would have no impact related to wind or shadow.

5.1.1.3 Recreation

Because no additional staffing would be required for project operation and the project would not involve the construction of housing or other structures that would increase population in the project area, the project would not increase the use of neighborhood recreational facilities or require construction or expansion of recreational facilities. The nearest recreational resource to the project area is Warm Springs Park, located approximately 2,000 feet to the south of the project area, across East Warren Avenue. Because of its distance from the project area, project activities would not cause an adverse effect on this facility. Therefore, the project would have no impacts related to recreation. Potential conflicts with the use of bicycle lanes located within the project area are discussed in Section 5.5, Transportation and Circulation.

5.1.1.4 Public Services

The proposed project would be constructed entirely within the BDPL Nos. 3 and 4 ROW and would not increase the number of employees working in the area. Therefore, the project would not require any new or physically altered governmental facilities to maintain acceptable service ratios, response times, or other performance objectives for any public services, including fire protection, police protection, schools, and other services. Therefore, the project would have no impacts related to public services.

5.1.1.5 Agriculture

The proposed project would be located on a site that has already been developed, and there are no agricultural uses on the project site or in the project area. Further, the project site is not zoned for such uses, and the project would not include any improvements that would require a change in land use. The California Department of Conservation's Farmland Mapping and Monitoring Program identifies the project site as Urban and Built-Up Land, defined as "…land [that] is used for residential, industrial, commercial, institutional facilities, cemeteries, airports, golf courses, sanitary landfills, sewage treatment, and water control structures" (California Department of Conservation, 2008). The proposed project would not convert any Prime Farmland, Unique Farmland, or Farmland of Statewide Importance to non-agricultural use, and would not conflict with existing agricultural land uses, zoning for agricultural land use, or a Williamson Act contract. Therefore, the project would have no impact on agricultural resources.

5.1.2 Significance Determinations

Thresholds of significance are used to assess the severity of environmental impacts on a project. The San Francisco Planning Department's Major Environmental Analysis (MEA) guidance was used in determining the significance criteria for this EIR. The MEA guidance is based on the CEQA Guidelines Appendix G, but includes some modifications. The significance criteria used to analyze each environmental resource topic are presented before the impacts discussion in each relevant section of Chapter 5. The following categories are used to designate impact significance:

- **No Impact (NI).** This determination applies if the project would have no impact relative to a significance criterion. For example, although the project would affect stormwater drainage, it would not require the construction of new stormwater drainage facilities or expansion of existing stormwater facilities. Therefore, there would be no impact related to the need for new stormwater drainage facilities or expansion of existing facilities.

- **Less than Significant (LS).** This determination applies if there is a potential for some limited impact relative to a significance criterion, but not a substantial adverse effect that qualifies under the significance criteria as a significant impact. Less than significant impacts do not require mitigation under CEQA.

The following significance determinations indicate the results of the impact analysis at two stages. The first determination represents the level of impact significance without mitigation, and the second determination represents the level of impact significance with implementation of the identified mitigation measure.

- **Potentially Significant before Mitigation/Less than Significant with Mitigation (PS/LS).** This determination applies if there is a potential for some adverse effect according to the significance criteria, but mitigation can reduce the impact to a less-than-significant level. Identification as "potentially" significant indicates a potential for this impact to occur but there is not enough project or site-specific information at this time to definitively determine that it is significant. In these cases, the EIR makes the more conservative determination. The impacts identified as "potentially significant" are treated as significant impacts in this EIR and thus require the identification of mitigation measures to reduce these impacts to a less than significant level.

- **Significant before Mitigation/Less than Significant with Mitigation (S/LS).** This determination applies to impacts that are significant and likely to occur, but for which mitigation can reduce the impact to a less-than significant level.

- **Significant, Unavoidable (S/SU).** This determination applies to impacts that are significant, but for which there appears to be no feasible mitigation to reduce the impacts to a less-than-significant level. Although some mitigation could be applied to lessen the impact, the residual effect would remain significant, and the impact is therefore unavoidable.

In determining the significance of a potential project impact, the analysis first describes the nature, frequency, magnitude, and/or severity of a potential effect and determines whether it is significant, potentially significant, or less than significant, or whether there would be no impact or the impact would not be applicable to the project.

As part of the significance determination process, the analysis considers whether or not compliance with applicable regulations would result in the implementation of environmental protection measures that could reduce a potentially significant impact to a less-than-significant level. In cases where there are no applicable regulations or such regulations exist, but by themselves they would not reduce an impact to a less-than-significant level, the impact is considered potentially significant (PS) or significant (S). If feasible mitigation measures could reduce these potentially significant or significant impacts to a less-than-significant level, the impact is defined as less than significant after mitigation. The EIR identifies mitigation measures to address all potentially significant and significant impacts.

Within each section in this chapter, a summary table at the beginning of the impact discussion summarizes the potential impacts and indicates the level of impact significance before and after mitigation. Throughout this EIR, environmental impacts are referred to with an impact prefix (e.g., LU for Land Use and Land Use Planning) followed by sequential numbers. The corresponding mitigation measures are numbered likewise; for example, Mitigation Measure M-LU-1 addresses Impact LU-1.

CEQA Section 15126.4 states that "if a mitigation measure would cause one or more significant effects in addition to those that would be caused by the project as proposed, the effects of the mitigation measure shall be discussed but in less detail than the significant effects of the project as proposed." The mitigation measures specified in Section 5.9, Biological Resources, would, for the most part, be implemented within the project area and the impacts would be similar to those of the proposed project. Implementation of these measures would not result in significant impacts beyond those disclosed for the project itself. However, some of the mitigation measures identified in this section could require off-site actions that could have secondary impacts. Therefore, Section 5.9 includes a discussion of potential secondary impacts.

5.1.3 References

California Department of Conservation. “Alameda County: Important Farmland”, 2008. Available at http://redirect.conservation.ca.gov/DLRP/fmmp/county_info_results.asp, accessed on March 17, 2009.

5.2 Land Use and Land Use Planning

This section provides an overview of existing land uses within and surrounding the project area, describes the laws and regulations that establish jurisdictional authority for land use planning, and evaluates the potential land use impacts of the proposed project.

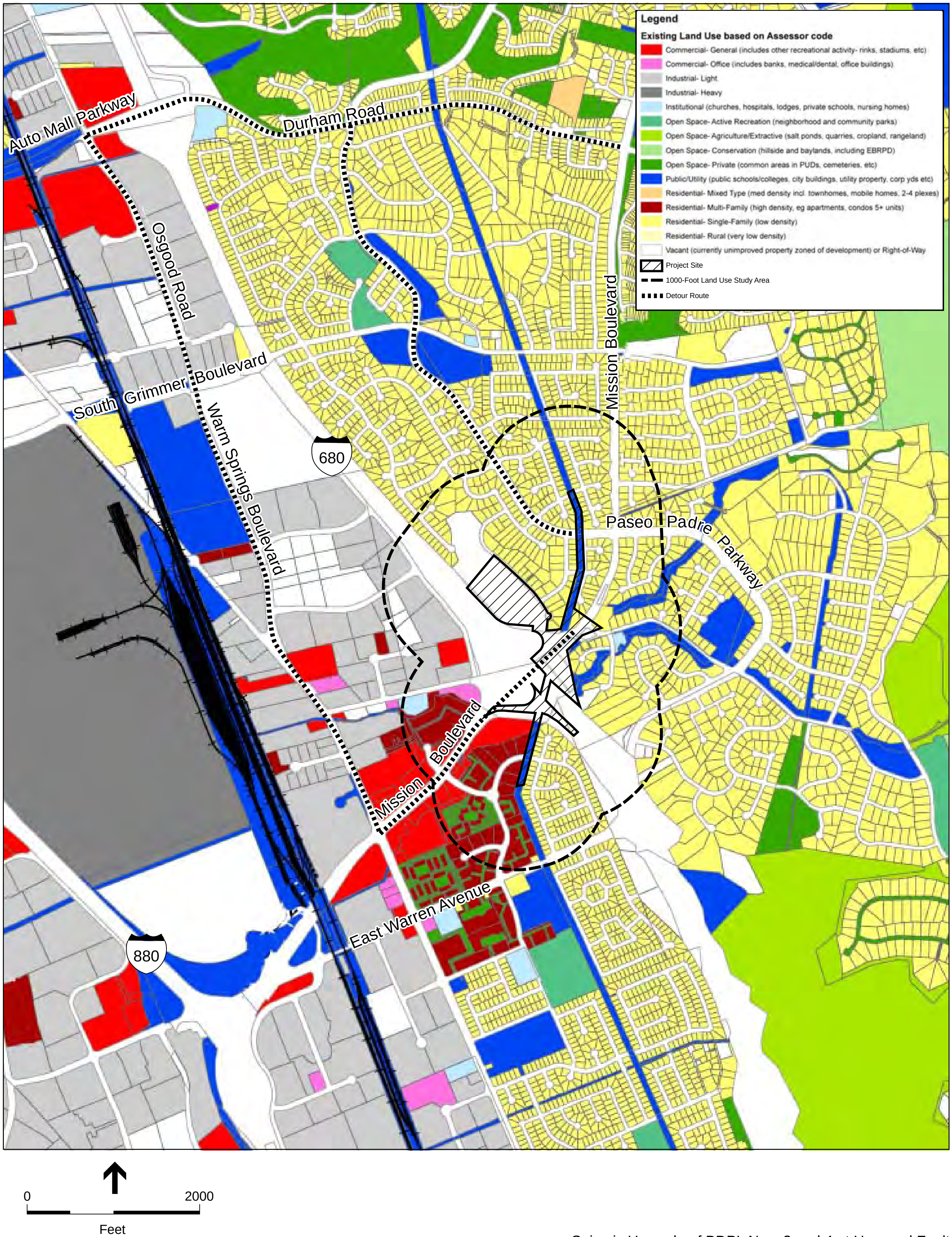
5.2.1 Setting

The project area is located entirely within the city of Fremont. BDPL Nos. 3 and 4 cross the Hayward fault near the intersection of Interstate 680 (I-680) and Mission Boulevard (see Figure 3.1 in Chapter 3, Project Description). The sections of the pipeline to be upgraded are located within the 80-foot SFPUC right-of-way (ROW) between the South and North Shutoff Stations. The limits of proposed construction activities extend approximately 3,800 linear feet along the SFPUC's existing 80-foot-wide pipeline ROW for BDPL Nos. 3 and 4; the estimated total disturbance area is 29 acres, including four construction staging areas that would be established adjacent to and outside of the ROW. This analysis discusses land uses within 1,000-feet of the project area, as well as along the detour routes for the temporary I-680 on-ramp and the Mission Boulevard closures (see **Figure 5.2-1**).

5.2.1.1 Regional Land Use Context

Fremont, which was incorporated in 1956, covers an area of approximately 90 square miles in southern Alameda County. The city is framed by the Fremont Hills to the east, by the water and salt ponds of San Francisco Bay to the west, and by the urbanized communities of Union City to the north and Milpitas to the south. Land use patterns in Fremont are defined by the city's topography, its agricultural past, certain transportation investments (ranging from railroads to freeways), and by the communities that developed around the original historic areas of the city (City of Fremont, 2008).

Fremont is divided into nine major neighborhoods or planning areas (City of Fremont, 2008). The project area is located at the junction of three planning areas: Industrial, Mission San Jose, and Warm Springs. Lands to the west of I-680 and north of Mission Boulevard are located in the Industrial Planning Area, which encompasses the majority of the city's research and development, biotechnology, engineering, and high-tech and office-related uses in a business park setting. Lands northeast of the intersection of I-680 and Mission Boulevard are within the Mission San Jose Planning Area, which is one of the city's original historic areas and includes residential and community-based commercial land uses as well as Ohlone College. To the south of Mission Boulevard is the Warm Springs Planning Area, another original historic area. Unlike in the Mission San Jose Planning Area, the heritage and evidence of the earlier town in the Warm Springs area have disappeared. The Warm Springs Planning Area includes the Warm Springs and Avalon residential neighborhoods as well as an auto-oriented commercial center near the intersection of Warm Springs Boulevard and Mission Boulevard.



SOURCE: City of Fremont, 2008

Seismic Upgrade of BDPL Nos. 3 and 4 at Hayward Fault

Figure 5.2-1

Existing Land Uses Based on Alameda County Assessor Codes

5.2.1.2 Existing Land Uses

In the vicinity of the project area, the existing BDPL Nos. 3 and 4 ROW is bordered to the north and south by residential neighborhoods and crosses I-680, Mission Boulevard, three I-680 on-ramps, Agua Caliente Creek (contained in an underground culvert), and Agua Fria Creek (a free-flowing creek where it crosses the BDPL Nos. 3 and 4 ROW). The project area includes the existing BDPL Nos. 3 and 4 ROW, which is undeveloped land; a California Department of Transportation (Caltrans) easement for I-680 and Mission Boulevard (the Caltrans ROW), which is occupied by roadways or open space; and private property. The project area includes eight construction zones and four staging areas, as shown on Figure 3.9 in Chapter 3, Project Description.

The BDPL Nos. 3 and 4 ROW on either side of the I-680 interchange is identified by the City of Fremont as open space (City of Fremont, 2009). Figure 5.2-1[1] depicts existing land uses in the vicinity of the project area, and **Table 5.2-1** describes the land uses within 1,000 feet of each construction zone and staging area. These uses include privately owned housing and businesses; the Caltrans ROW for Mission Boulevard and I-680, including open space areas; and the Agua Fria and Agua Caliente Creek corridors, which are managed by the Alameda County Flood Control and Water Conservation District (ACFCWCD). Residences abut the SFPUC ROW for approximately 1,700 feet on the north and 800 feet on the south. To the north, the residences are primarily single-family dwelling units; south of I-680, residences are a mix of single-family and multi-family dwelling units. The only school within 1,000 feet of the project area is Kiddo Land Learning Center at 46280 Briar Place; this facility is approximately 600 feet from the project area, near the intersection of Mission Boulevard and Curtner Road, north of I-680. An Extended Stay America Hotel is located approximately 350 feet west of the project area on Mission Boulevard.

As discussed in Chapter 3, Section 3.5, Project Construction, construction activities would require temporary closure of the I-680 northbound loop on-ramp and northbound diamond on-ramp as well as Mission Boulevard during installation and removal of the temporary bridges. For closure of the I-680 on- and off-ramps, the SFPUC would establish a traffic detour along Warm Springs Boulevard – Osgood Road on the west side of I-680 to provide a connection from Mission Boulevard to northbound I-680 via the Durham Road interchange (shown on Figure 5.2-1). Existing land uses along the detour route are primarily business parks occupied by research and development, biotechnology, and high-tech companies as well as office-related uses. General commercial land uses also exist in the vicinity of Warm Springs Boulevard – Osgood Road and Auto Mall Parkway.

For closure of Mission Boulevard, a detour would be created to route traffic around the closed portion of Mission Boulevard. From Mission Boulevard, westbound traffic on the east side of I-680 would be detoured north on Paseo Padre Parkway, west on Durham Road – Auto Mall Parkway, and south on Osgood Road – Warm Springs Boulevard – Osgood Road. Eastbound

1 Existing land uses presented in Figure 5.2-1 were identified by the City of Fremont in preparation for its General Plan Update 2030 using Alameda County Assessor tax codes; these were refined and corrected against actual known land uses.

TABLE 5.2-1
EXISTING LAND USES WITHIN THE PROJECT AREA AND SURROUNDING AREAS

Construction Zone	Description	Surrounding Land Uses
Zone 1	SFPUC ROW corridor and across Agua Fria Creek	Single- and multi-family residential Extended Stay America Hotel Commercial (including general commercial and office commercial) Open space (includes the riparian corridor along Agua Fria Creek managed by ACFCWCD) Public transportation facilities (Caltrans ROW) Industrial (research and development uses north of Brown Road)
Zone 2	Beneath southbound diamond on-ramp to I-680 and associated soundwall	
Zone 3	Across the Caltrans landscaped open space area west of I-680	
Zone 4	Beneath I-680 and the northbound loop on-ramp to I-680	Public transportation facilities (Caltrans ROW) Single-family residential
Zone 5	Across the Caltrans landscaped open space area east of I-680	
Zone 6	Beneath the I-680 northbound diamond on-ramp and across Caltrans landscaped open space	
Zone 7	Beneath Mission Boulevard and the I-680 northbound diamond on-ramp	Public transportation facilities (Caltrans ROW) Single-family residential Institutional (Kiddo Land Learning Center) private daycare Public utilities (including Agua Caliente Creek culvert maintained by Caltrans)
Zone 8	SFPUC ROW corridor	Single-family residential
Staging Area 1	Triangle-shaped Caltrans landscaped open space area between the Mission Boulevard southbound diamond on-ramp and the I-680 southbound loop off-ramp	Public transportation facilities (Caltrans ROW)
Staging Area 2	Caltrans landscaped open-space areas south of Mission Boulevard	Public transportation facilities (Caltrans ROW) Single-family residential
Staging Area 3	Caltrans landscaped open-space areas north of Mission Boulevard; a portion of this staging area is on undeveloped private property	Public transportation facilities (Caltrans ROW) Single-family residential
Staging Area 4	Vacant private property bounded by Crystalline Drive and I-680 northbound diamond on-ramp	Public transportation facilities (Caltrans ROW) Single-family residential
Detour Route	Warm Springs Boulevard – Osgood Road, Auto Mall Parkway	Business Parks General Commercial
Detour Route	Durham Road, Paseo Padre Parkway	Single-family residential Public/Utility Open space

NOTE: Existing land uses derived from Alameda County Assessor's Office Land Use codes.

SOURCE: City of Fremont, 2008.

traffic on the west side of I-680, including traffic from the areas between Warm Springs Boulevard and I-680, would be detoured from Mission Boulevard, north on Warm Springs Boulevard – Osgood Road, and west on Auto Mall Parkway – Durham Road to Mission Boulevard. Northbound I-680 traffic needing to access eastbound or westbound Mission Boulevard would also be directed to use these detour routes. During closure of eastbound Mission Boulevard, southbound traffic on I-680 would be directed to use the Auto Mall Parkway exit and would access Mission Boulevard via Durham Road. These detour routes are indicated on Figure 5.2-1. The Mission Boulevard detour on the east side of I-680 would be the same as that for the I-680 on-ramp closures. On the west side of I-680, the detours use Durham Road and Paseo Padre Parkway, both of which traverse single-family residential neighborhoods.

5.2.2 Regulatory Framework

5.2.2.1 Federal and State Regulations

No federal or state land use regulations directly apply to the proposed project.

5.2.2.2 Local Regulations

Under California Government Code Section 53090 et seq., the SFPUC receives intergovernmental immunity from city and county zoning and building ordinances. Please see Chapter 4, Plans and Policies, for a discussion of the regulatory setting related to land use plans and policies and more detailed information regarding intergovernmental immunity.

5.2.3 Impacts

5.2.3.1 Significance Criteria

The City and County of San Francisco has not formally adopted significance standards for impacts related to land use but generally considers that implementation of the proposed project would have a significant impact on land use and land use planning if it were to:

- Physically divide an established community;
- Have a substantial impact on the existing character of the vicinity; or
- Substantially disrupt or displace existing land uses or land use activities.

5.2.3.2 Approach to Analysis

Due to the nature of the proposed project, there would be no impacts related to the following criteria; therefore, no impact discussion is provided for these topics for the reasons described below:

> *Divide an established community*. With the exception of modifications to the existing slip-joint vault in the vicinity of the northbound loop on-ramp to I-680, several access manholes, and

> the north and south access structures for the articulated vault, all facility improvements under the proposed project would be constructed below grade within the existing SFPUC ROW for BDPL Nos. 3 and 4. The aboveground structures would be located within the ROW and would not divide an established community. Therefore, although the project area and existing ROW physically cross an established community, the project would not divide the community, so no impact would result. No additional discussion is presented regarding potential project impacts related to the division of an established community.

The proposed project components would be constructed almost entirely below grade within the SFPUC's existing ROW for BDPL Nos. 3 and 4, which, under existing conditions, is already used for water conveyance. Thus, the assessment of land use impacts focuses on temporary impacts on existing land uses and the existing character of the vicinity during project construction. Because construction activities would take place in developed areas and near land uses that are potentially sensitive to construction effects, the proposed project has the potential to affect or conflict with adjacent land uses and the existing character of the vicinity.

This analysis considers the proximity of construction activities and staging areas to land uses such as residential areas and schools and the project's potential to displace or disrupt these existing uses and to affect the existing character of the project vicinity during construction. These temporary effects could occur from adjacent construction activity and associated noise, vibration, dust, traffic congestion, and/or interrupted access as well as traffic noise along the proposed detour routes. Each of these potential construction effects is evaluated separately in Sections 5.5, Transportation and Circulation; 5.6, Noise; and 5.7, Air Quality. However, the intensity or potential combination of these construction effects and their potential to affect existing land uses and the existing character of the project vicinity is considered in this section. Impacts specific to recreational and agricultural land uses are discussed in Section 5.1.1, Scope of Analysis.

5.2.3.3 Impact Analysis

Summary of Impacts

Table 5.2-2 summarizes the potential land use impacts and the significance of project impacts before and after mitigation.

Construction Impacts

Impact LU-1: Temporary impacts related to disruption of existing land uses and effects on the existing character of the project vicinity during construction.

As discussed below, the proposed project could temporarily disrupt existing land uses and affect the character of the project vicinity as a result of construction activities and associated increases in traffic and noise as well as changes in air quality.

TABLE 5.2-2
SUMMARY OF IMPACTS – LAND USE AND LAND USE PLANNING

Impact	Significance Determination Before Mitigation	Significance Determination After Mitigation
Impact LU-1: Temporary impacts related to disruption of existing land uses and effects on the existing character of the project vicinity during construction.	S	SU
Impact LU-2: Temporary impacts related to displacement of existing land uses and effects on the existing character of the project vicinity during construction.	LS	–

LS = Less than Significant impact
PS = Potentially Significant impact
S = Significant impact
SU = Significant and Unavoidable impact, even with mitigation incorporated
– = Mitigation not required

Construction-Related Effects on Existing Land Uses and the Character of the Project Vicinity

The total duration of construction activities is estimated to be 27 months, with concurrent activity in two or more of the construction zones depending on the construction phasing. Land uses that could be affected by construction include residences that border the south and north ends of the pipeline alignment as well as industrial, commercial, and residential land uses along the proposed detour routes. Construction activities would not directly affect land uses in the project vicinity because construction would occur within the BDPL Nos. 3 and 4 ROW and associated staging areas. However, construction activities could cause nuisances to the surrounding land uses, including: traffic disruption related to the use of detours during temporary and intermittent nighttime construction, increases in construction-related traffic, and impeded access that could affect travel by residents in the project vicinity; noise impacts related to construction and truck traffic that could increase noise levels during the daytime and interfere with daily activities, noise increases during temporary bridge installation and removal and associated truck traffic as well as traffic along the proposed detour routes that could interfere with sleep when construction occurs at night; and air quality impacts related to increases in dust emissions. These effects could disrupt indoor or outdoor activities, thereby temporarily affecting the land uses and the existing character of the project vicinity.

A detailed analysis of traffic, noise, and air quality impacts related to proposed project is presented in the sections that follow (see Section 5.5, Transportation and Circulation, Section 5.6, Noise, and Section 5.7, Air Quality). The following is a summary of significant impacts related to the potential to disrupt existing land uses and affect the existing character of the project vicinity during construction that would result:

- Short-term impacts related to disruption of land uses from increased traffic on detour routes would be *significant* if the Mission Boulevard or I-680 on-ramp closures occurred outside the proposed times and without appropriate traffic management measures that would reduce traffic congestion and delays on the detour route (see Impact TR-1 in

Section 5.5). This land use impact would be reduced to a less-than-significant level with implementation of **Mitigation Measure M-TR-1, Traffic Control Plan**, which would require the preparation and implementation of a traffic control plan that would restrict the time periods when ramp closures would be permitted, thereby avoiding traffic disruptions that would disrupt land use activities.

- Short-term impacts related to disruption of land uses from construction noise during the daytime would be *significant* because the noise levels from construction equipment would exceed the speech interference criterion and haul and delivery truck noise could substantially exceed ambient noise levels at nearby residences, disrupting both indoor and outdoor residential uses (see Impacts NO-1 and NO-3). Implementation of **Mitigation Measure M-NO-1a, Noise Control Plan**, requiring implementation of noise reduction measures as part of a noise control plan; **Mitigation Measure M-NO-1b, Temporary Noise Barriers or Enclosures** requiring temporary noise barriers or enclosures along the ROW boundary in Zones 1 and 8 (where feasible); **Mitigation Measure M-NO-1c, Setback Restrictions**, requiring the contractor to locate all construction activities in Staging Area 4 at least 90 feet from residential receptors on Crystalline Drive; and **Mitigation Measure M-NO-3, Haul and Delivery Truck Operation Limits**, requiring that the access road to Staging Area 4 is located so that it affects the fewest number of residences as possible could reduce noise levels to less than the speech interference criterion or ambient noise levels. However, the feasibility of implementation of Mitigation Measures M-NO-1a, M-NO-1b, and M-NO-3 is uncertain, and consistent with the noise analysis, noise levels could exceed the speech interference criterion at the closest residential receptors to Zones 1 and 8, or could substantially exceed ambient noise levels along the haul truck route to Staging Area 4, even after mitigation. Therefore, implementation of the project would result in the short-term disruption of land uses, a significant and unavoidable impact.

- Short-term impacts related to disruption of land uses from nighttime construction would be *significant and unavoidable* because nighttime work would be conducted approximately 17 times over approximately 11 months for installation and removal of the temporary bridges on the I-680 on-ramps and Mission Boulevard. This nighttime construction would result in nighttime noise levels above the sleep interference criterion at the nearest sensitive receptor from construction activities, delivery truck traffic, and increased traffic on detour routes through residential neighborhoods (see Impacts NO-1 and NO-3). Nighttime vibration levels could also exceed the vibratory annoyance threshold (see Impact NO-4). Implementation of **Mitigation Measure M-NO-1a, Noise Control Plan,** requiring implementation of noise reduction measures as part of a noise control plan; **Mitigation Measure M-NO-1b, Temporary Noise Barriers or Enclosures,** requiring the construction contractor to erect temporary noise barriers or enclosures if feasible; **Mitigation Measure M-NO-1d, Nighttime Restrictions on Construction Activities**, requiring the contractor to restrict certain construction activities at night to the maximum extent feasible to reduce nighttime construction noise levels to the adjusted sleep interference criterion; **Mitigation Measure M-NO-3, Haul and Delivery Truck Operation Limits**, requiring time restrictions on truck traffic to the maximum extent possible; and **Mitigation Measure M-NO-4a, Vibration Limits**, limiting vibration levels associated with nighttime operation of heavy equipment, could reduce these impacts to a less-than-significant level. However, since some activities might have to be performed at night during the non-peak traffic periods, and since the feasibility of implementing some of these measures is uncertain, nighttime construction noise and vibration levels could occasionally exceed the applicable criterion. Therefore, potential nighttime exceedances of the sleep interference criterion and vibratory annoyance threshold, if they occur, would result in the short-term disruption of land uses, a significant and unavoidable impact.

- The project would involve significant emissions of fugitive dust (see Impact AQ-1) that could cause annoyance and disrupt land uses or affect the existing character of the vicinity, resulting in short term land use impacts. However, implementation of **Mitigation Measure M-AQ-1a, BAAQMD Dust Control Measures** would reduce land use impacts associated with dust emissions to *less than significant*.

In addition to the mitigation measures identified above for traffic and noise related impacts, the SFPUC would implement **Mitigation Measure M-LU-1: Neighborhood Notice** to help minimize construction-related land use impacts associated with construction by ensuring that property owners and tenants are notified prior to the start of construction, procedures for distribution of additional construction schedule/activities information and registration of complaints are developed and provided to the public, and alternative access routes are identified (as feasible). Although this mitigation measure, in addition to the mitigation measures described above, would help minimize construction-related land use effects, and would provide the public with the tools they need to plan around these effects and file complaints with the SFPUC if necessary, impacts related to the disruption of existing land uses and effects on the existing character of the project vicinity during construction would remain *significant and unavoidable* because of the significant and unavoidable impacts related to noise.

Impact LU-2: Temporary impacts related to displacement of existing land uses and effects on the existing character of the project vicinity during construction.

Staging Area 4 and a portion of Staging Area 3 are proposed to be located on private property that is currently vacant and undeveloped. Temporary construction easements and staging areas are also proposed within the Caltrans ROW for Staging Areas 1, 2, and 3, which are also undeveloped and would require encroachment permits. Because all of these areas are currently undeveloped, no active land uses would be displaced. Therefore, impacts related to the displacement of existing land uses during project construction would be *less than significant.* Furthermore, for activities within the Caltrans ROW, the SFPUC would obtain all necessary permits for construction activities and would abide by the permit conditions. For Staging Area 4 and the portion of Staging Area 3 located on private property, the SFPUC would make arrangements with the property owners for temporary use of their land for construction staging and would obtain temporary construction easements or other authorizations.

All other construction activities would be conducted on SFPUC property within the BDPL Nos. 3 and 4 ROW. The only land use within the ROW includes the existing underground pipelines and associated facilities. Therefore, there would be no change in land use or any displacement of land uses associated with construction in the ROW.

Facility Siting, Operation, and Maintenance Impacts

Following completion of proposed improvements to BDPL Nos. 3 and 4, pipeline operations would be consistent with existing operations, and pipeline maintenance would occur as needed. While project facilities would be monitored regularly in accordance with the standard inspection schedule, the frequency of monitoring or maintenance activities would not change substantially from current conditions and operation of the improved pipelines. All structures except for the modified slip-joint vault, access structures to the new articulated vault, and structures such as blowoff and air-relief valves would be constructed below ground within the existing ROW for BDPL Nos. 3 and 4. No new land uses would be introduced, and the project would not require the permanent acquisition of additional property. Therefore, operations and scheduled maintenance of the pipeline would not disrupt or divide an established community or displace an existing land use, and there would be no impacts related to land use and land use planning during operation and maintenance of the project.

5.2.4 Mitigation Measures

Mitigation Measure M-LU-1: Neighborhood Notice.

The SFPUC or its contractor will provide 14-day advance notice by mail to all residents, tenants, and/or property owners within 300 feet of project construction zones. The notice will state the construction location, activity, and schedule. The notice will provide alternative routes or detours, locations of delayed or impeded access, and suggestions to avoid traffic delays and reduce the effects of construction-related noise as well as dust and exhaust emissions (e.g., planning alternative schedules, closing windows facing the planned construction sites). The SFPUC will identify and provide a public liaison person before and during construction to respond to the concerns of neighboring residences, businesses, hospitals, schools, and other public facilities. Procedures for contacting the public liaison officer via a toll-free telephone number, email, or in person will be included in the mailed notices. Prior to construction, the SFPUC communications manager, resident engineer, and construction manager will develop and review procedures for receiving and responding to questions and complaints.

Mitigation Measure M-TR-1: Traffic Control Plan.

(See Section 5.5, Transportation and Circulation)

Mitigation Measure M-NO-1a: Noise Control Plan.

(See Section 5.6, Noise)

Mitigation Measure M-NO-1b: Temporary Noise Barriers or Enclosures.

(See Section 5.6, Noise)

Mitigation Measure M-NO-1c: Setback Restrictions.

(See Section 5.6, Noise)

Mitigation Measure M-NO-1d: Nighttime Restrictions on Construction Activities.

(See Section 5.6, Noise)

Mitigation Measure M-NO-3: Haul and Delivery Truck Operation Limits.

(See Section 5.6, Noise)

Mitigation Measure M-NO-4a: Vibration Limits.

(See Section 5.6, Noise)

5.2.5 References

City of Fremont, *Land Use Background Report for the General Plan Update 2030*, February 2008.

City of Fremont, *Zoning Atlas*, last updated February 24, 2009. Available online at http://www.fremont.gov/DocumentView.aspx?DID=1999, accessed October 19, 2009.

5.3 Aesthetics

This section provides an assessment of the visual character of the project area and evaluates the potential visual impacts that could result from implementation of the proposed project. This analysis describes the existing visual setting, evaluates the project's effect on visual resources, and addresses the impacts of the proposed project on views from designated scenic roads, scenic areas, and/or public view corridors. Mitigation measures to reduce significant impacts to a less-than-significant level are identified in Section 5.3.4.

5.3.1 Setting

Scenic vistas, roadways, and corridors are established for the purpose of protecting or preserving an aesthetic resource and are typically documented in general plans and resource management plans. For the purpose of this assessment, visual resources are generally defined as the natural and built landscape features that can be seen. Visual character, visual quality, and visual sensitivity are three terms used throughout this section. Visual character is the unique combination of landscape features that combine to make a view, including native landforms, water, and vegetation patterns as well as built features such as buildings, roads, and other structures. Landscape and built features combine to form unique perspectives with varying degrees of visual quality. Visual quality is the intrinsic appeal of a landscape or scene due to the combination of natural and built features in the landscape and is rated in this analysis as high, medium, or low. Visual sensitivity is the level of interest or concern that the public has for a particular aesthetic resource. Visual sensitivity is a measure of how noticeable proposed changes might be in a particular scene and is determined based on the distance from a public viewer and the proposed changes and the duration that a particular view would be available to the viewer. Areas such as scenic vistas, parks, trails, or scenic roadways typically have high visual quality and sensitivity because these locales appear natural, view durations are typically long, and close-up views are more commonly available.

This section describes the existing visual setting in the project area. More specifically, this section summarizes scenic resources, including scenic routes and scenic vistas located in the vicinity of proposed project. Site reconnaissance visits were conducted in October 2008 and May 2009 to observe the project site and surrounding area and to take representative photographs of existing visual conditions. A set of 11 photographs is included in this section to document the existing visual conditions of the project site and adjacent area. **Figure 5.3-1** provides an overview of photo locations; **Figures 5.3-2** through **5.3-4** depict views of the project site and adjacent area.

5.3.1.1 Visual Character and Quality

The visual character of the project area is typical of the Mission San Jose and Warms Springs planning areas of Fremont (see Section 5.2, Land Use and Land Use Planning), consisting of a suburban setting with residential and commercial land uses. The City of Fremont considers the Fremont Hills, which lie to the east of Fremont, to be a unique visual resource (City of Fremont, 1991). The Fremont Hills are the predominant visual feature of the project area. Landscaping

Viewpoint Location and Direction

Limits of Project Area

Construction Access

Caltrans Right Of Way

Existing BDPL No. 3

Existing BDPL No. 4

SFPUC Right of Way

New BDPL No. 3X

1 Staging Area 1

2 Staging Area 2

3 Staging Area 3

4 Staging Area 4

Note: Viewpoint labels refer to the picture number in Figures 5.3-2 through 5.3-4

0 400

Feet

SOURCE: GlobeXplorer; URS, 2008a

Figure 5.3-1
Location and Direction of Photo Viewpoints

2a. SFPUC ROW from Crawford Street looking southwest.

2b. South Shutoff Station from Crawford Street looking northeast.

2c. Staging area 1 and Agua Fria Creek riparian zone from the I-680 southbound offramp looking southwest.

2d. Slip-joint vault and staging areas 2 and 3 from northbound I-680 looking north.

SOURCE: ESA+Orion

Seismic Upgrade of BDPL Nos. 3 and 4 at Hayward Fault

Figure 5.3-2
Views of the Project Site and Surrounding Area

3a. Slip-joint vault and staging areas 2 and 3 from the Mission Boulevard/northbound onramp looking south.

3b. Staging areas 3 and 4 from eastbound Mission Boulevard looking north.

3c. Staging area 4 from northbound I-680 looking north.

3d. SFPUC ROW and North Shutoff Station from Nugget Place and Tissiack Place looking southwest.

SOURCE: ESA+Orion

Seismic Upgrade of BDPL Nos. 3 and 4 at Hayward Fault

Figure 5.3-3

Views of the Project Site and Surrounding Area

4a. SFPUC ROW from Nugget Way looking south towards the I-680/Mission Blvd. interchange.

4b. SFPUC ROW from Tissiack Place looking southwest.

4c. Staging areas 2 through 4 and SFPUC ROW from Crystalline Drive looking southeast.

SOURCE: ESA+Orion

Figure 5.3-4

Views of the Project Site and Surrounding Area

typical of a planned community built in the 1970s is present throughout and adjacent to the project area, and includes mature trees and shrubs in the SFPUC and California Department of Transportation (Caltrans) ROWs and along public roadways adjacent to the project area. The project area is bisected by Interstate 680 (I-680), which Caltrans has officially designated a state scenic highway north of Mission Boulevard for its views of wooded hills and valleys as seen from I-680 (Caltrans, 2009). The City of Fremont and Alameda County have designated I-680, Mission Boulevard, and Paseo Padre Parkway as scenic routes and considers these roads "from which the City is best seen" (City of Fremont, 1991). The visual quality of this area is considered moderate due to the prominence of the Fremont Hills in long-range views from the project area, as described below.

Land use at the southern end of the project area (Construction Zone 1 and the southern end of the SFPUC ROW within the project area) is mixed residential and includes single- and multi-family homes and apartments adjacent to the SFPUC ROW. Views of the SFPUC ROW and the aboveground portion of the South Shutoff Station are prominent from adjacent residences and consist of flat grassland, the shutoff station, perimeter fencing, and the riparian corridor of Agua Fria Creek to the north (see Figure 5.3-2, photos a and b). Backyard fencing and residential landscaping partially screen views of the SFPUC ROW and project area.

Views of the southern portion of the project area (Construction Zones 2 and 3 and Staging Area 1) from I-680 and Mission Boulevard, which are designated scenic routes, include the road network, freeway soundwalls, commercial land uses, and the non-native grassland found within the freeway interchange (see Figure 5.3-2, photo c). The Agua Fria Creek riparian corridor is visible from I-680 and appears as a natural undeveloped area adjacent to the transportation corridor.

Views of the center portion of the project area (Construction Zones 5 through 7 and Staging Areas 2 through 4) from I-680 and Mission Boulevard include the road network, freeway soundwalls, single-family residences, and undeveloped grassland within the freeway interchanges. The existing slip-joint vault is partially screened from public views by small trees and shrubs, as shown on Figure 5.3-2, photo d, and Figure 5.3-3, photo a. Partial views of the Agua Fria Creek riparian corridor can be seen from westbound Mission Boulevard. Staging Area 4 is prominent in views from northbound I-680 and appears as a large area of undeveloped grassland; Staging Areas 3 and 4 are also visible from eastbound Mission Boulevard (see Figure 5.3-3, photos b and c). Distant views of the Fremont Hills are also visible from these roadways.

The northern end of the project area (Construction Zone 8) consists of single-family homes. Views of the SFPUC ROW and the aboveground portion of the North Shutoff Station from adjacent residences are prominent and consist of relatively flat grassland as well as the shutoff station and associated access and temporary fencing (see Figure 5.3-3, photo d, and Figure 5.3-4, photo a). Mature trees and residential landscaping partially screen views of the project area from neighboring residences. The North Shutoff Station and SFPUC ROW are visible from Paseo Padre Parkway for approximately 200 feet, as it intersects the ROW. At the western end of Construction Zone 8, views of Mission Boulevard and I-680 are mostly screened from residences by fences, trees, and residential landscaping (see Figure 5.3-4b). Staging Areas 3 and 4, the I-680/Mission

Boulevard interchange, and I-680 itself are prominent in views from the residences along Crystalline Drive. Staging Area 4 appears as a large area of undeveloped grassland (see Figure 5.3-4, photo c) with I-680 behind it. Distant views of the Fremont Hills are also visible from areas within the northern end of the project area.

5.3.1.2 Viewer Sensitivity

Accepted visual assessment methods, including those adopted by the Federal Highway Administration (FHWA) and other federal agencies, establish sensitivity levels as a measure of public concern regarding changes to scenic quality. Viewer sensitivity, one of the criteria for evaluating visual impact significance, is generally divided into high, moderate, and low categories. The factors considered in assigning a sensitivity level include viewer activity, view duration, viewing distance, adjacent land uses, and special management or planning designations. Research on the subject suggests that certain activities (e.g., recreational activities) tend to heighten viewer awareness of visual and scenic resources, while others tend to be distracting (FHWA, 1988). For example, recreational activities favor attention to scenery as compared to commuting to and from work.

Sensitive viewers of the project viewshed primarily include motorists traveling along designated scenic routes, including I-680, Mission Boulevard, and Paseo Padre Parkway. However, short-range views of the project area from designated scenic roadways are dominated by the existing roadway infrastructure and other built features, diminishing the scenic quality of this area. In general, the viewer sensitivity of this area is considered low to moderate.

5.3.2 Regulatory Framework

5.3.2.1 Federal Regulations

No federal visual quality regulations apply to the proposed project.

5.3.2.2 State Regulations

The California Scenic Highway Program, governed by the Streets and Highways Code, Section 260 et seq., was created in 1963 to preserve and protect highway corridors in areas of outstanding natural beauty from changes that would diminish the aesthetic value of the adjacent lands. Caltrans designates highways as scenic based on how much of the landscape can be seen by travelers, the scenic quality of the landscape, and the extent to which views are compromised by development. Caltrans has classified the stretch of I-680 that starts at Mission Boulevard and runs north to Highway 24 (in Contra Costa County) as an officially designated state scenic highway due to views of wooded hillsides and valleys (Caltrans, 2009).

The California Scenic Highway Program requires local governmental agencies to take the following actions to protect the scenic appearance of a corridor:

- Regulate land use and the density of development

- Provide detailed land and site planning
- Prohibit offsite outdoor advertising and control onsite outdoor advertising
- Pay careful attention to and control earthmoving and landscaping
- Scrutinize the design and appearance of structures and equipment

5.3.2.3 Local Regulations

The City of Fremont and Alameda County have designated I-680, Mission Boulevard, and Paseo Padre Parkway as scenic routes (City of Fremont, 1991). The City of Fremont states that, "scenic routes may be thought of as the network of places from which the City is best seen." In addition, the City of Fremont considers the Fremont Hills, which lie to the east of Fremont and are visible from the project area, to be a unique visual resource.

5.3.3 Impacts

5.3.3.1 Significance Criteria

The City and County of San Francisco has not formally adopted significance standards for impacts related to aesthetics, but generally considers that implementation of the proposed project would have a significant impact on visual quality if it were to:

- Have a substantial adverse effect on a scenic vista;
- Substantially damage scenic resources, including but not limited to trees, rock outcroppings, and other features of the built or natural environment that contribute to a scenic public setting;
- Substantially degrade the existing visual character or quality of the site and its surroundings; or
- Create a new source of substantial light or glare that would adversely affect daytime or nighttime views in the area or substantially affect people or properties.

5.3.3.2 Approach to Analysis

Due to the nature of the proposed project, there would be no impacts related to the following criterion; therefore, no impact discussion is provided for this topic for the reason described below:

> *Permanent Source of Light or Glare*. The proposed project would not involve the installation of permanent lighting or any aboveground structures that would be a substantial source of light or glare. Therefore, there would be no impact related to new sources of substantial light or glare during operation of the project, and this impact is not discussed further in this analysis.

The visual impacts analysis was based on field observations conducted by ESA+Orion in October 2008 and May 2009. The analysis identified potential temporary and permanent visual impacts of the project on scenic vistas, as seen from scenic highways and local scenic roads, and on other visual resources identified by the City of Fremont. Information from the Caltrans list of designated scenic highways and the *Fremont General Plan* was used to analyze the proposed project's potential impacts on scenic vistas and other visual resources, as well as its potential to substantially degrade the visual character or quality of the project area and to create a new source of light or glare. Both construction-related and operational impacts were assessed.

5.3.3.3 Impact Analysis

Summary of Impacts

Table 5.3-1 summarizes the aesthetics impacts associated with implementation of the proposed project and shows the significance determination for each impact.

TABLE 5.3-1
SUMMARY OF IMPACTS – AESTHETICS

Impact	Significance Determination Before Mitigation	Significance Determination After Mitigation
Impact AE-1: Construction-related impacts on scenic vistas, scenic resources, or the visual character of the surroundings.	S	LS
Impact AE-2: Temporary construction-related sources of light and glare.	LS	–
Impact AE-3: Permanent impacts on scenic vistas, scenic resources, or the visual character of a community.	LS	–

LS = Less than Significant impact
PS = Potentially Significant impact
S = Significant impact
SU = Significant and Unavoidable impact, even with mitigation incorporated
– = Mitigation not required

Construction Impacts

Impact AE-1: Construction-related impacts on scenic vistas, scenic resources, or the visual character of the surroundings.

Construction activities within the project area would occur over a two-year period and would involve equipment operation and soil stockpiling throughout different sections of the entire project area, as well as construction of temporary bridges on the northbound on-ramps to I-680 and Mission Boulevard. Overall, approximately 29 acres of ROW and approximately 16 acres of staging areas would be affected by construction activities at the project site, resulting in short-term impacts on the scenic resources and scenic quality of the project area. Grasslands and vegetation would be removed during excavation activities and would be disturbed by construction machinery in areas that are not excavated.

Although site activities and removed vegetation would be visible from I-680 and Mission Boulevard, and construction activities in the northern project area would be visible from Paseo Padre Parkway, and could result in visual impacts related to views from these designated scenic routes, the duration of time spent viewing construction areas from these roadways would be brief. Views of the Fremont Hills from I-680 would not be substantially obscured by project construction. Views of construction activities and removed vegetation within the BDPL Nos. 3 and 4 ROW and at Staging Area 4 would be highly visible from land uses in the southern and northern portions of the project area and would cause a short-term change in the visual character of the area (see Figure 5.3-2, photos a and b; Figure 5.3-3, photo d; and Figure 5.3-4, photos a through c). Therefore, construction activity in the project area would result in adverse effects on scenic vistas, scenic resources, and the visual character of the area and would be *significant*. Implementation of **Mitigation Measure M-HY-1, Construction Water Quality Best Management Practices,** requiring the SFPUC to preserve existing vegetation in areas where no construction activity is planned or where construction activity would occur at a later date, and to revegetate disturbed areas following construction, would ensure that the visual character of the construction area is restored following the completion of each construction component and that permanent effects on scenic vistas, scenic resources, and the visual character of the area do not occur (see Section 5.11, Hydrology and Water Quality). Implementation of this mitigation measure would therefore reduce this impact to a less-than-significant level.

Impact AE-2: Temporary construction-related sources of light and glare.

Nighttime construction lighting would be required to install and remove the temporary bridges on the northbound on-ramps to I-680 and Mission Boulevard. Nighttime construction would occur 17 nights during approximately 11 months (9 months for bridge installation and 2 months for bridge removal). In addition, temporary street lighting, similar to existing street lighting, would be used for the approximately 11-month period the bridges are in place. As described in Chapter 3, Project Description, Section 3.5.12, Construction Equipment, a lighting plan would be prepared that identifies locations and methods to minimize light spillover to adjacent residential areas. Therefore, temporary construction-related sources of light and glare would be *less than significant*.

Facility Siting, Operation, and Maintenance Impacts

Impact AE-3: Permanent impacts on scenic vistas, scenic resources, or the visual character of a community.

Long-term visual impacts could result from project construction, including removal of trees and vegetation, construction of new aboveground structures, and alteration of existing aboveground structures. See Section 5.9, Biological Resources, and Figure 5.9-2 for the location and species of trees that would be removed as part of the proposed project. In accordance with the SFPUC's Right of Way Integrated Vegetation Management Policy, existing trees would not be replaced within the ROW (see Chapter 4, Plans and Policies, Section 4.2.2.2). Potential long-term visual impacts are described below, by project area.

Agua Fria Creek (tree removal). Use of trenchless excavation techniques at Agua Fria Creek would require removal of six trees within the riparian zone. Due to the density of trees in the riparian zone, the tree removal would not significantly affect the visual character of the area as seen from land uses to the south of Agua Fria Creek or by motorists along I-680. However, the use of cut-and-cover excavation at Agua Fria Creek would require removal of all 26 trees within the 80-foot-wide ROW and would partially open views between the residential area to the south and the transportation corridor to the north. From land uses south of the riparian zone, a segment of the I-680 soundwall would be exposed. For motorists traveling along I-680, the continuous riparian zone seen in Figure 5.3-2c would be interrupted. However, removal of 26 trees in this area would not substantially degrade designated scenic resources or the visual character of the area, as the overall riparian corridor, which is well developed with vegetation and trees, would remain, and the project's impact would be *less than significant*.

Staging Area 1 (tree removal). Two trees within Staging Area 1 (west of I-680), one of which is within the BDPL Nos. 3 and 4 ROW, would be removed. These trees are seen in the foreground center and left of Figure 5.3-2c. Removal of these trees would only be slightly noticeable to motorists traveling along Mission Boulevard or using the on- and off-ramp, and, therefore, the project's impact on scenic resources and the visual character of the area would be *less than significant*.

Staging Areas 2 and 3 (tree removal). Three trees within the northbound loop on-ramp to I-680 (Staging Areas 2 and 3), two of which are located within the BDPL Nos. 3 and 4 ROW, would be removed, in addition to two trees located to the west of the I-680 northbound diamond off-ramp adjacent to Staging Area 2. Views of these trees from northbound I-680 and eastbound Mission Boulevard are seen in the center right of Figure 5.3-3b. Removal of these trees would only slightly open views of the area and would only be slightly noticeable to motorists along Mission Boulevard, I-680, and on- and off-ramp users, and, therefore, the project's impact on scenic resources and the visual character of the area would be *less than significant*.

Slip-Joint Vault (alteration of existing structure, construction of new structure, and tree and vegetation removal). Three trees and some vegetation in the vicinity of the existing slip-joint vault, all of which are located within the BDPL Nos. 3 and 4 ROW, would be removed (see Figure 5.9-2). This slip-joint vault is the only aboveground structure to be modified under the proposed project (see Figures 5.3-2d and 5.3-3a). The vault would be made smaller by demolishing the west wall and constructing a new wall between BDPL Nos. 3 and 4; panels would be installed on the roof to direct leakage from BDPL No. 4 in the event the pipeline were to break, and an access hatch and security screen would be constructed. In addition, the south access structure to the proposed articulated vault would be constructed in the same area of the vegetation and tree removal. This access structure would be approximately 13 feet by 7 feet and would protrude 2.5 feet above grade.

The vault area is not visible from residential land uses in the area due to the presence of soundwalls and screening vegetation in residential areas. However, as shown on Figures 5.3-2d and 5.3-3a, the existing vegetation adjacent to the structure partially screens views of the vault. Removal of the three trees and shrubs located around the vault would make the exiting structure and proposed south access structure visible from the I-680 northbound diamond off-ramp, and Mission Boulevard, a designated scenic route. However, views of the modified slip-joint vault and south access structure by motorists traveling along area roadways, including scenic roadways, would be short in duration and the structures would not be highly noticeable. Therefore, removal of existing screening vegetation in this area would not substantially degrade designated scenic resources or the visual character of the area, and the project’s impact on scenic resources and the visual character of the area would be *less than significant*.

Staging Areas 3 and 4 and BDPL Nos. 3 and 4 ROW north of northbound diamond on-ramp (tree removal and construction of new structure). A total of 12 trees immediately north of the I-680 northbound diamond on-ramp and 1 tree to the south of the on-ramp would be removed (1 tree within Staging Area 3; 7 trees within Staging Area 4; and 5 trees within the BDPL Nos. 3 and 4 ROW). The trees to be removed are shown in Figure 5.3-2, photo d, as the row of trees in the background (left) between Mission Boulevard and private residences. Removal of these trees would partially open views to land uses to the north of Mission Boulevard, as seen from Mission Boulevard; however, mature trees within the residential properties would continue to screen views of the land uses from Mission Boulevard motorists. Removal of these trees would not significantly affect scenic resources or the visual character of the area, and the project's impact on scenic resources and the visual character of the area would be *less than significant*.

The north access structure for the proposed articulated vault (approximately 22 feet long by 20 feet wide, and 2.5 feet high) would be constructed at the location of the trees removed from the ROW, and the structure would be visible to motorists on the northbound diamond on-ramp, and from eastbound Mission Boulevard, a designated scenic route. However, views of the articulated vault by motorists traveling along area roadways, including scenic roadways, would be short in duration, and the structures would not be highly noticeable; therefore, the project’s impact on scenic resources and the visual character of the area would be *less than significant*.

Various Locations within Project Area (construction of new structures). The proposed project includes the construction of six aboveground manholes that would provide access to blowoff valves, and the construction of air release valves. Similar to the existing manholes (see Figure 3.4 in Chapter 3, Project Description), the proposed manholes would be approximately 6 feet in diameter and would protrude roughly 2.5 feet above grade. Because the access manholes would be close to the ground and barely visible, impacts related to permanent effects on scenic vistas or the visual character of a community due to construction or alteration of these aboveground structures would be *less than significant*.

5.3.4 Mitigation Measures

Mitigation Measure M-HY-1: Construction Water Quality Best Management Practices.

(See Section 5.11, Hydrology and Water Quality)

5.3.5 References

California Department of Transportation (Caltrans), "California Scenic Highway Mapping System," updated December 7, 2007, available online at: http://www.dot.ca.gov/hq/LandArch/scenic_highways/index.htm, accessed on March 19, 2009.

City of Fremont, *General Plan*, 1991, as amended through February 10, 1996.

U.S. Department of Transportation, Federal Highway Administration (FHWA), *Visual Impact Assessment for Highway Projects*, Washington, D.C., Publication No. FHWA-HI-88-054, 1988.

5.4 Cultural Resources

Cultural resources include historic architectural resources, archaeological resources, paleontological resources,[1] and human remains. This section provides an assessment of potential impacts on cultural resources that might be present in the vicinity of the proposed project. Mitigation measures to reduce impacts to a less-than-significant level are identified.

5.4.1 Setting

5.4.1.1 Definitions

Historical Resources

Based on the California Environmental Quality Act (CEQA) Guidelines, Section 15064.5(a)(3), historical resources include, but are not limited to, any object, building, structure, site, area, place, record, or manuscript that is historically or archaeologically significant or that is significant in the architectural, engineering, scientific, economic, agricultural, educational, social, political, military, or cultural annals of California.

Because the project sponsor must obtain a federal Section 404 permit from the U.S. Army Corps of Engineers (Corps) (see Section 5.9, Biological Resources, Impact BI-1), the project is also required to comply with Section 106 of the National Historic Preservation Act (NHPA). Section 106 requires, among other things, that federal agencies take into account how their actions will affect historic properties listed in or eligible for the National Register of Historic Places (NRHP or National Register). The Corps is the federal lead agency for the purpose of complying with Section 106.

Under federal regulations, historic properties are defined as any prehistoric or historic district, site, object, building, or structure included in or eligible for inclusion in the National Register (Title 36 of the Code of Federal Regulations [CFR], Section 800.16[l][1]). Historic properties that meet federal criteria are also considered historical resources under CEQA.

Area of Potential Effects

Federal regulations require the identification of historic properties within the "area of potential effects" (APE) of a project, defined as the geographic area within which an undertaking may directly or indirectly cause alterations in the character or use of historic properties (36 CFR 800.16[d]). For compliance with CEQA, the San Francisco Planning Department, Major Environmental Analysis Division (MEA) uses the term CEQA-APE (C-APE). This analysis uses the term C-APE, which is synonymous with APE for this project.

[1] Paleontology is the science of the forms of life existing in prehistoric times, as represented by fossilized animals and plants.

Historical Architectural and Archaeological Resources C-APE

The C-APE for historic architectural resources includes the area of direct impact from construction and construction vibration. The C-APE for archaeological resources includes surface and subsurface areas that could experience ground disturbance as a result of proposed project activities, including the locations of pipeline construction and improvements, equipment staging areas, as well as the locations of affected utilities, temporary bridges, and staging areas. The horizontal C-APE includes the entire 80-foot-wide SFPUC right-of-way (ROW) and the four staging areas shown on Figure 3.10 (in Chapter 3, Project Description). The vertical C-APE corresponds to the individual ground-disturbing project components (specifically the depth of excavation) outlined in Chapter 3. The analysis draws on the draft cultural resource technical document completed by Tetra Tech Inc. (2008) and the Historic Context and Archaeological Survey Report for Bay Division Pipeline Nos. 3 and 4 completed by ESA+Orion (2009).

Paleontological Resources C-APE

The C-APE for paleontological resources for the project includes all areas that may (1) experience subsurface excavation into natural rock formations during project construction or (2) result in the permanent burial of a known paleontological resource. The C-APE for paleontological resources is similar to the archaeological C-APE, except that the paleontological C-APE does not include areas where activities would disturb the ground surface only. Surface-disturbing activities that do not involve grading or excavation (e.g., parking/staging areas) would not disturb or destroy rock units where paleontological resources could be located and therefore are not considered to be within the paleontological C-APE. In some cases, ground excavations might only disturb surface soils or fill materials that are devoid of paleontological resources, and might never encounter potentially fossil-bearing rock units. However, because the subsurface stratigraphy at any one place is often unknown, all excavations below the ground surface are included in the paleontological C-APE.

5.4.1.2 Environmental Setting

The C-APE, described in the *Survey of Existing Historical Architectural and Archaeological Resources* (Tetra Tech, 2008), is located at the foot of the Diablo Range, between the southern San Francisco Bay and Mission Peak. It includes the BDPL Nos. 3 and 4 ROW as well as adjacent staging areas on California Department of Transportation (Caltrans) roadways and private property. The surrounding area is developed with private residences and business parks, as well as Interstate 680 (I-680), Mission Boulevard, and other roadways. Within the C-APE, Agua Caliente Creek has been entirely diverted into a culvert near Mission Boulevard and crossing I-680 (see Figure 5.11-1 in Section 5.11, Hydrology and Water Quality). Upstream of the C-APE, Agua Fria Creek exists as a natural (but confined) drainage until it becomes culverted under I-680. Downstream of the I-680 box culvert, the creek enters the C-APE where approximately 1,000 feet of creek, including the 80 foot portion within the C-APE, flows as a natural drainage. The creek is culverted again at the parking lot at the west end of the Extended Stay Hotel at 46312 Mission Boulevard, and remains in a culvert until it reaches the San Francisco Bay (approximately 3.2 miles to the west). Areas of the C-APE that have not been developed or landscaped are generally covered with non-native grasses, ruderal vegetation, some trees, brush, and riparian vegetation (near Agua Fria Creek).

BDPL Nos. 3 and 4 traverse a terrain that gently slopes from east to west. The soils and sediments within the SFPUC ROW and C-APE are composed of a series of Pleistocene age (pre-10,000 Before Present [BP]) and Holocene age (10,000 BP to present) fluvial deposits consisting predominantly of clay (Gmoser et al., 1999:II-68, II-77). Agua Fria and Agua Caliente Creeks played a crucial role in the development of the project vicinity. Over time, the meandering creek channels in the vicinity of modern-day Mission Boulevard and I-680 cut into the Pleistocene deposits, creating Holocene-age terraces between the creeks. The creek flows also contributed to the development of an alluvial fan[2] west of the Mission Boulevard/I-680 intersection (Gmoser et al., 1999:II-81). With time, the alluvial fan stabilized and alluvium also began to cover the Pleistocene deposits again. Several deposits of Holocene alluvium, from 1.8 and 2.5 meters (5.9 and 8.2 feet) deep, sit atop the older deposits, and episodic flooding of creeks in this area created raised areas that became desirable for human settlement (Hylkema, 2002:236).

During the historical development of the project area, artificial fill material of varying depths was introduced atop this alluvium, particularly during the construction of I-680 and installation of BDPL Nos. 3 and 4. However, in some areas the Holocene soil deposits are at the ground surface (Gmoser et al., 1999:II-68, II-77). Archaeological subsurface testing programs conducted in the vicinity of the southeastern part of the Mission Boulevard/I-680 intersection identified recent fill deposits between 1.5 and 3 meters (5 and 10 feet) in depth (Gmoser et al., 1999).

The C-APE is entirely within a modern landscape of paved streets and highways, and residential neighborhoods. Most vegetation is contained within landscaped areas and along Agua Fria Creek, west of I-680. The BDPL Nos. 3 and 4 ROW is devoid of structures (except for those that are part of the water supply system) and the grass along the ROW is maintained by the SFPUC.

Prior to development, the area was dominated by a southern oak woodland environment (Baumhoff, 1978:19) and grassland (Hylkema, 2002:235). The presence of freshwater in Agua Caliente and Agua Fria Creeks likely attracted terrestrial fauna and birds, including elk and migratory birds along the Pacific Flyway (Hylkema, 2002:236; Moratto, 1984:221). Additionally, marine mammals were present along the bayshore, which was only 1.75 miles to the west in 1899 (USGS, 1899). Historically, nearby shorelines would also have offered opportunities for nearshore fishing, shellfish collecting, and hunting in tidal marshes (Hylkema, 2002:233, 235; Moratto, 1984:221).

2 Alluvium consists of unconsolidated mixtures of gravel, sand, clay, and silt typically deposited by streams. An alluvial fan is a fan-shaped deposit formed where a fast flowing stream flattens, slows, and spreads, typically at the exit of a canyon into a flatter plain.

5.4.1.3 Archaeological/Prehistoric-Period Setting

Both prehistoric and historic-period resources are considered archaeological resources. This discussion of prehistoric archaeology addresses cultural patterns in the project C-APE through the time of European contact. Historic-period archaeological resources, starting with the Mission era, are discussed below under the heading Historic-Period Setting.

Prehistoric Context

Many of the first surveys of archaeological sites in the San Francisco Bay region, including the East Bay, were conducted between 1906 and 1908; these surveys yielded the initial documentation of nearly 425 "earth mounds and shell heaps" along the bay shoreline (Nelson, 1909). The most notable of these sites were excavated, such as the Emeryville shellmound (CA-ALA-309), the Ellis Landing site (CA-CCO-295) in Richmond, the Fernandez site (CA-CCO-259) in Rodeo Valley, and the West Berkeley site (CA-ALA-307) (Moratto, 1984). These dense midden sites have been carbon-14 dated to be 2,310 (±220 years) old, but other evidence from around the bay suggests that human occupation in the region dates back farther, to about 7,000 years ago (Davis and Treganza, 1959).

Archaeologists have developed individual cultural chronological sequences tailored to the archaeology and material culture of each subregion of California. Each of these sequences is based principally on the presence of distinctive cultural traits and stratigraphic separation of deposits. Hylkema (2002:237–250) identified a sequence of four general cultural periods for the southern San Francisco Bay Area based on changes in bead types and on sequences developed by earlier research:

- Early Period, circa (ca.) 2000 to 500 BC
- Middle Period, ca. 500 BC to AD 700
- Middle to Late Transition, ca. AD 700 to 1200
- Late Period, ca. AD 1200 to 1769

The Early Period of the present-day southern San Francisco Bay Area included characteristics similar to those of cultural groups along the southern California coast. In addition to shell bead typologies, this cultural period is characterized based on the presence of flexed burials with red pigment. Most Early Period traits are distinct to the immediate Bay Area, but some are considered similar to traits identified in the Sacramento–San Joaquin Delta (Hylkema, 2002:243–244).

The presence of large and small cobble mortars and varied pestle types is common in Middle Period assemblages and suggests an increased reliance on acorns. Manos and milling stones continue to be present in Middle Period assemblages of the South Bay as well, suggesting a similar continued reliance on hard seeds. Contracting-stemmed and lanceolate projectile points are the most common forms of points, but this artifact type is less common than during the Early Period as a whole. Other artifact types common in Middle Period assemblages include bone fish spears, serrated bone scapulas, beveled elk antler wedges, flexed burials in residential sites, and expressions of cosmological beliefs, such as animal burials, charmstones, quartz crystals, and bone whistles (Hylkema, 2002: 244–247).

The Middle to Late Transition Period initiates a phase of significant social change, including increased social hierarchy and localized economic systems. Burials and associated grave goods indicate an emphasis on wealth. During this period, the importance of *Olivella* shell beads rises; edge-incised and banjo-style *Haliotis* pendants become common; tubular tobacco pipes appear; and bone fish spears are replaced by new harpoon styles (Hylkema, 2002:247).

The social change that began during the Middle to Late Transition Period continued and developed further during the Late Period, as indicated by the elaboration of associated ceremonial grave goods. Various artifacts exhibit stylistic changes, with fine workmanship, decoration, and elaboration of forms. Small obsidian Stockton serrated points increase in Late Period assemblages, indicating the introduction of the bow and arrow during this time. An additional indication of external interactions comes from the introduction of bone and antler harpoon styles from northern California. This has led some researchers to hypothesize a movement of northern populations south into the San Francisco Bay Area following the withdrawal of the Middle Period Meganos Culture (Hylkema, 2002:247–250).

Ethnographic Context[3]

The C-APE is within the traditional territory of the Costanoan people, also referred to as Ohlone, Mutsun, and Rumsun (Levy, 1978:485–495). These people, collectively referred to by ethnographers as Costanoan, were actually distinct sociopolitical groups that spoke at least eight languages of the same Penutian language group. The Costanoan occupied a large territory from San Francisco Bay in the north to the Big Sur and Salinas Rivers in the south. The primary sociopolitical unit was the tribelet, or village community, which was overseen by one or more chiefs. The C-APE is in the greater *Chochenyo* language area and was occupied by the *lisyan* tribelet (Levy, 1978:485).

Economically, the Costanoan engaged in hunting and gathering. Their territory encompassed both coastal and open valley environments that contained a wide variety of resources, including grass seeds, acorns, bulbs and tubers, bear, deer, elk, antelope, a variety of bird species, marine resources, and small mammals. The Costanoan acknowledged private ownership of goods and songs, and village ownership of rights to land and/or natural resources; they appear to have aggressively protected their village territories, requiring monetary payment for access rights in the form of clamshell beads, and even shooting trespassers if caught. After European contact, Costanoan society was severely disrupted by missionization, disease, and displacement.

[3] Ethnography is the branch of anthropology that deals with the description of various racial and cultural groups of people.

5.4.1.4 Historic-Period Setting

For the purpose of this analysis, the historic period for the C-APE begins with the Mission era and extends through the Gold Rush, or roughly the 1770s to the 1850s. The historical setting of the project area is described below and has been adapted from the historic background presented in Tetra Tech (2008). The historical context of the SFPUC regional water system (from 1856 to the present) is presented after this description of the project area history (San Francisco Planning Department, 2008).

Early History of Southwestern Alameda County and the Project Area

The C-APE is on land that was once a part of a large Mexican land grant, Rancho Agua Caliente, which was 3,870 hectares (9,564 acres) granted to Fulgencio Higuero in 1858. The 1840s and 1850s was a period of change for the San Francisco Bay Area. When gold was discovered in 1848, a wave of immigrants came to the region, either passing through on their way to the gold mines in the foothills or to settle in the area, attracted by the fertile soil. Many settled on the lands adjacent to Mission San Jose, just southwest of the C-APE, and established farms. Portuguese immigrants came to the area during this period to work in the many orchards and fields. New communities were established as more settlers came to the region to work as farmers and ranchers. Schools, churches, stores, and residences were developed during the period between 1848 and 1860. The area that is now Fremont became part of Washington Township in 1853, made up of Niles, Centerville, Newark, Alvarado, Irvington, Decoto, Mission San Jose, and Warm Springs. The township became established as an agricultural center that shifted from raising cattle to producing wheat in the late 1890s. Fruit trees were imported from other parts of the western U.S., and orchards and vineyards replaced grain fields by the 1900s. Farming was the primary economic mainstay of Fremont throughout the late 19th and into the 20th century. The general project area remained largely undeveloped throughout the 19th century, but by the mid-20th century the area was covered with orchards. The general vicinity of the project area remained an agricultural production area until the early 1970s.

The years following World War II brought a period of dramatic growth to California, as the state transformed from a largely agricultural to an industrial society. Suburban development increased as residents moved out of urban centers to communities where housing was less expensive. During the immediate post-war period, tract homes were first built in Oakland but slowly began to be built in Washington Township (although not within the C-APE). Washington Township continued to be governed by the Alameda County Board of Supervisors in Oakland, but eventually the residents realized that infrastructure was needed to prepare for the increase in residents that was inevitable. Alameda County was slow to assist the township, so businessmen and the Chambers of Commerce organized a plan to incorporate five of the eight towns into the City of Fremont in 1956.

Construction of the portion of I-680 that connects Highway 101 near San Jose with Highway 780 in Benicia (in 1964), and construction of the Nimitz Freeway (I-880) that links Oakland with San Jose (in 1957), spurred residential growth in Washington township. Further growth was expected and infrastructure was needed to support the increased population with expanded sewer and street systems. In 1956, the town of Fremont, which included the towns of Niles, Mission San Jose, Centerville, Irvington, and Warm Springs, was incorporated. The stretch of I-680 that is within the C-APE, between Mission Boulevard and Highway 237, was completed in 1971. The portion of Mission Boulevard that is within the C-APE, also known as CA-262, is the short section of Mission Boulevard linking I-680 and I-880 in Fremont. Construction was completed on this stretch of Mission Boulevard in 1970.

The first residential subdivisions in the vicinity of the project area were constructed during the early 1960s among orchards and fields. The Franciscan Park Subdivision, established around the south portion of the project area in 1964, consisted of Mohave Drive, Crawford and Bradley Streets, and Crawford, Bradley, and Aztec Courts. U.S. Geological Survey (USGS) topographic maps depict this housing tract surrounded by orchards and fields until the early 1970s. The residential subdivisions that abut the north end of the project area were developed in the mid-1980s.

Regional Water System History

The following brief history of the SFPUC water system is adapted from the Water System Improvement Program (WSIP) Program Environmental Impact Report (PEIR) (San Francisco Planning Department, 2008). The cultural resources analysis presented in the PEIR provides a historical context for BDPL Nos. 3 and 4, and how they relate to the C-APE and the SFPUC regional water system as a whole.

The history of the SFPUC water system begins with the need for water in the growing city of San Francisco, situated on a semi-arid peninsula. Although San Francisco is surrounded by the Pacific Ocean and the bay, there is little freshwater nearby. The few creeks and springs in the region were not sufficient to support the population of San Francisco as it grew after the mid-1800s Gold Rush. San Francisco's first private water companies formed in the 1850s and underwent consolidation, a pattern that was similar to other urban water companies. The Spring Valley Water Works (later Spring Valley Water Company) (referred to below as Spring Valley), founded in 1860, was the dominant city water distributor and began to buy other water companies in the area.

Spring Valley slowly began developing sources of water within San Francisco and then turned to boundaries outside of the city. While it had dams under construction along the Peninsula, Spring Valley also looked eastward across the bay to seek additional water sources in Alameda County. One of the means of obtaining more water was from Alameda Creek. In 1887, Spring Valley diverted water from Alameda Creek to San Francisco, and by 1900, the company was diverting over 21.5 million gallons of water a day from the Alameda Creek watershed to San Francisco.

The SFPUC water facilities in the project area are associated with the Bay Division of the Hetch Hetchy Aqueduct, which delivers water from an impounded section of the Tuolumne River through a series of pipes, tunnels, and reservoirs to San Francisco. In total, the Hetch Hetchy system includes multiple dams and reservoirs, conduits, and power plants in addition to approximately 150 miles of tunnels and pipelines. The Bay Division portion of the system extends from the Irvington Portal, along the eastern edge of the bayshore plain near Fremont, to the Pulgas Portal/Pulgas Tunnel interface southwest of Crystal Springs Reservoir on the San Francisco Peninsula. The planning and construction of the Hetch Hetchy Aqueduct stemmed from San Francisco's desire for a municipally owned water supply. Before Hetch Hetchy's construction began in 1913, the city relied primarily on the privately owned Spring Valley for its water supply. This relationship was forged largely through Spring Valley's virtual monopoly over the Peninsula's water supply, secured through acquisitions of water sources in San Mateo, Santa Clara, and Alameda counties as well as construction of major reservoirs and dams, including Crystal Springs Reservoir along San Mateo Creek (SFPUC, 2008).

Construction History of BDPL Nos. 1 and 2

Both BDPL Nos. 1 and 2 were built to carry water across the southern end of San Francisco Bay at the Dumbarton Straits, connecting the Irvington Portal on the eastern side of the bay to Pulgas Tunnel on the western side of the bay. In 1924, the City and County of San Francisco (CCSF) built BDPL No. 1 as part of the Hetch Hetchy project. Only a few years after the first pipeline was completed, the continued expansion of the San Francisco metropolitan area precipitated the need for more Hetch Hetchy water, and in 1934 construction of BDPL No. 2 began, following the BDPL No. 1 ROW.

Construction History Summary of BDPL Nos. 3 and 4

BDPL Nos. 3 and 4 were added to the system in 1952 and 1973, respectively, but were routed on a path that skirted the southern end of San Francisco Bay through Santa Clara and San Mateo counties. In addition to being a part of the water system that delivers water for San Francisco, BDPL Nos. 3 and 4 serve the cities of Hayward, Fremont, Milpitas, San Jose, Santa Clara, Sunnyvale, Mountain View, Palo Alto, Stanford University, Menlo Park, and Redwood City, and several smaller water districts.

BDPL No. 3 was constructed to serve the growing post-war demand for water in the region. Because the existing BDPL Nos. 1 and 2 crossed the bay at the Dumbarton Straits, the new pipeline was designed to circumvent the bay so that a submarine disturbance would not cut the city off from major water sources (SFPUC, 1951). BDPL No. 3 was built to increase the water transmission capacity from the Hetch Hetchy system in the Sierra Nevada to the terminal reservoirs on the Peninsula, and was funded under a $25,000,000 water bond issue approved by the electorate in 1947 (SFPUC, 1953).

Beginning in the late 1940s, the SFPUC assembled an 80-foot-wide ROW for the majority of the 34-mile length of pipeline, which was designed to connect the Irvington Portal of the Hetch Hetchy Aqueduct (near the south end of San Francisco Bay) to the Pulgas Tunnel via Milpitas, Mountain View, and Bear Gulch Reservoir. BDPL No. 3 was designed to deliver 76 million gallons per day (mgd) through a 78-inch pipe from the portal to Milpitas and then to a 72-inch pipe from Milpitas to the Pulgas Portal (Lauenstein, 1948). The pipeline was begun in 1950 and completed in 1952 for a total cost of $8.3 million. Plans for BDPL No. 3, dated July 1950, were signed by G.W. Pracy, General Manager and Chief Engineer of the San Francisco Water Department at the SFPUC from

1949 to 1957. Other staff engineers such as C.A. Lauenstein and N.A. Eckhart played a role in the design. The pipeline segment through the project area was constructed by Artukovich Brothers and Steve Rados under contract to the SFPUC, while other pipeline segments outside of the project area were constructed by the United Concrete Pipe Company. The segment of pipeline through the project area was a 78-inch reinforced-concrete cylinder pipe, with 78-inch welded-steel pipe under Agua Fria and Agua Caliente Creeks. The pipeline segments beneath I-680 were encased in concrete in anticipation of the future construction of this freeway.

In order to further increase the SFPUC's trans-bay pipeline capacity, BDPL No. 4 was constructed parallel to, and 15 feet away from, BDPL No. 3. Construction of BDPL No. 4 began in 1966 and was completed in 1973. The pipeline segment through the project area was a 96-inch-diameter pipe consisting of steel-cylinder reinforced-concrete pipe lain in 20-foot sections. The pipeline segment through the project area was constructed by the contracting firm of Vido Artukovich and Son, Inc. of El Monte, California, for a contract amount of approximately $5 million. At the time of construction, Arthur H. Frye, Jr. was the San Francisco Water Department's General Manager and Chief Engineer. Construction of the pipeline section through the project area began in February 1966, and this section was connected to BDPL Nos. 1, 2, and 3 at the Irvington Portal in December 1966. Construction details for both BDPL Nos. 3 and 4 are presented in the *Historic Context and Archaeological Survey Report* for this project (ESA+Orion, 2009).

5.4.1.5 Paleontological Setting

Paleontological resources are the fossilized remains of plants and animals, including vertebrates (animals with backbones), invertebrates (e.g., starfish, clams, ammonites, and coral marine), and fossils of microscopic plants and animals (microfossils). The age and abundance of fossils depend on the location, topographic setting, and particular geologic formation in which they are found. Fossil discoveries not only provide a historical record of past plant and animal life, but assist geologists in dating rock formations.

The presence of fossils is inherently linked to the landscape evolution summarized above from Gmoser et al. (1999). Depositional episodes relate to a variety of landform processes, including the development of alluvial fans, episodic flooding, accumulation of estuarine sediments, and downslope soil movements. These processes serve to bury and preserve plant and animal remains. Within the project area, three geologic units each reflect a distinct depositional environment and age range. Geologists refer to the oldest (deeper) unit as the Pleistocene Irvington Gravels (this unit is included within pre-Quaternary deposits, *br*, as shown on Figure 5.10-1). The younger (shallower) deposits include Holocene and Pleistocene alluvial fan and fluvial[4] deposits (identified as *Qa* and *Qf* in Figure 5.10-1). Refer to Section 5.10, Geology and Soils, for additional detail on the geology of the area.

Artificial fills are also common in the project area and are associated with construction of the Mission Boulevard/I-680 interchange and past installation and maintenance of the original BDPL Nos. 3 and 4. Artificial fills are typically materials that have been disturbed and are thus unlikely

[4] Fluvial deposits include sediments deposited in a stream channel, along a stream bank, or on a floodplain.

to yield in-situ paleontological resources. A geotechnical report completed for this project (URS, 2008) identified artificial fill at depths ranging from 8 to 25 feet below the ground surface along the pipeline alignment. Gmoser et al. (1999) identified the broader area as having between 5 and 10 feet of fill materials, with some areas of native soil still exposed at the surface.

Regionally, Pleistocene and older Holocene rock units in the East Bay Hills and flatlands are known to contain a variety of invertebrate and vertebrate fossil assemblages. Pleistocene alluvial fan deposits have been described as locally containing freshwater mollusks and extinct late-Pleistocene vertebrate fossils; in addition, scientists have found a large suite of early-Pleistocene vertebrate fossils within the Irvington Gravels such as the remains of mammoths, horses, bison, pigs, and camels (Helley and Graymer, 1997). Therefore, the East Bay Hills and flatlands have the potential to yield additional paleontological resources. A site-specific literature and records search was performed to evaluate the potential for paleontological resources to be present in the project area, as described in the section below.

5.4.1.6 Research Methods and Results

Historic Architectural Resources

A records search was conducted at the Northwest Information Center (NWIC) of the California Historical Resources Information System at Sonoma State University, Rohnert Park, California (NWIC File No. 07-1065). The records search encompassed a 1-mile (1.6-kilometer) buffer around the C-APE. Also reviewed was the California Inventory of Historical Resources (DPR OHP, 1976), California Historical Landmarks (DPR OHP, 1990), California Points of Historical Interest (DPR OHP, 1992), and the Historic Properties Directory Listing (DPR OHP, 2006). The Historic Properties Directory contains listings of the National Register and the California Register of Historical Resources (California Register), and the most recent listing of the California Historical Landmarks and California Points of Historical Interest. Historic topographic quadrangles from 1899 through 1961 were also reviewed.

The NWIC records search found no previously recorded historic-period architectural resources that are eligible for the California or National Registers within 1 mile (1.6 kilometers) of the C-APE. The Alameda County Landmarks and Contributing Buildings Comprehensive Survey 2005–2008 was consulted, and no historic-period resources were identified within the C-APE (Alameda County, 2008).

Pipeline portions of the SFPUC regional water system that have been identified as eligible for the National and California Registers include BDPL Nos. 1 and 2 and San Joaquin Pipelines Nos. 1 and 2. Both sets of pipelines have been identified as eligible under the National and California Registers because of their importance for their association with the construction and development of the Hetch Hetchy system. The Sunol Dam, filter galleries, aqueduct, and administrative complex were also identified as a historic district (Spring Valley’s Alameda Creek System Historic District) (JRP, 2008a). The SFPUC’s Bay Division Pipeline Reliability Upgrade Project Final EIR concluded that BDPL Nos. 3 and 4 were not eligible for listing in the National or California Register as a historic district or contributors to an historic district and also noted that

BDPL No. 4, specifically, was not yet 50 years old (San Francisco Planning Department, 2009). These pipelines are further evaluated for their historical significance below.

Historic Architectural Survey and Results

Tetra Tech conducted a field survey and archival research for the historical context used in this analysis. Tetra Tech conducted research at the Fremont Main Library, the Alameda County Assessor's Office, SFPUC Archives of the General Manager, map collections of the University of California at Berkeley, the Map and File Room of Alameda County, and the City of Fremont Building Department. Tetra Tech also examined the records search results from the NWIC (NWIC File No. 07-1065).

In addition, an ESA architectural historian surveyed and evaluated the C-APE on December 10, 2008. All aboveground pipeline facilities were photographed. ESA conducted archival research at the SFPUC Archives of the General Manager, primarily for the historical context and construction history of BDPL Nos. 3 and 4. The pipeline sections located in the C-APE were evaluated for their eligibility under National and California Register Criteria A/1 through D/4 (see discussion below in Section 5.4.2, Regulatory Framework, for a description of each criterion).

Evaluation of Potential Historic Architectural Resources. The portions of I-680 and Mission Boulevard that are within the C-APE were constructed between the late 1960s and early 1970s and are less than 45 years old. All residences and other structures in the immediate area of the C-APE were built between the mid-1960s and mid-1980s. Due to their more recent construction dates, these structures would not be eligible for listing in either the National or California Registers and would not be considered historical resources for CEQA purposes.

Evaluation of BDPL No. 3. ESA evaluated BDPL No. 3 for potential listing as a historical resource under the National and California Register Criteria A/1 through D/4 (see discussion below).[5] This pipeline was completed in 1952 and is at least 50 years old as of 2009. As such, it meets the minimum age threshold for consideration for listing in the National Register (see discussion below in Section 5.4.2, Regulatory Framework). The pipeline is also at least 45 years old as of 2009 and therefore meets the minimum age threshold for consideration for listing in the California Register.

Although BDPL No. 3 meets the minimum age requirements for eligibility, it does not appear to meet National/California Register Criterion A/1, outlined in Section 5024.1 of the California Public Resources Code, because it is not important for its association with significant trends and/or events in San Francisco's water system development and is not important within the context of regional or local development.

Pipelines, like other water-related structures or infrastructure, are inherently vital to the communities they serve. To be eligible for listing in the National/California Register under Criterion A/1, pipelines and their associated structures must have demonstrable importance

[5] The approach to this evaluation has been adapted from the *Historic Resources Evaluation Report for the San Andreas Pipeline No. 3 Installation Project* (JRP, 2008b).

directly related to significant historical events and trends. In most cases, pipelines for municipal water systems, such as BDPL No. 3, are not significant within the context of stimulating or accommodating urban growth, because such a commonplace function is the basic role of all municipal water pipelines.

The pipeline, built in 1952, was part of the San Francisco Water Department's construction of pipelines and other structures to upgrade and improve the system built in the 1920s. Unlike BDPL Nos. 1 and 2—which were part of John R. Freeman's original plan for the development of the Hetch Hetchy water system and were built across the southern end of San Francisco Bay at the Dumbarton Straits—BDPL No. 3 was built nearly three decades later, to increase the water transmission capacity of the system due to a growing post-war demand for water service, and it traversed a path around the southern end of the bay in order to diminish the likelihood that any interruption in service to BDPL Nos. 1 and 2 would cut the city off from a major water source. BDPL No. 3 was also one of several pipelines in this portion of the water system built to serve the region—in this case to bolster the supply of water at the terminal reservoirs on the Peninsula and to provide increased supply to suburban SFPUC customers, such as the multiple communities in the South Bay. As such, BDPL No. 3 is not historically associated with the original development of the Hetch Hetchy system and has no connection to the Spring Valley Water Company. Therefore, BDPL No. 3 does not appear to meet National/California Register Criterion A/1, either individually or as a contributor to a historic district.

The BDPL No. 3 also does not appear to be significant under National/California Register Criterion B/2 for its association with persons important in local, state, or national history. There is no indication that the SFPUC leadership, or other individuals, obtained prominence because of their association with the construction or development of this pipeline.

Under National/California Register Criterion C/3, facilities such as pipelines can be deemed historically significant for their importance within the field of water conveyance engineering and design. This significance determination is based on whether a structure embodies distinctive characteristics of type, period, or method of construction or represents the work of a master engineer, designer, or builder. Attributes to consider are its rarity, innovative design techniques or construction methods, boldness of the engineering achievement, and aesthetics. These attributes are weighed in conjunction with evaluation of the water conveyance's type, period, or method of construction and its association with possibly significant engineers and/or builders.

BDPL No. 3 is not significant in any of these ways. It was built from reinforced-concrete pipe or welded-steel pipe, a common pipeline technology in the 1950s. The SFPUC used this type of construction in many of its pipelines, including its applied finishes, and thus the pipeline is not rare for its type. Historical evidence does not indicate that the pipeline itself was an engineering achievement, particularly compared with other Hetch Hetchy pipelines that had far greater engineering challenges to overcome, such as tunneling through mountains or bridging San Francisco Bay. Installation of BDPL No. 3 did not entail bold or remarkable engineering, and it skirted the southern end of the bay rather than going under or over it.

The SFPUC and its construction contractors (United Concrete Pipe Company, the Artukovich Brothers, and Steve Rados) used conventional techniques and methods for its design and construction. Finally, there is no evidence that a significant "master" engineer played an important role in the design, construction, or alterations of BDPL No. 3, and the pipeline does not represent the important achievement of any engineer. San Francisco Water Department General Manager and Chief Engineer G.W. Pracy signed the plans for BDPL No. 3, and other staff engineers such as C.A. Lauenstein and N.A. Eckhart played a role in the design. Research did not reveal that these individuals were considered master engineers. Therefore, BDPL No. 3 is not significant under National/California Register Criterion C/3 as a significant engineering resource, either individually or as a contributor to a historic district.

In rare instances, engineering structures like pipelines can serve as sources of important information about historical construction materials or technologies (National/California Register Criterion D/4); however, engineering manuals, industry publications, and other historical records of the period contain ample information about pipelines of the type used for the BDPL No. 3, along with information on installation methods for such pipelines. Therefore, this structure does not appear to be a principal source of important information in this regard.

In summary, BDPL No. 3 does not appear to qualify for listing under the National/California Register criteria, either individually or as a contributor to a historic district, and therefore would not be considered a historical resource for CEQA purposes.

Evaluation of BDPL No. 4. BDPL No. 4 was built in sections between 1966 and 1973 (the segment in the C-APE was completed in 1967), and it does not meet the minimum age threshold. In addition, it does not appear that BDPL No. 4 has "exceptional importance" (i.e., has achieved significance within the recent past). Therefore, BDPL No. 4 does not qualify as a historic under National Register Criteria G which applies to properties that have achieved "exceptional significance" in the last 50 years because of the extraordinary importance of an event or because the entire category of resources is so fragile that survivors of any age are unusual. Listed properties that had attained significance in less than 50 years include: the launch pad at Cape Canaveral for its association with the moon landing, the home of nationally prominent playwright Eugene O'Neill, and Nike missile bases for their association with the Cold War. BDPL No. 4, a typical pipeline built in the late 1960s and early 1970s for redundancy purposes, is not associated with an extraordinary event or category of resources so fragile that survivors of any age are unusual, and has no exceptionally important historical associations that would be similar to the examples provided by the National Register. Because the pipeline does not meet the minimum age threshold and does not appear to have exceptional importance, BDPL No. 4 was not evaluated for its eligibility under federal or state criteria.

Archaeological Resources

The NWIC records search described above under the heading Historical Architectural Resources found 57 previous surveys and studies within a one-mile radius. Twelve recorded cultural resources as well as one isolate (an isolated artifact found away from an identified site) were identified within the search radius.

Native American Contact

The San Francisco Planning Department requested that the California Native American Heritage Commission (NAHC) search its sacred lands file covering the C-APE and requested a list of local Native Americans for consultation purposes. The NAHC did not have records of any Native American sacred sites within the C-APE, but recommended eight Native Americans who might be able to identify resources not on file with the NAHC. The NAHC also suggested contact with the listed Native Americans in the event they had any concerns regarding the project.

The San Francisco Planning Department initiated these communications via letters mailed on April 1, 2008. Colleen Culver-Jaffe (San Francisco Planning Department) and Scott MacPherson (SFPUC) visited the C-APE with Andrew Galvan of the Ohlone Indian Tribe on July 3, 2008. The Corps sent contact letters to the eight identified Native American individuals and organizations on October 27, 2009 and a copy of the Historic Context and Archaeological Survey Report (ESA+Orion, 2009) was provided along with the letter.

Historical Society Contacts

The Alameda County Library; the Alameda County Parks, Recreation, and Historical Division; and the Alameda Museum of Local History were contacted on April 7, 2008 regarding the proposed project. No response has been received as of this writing.

Records Search and Literature Findings

One archaeological site—CA-ALA-576 (formerly CA-ALA-342 and CA-ALA-509)—was identified within the C-APE (Gmoser et al., 1999; King, 1968). The site was first uncovered in 1968 (King, 1968) and a wide variety of artifacts were uncovered. Additional investigations by Galvan and Thompson also uncovered artifacts. Gmoser et al. (1999:III-2) recommended the site as eligible to the National Register under Criterion D, because it has yielded or may be likely to yield additional information important to prehistory. The State Historic Preservation Officer concurred with this determination in a response dated December 29, 1999 (SHPO, 2009).

Archaeological Resources Outside of the C-APE. One additional archaeological resource has been recorded close to the C-APE. An isolate (CA-ALA-ISO-13) was found on the west side of I-680 within the Agua Caliente Creek bed, outside of the C-APE (Bryne, 1992). Nine other cultural resources located within 1 mile (1.6 kilometers) of the C-APE have been identified (P-01-000004, P-01-000013, P-01-000153, P-01-000141 P-01-002120, P-01-001783, P-01-010625), and C-921 and P-01-001624).

Archaeological Resource Predictions

Based on the property types and settings of recorded archaeological sites within the NWIC records search radius, the ethnographic context of the area, and the archaeological materials and features from CA-ALA-576, the following prehistoric archaeological property types could be present within the C-APE:

- *Habitation middens*. Midden sites have distinct boundaries and large amounts of shell, living surfaces, and the remains of daily life activities, and can include burials with associated grave goods. These sites would have been more permanent, used over an extended period, and located in or near productive habitats, such as Agua Caliente and Agua Fria Creeks.

- *Temporary camps or food processing localities*. These are ephemeral sites with little to no shell but containing the remains of casual-use activities, such as food processing and tool manufacture. Such sites are often unpredictably distributed and represent mobile short-term activities. They would be expected in areas that supported subsistence practices, such as fishing along Agua Caliente and Agua Fria Creeks.

- *Isolated artifacts*. These artifacts are unconnected with formal sites. They generally possess limited information and are unlikely to provide data that addresses important research issues. However, important information can be gained through dating items made of obsidian or artifacts with temporally distinctive styles.

- *Human remains*. Human remains can occur both as elements of formal archaeological sites and as isolated features. Human burials and associated grave goods may be located in native soil (non-fill) or in secondary contexts.

Modern urban development covers almost the entirety of the C-APE, and artificial fill is present within the top 1.5 to 3 meters (4.9 to 9.8 feet) of elevation. With the exception of the initial installation of BDPL Nos. 3 and 4, subsurface disturbances resulting from development are likely confined to this layer of fill. As such, the fill would act as a cap over the native soils and archaeological deposits below it, as demonstrated by the subsurface testing programs at site CA-ALA-576.

Historic-period archaeological property types in the general vicinity might include Spanish colonial and Mexican residential and agricultural features as well as early American agricultural features, especially the remnants of barns and outbuildings, associated with the dairy and agricultural industries. Artifacts and features might include stone, concrete, or adobe footings and walls; filled wells or privies; and deposits of metal, glass, and/or ceramic refuse. However, based on a review of historic USGS and Thompson and West (1878) maps, there appears to be a low possibility that historic-period archaeological resources are located within the C-APE.

Archaeological Field Survey Methods and Results

A pedestrian archaeological field survey was undertaken by Tetra Tech archaeologists on January 16, 2008 and by an ESA archaeologist on March 19, 2008. A portion of the C-APE north of Mission Boulevard and south of the SFPUC ROW is on private property, but the area was observed during a field meeting with SFPUC staff. The area was landscaped and had little ground surface visibility. The archaeologists conducted the survey by walking 15-meter (50-foot) transects and using surface scrapes due to the dense vegetation. Digital photograph overviews were taken of the surveyed area. The ground surface of much of the C-APE, has been disturbed by pipeline installation, freeway construction, culvert construction, or residential construction and could not be observed.

No archaeological resources were observed on the surface within the C-APE during the archaeological surface survey. However, based on previous archaeological investigations in the area there is a high possibility that additional buried or unknown archaeological resources exist in the C-APE.

Paleontological Resources

Standards for the Assessment of Paleontological Resources Potential

The Society of Vertebrate Paleontology (SVP) has established guidelines for the identification, assessment, and mitigation of adverse impacts on nonrenewable paleontological resources (SVP, 1995). The SVP has helped define the value of paleontological resources and, in particular, states the following:

- Vertebrate fossils[6] and fossiliferous (fossil-containing) deposits are considered significant nonrenewable paleontological resources and are afforded protection by federal, state, and local environmental laws and guidelines.
- A paleontological resource is considered to be older than recorded history (or 5,000 years BP) and is not to be confused with an archaeological resource.
- Invertebrate fossils[7] are not significant paleontological resources, *unless* they are present with an assemblage of vertebrate fossils or they provide undiscovered information.
- A project paleontologist, special interest group, lead agency, or local government can designate certain plant or invertebrate fossils as significant.

In accordance with these principles, the SVP outlined criteria for screening the paleontological potential of rock units and established assessment and mitigation procedures tailored to such potential. High- and low-potential rocks are determined by applying the following criteria (SVP, 1995):

> *High Potential*. Rock units (or formations) in which vertebrate or significant invertebrate fossils have been found. These rock units include sedimentary and some volcanic formations that contain significant fossil resources anywhere within their geographic extent and sedimentary deposits formed in a time period or composed of materials suitable for the preservation of fossils. Only invertebrate fossils that provide new information on existing flora or fauna, or on the age of a rock unit would be considered significant.
>
> *Low Potential*. Rock units that have few, if any, records of vertebrate fossils in institutional collections, or that have been shown in surveys or paleontological literature to be largely absent of fossil resources. Low potential rocks also include metamorphic and most volcanic rocks.

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[6] A vertebrate fossil is the fossilized remains of animals that possess a backbone or spinal column.
[7] An invertebrate fossil is the fossilized remains of animals that lack a backbone or spinal column.

Although not discussed in SVP standards, slope deposits (such as colluvium, landslides, and earth flows) and soils are materials with little or no potential to contain paleontological resources. While such materials were originally derived from rocks, they have been weathered or reworked such that fossils would not likely be preserved.

Records Search and Literature Review

To identify paleontological resources in the C-APE and to assess the potential paleontological productivity of each stratigraphic unit present, PaleoResource Consultants (2008) reviewed geologic maps and the published as well as available, unpublished geological and paleontological literature (including previous environmental impact assessment documents, paleontological resource impact mitigation program final reports, and geotechnical reports). In addition, the consultant examined available aerial photographs of the area to aid in determining the areal distribution of distinctive sediment and soil types. The literature and aerial photograph review was supplemented by an archival records search conducted at the University of California Museum of Paleontology in Berkeley, California, for additional information regarding the occurrence of fossil sites and remains in and near the project area. These methods are consistent with SVP (1995) guidelines for assessing the importance of paleontological resources in areas of potential environmental effect.

The number and locations of previously recorded fossil sites from rock units exposed in and near the Project site and the types of fossil remains each rock unit has produced were evaluated based on the above review. However, no subsurface exploration was conducted for this assessment and no field survey was conducted to confirm previous geologic mapping or look for fossils exposed at the surface.

Records Search and Literature Findings

Although no fossils are known to directly underlie the proposed project site, the paleontological resource assessment conducted by PaleoResource Consultants (2008) found that both of the geologic formations underlying the project site have regionally produced either Irvingtonian (1.2 to 0.5 million years ago) or Rancholabrean (500,000 to 10,000 years ago) fossils, and are thus considered high-potential rock units. Significant vertebrate fossils found in these formations include the remains of mammoths, horses, bison, pigs, and camels. Specific fossil occurrences discovered in the records and literature search conducted by PaleoResources (2008) are summarized below.

Irvington Gravels (included within pre-Quaternary deposits, br, shown on Figure 5.10-1). Regionally, there are numerous vertebrate fossil records within this unit. Fossils within the Irvington Gravels have been described as the best known sample of earlier Pleistocene land life in the western United States. Locally, three fossil sites exist within four miles north-northwest of the project site. These sites have produced fossils of invertebrates, fish, amphibians, reptiles, birds, and mammals, including 18 species of herbivores and 8 species of carnivores. Plants have also been discovered in the Irvington Gravels, including maple (*Acer*), blue blossom (*Ceanothus*), ash (*Fraxinus*), canyon oak (*Quercus*), and willow (*Salix*). Since plant, invertebrate, and vertebrate fossils have been previously reported from the Irvington Gravels, and since previously known localities of fossils are found in the vicinity of the project area, the Irvington Gravels are judged to have a high potential to contain paleontological resources based on the SVP (1995) criteria.

Undivided Surficial Deposits (equivalent to units Qa and Qf in Figure 5.10-1). Fossil remains of land mammals have also been found in undivided surficial deposits. Several sources, including geologic reports and compilations of paleontological records, identified the presence of Holocene and Pleistocene fossils in the region within this unit. Specifically, 48 individual sites in Alameda County have yielded Rancholabrean vertebrate fossils. Since fossil invertebrates and vertebrates have been previously reported from the undivided surficial deposits, this sedimentary unit is judged to have a high potential to contain paleontological resources based on the SVP (1995) criteria.

5.4.2 Regulatory Framework

5.4.2.1 Federal Regulations

National Historic Preservation Act

Because the project sponsor must obtain a federal Section 404 permit from the Corps, the project is required to comply with Section 106 of the NHPA. Historic properties are protected through the NHPA of 1966, as amended (16 USC 470f), and its implementing regulations. Prior to implementing an "undertaking" (e.g., issuing a federal permit), Section 106 of the NHPA requires federal agencies to consider the effects of the undertaking on historic properties and to afford the Advisory Council on Historic Preservation a reasonable opportunity to comment on any undertaking that would adversely affect properties listed or eligible for listing in the National Register. Under the NHPA, an archaeological site, historic building, structure or object is considered significant if it meets the National Register listing criteria at 36 CFR 60.4, as stated below:

> The quality of significance in American history, architecture, archaeology, engineering, and culture is present in districts, sites, buildings, structures, and objects that possess integrity of location, design, setting, materials, workmanship, feeling, and association and
>
> a) That are associated with events that have made a significant contribution to the broad patterns of our history, or
>
> b) That are associated with the lives of persons significant in our past, or
>
> c) That embody the distinctive characteristics of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction, or
>
> d) That have yielded, or may be likely to yield, information important in prehistory or history.

In addition to meeting one or more of these criteria, an archaeological or historic resources must possess "integrity" to qualify for listing in the NHPA. Integrity is generally evaluated with reference to such qualities as location, design (i.e., site structure), materials, workmanship, setting, feeling, and association. A potentially eligible site must retain the integrity of the values that would make it significant. Integrity refers to both the authenticity of a property's historic period, and to its ability to convey its significance. Although the evaluation of integrity is sometimes a subjective judgment, it must always be grounded in an understanding of the resource's physical features and how they relate to its significance.

Properties that otherwise are excluded from inclusion in the NRHP, such as religious properties, moved properties, birthplaces or graves, cemeteries, reconstructed properties, commemorative properties and properties that have achieved significance within the past 50 years may be eligible for the NRHP if they meet one of the four criteria and also meet the standards in the relevant criteria consideration.

Federal review of projects is normally referred to as the Section 106 process. This process is the responsibility of the federal lead agency. The Section 106 review normally involves a four-step procedure, which is described in detail in the implementing regulations (36 CFR 800):

- Identify historic properties in consultation with the State Historic Preservation Officer and interested parties;
- Assess the effects of the undertaking on historic properties;
- Consult with the State Historic Preservation Officer, other agencies, and interested parties to develop an agreement that addresses the treatment of historic properties and notify the Advisory Council on Historic Preservation; and finally,
- Proceed with the project according to the conditions of the agreement.

5.4.2.2 State Regulations

The State of California implements the NHPA through its statewide comprehensive cultural resource surveys and preservation programs. The California Office of Historic Preservation (OHP), as an office of the California Department of Parks and Recreation, implements the policies of the NHPA on a statewide level. The OHP also maintains the California Historic Resources Inventory. The State Historic Preservation Officer is an appointed official who implements historic preservation programs within the state's jurisdictions.

California Public Resources Code and Health and Safety Code

Several sections of the California Public Resources Code (PRC) protect cultural resources. Under Section 5097.5, no person shall knowingly and willfully excavate upon, or remove, destroy, injure, or deface, any historic or prehistoric ruins, burial grounds, archaeological or vertebrate paleontological site (including fossilized footprints), inscriptions made by human agency, rock art, or any other archaeological, paleontological, or historical feature situated on public lands, except with the express permission of the public agency that has jurisdiction over the lands. Violation of this section is a misdemeanor. Section 5097.98 states that if Native American remains are identified within a project area, the lead agency must work with the appropriate Native Americans as identified by the Native American Heritage Commission and develop a plan for the treatment or disposition of, with appropriate dignity, the human remains and any items associated with Native American burials. These procedures are also addressed in Section 15046.5 of the CEQA Guidelines. California Health and Safety Code Section 7050.5 prohibits disinterring, disturbing, or removing human remains from a location other than a dedicated cemetery. Section 30244 of the PRC requires reasonable mitigation for impacts on paleontological and archaeological resources that occur as a result of development on public lands.

PRC Section 5024.1[a] states that the California Register of Historic Resources (California Register) is "an authoritative listing and guide to be used by state and local agencies, private groups, and citizens in identifying the existing historical resources of the state and to indicate which resources deserve to be protected, to the extent prudent and feasible, from substantial adverse change." PRC Section 5024.1[b]) states that the criteria for eligibility to the California Register are based on National Register criteria, and that certain resources are determined by the statute to be automatically included in the California Register, including California properties formally eligible for or listed in the National Register.

Title 14, Section 4307 of the California Code of Regulations also prohibits any person from removing, inuring, defacing or destroying any object of paleontological, archaeological or historical interest or value.

California Environmental Quality Act

CEQA, as codified in PRC Sections 21000 et seq., is the principal statute governing the environmental review of projects in the state. The CEQA Guidelines define a historical resource as: (1) a resource in the California Register; (2) a resource included in a local register of historical resources, as defined in PRC Section 5020.1(k) or identified as significant in a historical resource survey meeting the requirements of PRC Section 5024.1(g); or (3) any object, building, structure, site, area, place, record, or manuscript that a lead agency determines to be historically significant or significant in the architectural, engineering, scientific, economic, agricultural, educational, social, political, military, or cultural annals of California, provided the lead agency's determination is supported by substantial evidence in light of the whole record.

CEQA Section 15064.5(3) states that any object, building, structure, site, area, place, record, or manuscript that a lead agency determines to be historically significant or significant in the architectural, engineering, scientific, economic, agricultural, educational, social, political, military, or cultural annals of California may be considered a historical resource, provided the lead agency's determination is supported by substantial evidence in light of the whole record. Generally, a resource is considered by the lead agency to be "historically significant" if the resource meets the criteria for listing in the California Register (PRC Section 5024.1, Title 14 of the California Code of Regulations [CCR], Section 4852) including the following:

1) Is associated with events that have made a significant contribution to the broad patterns of California's history and cultural heritage;

2) Is associated with the lives of persons important in our past;

3) Embodies the distinctive characteristics of a type, period, region, or method of construction, or represents the work of an important creative individual, or possesses high artistic values; or

4) Has yielded, or may be likely to yield, information important in prehistory or history [14 CCR Section 4852(b)].

For a resource to be eligible for the California Register, it must also retain enough integrity to be recognizable as a historical resource and to convey its significance. A resource that does not retain sufficient integrity to meet the National Register criteria may still be eligible for listing in the California Register.

CEQA requires lead agencies to determine if a proposed project would have a significant effect on important archaeological resources, either historical resources or unique archaeological resources. If a lead agency determines that an archaeological site is a historical resource, the provisions of PRC Section 21084.1 and CEQA Guidelines Section 15064.5 would apply. If an archaeological site does not meet the CEQA Guidelines criteria for a historical resource, then the site may meet the threshold of PRC Section 21083 regarding unique archaeological resources. A unique archaeological resource is "an archaeological artifact, object, or site about which it can be clearly demonstrated that, without merely adding to the current body of knowledge, there is a high probability that it meets any of the following criteria:

1) Contains information needed to answer important scientific research questions and that there is a demonstrable public interest in that information.

2) Has a special and particular quality such as being the oldest of its type or the best available example of its type.

3) Is directly associated with a scientifically recognized important prehistoric or historic event or person [PRC Section 21083.2 (g)]."

The CEQA Guidelines note that if a resource is neither a unique archaeological resource nor a historical resource, the effects of the project on that resource shall not be considered a significant effect on the environment (CEQA Guidelines Section 15064[c][4]).

5.4.2.3 Local Regulations

City and County of San Francisco

San Francisco Historic Preservation Commission and Planning Code Articles 10 and 11

The Office of Historic Preservation has included the CCSF on its list of Certified Local Governments, which means that San Francisco has an approved historic preservation ordinance, an Historic Preservation Commission, and other formal processes related to historic preservation and cultural resources management. The CCSF reviews the historical resources designated under Articles 10 and 11 of the San Francisco Planning Code when it evaluates impacts on historic resources (see Section 5.4.3.1, Significance Criteria). Article 10 describes procedures regarding the preservation of sites and areas of special character or special historic, architectural, or aesthetic interest or value, such as officially designated city landmarks and buildings included within locally designated historic districts. Article 11 of the Planning Code designated six downtown conservation districts. There are no CCSF-designated city landmarks or properties that contribute to designated historic districts in the Historical Architectural and Archaeological Resources C-APE.

5.4.3 Impacts

5.4.3.1 Significance Criteria

The CCSF has not formally adopted significance standards for impacts related to cultural resources, but generally considers that implementation of the proposed project would have a significant impact if it were to:

- Cause a substantial adverse change in the significance of a historical resource as defined in CEQA Guidelines Section 15064.5, including those resources listed in Article 10 or Article 11 of the San Francisco Planning Code;
- Cause a substantial adverse change in the significance of a unique archaeological resource pursuant to PRC Section 21083;
- Directly or indirectly destroy a unique paleontological resource or site or unique geological feature; or
- Disturb any human remains, including those interred outside of formal cemeteries.

5.4.3.2 Approach to Analysis

The analysis considers direct and indirect impacts on both known cultural and paleontological resources as well as inadvertent discoveries within the C-APE. Potential impacts on architectural and structural resources are assessed by identifying the activities that could affect the architectural resources that have been identified as historical resources for the purposes of CEQA. While most historic buildings and many historic-period archaeological properties are generally significant because of their association with important events, people, or styles (California Register Criteria A, B, and C), the significance of most prehistoric and historic-period archaeological properties is usually assessed under Criterion D. This criterion stresses the potential for discovering important historical information within the site rather than the resource's significance as a surviving example of a type of construction or its association with an important person or event.

Once a resource has been identified as significant, it must be determined whether the project would "cause a substantial adverse change in the significance" of the resource (CEQA Guidelines 15064.5[b]). A substantial adverse change in the significance of a historical resource or unique archaeological resource means "physical demolition, destruction, relocation, or alteration of the resource or its immediate surroundings such that the significance of the historical resource would be materially impaired" (CEQA Guidelines Section 15064.5[b][1]). A historical resource is materially impaired through the demolition or alteration of the historical resource's physical characteristics that convey its historical significance and that justify its inclusion in the California Register (CEQA Guidelines Section 15064.5[b][2][A]).

The impact analysis for paleontological resources is based on the paleontological potential of the rock units to be disturbed by project-related excavations.

5.4.3.3 Impact Analysis

Summary of Impacts

Table 5.4-1 summarizes the potential cultural resource impacts and the significance of project impacts before and after mitigation.

TABLE 5.4-1
SUMMARY OF IMPACTS – CULTURAL RESOURCES

Impact	Significance Determination Before Mitigation	Significance Determination After Mitigation
Impact CP-1: Impacts on the historical significance of an individual facility, historic district, or a contributor to a historic district.	LS	–
Impact CP-2: Impacts on unknown and known prehistoric and historic-period archaeological resources.	S	LS
Impact CP-3: Impacts on paleontological resources.	PS	LS
Impact CP-4: Impacts on human remains.	PS	LS

LS = Less than Significant impact
PS = Potentially Significant impact
S = Significant impact
SU = Significant and Unavoidable impact, even with mitigation incorporated
– = Mitigation not required

Construction Impacts

Impact CP-1: Impacts on the historical significance of an individual facility, historic district, or a contributor to a historic district.

No historical architectural resources eligible for listing in the National or California Registers were identified within or immediately adjacent to the C-APE, either individually or as contributors to a historic district. As such, the project would have no direct or indirect impact on historical resources pursuant to Section 15064.5 of the CEQA Guidelines or PRC Section 5024.1, as none were identified in the C-APE. Therefore, impacts on the historical significance of an individual facility, historic district, or a contributor to a historic district would be *less than significant*, and no mitigation is required.

Impact CP-2: Impacts on unknown and known archaeological resources.

Construction could result in direct impacts on known and/or unknown archaeological resources during earthmoving activities. Known archaeological site CA-ALA-576 is located within the C-APE and has been evaluated by the State Historic Preservation Officer as eligible for listing on the California and National Registers under Criterion 4/D. The significance of this resource could be materially impaired because construction excavation to depths of 15 to 30 feet could alter characteristics that convey its significance—that is, the site's ability to yield information important to prehistory.

Avoidance is not a feasible option for the project because the pipelines need to be upgraded where they cross the Hayward fault. Without these upgrades, rupture of these pipelines at this location would result in flood damage, public safety hazards, and temporary loss of potable water supply to downstream customers for domestic consumption, commercial uses, hospitals, and firefighting purposes. Therefore, impacts on this known archaeological resource would be *significant*. The State Historic Preservation Officer has additionally determined that the proposed project would have an adverse effect on archaeological site CA-ALA-576 and agrees that avoidance through redesign is infeasible (OHP, 2009). Implementation of **Mitigation Measure M-CP-2a, Archaeological Research Design and Treatment Plan and Archaeological Data Recovery Report for CA-ALA-576,** which specifies preparation of a research design and treatment plan and a data recovery report for the site would reduce this impact to a less-than-significant level by requiring systematic data recovery.

Although no additional archaeological sites were identified by the records search or found during the surface survey of the C-APE, the inadvertent discovery of cultural resources is a high possibility because of the known sensitivity of the area. Therefore, impacts related to the potential to encounter previously undiscovered archaeological resources would be *potentially significant*. This impact would be reduced to a less-than-significant level with implementation of **Mitigation Measure M-CP-2b, Extended Archaeological Survey**, **Mitigation Measure M-CP-2c, Archaeological Evaluation Plan and Archaeological Evaluation and Effects Report**, and **Mitigation Measure M-CP-2d, Archaeological Monitoring Plan and Accidental Discovery Measures**. Because this project requires a federal permit and compliance with Section 106, these mitigation measures are tailored to ensure that the project also satisfies federal requirements. Continued Native American consultation will be required throughout development and implementation of Mitigation Measures M-CP-2a, M-CP-2b, M-CP-2c, and M-CP-2d as a component of Section 106 compliance.

Impact CP-3: Impacts on paleontological resources.

Construction could result in direct impacts on paleontological resources during any earthmoving activities that disturbed or buried previously undisturbed fossil-bearing sediments, making those sediments and their paleontological resources unavailable for future scientific investigation. Although earthmoving associated with construction would be a comparatively short-term activity, the loss of any fossil-bearing sediments, fossil remains, unrecorded fossil sites, associated specimen data, and the corresponding geologic and geographic site data would constitute a long-term environmental impact. No paleontological resources are known to occur directly within the project area; however, the rock units that the project would disturb have a high potential to yield fossil resources.

Potential impacts on paleontological resources would result primarily from installation of the new BDPL No. 3 and its associated vault and from excavations for improvements to the existing BDPL No. 4 and associated slip-joint vault. As described in Section 5.4.1, Setting, both native geological formations underlying the project area have a high potential to yield paleontological resources. Thus, any project activity that disturbs Irvington Gravels or undivided surficial deposits could potentially encounter paleontological resources.

Installation of the new BDPL No. 3X would require construction activities along the entire 2,360-foot segment of pipeline to be installed. Construction would include pipeline installation within existing corrugated-metal pipes, open-trench excavation, and cut-and-cover excavation. Jack-and-bore or open-trench excavation could be used to cross Agua Fria Creek at the south end of the project area. The depths of excavation required for installation of the new pipeline would range from 13 to 35 feet below the ground surface, depending on the specific zone and method of excavation.

As discussed above in Section 5.4.1, fill material within the BDPL Nos. 3 and 4 ROW ranges in depth from 8 to 25 feet. Because the new BDPL No. 3X would be built approximately 15 feet west of the existing BDPL No. 3, it is reasonable to expect the depth of fill material along BDPL No. 3X to be closer to 5 to 10 feet where the pipeline would be installed, as reported by Gmoser et al. (1999). Thus, previously undisturbed units are likely to be encountered during installation of the new pipeline.

Improvements to BDPL No. 4 would include modifications to the existing slip-joint vault and upgrades to BDPL No. 4 at Traces B and C of the Hayward fault. Construction of these improvements would include excavations to depths of 15 to 20 feet to access the existing pipeline. At Trace C, use of the slipline method would require excavation for launch pits only, thus involving much less ground disturbance than removing and replacing the pipeline segment by open-cut excavation. While these improvements could require excavations into previously disturbed soils, the excavation could extend beyond the previous limits and therefore disturb previously undisturbed units.

Because both Irvington Gravels and undivided surficial deposits could be encountered during installation of the new BDPL No. 3X and during construction of improvements to BDPL No. 4, and these geologic units have a high potential to yield paleontological resources, impacts related to disturbance or destruction of paleontological resources would be *potentially significant*. This potentially significant impact would be reduced to a less-than-significant level with implementation of **Mitigation Measures M-CP-3a: Worker Training and M-CP-3b, Paleontological Resources Monitoring**, which require that workers are trained to recognize fossils, that a trained paleontologist monitors construction activities, and that accidentally discovered fossils be appropriately assessed for their significance and salvaged if deemed necessary. Implementation of this measure would ensure that any paleontological resources encountered during construction would be recovered and appropriately managed.

Impact CP-4: Impacts on human remains.

Construction could result in impacts on Native American human remains during ground-disturbing activities. Therefore, impacts related to disturbance or destruction of human remains would be *potentially significant*. This significant impact would be reduced to a less-than-significant level with implementation of **Mitigation Measure M-CP-4, Human Remains and Associated or Unassociated Funerary Objects**, which requires that the treatment of human remains and of associated or unassociated funerary objects discovered during any soil-disturbing activity must comply with applicable state laws.

Facility Siting, Operation, and Maintenance Impacts

Following completion of the proposed project, pipeline operations would be consistent with existing operations, and pipeline maintenance would occur as needed. While project facilities would be monitored regularly in accordance with the standard inspection schedule, the frequency of monitoring or maintenance activities would not change substantially from current conditions. Therefore, the project would not result in any impacts to cultural or paleontological resources as a result of facility siting, operation, or maintenance.

5.4.4 Mitigation Measures

Mitigation Measure M-CP-2a: Archaeological Research Design and Treatment Plan and Archaeological Data Recovery Report for CA-ALA-576.

Prior to construction, the SFPUC will retain a qualified archaeologist to design and implement an archaeological research design and treatment plan (ARDTP) to recover important cultural resources that may be present in CA-ALA-576,. The ARDTP will be used for federal and state consultation as the historic properties treatment plan (HPTP). The ARDTP/HPTP will be prepared in conjunction, as appropriate, with a Memorandum of Agreement among the Corps, SFPUC, State Historic Preservation Officer, and Native American organizations. Once approved, the archaeologist will implement a data recovery investigation and/or other treatment, consistent with the ARDTP/HPTP. A Native American consultant will be present during all ground-disturbing activities associated with the data recovery effort. Upon completion of the data recovery and treatment efforts, the archaeologist will prepare an archaeological data recovery report (ADRR) that describes the archaeological and historical research methods employed in the archaeological evaluation/monitoring/data recovery program(s) undertaken, and that also presents, analyzes, and interprets the recovered data. Information that may put at risk any archaeological resource will be provided in a separate removable insert within the final report. Once approved by the Environmental Review Officer (ERO), copies of the ADRR will be distributed as follows: the relevant California Historical Resources Information System Information Center will receive one copy and the ERO will receive a copy of the transmittal of the ADRR to the Information Center. MEA will receive three copies of the ADRR, along with copies of any formal site recordation forms (DPR 523 series) and/or documentation for evaluation under National Register/California Register criteria. Copies will also be submitted to the appropriate federal agencies, the State Historic Preservation Officer, and the Advisory Council of Historic Preservation as necessary.

Mitigation Measure M-CP-2b: Extended Archaeological Survey for Areas Outside of CA-ALA-576.

Prior to construction, the SFPUC will retain a qualified archaeologist to design and implement an extended archaeological survey (EAS) to investigate the potential presence of archaeological resources within the C-APE, but outside of the known boundaries of CA-ALA-576. The EAS will include geotechnical soil coring samples in areas outside of the known boundaries of CA-ALA-576 to determine the presence or absence of cultural materials. The EAS must be approved by the ERO prior to conducting the investigation. The qualified archaeologist would prepare and present the results of the survey in a report to be approved by the ERO.

Mitigation Measure M-CP-2c: Archaeological Evaluation Plan and Archaeological Evaluation and Effects Report.

If potentially significant cultural materials—including prehistoric materials such as obsidian and chert flaked-stone tools (e.g., projectile points, knives, scrapers) or toolmaking debris; culturally darkened soil ("midden") containing heat-affected rocks, artifacts, or shellfish remains; stone milling equipment (e.g., mortars, pestles, handstones, or milling slabs); battered stone tools, such as hammerstones and pitted stones, or historic-period materials such as stone, concrete, or adobe footings and walls; filled wells or privies; or deposits of metal, glass, and/or ceramic refuse—are identified during the EAS, the SFPUC will retain a qualified archaeologist and a Native American consultant to design and implement an archaeological evaluation plan for evaluating the resource's eligibility to the National and California Registers. The results of this evaluation will be included in an archaeological evaluation and effects report prepared by a qualified archaeologist.

Mitigation Measure M-CP-2d: Archaeological Monitoring Plan and Accidental Discovery Measures.

A qualified archaeologist will prepare an archaeological monitoring plan (AMP), including measures that will be implemented to ensure that important, previously unrecorded archaeological resources that are discovered during construction (but were not identified during implementation of the EAS or ARDTP/HPTP) are identified, evaluated, and treated appropriately. The AMP will include the following measures should construction activities result in the accidental discovery of a cultural resource:

> Construction activities will immediately be suspended within 50 feet of the find if there is any indication of a potential archaeological resource.
>
> To avoid any potential adverse effect from the proposed project on accidentally discovered buried or submerged historical resources, as defined in CEQA Guidelines Section 15065.4(a)(c), the SFPUC will distribute the Planning Department's archaeological resource "ALERT" sheet to the project prime contractor; to any project subcontractor firms (including demolition, excavation, grading, foundation, pile driving, etc.); and/or to utilities firms involved in soil-disturbing activities within the project site. Prior to any soil-disturbing activities being undertaken, each contractor is responsible for ensuring that the ALERT sheet is circulated to all field personnel, including machine operators, field crew, pile drivers, supervisory personnel, etc. The SFPUC will provide the ERO with a signed affidavit from the responsible parties (prime contractor, subcontractor(s), and utilities firm) confirming that all field personnel have received copies of the ALERT sheet.
>
> If the ERO determines that an archaeological resource may be present within the project site, the SFPUC will retain the services of a qualified archaeological consultant. The archaeological consultant will advise the ERO as to whether the discovery is an archaeological resource that retains sufficient integrity and is of potential scientific/historical/cultural significance. If an archaeological resource is present, the archaeological consultant will identify and evaluate the archaeological resource. The archaeological consultant will make a recommendation as to what action, if any, is warranted. Based on this information, the ERO may require, if warranted, specific additional measures to be implemented by the SFPUC.
>
> Measures might include: preservation in situ of the archaeological resource; an archaeological monitoring program; or an archaeological evaluation program. The ERO may also require that the SFPUC immediately implement a site security program if the archaeological resource is at risk from vandalism, looting, or other damaging actions.

Mitigation Measure M-CP-3a: Worker Training.

Prior to the initiation of site preparation and/or start of construction, SFPUC shall ensure that all construction forepersons and field supervisors receive training overseen by a qualified professional paleontologist, as defined by the Society of Vertebrate Paleontology's (SVP) Conformable Impact Mitigation Guidelines Committee (1995) and who is experienced in teaching non-specialists about certain characteristics in the excavation that might suggest it is a fossil locality. Training on paleontological resources shall also be provided to all other construction workers but may include videotape of the initial training and/or the use of written materials rather than in-person training by a paleontologist.

Mitigation Measure M-CP-3b: Paleontological Resources Monitoring.

The SFPUC will retain a qualified professional paleontologist, as defined by the SVP's Conformable Impact Mitigation Guidelines Committee (SVP 1995), to conduct onsite monitoring for unanticipated discovery of potentially significant paleontological resources during initial ground disturbing activities (e.g., grading and excavation). After initial ground disturbance activities in the paleontologically sensitive areas, monitoring may cease but a paleontologist will be retained on-call by the SFPUC and its contractor throughout the project in the event of an unanticipated find during subsequent construction activities. If potential fossils are discovered during construction, all earthwork or other types of ground-disturbance in the vicinity of the find shall cease immediately until a qualified professional paleontologist, as defined by the SVP's Conformable Impact Mitigation Guidelines Committee (SVP 1995), can assess the nature and importance of the find and recommend appropriate salvage and treatment. The SFPUC shall be responsible for ensuring that the recommendations of the paleontological monitor regarding treatment and reporting are implemented and reported to the San Francisco Planning Department Environmental Review Officer.

Mitigation Measure M-CP-4: Human Remains and Associated or Unassociated Funerary Objects.

The treatment of human remains and of associated or unassociated funerary objects discovered during any soil-disturbing activity, must comply with applicable state laws, including: immediate notification of the coroner of the county within which the project is located and, in the event of the coroner's determination that the human remains are Native American, notification of the California Native American Heritage Commission, who would appoint a Most Likely Descendant (MLD) (PRC Section 5097.98). The archaeological consultant, SFPUC, and MLD would then make all reasonable efforts to develop an agreement for the treatment, with appropriate dignity, of human remains and associated or unassociated funerary objects (CEQA Guidelines Section 15064.5[d]). The agreement should take into consideration the appropriate excavation, removal, recordation, analysis, custodianship, curation, and final disposition of the human remains and associated or unassociated funerary objects. The PRC allows 48 hours to reach agreement on these matters. If the MLD and the other parties do not agree on the reburial method, the project will follow Section 5097.98(e) of the PRC, which states that "the landowner or his or her authorized representative shall reinter the human remains and items associated with Native American burials with appropriate dignity on the property in a location not subject to further subsurface disturbance."

5.4.5 References

Alameda County, Alameda County Landmarks and Contributing Buildings Comprehensive Survey 2005–2008, 2008.

Baumhoff, Martin A., "Environmental Background." In: *Handbook of North American Indians, Vol. 8,* pp. 16–24. Robert F. Heizer, volume editor, and William C. Sturtevant, general editor. Smithsonian Institution, Washington, DC, 1978.

Bryne, Stephen, Site Record for CA-ALA-ISO-13. On file at the Northwest Information Center of the California Historical Resources Information System, Rohnert Park, CA, 1992.

California (State of) Department of Parks and Recreation, Office of Historic Preservation (DPR OHP), *California Inventory of Historic Resources.* The Resources Agency, Sacramento, CA, 1976.

California (State of) Department of Parks and Recreation, Office of Historic Preservation (DPR OHP), *California Historical Landmarks*, Sacramento, CA, 1990.

California (State of) Department of Parks and Recreation, Office of Historic Preservation (DPR OHP), *California Points of Historical Interest*, Sacramento, CA, 1992.

California (State of) Department of Parks and Recreation, Office of Historic Preservation (DPR OHP), *Historic Properties Directory*, Directory of Properties in the Historic Property Data File for San Mateo County, Sacramento, CA, updated September 2006.

California State Historic Preservation Officer (SHPO), Letter to ESA regarding SFPUC WSIP, BDPL Pipelines Nos. 3 and 4 at Hayward Fault Seismic Upgrade Project, April 28, 2009.

Davis, J.T. and A.E. Treganza, "The Patterson Mound: A Comparative Analysis of the Archaeology of Site ALA-328." In: *Reports of the University of California Archaeological Survey*, 47:1–92. Berkeley, CA, 1959.

ESA+Orion, *Historic Context and Archaeological Survey Report, Bay Division Pipeline Nos. 3 and 4.* Prepared for the San Francisco Public Utilities Commission, February 2009.

Gmoser, Glenn, Krase, Elizabeth, Hurley, Marianne, and Kostura, William, *Historic Property Survey Report and Finding of No Historic Properties Affected for the I-680 "Sunol Grade" Southbound Improvement Project in the Cities of Pleasanton and Fremont in Unincorporated Alameda County, and in the City of Milpitas, Santa Clara County.* Prepared by Caltrans, District 4, Office of Environmental Planning, South. On file at the Northwest Information Center of the California Historical Resources Information System, Rohnert Park, CA. Survey No. S-22501, 1999.

Helley, E.J., and R.W. Graymer, *Quaternary Geology of Alameda County, and Parts of Contra Costa, Santa Clara, San Mateo, San Francisco, Stanislaus, and San Joaquin Counties, California: A Digital Database*, U.S. Geological Survey, Open-File Report 97-97, 1997.

Hylkema, Mark, "Tidal Marsh, Oak Woodlands, and Cultural Florescence in the Southern San Francisco Bay Region." In: *Catalysts to Complexity: Late Holocene Societies of the California Coast*. Jon M. Erlandson and Terry L. Jones, editors. In: Perspectives in California Archaeology, Vol. 6. Jeanne E. Arnold, series editor. Cotsen Institute of Archaeology, University of California, Los Angeles, CA, 2002.

JRP Historical Consulting, *Analysis of Historic Districts Potentially Impacted by WSIP Projects.* Memo from Rand F. Herbert, Christopher McMorris, and Stephen R. Wee to Irina Torrey, SFPUC, and Diana Sokolove, MEA, March 31, 2008a.

JRP Historical Consulting, *Historic Resources Evaluation Report for the San Andreas Pipeline No. 3 Installation Project*, March 2008b.

King, Chester D., *Excavations at ALA-342: A Summary Report.* On file at the Northwest Information Center of the California Historical Resources Information System, Rohnert Park, CA. Survey No. S-12276, 1968.

Lauenstein, C.A., *Bay Division Pipe No. 3*, November 4, 1948. Memorandum in SFPUC Archives Re: Bay Division Pipeline No. 3 Cost Estimate, 1948 Supply folder.

Levy, Richard, "Costanoan." In: *Handbook of North American Indians, Vol. 8,* pp. 485–495. Robert F. Heizer, volume editor, and William C. Sturtevant, general editor. Smithsonian Institution, Washington, DC, 1978.

Moratto, Michael J., *California Archaeology*, Academic Press, Orlando, FL, 1984.

Nelson, Nels., "Shellmounds of the San Francisco Bay Region." In: *American Archaeology and Ethnology*, Vol. 7, No. 4, University of California Publications, Berkeley, CA, 1909.

Northwest Information Center Records Search (NWIC), *File NO. 07-1065, NWIC California Historical Resources Information System at Sonoma State University*, Rohnert Park, California, January, 2008.

PaleoResource Consultants, F & F GeoResource Associates, Inc., *Preliminary Paleontological Resource Impact Assessment, Seismic Upgrade of Bay Division Pipelines 3 and 4 at the Hayward Fault Crossing Phase 2*, December 2008.

San Francisco Planning Department, *Program Environmental Impact Report for the San Francisco Public Utility Commission's Water System Improvement Program*, File No. 2005.0159E. State Clearinghouse No. 2005092026, October 2008.

San Francisco Planning Department, *Bay Division Pipeline Reliability Upgrade Project Final EIR*, July 29, 2009.

San Francisco Public Utilities Commission (SFPUC), *Annual Report Fiscal Year 1949–1950,* 1951.

San Francisco Public Utilities Commission (SFPUC), *Annual Report Fiscal Year 1951–1952,* 1953.

San Francisco Public Utilities Commission (SFPUC), *SFPUC History: O'Shaughnessy and Hetch Hetchy.* Available online at http://sfwater.org/Files/History/HH_historybrochure.pdf. Accessed on April 10, 2008.

Society of Vertebrate Paleontology (SVP), *Assessment and Mitigation of Adverse Impacts to Nonrenewable Paleontologic Resources: Standard Guidelines*, Society of Vertebrate Paleontology News Bulletin, Vol. 163, pp. 22–27, 1995.

Tetra Tech, Inc., *Survey of Existing Historical Architectural and Archaeological Resources – Seismic Upgrade of Bay Division Pipeline Nos. 3 and 4 at Hayward Fault Project.* Prepared for the San Francisco Public Utilities Commission, April 2008.

Thompson and West, Map of Alameda, California. Published by Thompson and West, Oakland, CA, 1878.

URS Corporation, *Bay Division Pipelines 3 & 4 Hayward Fault Crossing Geotechnical Report, Fremont, CA*, December 5, 2008.

U.S. Geological Survey (USGS), *San Jose Quadrangle,* 15', 1:62,500. Surveyed 1895. Published March 1899.

5.5 Transportation and Circulation

This section describes the existing roadway network in the vicinity of the project and the traffic regulatory framework, assesses potential transportation impacts during construction, and identifies mitigation measures for significant impacts.

This section addresses the following project area roadways (see Figures 3.1 and 3.9 in Chapter 3, Project Description) that would be directly affected by construction activities:

- Interstate 680 (I-680) mainline and on- and off-ramps
- Interstate 880 (I-880) mainline and on- and off-ramps
- Mission Boulevard
- Paseo Padre Parkway
- Eight residential roads: Mohave Drive, Crawford Street, Omega Drive, Nugget Way, Nugget Place, Tissiack Way, Tissiack Place, and Tissiack Court
- Three key intersections in the vicinity of the project site: Mohave Drive / Mission Boulevard, Paseo Padre Parkway / Mission Boulevard, and Paseo Padre Parkway / Omega Drive

This section also addresses the following roadways proposed for use as detour routes during periods of temporary closure of the northbound I-680 diamond and loop on-ramps at the Mission Boulevard interchange, as well as temporary closure of Mission Boulevard:

- Warm Springs Boulevard–Osgood Road
- Auto Mall Parkway–Durham Road
- South Grimmer Boulevard (Mission Boulevard closure only)
- Paseo Padre Parkway

5.5.1 Setting

This section describes the roadway network that provides access to the current SFPUC right-of-way (ROW) of BDPL Nos. 3 and 4, as well as the proposed construction staging areas that would be established adjacent to and outside the ROW. The pipeline's proposed alignment is located in the city of Fremont in southern Alameda County.

5.5.1.1 Roadway Network

Regional Access

I-680 (the Sinclair Freeway) and I-880 (the Nimitz Freeway) provide access to all project work areas. I-680 extends from I-280 and Highway 101 in San Jose to I-80 near Fairfield, connecting the Livermore-Amador Valley to Contra Costa County to the north and Santa Clara Valley to the south. I-680 has seven lanes in the project area (four southbound lanes and three northbound lanes). Access to the project area from I-680 is via four diamond and four loop on- and off-ramps at Mission Boulevard. The average annual daily traffic volume on I-680 at the interchange with

Mission Boulevard is about 148,700 vehicles; the AM and PM peak-hour traffic volumes are approximately 11,690 and 10,260 vehicles, respectively (Caltrans, 2008).

In the project area, I-880 runs parallel to I-680 as an eight-lane freeway that extends from I-280 in San Jose to I-80 at the San Francisco–Oakland Bay Bridge. The project area can be accessed from I-880 at the Mission Boulevard interchange. The average annual daily traffic volume on I-880 at the interchange with Mission Boulevard is approximately 163,300 vehicles; the AM and PM peak-hour traffic volumes are approximately 9,400 and 11,360 vehicles, respectively (Caltrans, 2008).

Local Access

Project Area Streets

The key segments of the roadway system providing local access to and within the project area (shown on Figures 3.1 and 3.9 in Chapter 3) are discussed below.

Mission Boulevard is an arterial route that locally connects I-880 on the south and I-238 and I-580 near Castro Valley on the north, intersecting I-680 (at interchanges) twice. The segment of Mission Boulevard between I-880 and I-680 in the project area is designated Highway 262. In the project area, Mission Boulevard is a four- to six-lane arterial with a 15-foot-wide median, and no parking is permitted. Mission Boulevard has signalized intersections at Warm Springs Boulevard, Mohave Drive, Paseo Padre Parkway, and South Grimmer Boulevard within the project study area. The average annual daily traffic volume on Mission Boulevard at Mohave Drive is approximately 72,000 vehicles (Caltrans, 2008); the AM and PM peak-hour traffic volumes on Mission Boulevard at its key intersections in the project area are about 3,580 and 3,820 vehicles, respectively, at Mohave Drive, and are about 1,475 and 1,745 vehicles, respectively at Paseo Padre Boulevard.

Paseo Padre Parkway is classified as a parkway by the City of Fremont, connecting Mission Boulevard on the east and the Dumbarton Bridge (Highway 84) on the west (via Decoto Road). In the project area, Paseo Padre Parkway has two traffic lanes in each direction and a 20-foot-wide landscaped median. Paseo Padre Parkway intersects with Mission Boulevard at a traffic signal, with Omega Drive at a T-intersection with a stop sign on the Omega Drive approach, with South Grimmer Boulevard at an all-way stop-sign controlled intersection, and with Durham Road at a traffic signal. Because there is no median break at Tissiack Way, access between Tissiack Way and Paseo Padre Parkway is available only via right-turn-in and right-turn-out only. The AM and PM peak-hour traffic volumes on Paseo Padre Parkway at its key intersection with Mission Boulevard are both about 430 vehicles.

Warm Springs Boulevard – Osgood Road is an arterial route that connects Scott Creek Road (about 2 miles south of Mission Boulevard) and Washington Boulevard (about 3.5 miles north of Mission Boulevard), intersecting with Mission Boulevard, South Grimmer Boulevard, and Auto Mall Parkway (each are signalized intersections). In the project area, Warm Springs Boulevard varies from one to two lanes in each direction of travel, with a center two-way left-turn lane, and left-turn lanes at major intersections. The AM and PM peak-hour traffic volumes on Warm Springs Boulevard at its intersection with Mission Boulevard are about 1,760 and 1,785 vehicles, respectively.

Auto Mall Parkway – Durham Road is an arterial route that connects the Tri-Cities Landfill (west of I-880) and Mission Boulevard in the east, intersecting with the I-880 interchange, Fremont Boulevard, Warm Springs Boulevard, the I-680 interchange, and Paseo Padre Parkway. In the project vicinity, Auto Mall Parkway – Durham Road has two through lanes and additional left-turn lanes in each direction of travel at major intersections.

South Grimmer Boulevard is a two-lane roadway in the study area, extending as a four-lane arterial west of Warm Springs Boulevard – Osgood Road. South Grimmer Boulevard intersects with Parkmeadow Drive and Paseo Padre Parkway at all-way stop-sign controlled intersections.

Mohave Drive is a collector street, connecting residential streets with Mission Boulevard. It has one traffic lane in each direction, but its approach at the key intersection with Mission Boulevard widens to three lanes—one lane for each movement (left turn, straight, and right turn). The intersection of Mohave Drive and Mission Boulevard is signalized.

Crawford Street is a residential street with two traffic lanes and on-street parking on both sides. The south end of the project area (the BDPL Nos. 3 and 4 ROW at the South Shutoff Station) crosses Crawford Street at a 90-degree angle. This street meets Mohave Drive at a roundabout, west of the SFPUC ROW.

Omega Drive is a residential street with two traffic lanes and on-street parking on both sides. Omega Drive connects residential streets with Paseo Padre Parkway. The T-intersection of Omega Drive and Paseo Padre Parkway is unsignalized, with a stop sign at the Omega Drive approach.

Nugget Way is a residential street that extends into a cul-de-sac as ***Nugget Place***; it has two traffic lanes and on-street parking on both sides. Nugget Way is approximately 36 feet wide, which is sufficient to allow for parking on both sides. The BDPL Nos. 3 and 4 ROW crosses Nugget Way at a 90-degree angle. The entrance to the cul-de-sac (Nugget Place) is only 32 feet wide. Although parking does not appear to be restricted at this location (there are no parking regulation signs), it is considered too narrow to allow for curbside parking on both sides of a street. However, cars were seen parked on one side of the cul-de-sac entrance.

Tissiack Way is a residential street with two traffic lanes that extends into a cul-de-sac as ***Tissiack Place***. Although parking does not appear to be restricted (there are no parking regulation signs), the street is only 26 feet wide, which is typically considered too narrow to allow for curbside parking.[1] However, a few vehicles were seen parked on this street. The BDPL Nos. 3 and 4 ROW is on the west side of Tissiack Way – Tissiack Place.

Tissiack Court is a residential cul-de-sac street with two traffic lanes. Although parking does not appear to be restricted (there are no parking regulation signs), the street is only 28 feet wide, which is typically considered too narrow to allow for curbside parking. However, a few vehicles were seen parked on this street.

[1] The typical width of each residential traffic lane (right and left) is 10 feet, and the typical parking space width on each side of the street is 7 to 8 feet. Therefore, to allow for adequate curbside parking on both sides, a residential street should be 34 to 36 feet wide.

Traffic volumes on Crawford Street, Omega Drive, Nugget Way – Nugget Place, Tissiack Way – Tissiack Place, and Tissiack Court are relatively low, typical for residential streets.

Truck Access

The City of Fremont developed a truck route plan, which was adopted by the City Council in April 1988 and amended in January 2000 (City of Fremont, 2000). The plan designates truck routes within Fremont to provide contractors with the preferred travel roadways to and from connecting local roadways. Local roadways should not be used in place of adjacent truck routes unless otherwise noted on Fremont's truck route plan. Within the project area, the designated truck routes are along I-880, I-680, and part of Mission Boulevard between I-680 and I-880 (Highway 262).

5.5.1.2 Existing Baseline Traffic Conditions

A level of service[2] (LOS) analysis was performed for the proposed project for the Mission Boulevard / Mohave Drive, Mission Boulevard / Paseo Padre Parkway, and Paseo Padre Parkway / Omega Drive intersections, based on intersection turning movement counts collected by Baymetrics Inc. on Thursday, March 6, 2008 (CHS Consulting Group, 2008b). Existing baseline LOS were analyzed for I-680/I-880 and associated on- and off-ramps, based on traffic volume data collected in March and April 2006 and obtained from Caltrans (Caltrans, 2008). These intersections, I-680, I-880, and the on- and off-ramps were chosen for the analysis because they would be directly affected by traffic generated under the proposed project for the 27-month project duration. The LOS analysis to determine the baseline traffic conditions was performed using the 2000 *Highway Capacity Manual* Operations Methodology (TRB, 2000). **Table 5.5-1** summarizes the existing LOS at these key intersections and at the I-680 and I-880 interchange with Mission Boulevard.

Level of Service Standards

LOS standards are established by congestion management agencies (CMAs) and other jurisdictional entities to assess and regulate long-term traffic impacts due to future permanent development. Although the standards do not directly apply to temporary construction projects, they can be used to guide evaluations of impacts related to traffic increases.

The Alameda County Congestion Management Agency (ACCMA) established LOS E as a standard for I-680 and I-880, except where LOS F was originally measured (in which case the standard would be LOS F) (ACCMA, 2007). The City of Fremont uses LOS D as the threshold for intersections. Caltrans generally endeavors to maintain a target level of service at the transition between LOS C and LOS D. For the purpose of this analysis, LOS A through D are considered excellent to satisfactory service levels, and LOS E and F indicate congested conditions.

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[2] Level of service is a qualitative description of a facility's performance based on average delay per vehicle, vehicle density, or volume-to-capacity ratios. LOS range from LOS A, which indicates free-flow or excellent conditions with short delays, to LOS F, which indicates congested or overloaded conditions with extremely long delays.

TABLE 5.5-1
SUMMARY OF LEVELS OF SERVICE – 2008 EXISTING CONDITIONS

Intersection	Level of Service and Criteria[a,b] AM Peak Hour	Level of Service and Criteria[a,b] PM Peak Hour
Mission Boulevard / Mohave Drive (signalized)	C / 21.4	D / 38.8
Mission Boulevard / Paseo Padre Parkway (signalized)	B / 18.4	B / 12.3
Paseo Padre Parkway / Omega Drive (side street stop-controlled)	B / 10.5	A / 9.2
Freeway Ramp Junctions		
I-680 Northbound off-ramp diverge	C / 21.2	C / 28.9
I-680 Northbound on-ramp merge	B / 17.2	C / 21.1
I-680 Southbound off-ramp diverge	F / 37.8	D / 28.2
I-680 Southbound on-ramp merge	C / 22.4	C / 21.1
I-880 Northbound off-ramp diverge	B / 12.9	B / 13.6
I-880 Northbound on-ramp merge	C / 25.9	F / 33.9
I-880 Southbound off-ramp diverge	D / 33.3	F / 36.6
I-880 Southbound on-ramp merge	C / 20.8	C / 21.0
Freeway Mainline Segments		
I-680 NB, north of Mission Boulevard interchange	C / 25.4	D / 30.6
I-680 NB, south of Mission Boulevard interchange	D / 27.9	E / 39.5
I-680 SB, north of Mission Boulevard interchange	D / 30.6	C / 22.2
I-680 SB, south of Mission Boulevard interchange	D / 27.0	C / 24.5
I-880 NB, north of Mission Boulevard interchange	C / 22.3	D / 29.9
I-880 NB, south of Mission Boulevard interchange	C / 22.7	D / 27.7
I-880 SB, north of Mission Boulevard interchange	D / 34.6	E / 42.4
I-880 SB, south of Mission Boulevard interchange	C / 24.5	C / 25.0

NOTE: NB = northbound; SB = southbound

[a] The LOS criterion for intersections is average delay, expressed in terms of seconds per vehicle; for the overall LOS/delay for signalized intersections, and for the worst LOS/delay for a stop-controlled turning movement at side street stop-controlled intersections. The LOS criterion for freeway ramp junctions and mainline segments is vehicle density, expressed in terms of passenger cars per mile per lane.
[b] Calculations by CHS Consulting Group.

Table 5.5-1 shows that the existing LOS on all roadways and intersections is acceptable—except on the I-680 southbound off-ramp to westbound Mission Boulevard (LOS F) (during the AM peak hour); and on the northbound I-680 segment south of Mission Boulevard (LOS E) (during the PM peak hour), the I-880 northbound on-ramp (LOS F) (during the PM peak hour), the I-880 southbound off-ramp (LOS F) (during the PM peak hour), and the southbound I-880 segment north of Mission Boulevard (LOS E) (during the PM peak hour).

Parking Supply and Demand

The land uses surrounding the project area consist mostly of single-family residential subdivisions at the north and south ends of the ROW. A parking supply and occupancy survey was performed on a Saturday afternoon, when parking occupancy in a residential neighborhood is usually the highest (CHS Consulting Group, 2008a). **Table 5.5-2** summarizes parking supply and occupancy conditions at both the north end (Tissiack Way area) and south end (Mohave Drive area) of the ROW. As shown, the average on-street parking occupancy in the Mohave Drive area is approximately 47 percent, with higher occupancy along Crawford Street (61 percent) and lower occupancy at the other immediate surrounding streets (Bradley Court and Bradley Street). The average parking occupancy in the Tissiack Way area is approximately 7 percent.

TABLE 5.5-2
SUMMARY OF PARKING SUPPLY AND OCCUPANCY LEVELS – EXISTING CONDITIONS

Area/Street	Number of Parking Spaces			Percent Occupancy
	Occupied	Vacant	Total	
Mohave Drive Area				
Crawford Street	45	29	74	61%
Bradley Court	5	12	17	29%
Bradley Street	24	43	67	36%
TOTAL	**74**	**84**	**158**	**47%**
Tissiack Way Area				
Omega Drive	0	16	16	0%
Nugget Way	2	10	12	17%
TOTAL	**2**	**26**	**28**	**7%**

SOURCE: CHS Consulting Group, 2008a.

Bikeways and Pedestrian Facilities

Bikeways are typically classified as Class I, Class II, or Class III facilities. Class I bikeways are bike paths with exclusive rights-of-way for bicyclists and pedestrians, and with minimal cross flow by motorized vehicles. Class II bikeways are bike lanes striped within the paved areas of roadways, established for the preferential use of bicycles. Class III bikeways are signed bike routes that allow bicycles to share streets or sidewalks with vehicles or pedestrians. The project area contains Class II bikeways, with a 5-foot-wide bike lane on both sides of Mission Boulevard and Paseo Padre Parkway north of the intersection with Mission Boulevard.

Transit

Several transit routes exist in the proximity of the project area. The Santa Clara Valley Transportation Authority operates three express bus routes along Mission Boulevard (Routes 120, 140, and 181); these routes serve the areas between the Fremont BART station and the Lockheed Martin Transit Center, Montague Expressway, and San Jose Diridon Transit Center. The bus frequencies on these routes vary widely, with Routes 120 and 140 operating in the peak direction only (from 6:30 a.m. to 9:00 a.m., nine buses run from Fremont to Sunnyvale; from 4:30 p.m. to

7:00 p.m., nine buses run from Sunnyvale to Fremont). Route 181 runs along, but does not stop on, Mission Boulevard in the project area; its frequency is every 15 minutes. Routes 120 and 140 have stops in the project area at the intersections of Mission Boulevard / Paseo Padre Parkway and Mission Boulevard / Mohave Drive (SCVTA, 2009).

AC Transit operates one bus route along Mission Boulevard (Route 217). This route serves the areas between the Fremont BART station and the Great Mall light rail station. The bus frequency on this route is approximately 30 minutes during the peak hours. In the project area, this route stops at the intersection of Mission Boulevard and Warm Springs Boulevard (AC Transit, 2009).

5.5.2 Regulatory Framework

5.5.2.1 Federal Regulations

No federal regulations address the transportation impacts associated with the project.

5.5.2.2 State Regulations

The project would cross under I-680 and Mission Boulevard in the city of Fremont. A Caltrans encroachment permit would be required for construction of the proposed improvements within the Caltrans ROW, including access to and from the construction site. Caltrans also requires a transportation management plan and additional encroachment permit(s) for any necessary site investigation. The SFPUC and Caltrans have executed a cooperative agreement to outline the review processes by and submittals to Caltrans, and to assign project-development responsibilities during the design, construction, and post-construction phases of the project (Caltrans and CCSF, 2009). The parties have had preliminary discussions regarding possible post-construction joint use and maintenance of the Caltrans ROW within the project area. If the project is approved, the parties would further consider such an arrangement.

5.5.2.3 Local Regulations

The City of Fremont would require traffic and parking permits for use of local streets and an encroachment permit for work within Mission Boulevard that is outside of Caltrans' ROW. In addition, the City of Fremont would review the detour plans for any proposed full closure of Mission Boulevard and I-680 northbound loop and diamond on-ramps.

Within Fremont, the target LOS is a volume-to-capacity (V/C) ratio of 0.85 to 0.90, which is equivalent to LOS D, or a 35- to 55-second delay (City of Fremont, 2008). The ACCMA, in its role as monitor of routes of regional significance (including state highways), established LOS E as a standard for I-680 and I-880, except where LOS F was originally measured (in which case the standard would be LOS F) (ACCMA, 2007).

5.5.3 Impacts

This section presents the significance criteria used in determining significant transportation impacts of the proposed project, an analysis of those impacts, and recommended mitigation measures.

5.5.3.1 Significance Criteria

The City and County of San Francisco has not formally adopted significance standards for impacts related to transportation, but generally considers that implementation of the proposed project would have a significant effect on transportation and circulation if it were to:

- Cause an increase in traffic which is substantial in relation to the existing traffic load and capacity of the street system (i.e., result in a substantial increase in either the number of vehicle trips, the volume-to-capacity ratio on roads, or congestion at intersections);
- Exceed, either individually or cumulatively, a level of service standard established by the county congestion management agency for designated roads or highways (unless it is practical to achieve the standard through increased use of alternative transportation modes);
- Result in a change in air traffic patterns, including either an increase in traffic levels, obstructions to flight, or a change in location, that results in substantial safety risks;
- Substantially increase hazards due to a design feature (e.g., sharp curves at dangerous intersections) or incompatible uses;
- Result in inadequate access for general and emergency response traffic, and for bicyclists and pedestrians;
- Result in inadequate parking capacity that could not be accommodated by alternative solutions; or
- Conflict with adopted policies, plans, or programs supporting alternative transportation (e.g., conflict with policies promoting bus turnouts, bicycle racks, etc), or cause a substantial increase in transit demand that cannot be accommodated by existing or proposed transit capacity or alternative travel modes.

5.5.3.2 Approach to Analysis

Based on the proposed construction activities and the project's physical environmental setting, the project would not result in impacts related to the following criteria. No impact discussion is provided for these topics for the following reasons:

Individual or cumulative long-term exceedence of LOS standards. LOS standards, established by county CMAs and documented in Congestion Management Programs, are intended to regulate long-term traffic impacts due to future development, and do not apply to temporary construction projects whose short-term traffic increases end when construction activities end. The proposed project would not generate any long-term, ongoing traffic volume increases. However, the impact analysis below does present an LOS analysis for the project construction phase because, while traffic increases would end when construction activities end, the project includes construction over an extended period of 27 months. The construction phase LOS analysis evaluates whether construction or detour traffic would cause traffic levels to exceed the V/C ratio on area roadways or increase congestion at intersections (see Impacts TR-1 and TR-2), and cumulative increases in construction traffic are addressed in Section 6.2.3.3, Cumulative Impact analysis.

Changes in air patterns. The proposed project would not have the potential to change air traffic patterns at any airport in the project area.

Conflicts with adopted plans, policies, or programs supporting alternative transportation. The proposed project would neither generate an increase in transit demand nor eliminate alternative transportation corridors or facilities (e.g., bike paths or lanes, bus turnouts) during service hours, and would not involve permanent changes in any roadways or changes in policies or programs that support alternative transportation. The short-term effects of construction activities on transit service are discussed under Impacts TR-1 and TR-2.

Standard transportation engineering methodologies were used in conducting the transportation impacts analysis. Construction-related transportation impacts are not generally considered significant because of their limited duration. However, because project construction would occur at varying levels of intensity over a two-year period, from approximately April 2012 to February 2014, such impacts could be significant. Construction activities that affect roadway operations are typically regulated through permits and construction requirements to ensure that traffic flow is not unduly disrupted. Construction best management practices, which include the preparation of a traffic control plan, typically ensure the safety of construction workers, motorists, bicyclists, and pedestrians throughout the construction phase. Accordingly, preparation of a traffic control plan is specified as a mitigation measure for all traffic-related impacts of the project (see Section 5.5.4, Mitigation Measures).

Project-related traffic was estimated separately for construction workers, delivery trucks, and hauling trucks. The traffic analysis was performed for the week that would have the greatest amount of project-related traffic, to present a worst-case scenario. It considers the project impacts compared to existing (2008) baseline and future (2012) baseline conditions. The traffic analysis considers impacts on the key intersections, I-680/I-880 mainline segments and ramps, and residential neighborhoods in the vicinity of the proposed project. Because the project would involve traffic detouring at night if work requires the temporary closure of the I-680 northbound ramps or travel lanes in either direction on Mission Boulevard, a detour traffic impact analysis is included. Future traffic impacts were analyzed using the traffic volumes estimated by the Alameda Countywide Travel Forecasting Model (ACCMA, 2008).

5.5.3.3 Impact Analysis

Summary of Impacts

Table 5.5-3 summarizes the potential transportation and circulation impacts and the significance of project impacts before and after mitigation.

TABLE 5.5-3
SUMMARY OF IMPACTS – TRANSPORTATION AND CIRCULATION

Impact	Significance Determination Before Mitigation	Significance Determination After Mitigation
Impact TR-1: Short-term increased traffic volumes and delays on roadways due to temporary reduction in roadway capacity.	S	LS
Impact TR-2: Short-term increased traffic volumes and delays on roadways due to construction-related vehicle trips.	LS	–
Impact TR-3: Short-term increased potential traffic safety hazards for vehicles, bicyclists, and pedestrians on public roadways due to construction-related vehicle trips and construction within roadways.	S	LS
Impact TR-4: Short-term impaired access to adjacent roadways and land uses for both general and emergency response traffic as well as for bicyclists and pedestrians due to construction within roadways.	S	LS
Impact TR-5: Short-term displacement of on-street parking due to temporary increased parking demand or construction within roadways.	LS	–

LS = Less than Significant impact
PS = Potentially Significant impact
S = Significant impact
SU = Significant and Unavoidable impact, even with mitigation incorporated
– = Mitigation not required

Construction Impacts

This section describes the potential impacts of, and mitigation measures for, the construction activities expected to occur between 2012 and 2014. Because construction is scheduled to begin in 2012, future baseline conditions were estimated to determine the roadway system's performance with and without the project traffic. In addition, potential traffic impacts related to increased traffic on detour roadways and increased construction traffic (Impacts TR-1 and TR-2) were compared to the transportation conditions that existed in 2008 at the time of this EIR's Notice of Preparation.

Future baseline traffic volumes in 2012 were determined by increasing the existing volumes by an annual growth rate times the number of years of growth. Project-related vehicle trips were then estimated from the construction schedule using the task durations in the construction schedule and total number of workers, deliveries, and cubic yards of excavated and backfill materials provided by the SFPUC for each construction zone (see **Appendix B**). These project-related vehicle trips were added to the future baseline volumes to create the "future baseline plus project traffic" scenario, which was compared to the future baseline conditions.

Future Baseline Conditions

Year 2012 baseline traffic volumes were estimated based on the projected growth rates derived from the Alameda Countywide Travel Demand Forecasting Model for 2005 and 2015 (ACCMA, 2008). Peak-hour volumes on the study roadways are forecasted to increase by about 2 percent per year between 2008 and 2012.

Vehicle Trip Generation

The duration of each construction activity would vary depending on the length of the construction zone, complexity of construction method, and site constraints. This variance would affect the total daily number of vehicles that would be generated by construction traffic. Daily traffic volumes were estimated for each construction activity in each construction zone using the task durations in the preliminary construction schedule and total number of workers, deliveries, and cubic yards of excavated and backfill materials estimated by the SFPUC (see **Appendix B**). Vehicles trips were estimated separately for three different groups using the following assumptions:

- *Construction Worker Trips* – Construction worker trips were estimated based on the number of construction workers needed for each task. Daily construction worker trips were estimated by multiplying the number of construction workers by two to account for both inbound and outbound vehicle traffic. Half of the daily construction worker vehicle trips were assumed to be inbound trips during the AM peak hour, and the remaining half were assumed to be outbound trips during the PM peak hour.

- *Material and Equipment Vehicle Trips* – The daily material and equipment vehicle trips were estimated by dividing the total number of expected deliveries by the number of working days for each task, and then multiplying the number of truck trips by two to account for inbound and outbound truck traffic. It is anticipated that material and equipment vehicle trips would not occur during the PM peak hour.

- *Hauling Truck Trips* – The hauling truck trips would consist of onsite truck trips to move soil between the excavation and staging areas, offsite truck trips to dispose of excavation spoils, and offsite truck trips to deliver clean backfill materials. Offsite spoils removal and backfill truck trips were estimated separately. Trucks with a 15-cubic yard capacity would be used for spoils hauling and structural fill delivery. For onsite and offsite hauling of excavation spoils, the estimated volume of excavated materials was multiplied by a bulking factor of 15 percent to determine the number of truck loads. Other assumptions involved in the estimate include:

  - The number of onsite truck loads for spoils handling was doubled to determine the number of truck trips accounting for inbound and outbound truck traffic between excavation and staging areas.

  - The number of offsite truck loads for both excavated and backfilled volumes was doubled to determine the number of truck trips accounting for inbound and outbound truck traffic.

  - The number of total truck trips was divided by the number of working days for each task to determine the daily trip generation. Hourly hauling truck trips were estimated by dividing the daily trips by 10, assuming a 10-hour working day.

For the daily traffic volumes that would be generated by the proposed project from April 2012 to March 2014, the expected greatest amount of vehicle activity was estimated to occur during an approximately one week-long period in December 2012—with approximately 344 vehicles per day, including approximately 136 vehicles associated with construction worker trips, 24 with material/equipment deliveries, 102 with spoils removal and/or backfill delivery to offsite locations, and 82 with onsite truck trips, as summarized in **Table 5.5-4**. The duration of this highest-trip-generation period would account for less than 1 percent of the entire construction period, and would occur when work is conducted concurrently in Zones 1, 2, 6, 7, and 8 (utilizing all staging areas). On an average project work day, the number of daily trips would be approximately 112 vehicles per day. **Appendix B** includes a detailed discussion of the daily traffic volumes, including a breakdown by construction task as identified in the preliminary construction schedule.

TABLE 5.5-4
DAILY VEHICLE TRIP GENERATION (HIGHEST VOLUME WEEK)[a]

Construction Zone and Tasks	Worker Vehicle Trips	Delivery Truck Trips	Spoils and Fill Truck Trips[b]	Onsite Truck Trips	Total Trips
Zone 7 – Temporary Bridges and Articulated Vault	24	2	24	–	50
Zone 6 – Temporary Bridges and Cut-and-Cover	32	4	–	–	36
Zones 1 and 8 – Install Valve and Tee	48	14	8	10	80
Zone 2 – Trenchless	32	4	70	72	178
TOTAL	**136**	**24**	**102**	**82**	**344**

[a] Calculations by CHS Consulting Group, based on the preliminary construction information (task durations, schedule, number of workers and deliveries, and estimates of excavated and backfill materials (see **Appendix B**).
[b] Spoils and backfill truck trips are based on 15-cubic-yard-capacity truck.

Table 5.5-5 shows the inbound and outbound trips during the peak hours for each task during the highest-volume week of the project. The impact analysis below was completed using these AM and PM peak-hour volumes.

Vehicle Trip Distribution

Worker autos and construction vehicles are expected to be evenly distributed between the two freeways (I-680 and I-880) that connect with Mission Boulevard in the vicinity of the project area. For the impact analysis, the offsite vehicle trips were assigned (25 percent each) to and from I-680 North, I-680 South, I-880 North, and I-880 South. To conservatively assess the potential impacts, worker autos were all directed to and from Staging Area 4 (through each of the three study intersections, including Omega Drive / Paseo Padre Parkway). Depending on the location, deliveries and hauling trucks were routed to and from their work area/staging area location.

Impact TR-1: Short-term increased traffic volumes and delays on roadways due to temporary reduction in roadway capacity.

Project construction could require use of a portion of public roadways within the project area and could result in a temporary reduction in the number of travel lanes and/or the available width of travel lanes, which would cause increased congestion and delays in traffic flow (including transit)

TABLE 5.5-5
HOURLY VEHICLE TRIP GENERATION (HIGHEST VOLUME WEEK) – AM PEAK HOUR, MIDDAY, AND PM PEAK HOUR[a]

Construction Zone and Tasks	Worker Vehicle Trips[b]			Delivery Truck Trips[c]			Spoils and Fill Truck Trips[d]			Onsite Truck Trips			Total Trips		
	AM	Midday	PM	AM	Midday	PM	AM	Midday	PM	AM	Midday	PM	AM	Midday	PM
Inbound															
Zone 7 – Temporary Bridges and Articulated Vault	12	–	–	1	–	–	2	3	2	–	–	–	15	3	2
Zone 6 – Temporary Bridges and Cut-and-Cover	16	–	–	1	1	–	–	–	–	–	–	–	17	1	–
Zones 1 and 8 – Install Valve and Tee	24	–	–	4	3	–	1	1	1	1	1	1	30	5	2
Zone 2 – Trenchless	16	–	–	1	1	–	4	3	3	4	3	3	25	7	6
Outbound															
Zone 7 – Temporary Bridges and Articulated Vault	–	–	12	1	–	–	2	3	2	–	–	–	3	3	14
Zone 6 – Temporary Bridges and Cut-and-Cover	–	–	16	1	1	–	–	–	–	–	–	–	1	1	16
Zones 1 and 8 – Install Valve and Tee	–	–	24	4	3	–	1	1	1	1	1	1	6	5	26
Zone 2 – Trenchless	–	–	16	1	1	–	3	3	4	3	3	4	7	7	24
TOTAL	**68**	**–**	**68**	**14**	**10**	**–**	**13**	**14**	**13**	**9**	**8**	**9**	**104**	**32**	**90**

[a] Calculations by CHS Consulting Group, based on the preliminary construction information (task durations, schedule, number of workers and deliveries, and estimates of excavated and backfill materials (see **Appendix B**).
[b] Worker trips would occur during the AM and PM peak hour only.
[c] Delivery truck trips would occur during the AM and midday peak hours only.
[d] Spoils and backfill truck trips are distributed evenly over a 10-hour workday.

on the affected roadways. Road closures would also result in a temporary reduction in road capacity, requiring drivers to detour to potentially less convenient routes to access their destinations, as discussed below.[3] The actual impact of construction activities on roadway capacity and traffic operations would depend on the length of the affected roadway segment, the number of travel lanes that would be available for vehicular flow, and the duration of construction activities on the roadways.

Construction activities under the proposed project that could affect roadway capacity and increase traffic delays include the construction and removal of temporary bridges on the northbound I-680 diamond and loop on-ramps, as well as Mission Boulevard, to facilitate construction of the new BDPL No. 3X (see Figure 3.10 in Chapter 3, Project Description); the temporary bridges would be used to prevent major traffic disruptions by providing traffic flow on these roadways while construction occurs beneath the bridges. Potential effects on roadway capacity and increased traffic delays during installation of these bridges are discussed below.

Utility relocations and removals (described in Table 3.2 in Chapter 3) would occur in Zone 7, which crosses Mission Boulevard and the I-680 northbound diamond on-ramp. The affected utilities (Caltrans / City of Fremont storm drain pipes and inlets, Union Sanitary District sanitary sewer line, AT&T communication lines, PG&E gas and electric lines, City of Fremont street lighting, and Alameda County Water District water lines) would be temporarily or permanently relocated or supported in place during construction (see Section 5.8, Utilities and Service Systems). The work on the affected utilities would have no additional impact on roadway capacity beyond that described below. Utility relocations could also occur in Zone 8 (in the area of Nugget Way). The affected utilities (PG&E 2-inch electricity line and 2-inch gas line, Union Sanitary District sanitary sewer line, and AT&T communication lines) could be temporarily or permanently rerouted around the limits of BDPL No. 3X construction or supported in place. This work would occur at the same time or prior to project construction in the area and would have no additional impact on access to adjacent roadways or land uses for both general and emergency response traffic or for bicyclists and pedestrians (see Impact TR-4).

Mission Boulevard

The new BDPL No. 3X and articulated vault would be installed beneath Mission Boulevard under a temporary bridge. To maintain traffic flow, the bridge would be constructed in stages, and traffic would be shifted for nine months, as described below:

- For construction of the westbound segment of the temporary bridge crossing Mission Boulevard, the existing 16-foot-wide raised center median of Mission Boulevard would be demolished, the two eastbound lanes and two westbound lanes of traffic would be shifted south, and the westbound segment of the temporary bridge would then be constructed.

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[3] Analysis of impacts during temporary lane closures used information in the Draft Lane Closure Report (URS, 2009), adjusted as appropriate based on automatic machine traffic count data collected for this EIR (CHS Consulting Group, 2009).

- For construction of the center segment of the temporary bridge crossing Mission Boulevard, the westbound lanes of traffic would be rerouted across the westbound segment of the temporary bridge, and the center segment of the temporary bridge would be constructed.
- For construction of the remaining eastbound segment of the temporary bridge crossing Mission Boulevard, eastbound traffic would be rerouted to the center segment of the temporary bridge, and the eastbound segment of the temporary bridge would be constructed.

After all segments of the temporary bridge are completed, normal traffic flow would be restored on Mission Boulevard in the westbound direction, with a slight shift to the north remaining in the eastbound lanes to accommodate work activities adjacent to the existing slip-joint vault (see Chapter 3, Figure 3.10). Once the temporary bridge structures spanning Mission Boulevard are no longer needed, similar lane shifts as outlined above, implemented in reverse order over an approximately two-month period, would allow for removal of the temporary bridge structures, backfilling of the excavation area, and restoration of Mission Boulevard to its original condition without substantial disruption of traffic.

Single Lane Closures on Mission Boulevard. Temporary lane closures on Mission Boulevard could be needed during construction to maximize the number of temporary bridge structure elements that could be installed at any given time. To minimize traffic delays, the individual lane closures would be scheduled during low-travel periods, which for Mission Boulevard at the I-680 underpass would be weekdays and Sundays between 10 p.m. and 6 a.m. (westbound) and between 11 p.m. and 6 a.m. (eastbound), and Saturdays between 10 p.m. and 7 a.m. (westbound) and between 12 midnight and 7 a.m. (eastbound), as described in Chapter 3, Project Description.

Full Closure of Mission Boulevard. In order to maximize the amount of construction that could be accomplished and reduce the overall schedule, contractors could also use the entire Mission Boulevard ROW for installation of the temporary bridge segments and to shift traffic barriers, crash-cushion arrays, channelizers, and construction area signs. Full lane closures could occur up to nine nights during the 11-month period required to install and remove the temporary bridges. To minimize traffic delays associated with full closure, the closures would be scheduled during low-travel periods, which for Mission Boulevard at the I-680 underpass would be weekdays and Sundays between 11 p.m. and 6 a.m., and Saturdays between 12 midnight and 7 a.m., as described in Chapter 3, Project Description.

Warm Springs Boulevard – Osgood Road to Auto Mall Parkway – Durham Road and Warm Springs Boulevard to South Grimmer Boulevard is the planned detour route for the closure of the eastbound direction of Mission Boulevard, and motorists could also use South Grimmer Boulevard to get to Mission Boulevard (**Figure 5.5-1**). When closure of eastbound Mission Boulevard is necessary, the I-680 southbound off-ramp to eastbound Mission Boulevard would be closed and motorists that wish to use that ramp would be directed to exit I-680 at Durham Road, and to use Durham Road to reach eastbound Mission Boulevard. Based on 2008 traffic volumes, this eastbound Mission Boulevard segment has weekday and Saturday average daily

SOURCE: URS, 2009

Seismic Upgrade of BDPL Nos. 3 and 4 at Hayward Fault

Figure 5.5-1
Eastbound Mission Boulevard Temporary Closure - Detour Route

traffic (ADT) volumes of about 27,200 vehicles, and would be closed weekdays or Sundays between 11 p.m. and 6 a.m., and Saturdays between 12 midnight and 7 a.m., when such closure is necessary. The total directional volume during the seven-hour weekday closure period is approximately 1,563 vehicles, with a peak volume (687 vehicles in 2008 and an estimated 744 vehicles in 2012) occurring between 11 p.m. and 12 midnight. The total directional volume during the seven-hour Saturday closure period is approximately 2,437 vehicles, with a peak volume (695 vehicles in 2008 and an estimated 752 vehicles in 2012) occurring between 12 midnight and 1 a.m. Eastbound outbound trips from the Extended Stay Motel (on the south side of Mission Boulevard between Mohave Drive and I-680) would be directed to use the existing opening in the median on Mission Boulevard (just east of the motel's driveway) to turn onto westbound Mission Boulevard (to follow the prescribed detour route). Vehicles exiting the gas station on the corner of Mission/Mohave would be directed to use the driveway on Mohave Drive, not the driveways on Mission Boulevard.

Paseo Padre Parkway to Durham Road – Auto Mall Parkway to Osgood Road – Warm Springs Boulevard is the planned detour route for the closure of the westbound direction of Mission Boulevard (**Figure 5.5-2**), and motorists could also use South Grimmer Boulevard to get between Paseo Padre Parkway and Warm Springs Boulevard.

During full closure of Mission Boulevard, northbound traffic on I-680 needing to access eastbound or westbound Mission Boulevard would also be directed to use this detour route to access Mission Boulevard. Based on 2008 traffic volumes, this westbound Mission Boulevard segment has weekday and weekend ADT volumes of about 7,365 vehicles and would be closed weekdays and Sundays between 10 p.m. and 6 a.m., and Saturdays between 10 p.m. and 7 a.m., when such closure is necessary. The total directional volume during the eight-hour weekday closure period is approximately 414 vehicles, with a peak volume (159 vehicles in 2008 and 172 vehicles in 2012) occurring between 10 p.m. and 11 p.m. The total directional volume during the nine-hour Saturday closure period is approximately 690 vehicles, with a peak volume (223 vehicles in 2008 and an estimated 241 vehicles in 2012) occurring between 10 p.m. and 11 p.m.

To evaluate the potential effects on the detour roadways during closure of Mission Boulevard, the capacity of the detour roadway was determined based on the number of lanes, lane widths, and other roadway geometric characteristics; the V/C ratio was determined by dividing the total existing traffic volumes (Mission Boulevard and planned detour routes) by the roadway capacity. For this analysis, a V/C ratio of 0.90 or less (consistent with the City of Fremont target LOS discussed in Section 5.5.2, Regulatory Framework) is considered an acceptable LOS on the detour routes during closure of the Mission Boulevard. Based on the estimated closure periods, the analysis of the detour roadways considers the following hourly periods: 11 p.m. to 12 midnight, and 5 a.m. to 6 a.m. (weekdays), and 12 midnight to 1 a.m. and 6 a.m. to 7 a.m. (Saturdays).

SOURCE: URS, 2009

Seismic Upgrade of BDPL Nos. 3 and 4 at Hayward Fault

Figure 5.5-2
Westbound Mission Boulevard Temporary Closure - Detour Route

Tables 5.5-6 and **5.5-7** show the estimated detour roadway volumes (including the baseline traffic on the detour roadway and the amount of traffic that would be detoured to that roadway), the number of travel lanes for each roadway segment, and the resulting V/C ratios for weekdays at three times between 11 p.m. and 6 a.m. for the 2008 and 2012 analysis scenarios, based on baseline roadway volumes plus the detoured traffic volumes. To address potential weekend closures of Mission Boulevard, **Tables 5.5-8** and **5.5-9** show the same information for Saturdays at two times (12 midnight and 7 a.m.) for the 2008 and 2012 analysis scenarios. As shown in the tables, none of the detour routes would experience conditions during the planned closure periods in excess of the 0.90 V/C ratio threshold specified as a target LOS by the City of Fremont.[4] Warm Springs Boulevard between Mission Boulevard and South Grimmer Boulevard would be the most affected roadway segment, providing only one northbound through-lane (with an approximate capacity of 900 vehicles per hour) at the intersection of South Grimmer Boulevard. Between 11 p.m. and 12 midnight on weekdays (and 12 midnight and 1 a.m. on Saturday), the V/C ratio would be as high as 0.90 (i.e., 90 percent of capacity) in 2012 with traffic detoured from eastbound Mission Boulevard.

Because of the nature of South Grimmer Boulevard in the project area (e.g., terminating at Mission Boulevard), it is expected that its existing traffic volumes during the planned closure periods are relatively low, and that if some traffic used this roadway as a detour, the existing plus detour volumes would also result in better than 0.90 V/C ratio conditions for both the 2008 and 2012 analysis scenarios.

Although only Saturday traffic volumes are shown in Tables 5.5-8 and 5.5-9, traffic volumes are generally lower on Sunday, and therefore detouring traffic on Sunday evenings would not exceed the 0.90 V/C ratio, although the hours of closure would shift to 11 p.m. to 6 a.m. to avoid exceeding the 0.90 V/C ratio. On the basis of both current (2008) and future (2012) analysis baselines, adequate roadway capacity would be provided (if single lanes were closed), and the detour roadways would not be adversely affected (if full lane closure were needed) during construction of the temporary bridges on Mission Boulevard; however, short-term construction impacts related to the reduction in roadway capacities and increases in traffic delays on Mission Boulevard and the detour roadways would be *significant* if the Mission Boulevard closures occurred outside of the proposed times and without appropriate traffic management measures. This impact would be reduced to a less-than-significant level with implementation of **Mitigation Measure M-TR-1, Traffic Control Plan**, which requires the preparation of a traffic control plan specifying traffic control measures to be implemented during the construction and removal of the temporary bridges and potential lane closures. Implementation of the traffic control plan would reduce the impacts of the short-term lane closures by requiring implementation of circulation and detour plans to minimize impacts on local street circulation during road closures and restricting the time periods when lanes could be closed.

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[4] Because the number of lanes on Durham Road between Paseo Padre Parkway and Mission Boulevard is the same as the number west of Paseo Padre Parkway, it is expected that the conditions on that segment during the planned closure periods would also be better than the 0.90 V/C ratio threshold.

TABLE 5.5-6
MISSION BOULEVARD FULL CLOSURE TRAFFIC ANALYSIS (2008) – WEEKDAYS (11 PM TO 6 AM)[a]

Roadway Segment	Direction	Number of Lanes	Roadway Volumes		Detour Volumes		Total Volumes		V/C Ratio[b]	
			11 p.m.[c]	5 a.m.[c]	11 p.m.	5 a.m.	11 p.m.	5 a.m.	11 p.m.	5 a.m.
Warm Springs Boulevard between Mission Boulevard and South Grimmer Boulevard	Northbound[d]	1	61	46	687	164	748	210	83%	23%
	Southbound[e]	1	89	76	110	64	199	140	22%	16%
Osgood Road between South Grimmer Boulevard and Durham Road – Auto Mall Parkway	Northbound[d]	2	83	41	687	164	770	205	43%	11%
	Southbound[e]	2	46	302	110	64	120	345	9%	20%
Durham Road – Auto Mall Parkway between Osgood Road and I-680 Southbound On-ramp	Eastbound[d]	2	482	242	687	164	942	352	65%	23%
	Westbound[e]	2	191	920	110	64	265	963	17%	55%
Durham Road between I-680 Northbound Off-ramp and Paseo Padre Parkway	Eastbound[d]	2	95	16	700	164	568	126	44%	10%
	Westbound[e]	2	52	23	110	64	126	66	9%	5%
Paseo Padre Parkway between Durham Road and South Grimmer Boulevard	Northbound[e]	1	21	3	110	64	95	46	15%	7%
	Southbound	1	24	7	–	–	24	7	3%	1%
Paseo Padre Parkway between South Grimmer Boulevard and Mission Boulevard	Northbound[e]	1	9	4	110	64	119	68	13%	8%
	Southbound	1	29	4	–	–	29	4	3%	0%

[a] Calculations by CHS Consulting Group, using traffic volumes from automatic machine traffic counts on affected roadways (CHS, 2009).
[b] Volume-to-capacity ratio, with approximate capacities per lane equal to 900 vehicles/hour.
[c] This represents the start of a one-hour period (i.e., 11 p.m. to 12 midnight and 5 to 6 a.m.).
[d] This is direction that traffic detoured from eastbound Mission Boulevard would use.
[e] This is direction that traffic detoured from westbound Mission Boulevard would use.

TABLE 5.5-7
MISSION BOULEVARD FULL CLOSURE TRAFFIC ANALYSIS (2012) – WEEKDAYS (11 PM TO 6 AM)[a]

Roadway Segment	Direction	Number of Lanes	Roadway Volumes		Detour Volumes		Total Volumes		V/C Ratio[b]	
			11 p.m.[c]	5 a.m.[c]	11 p.m.	5 a.m.	11 p.m.	5 a.m.	11 p.m.	5 a.m.
Warm Springs Boulevard between Mission Boulevard and South Grimmer Boulevard	Northbound[d]	1	66	50	744	178	810	228	90%	25%
	Southbound[e]	1	96	82	119	69	215	152	24%	17%
Osgood Road between South Grimmer Boulevard and Durham Road – Auto Mall Parkway	Northbound[d]	2	90	44	744	178	833	222	46%	12%
	Southbound[e]	2	50	327	119	69	130	373	9%	22%
Durham Road – Auto Mall Parkway between Osgood Road and I-680 Southbound On-ramp	Eastbound[d]	2	522	262	744	178	1,020	381	70%	24%
	Westbound[e]	2	207	996	119	69	287	1,042	18%	59%
Durham Road between I-680 Northbound Off-ramp and Paseo Padre Parkway	Eastbound[d]	2	103	17	758	178	615	136	48%	11%
	Westbound[e]	2	56	25	119	69	136	71	10%	5%
Paseo Padre Parkway between Durham Road and South Grimmer Boulevard	Northbound[e]	1	23	3	119	69	103	50	16%	8%
	Southbound	1	26	8	–	–	26	8	3%	1%
Paseo Padre Parkway between South Grimmer Boulevard and Mission Boulevard	Northbound[e]	1	10	4	119	69	129	74	14%	8%
	Southbound	1	31	4	–	–	31	4	3%	0%

a Calculations by CHS Consulting Group, using traffic volumes from automatic machine traffic counts on affected roadways (CHS. 2009).
b Volume-to-capacity ratio, with approximate capacities per lane equal to 900 vehicles/hour.
c This represents the start of a one-hour period (i.e., 11 p.m. to 12 midnight and 5 to 6 a.m.).
d This is direction that traffic detoured from eastbound Mission Boulevard would use.
e This is direction that traffic detoured from westbound Mission Boulevard would use.

TABLE 5.5-8
MISSION BOULEVARD FULL CLOSURE TRAFFIC ANALYSIS (2008) – SATURDAYS (12 AM TO 7 AM)[a]

Roadway Segment	Direction	Number of Lanes	Roadway Volumes		Detour Volumes		Total Volumes		V/C Ratio[b]	
			12 a.m.[c]	6 a.m.[c]	12 a.m.	6 a.m.	12 a.m.	6 a.m.	12 a.m.	6 a.m.
Warm Springs Boulevard between Mission Boulevard and South Grimmer Boulevard	Northbound[d]	1	41	23	695	415	736	438	82%	49%
	Southbound[e]	1	45	35	122	42	167	77	19%	9%
Osgood Road between South Grimmer Boulevard and Durham Road – Auto Mall Parkway	Northbound[d]	2	18	24	695	415	713	439	40%	24%
	Southbound[e]	2	25	10	122	42	147	52	8%	3%
Durham Road – Auto Mall Parkway between Osgood Road and I-680 Southbound On-ramp	Eastbound[d]	2	235	86	695	415	930	501	52%	28%
	Westbound[e]	2	226	124	122	42	348	166	19%	9%
Durham Road between I-680 Northbound Off-ramp and Paseo Padre Parkway	Eastbound[d]	2	97	21	700	416	797	437	44%	24%
	Westbound[e]	2	53	19	122	42	175	61	10%	3%
Paseo Padre Parkway between Durham Road and South Grimmer Boulevard	Northbound[e]	1	24	5	122	42	146	47	16%	5%
	Southbound	1	16	6	–	–	16	6	2%	1%
Paseo Padre Parkway between South Grimmer Boulevard and Mission Boulevard	Northbound[e]	1	24	3	122	42	146	45	16%	5%
	Southbound	1	26	0	–	–	26	0	3%	0%

[a] Calculations by CHS Consulting Group, using traffic volumes from automatic machine traffic counts on affected roadways (CHS, 2009).
[b] Volume-to-capacity ratio, with approximate capacities per lane equal to 900 vehicles/hour.
[c] This represents the start of a one-hour period (i.e., 12 midnight to 1 a.m.; and 6to 7 a.m.).
[d] This is direction that traffic detoured from eastbound Mission Boulevard would use.
[e] This is direction that traffic detoured from westbound Mission Boulevard would use.

TABLE 5.5-9
MISSION BOULEVARD FULL CLOSURE TRAFFIC ANALYSIS (2012) – SATURDAYS (12 AM TO 7 AM)[a]

Roadway Segment	Direction	Number of Lanes	Roadway Volumes		Detour Volumes		Total Volumes		V/C Ratio[b]	
			12 a.m.[c]	6 a.m.[c]	12 a.m.	6 a.m.	12 a.m.	6 a.m.	12 a.m.	6 a.m.
Warm Springs Boulevard between Mission Boulevard and South Grimmer Boulevard	Northbound[d]	1	44	25	752	449	797	474	89%	53%
	Southbound[e]	1	49	38	132	45	181	83	20%	9%
Osgood Road between South Grimmer Boulevard and Durham Road – Auto Mall Parkway	Northbound[d]	2	19	26	752	449	772	475	43%	26%
	Southbound[e]	2	27	11	132	45	159	56	9%	3%
Durham Road – Auto Mall Parkway between Osgood Road and I-680 Southbound On-ramp	Eastbound[d]	2	254	93	752	449	1,007	542	56%	30%
	Westbound[e]	2	245	134	132	45	377	180	21%	10%
Durham Road between I-680 Northbound Off-ramp and Paseo Padre Parkway	Eastbound[d]	2	105	23	758	450	863	473	48%	26%
	Westbound[e]	2	57	21	132	45	189	66	11%	4%
Paseo Padre Parkway between Durham Road and South Grimmer Boulevard	Northbound[e]	1	26	5	132	45	158	51	18%	6%
	Southbound	1	17	6	–	–	17	6	2%	1%
Paseo Padre Parkway between South Grimmer Boulevard and Mission Boulevard	Northbound[e]	1	26	3	132	45	158	49	18%	5%
	Southbound	1	28	0	–	–	28	0	3%	0%

[a] Calculations by CHS Consulting Group, using traffic volumes from automatic machine traffic counts on affected roadways (CHS, 2009).
[b] Volume-to-capacity ratio, with approximate capacities per lane equal to 900 vehicles/hour.
[c] This represents the start of a one-hour period (i.e., 12 midnight to 1 a.m.; and 6 to 7 a.m.).
[d] This is direction that traffic detoured from eastbound Mission Boulevard would use.
[e] This is direction that traffic detoured from westbound Mission Boulevard would use.

Northbound I-680 Diamond and Loop On-ramps

The new BDPL No. 3X and articulated vault would be installed beneath the northbound I-680 diamond on-ramp under temporary bridges and modifications to the existing slip-joint vault would be constructed beneath the northbound I-680 loop on-ramp under temporary bridges. To facilitate the bridge installations prior to construction, temporary detour paving would be laid adjacent to the affected ramps to allow continued freeway access while the temporary bridges are installed. Each of the on-ramps would be closed approximately four nights to shift traffic to the detour route and back during bridge installation and removal. These closures would occur during the overnight hours on weekday or weekend evenings from 10 p.m. to 6 a.m. (diamond ramp), and from 12 midnight to 6 a.m. (loop ramp). For the loop on-ramp, two closures would occur over a two-month period for temporary bridge installation, and two closures would occur during a one-month period for bridge removal. For the diamond on-ramp, two closures would occur over a three-month period for bridge installation, and two closures would occur over a two-month period for bridge removal. During closure, traffic that ordinarily uses the affected ramps would be detoured onto other roads to access I-680 at the Auto Mall Parkway – Durham Road interchange, which is the next adjacent interchange to the north along I-680.

The roadways that could be adversely affected during ramp closure and detour periods include the following:

- Warm Springs Boulevard between Mission Boulevard and South Grimmer Boulevard
- Osgood Road between South Grimmer Boulevard and Durham Road (Auto Mall Parkway)
- Durham Road (Auto Mall Parkway) between Osgood Road and I-680 Southbound On-ramp
- Durham Road between I-680 Northbound Off-ramp and Paseo Padre Parkway
- Paseo Padre Parkway between Durham Road and South Grimmer Boulevard
- Paseo Padre Parkway between South Grimmer Boulevard and Mission Boulevard
- Mission Boulevard between Paseo Padre Parkway and I-680 Northbound On-ramp
- Mission Boulevard between Brown Road (just west of I-680 Ramps) and Warm Springs Boulevard

To evaluate potential effects on these roadways during closure of the I-680 on-ramps, the roadway capacity was determined based on the number of lanes, lane widths, and other roadway geometric characteristics; the V/C ratio was determined by dividing the total existing traffic volumes (on-ramps and planned detour routes) by the roadway capacity. For this analysis, a V/C ratio of 0.90 or less (consistent with City of Fremont target LOS discussed in Section 5.5.2, Regulatory Framework) is considered an acceptable LOS on the detour routes during closure of the on-ramps.

Based on 2008 traffic volumes, the northbound I-680 diamond on-ramp has a weekday ADT volume of about 362 vehicles; by 2012, the volume for this ramp is projected to be about 424 vehicles. As described above, this on-ramp is expected to close during the overnight hours between 10 p.m. and 6 a.m. on weekdays or weekends, as described in Chapter 3, Project Description.

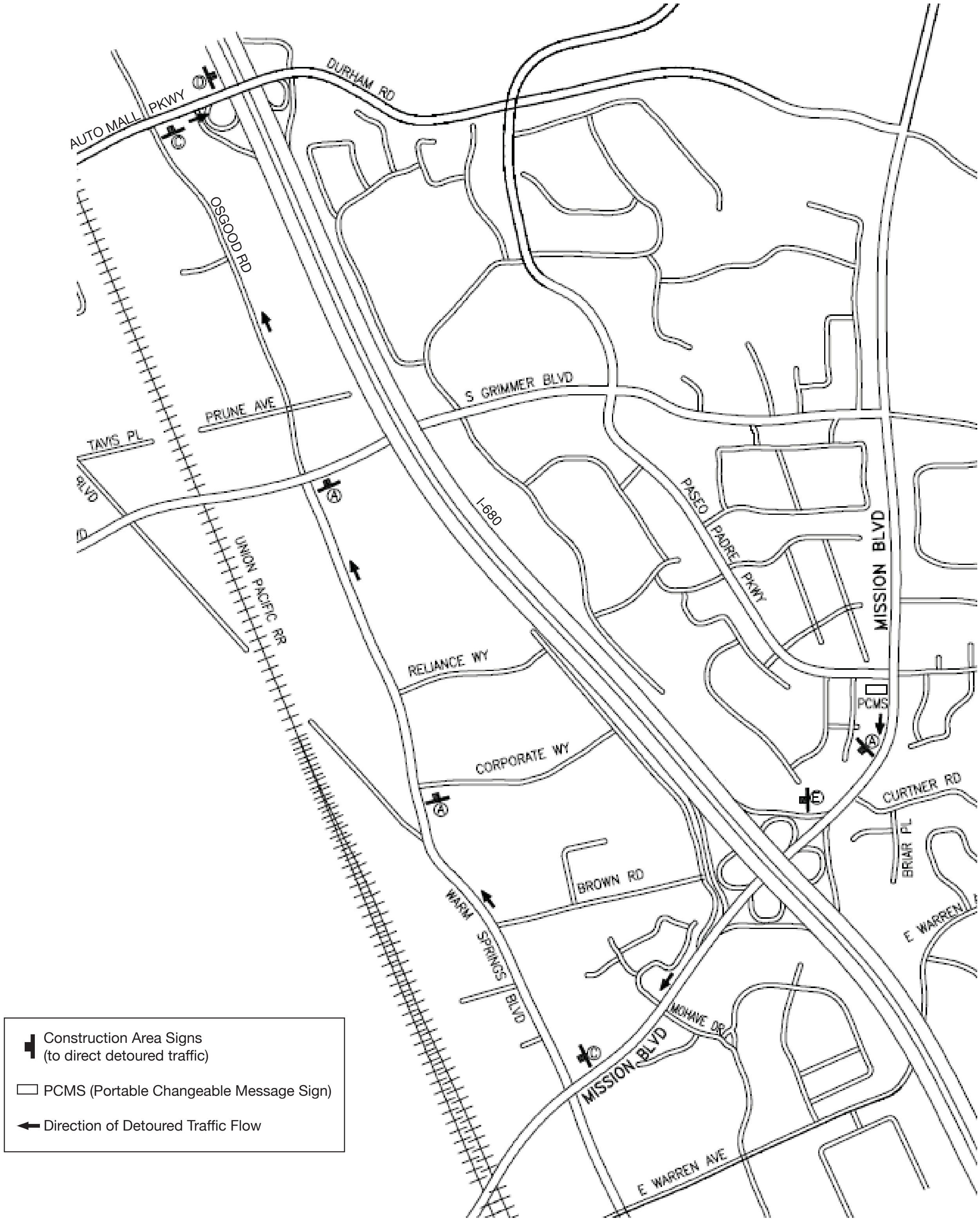
The total ramp volume during these hours on weekdays is approximately 19 vehicles, with a peak volume (8 vehicles in the 2008 scenario and 9 vehicles in the 2012 scenario) occurring between 11 p.m. and 12 midnight; Saturday and Sunday volumes would be similar during these periods. Warm Springs Boulevard-Osgood Road is the planned detour route for the ramp closure because this roadway primarily traverses a commercial/industrial area with few adjacent residences (compared to Paseo Padre Boulevard, which primarily passes through a residential area). This detour route is shown on **Figure 5.5-3**.

Based on 2008 traffic volumes, the northbound loop on-ramp has a weekday ADT volume of about 16,982 vehicles; by 2012, the volume for this ramp is projected to be about 19,900 vehicles. As described above, this on-ramp is expected to be closed during the overnight hours between 12 midnight and 6 a.m. on weekdays or weekend evenings, as described in Chapter 3, Project Description. The later closure time is necessary to avoid traffic congestion because volumes on the northbound loop on-ramp are continually high between 10 p.m. and 12 midnight (approximately 548 vehicles per hour on weekdays between 10 p.m. and 11 p.m., decreasing to about 234 vehicles per hour between 12 midnight and 1 a.m.); Saturday and Sunday volumes would be similar during these periods. Similarly, reopening at 6 a.m. would prevent congestion (there are approximately 442 vehicles per hour between 5 a.m. and 6 a.m., increasing to about 785 vehicles per hour between 6 a.m. and 7 a.m.). During the planned hours of closure, the ramp volume is about 1,292 vehicles, with a peak volume (442 vehicles in 2008 and 518 vehicles in 2012) occurring between 5 a.m. and 6 a.m. **Figure 5.5-4** illustrates the detour route (using Warm Springs Boulevard again) proposed for this ramp closure.

Based on the estimated closure periods for both on-ramps, the analysis of the detour roadways considers three peak-hour times: 10 p.m. to 11 p.m. when traffic would be detoured only from the northbound I-680 diamond on-ramp, as well as 12 midnight to 1 a.m., and 5 a.m. to 6 a.m. when traffic could be detoured from either on-ramp. The ramp and roadway volumes at these times represent the worst-case roadway conditions because volumes in between these hours are relatively lower.

Tables 5.5-10 and **5.5-11** show the estimated detour roadway volumes, the number of travel lanes for each roadway segment, and V/C ratios at three times between 10 p.m. and 6 a.m. for the 2008 and 2012 analysis scenarios. As shown in the tables, none of the detour routes would experience conditions in excess of the 0.90 V/C ratio threshold specified by the City of Fremont during the planned closure periods. Warm Springs Boulevard between Mission Boulevard and South Grimmer Boulevard would be the most affected roadway segment, providing only one northbound through-lane (with an approximate capacity of 900 vehicles per hour) at the intersection of South Grimmer Boulevard. Between 5 a.m. and 6 a.m., the V/C ratio would be as high as 0.63 (i.e., 63 percent of capacity) with traffic detoured from the I-680 on-ramps.

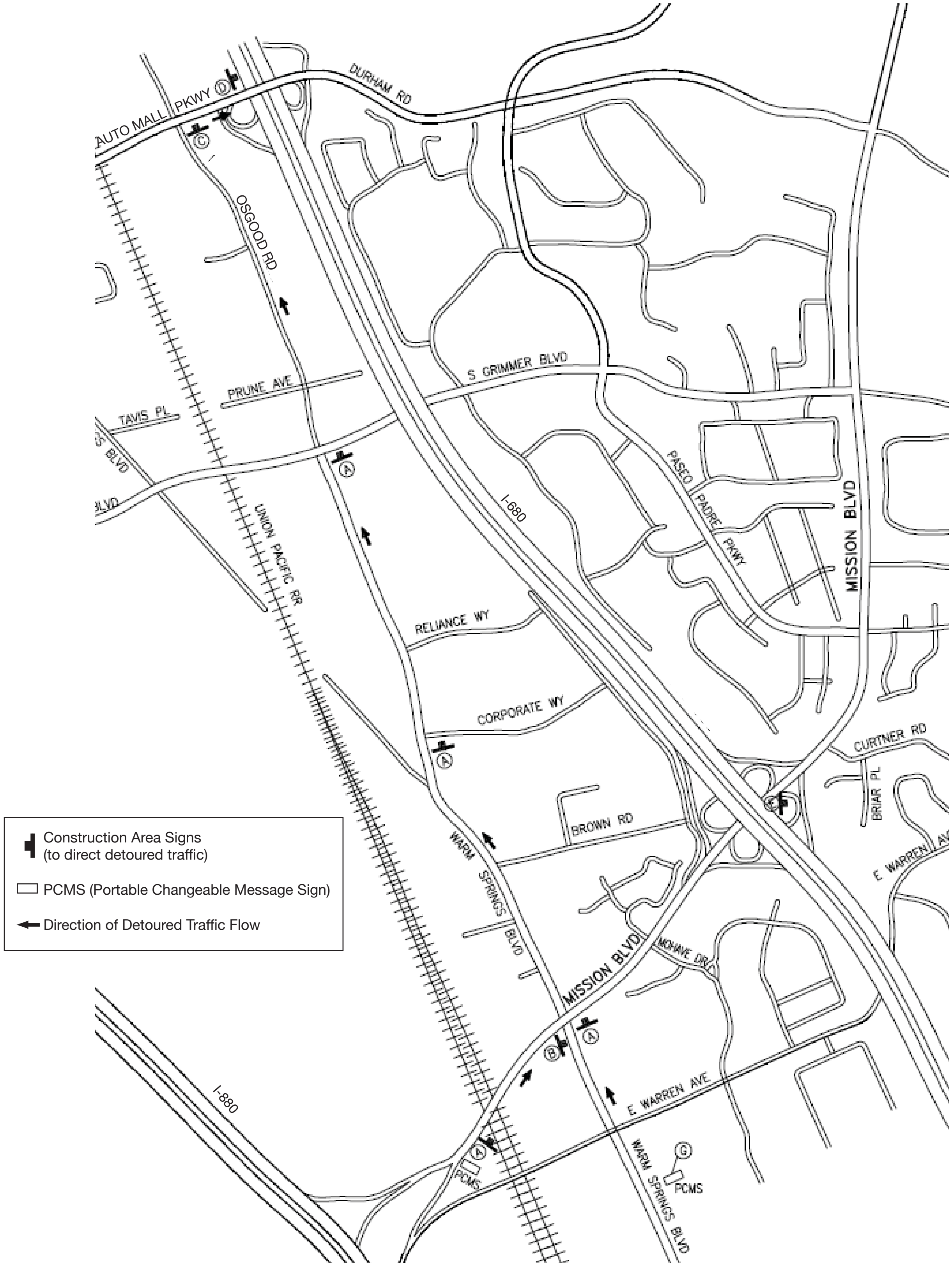
However, under the 2012 analysis scenario, if the detour were to remain in place past 6:00 a.m., roadway conditions along Warm Springs Boulevard would quickly deteriorate, causing traffic congestion, because the northbound I-680 loop ramp volume between 6 a.m. and 7 a.m. would be 920 vehicles, which is higher than the average capacity of Warm Springs Boulevard (i.e., a V/C ratio greater than 1.00).



SOURCE: URS, 2008

Seismic Upgrade of BDPL Nos. 3 and 4 at Hayward Fault

Figure 5.5-3
Northbound I-680 Diamond On-Ramp Temporary Closure - Detour Route



SOURCE: URS, 2008

Seismic Upgrade of BDPL Nos. 3 and 4 at Hayward Fault

Figure 5.5-4
Northbound I-680 Loop On-Ramp Temporary Closure - Detour Route

TABLE 5.5-10
RAMP CLOSURE TRAFFIC ANALYSIS (2008)[a]

Roadway Segment	Direction	Number of Lanes	Roadway Volumes			Detour Volumes			Total Volumes			V/C Ratio[b]		
			10 p.m.[c]	12 a.m.[c]	5 a.m.[c]	10 p.m.	12 a.m.	5 a.m.	10 p.m.	12 a.m.	5 a.m.	10 p.m.	12 a.m.	5 a.m.
Warm Springs Boulevard between Mission Boulevard and South Grimmer Boulevard	Northbound	1	157	44	46	2	234	442	159	278	488	18%	31%	54%
	Southbound	1	94	70	76	–	–	–	94	70	76	10%	8%	8%
Osgood Road between South Grimmer Boulevard and Durham Road – Auto Mall Parkway	Northbound	2	107	47	41	2	234	442	109	281	483	6%	16%	27%
	Southbound	2	67	21	302	–	–	–	67	21	302	4%	1%	17%
Durham Road – Auto Mall Parkway between Osgood Road and I-680 Southbound On-ramp	Eastbound	2	439	368	242	2	234	442	441	602	684	25%	33%	38%
	Westbound	2	326	87	920	–	–	–	326	87	920	18%	5%	51%
Durham Road between I-680 Northbound Off-ramp and Paseo Padre Parkway	Eastbound	2	147	48	16	–	–	–	147	48	16	8%	3%	1%
	Westbound	2	62	20	23	–	–	–	62	20	23	3%	1%	1%
Paseo Padre Parkway between Durham Road and South Grimmer Boulevard	Northbound	1	31	15	3	–	–	–	31	15	3	3%	2%	0%
	Southbound	1	20	10	7	–	–	–	20	10	7	2%	1%	1%
Paseo Padre Parkway between South Grimmer Boulevard and Mission Boulevard	Northbound	1	29	9	4	–	–	–	29	9	4	3%	1%	0%
	Southbound	1	41	18	4	–	–	–	41	18	4	5%	2%	0%
Mission Boulevard between Paseo Padre Parkway and I-680 Northbound On-ramp	Eastbound	2	254	27	18	–	–	–	254	27	18	14%	2%	1%
	Westbound	2	159	28	64	2	1	3	161	29	67	9%	2%	4%
Mission Boulevard between Brown Road (just west of I-680 Ramps) and Warm Springs Boulevard	Eastbound	3	1,117	259	164	–	–	–	1,117	259	164	41%	10%	6%
	Westbound	3	639	258	1,001	2	1	3	641	259	1,004	24%	10%	37%

[a] Calculations by CHS Consulting Group, using traffic volumes from automatic machine traffic counts on affected roadways.
[b] Volume-to-capacity ratio, with approximate capacities per lane equal to 900 vehicles/hour.
[c] This represents the start of a one-hour period (i.e., 10 to 11 p.m.; 12 midnight to 1 a.m.; and 5 to 6 a.m.

TABLE 5.5-11
RAMP CLOSURE TRAFFIC ANALYSIS (2012)[a]

Roadway Segment	Direction	Number of Lanes	Roadway Volumes[b] 10 p.m.[e]	12 a.m.[e]	5 a.m.[e]	Detour Volumes[c] 10 p.m.	12 a.m.	5 a.m.	Total Volumes 10 p.m.	12 a.m.	5 a.m.	V/C Ratio[d] 10 p.m.	12 a.m.	5 a.m.
Warm Springs Boulevard between Mission Boulevard and South Grimmer Boulevard	Northbound	1	170	48	50	2	274	518	172	322	568	19%	36%	63%
	Southbound	1	102	76	82	–	–	–	102	76	82	11%	8%	9%
Osgood Road between South Grimmer Boulevard and Durham Road – Auto Mall Parkway	Northbound	2	116	51	44	2	274	518	118	325	562	7%	18%	31%
	Southbound	2	73	23	327	–	–	–	73	23	327	4%	1%	18%
Durham Road – Auto Mall Parkway between Osgood Road and I-680 Southbound On-ramp	Eastbound	2	475	398	262	2	274	518	477	672	780	27%	37%	43%
	Westbound	2	353	94	996	–	–	–	353	94	996	20%	5%	55%
Durham Road between I-680 Northbound Off-ramp and Paseo Padre Parkway	Eastbound	2	159	52	17	–	–	–	159	52	17	9%	3%	1%
	Westbound	2	67	22	25	–	–	–	67	22	25	4%	1%	1%
Paseo Padre Parkway between Durham Road and South Grimmer Boulevard	Northbound	1	34	16	3	–	–	–	34	16	3	4%	2%	0%
	Southbound	1	22	11	8	–	–	–	22	11	8	2%	1%	1%
Paseo Padre Parkway between South Grimmer Boulevard and Mission Boulevard	Northbound	1	31	10	4	–	–	–	31	10	4	3%	1%	0%
	Southbound	1	44	19	4	–	–	–	44	19	4	5%	2%	0%
Mission Boulevard between Paseo Padre Parkway and I-680 Northbound On-ramp	Eastbound	2	275	29	19	–	–	–	275	29	19	15%	2%	1%
	Westbound	2	172	30	69	2	1	4	174	31	73	10%	2%	4%
Mission Boulevard between Brown Road (just west of I-680 Ramps) and Warm Springs Boulevard	Eastbound	3	1,209	280	178	–	–	–	1,209	280	178	45%	10%	7%
	Westbound	3	692	279	1,084	2	1	4	694	280	1,088	26%	10%	40%

[a] Calculations by CHS Consulting Group, using traffic volumes from automatic machine traffic counts on affected roadways.
[b] Annual growth rate of 2 percent per year from 2009 counts.
[c] Annual growth rate of 2 percent per year from 2006 counts.
[d] Volume-to-capacity ratio, with approximate capacities per lane equal to 900 vehicles/hour.
[e] This represents the start of a one-hour period (i.e., 10 to 11 p.m.; 12 midnight to 1 a.m.; and 5 to 6 a.m.)

Although the detour roadways would not be adversely affected during the proposed on-ramp closure times, the short-term construction impacts on Warm Springs Boulevard would be *significant* for both current (2008) and future (2012) analysis baselines if the on-ramp closures occurred outside of the proposed times and without appropriate traffic management measures (per the significance criterion related to increased traffic volumes and substantial delays). This impact would be reduced to a less-than-significant level with implementation of **Mitigation Measure M-TR-1, Traffic Control Plan**, which would require the preparation and implementation of a traffic control plan. Implementation of the traffic control plan would reduce the impacts of the short-term lane closures by requiring implementation of circulation and detour plans to minimize impacts on local street circulation during road closures and restricting the time periods when lanes could be closed to specific periods when traffic volumes are low.

Impact TR-2: Short-term increased traffic volumes and delays on roadways due to construction-related vehicle trips.

Construction-related vehicle trips would include construction workers traveling to and from the project site, haul truck trips associated with excavation materials transfer and disposal; haul truck trips associated with importing of backfill materials; and materials and equipment deliveries. The number of construction-related vehicles traveling to and from the project work sites would vary on a daily basis, depending on the construction phase, planned activity, and material needs. The greatest number of construction-generated vehicle trips would generally occur during the excavation, concrete pouring, and backfilling stages of construction within each construction zone.

Construction traffic could result in short-term increases in traffic volumes on roadways in the immediate vicinity of the project site and along haul routes. Adding construction vehicle traffic to the existing roadway volumes, without increasing the capacity of the roadway, could result in increased congestion and delay of vehicles, including transit. Construction truck traffic could also temporarily reduce roadway capacities due to the slower travel speeds and larger turning radii of trucks. Impacts of construction traffic would be most noticeable in the immediate vicinity of the project, and less noticeable farther away and on regional facilities.

The peak construction period, during which the greatest amount of additional vehicle traffic would be generated, represents the worst-case scenario for this impact analysis. The peak construction period would last approximately one week. **Table 5.5-12** presents a comparison of the LOS for the study intersections, on- and off-ramps at Mission Boulevard, and I-680/I-880 freeway mainline segments for the 2008 and 2012 analysis scenarios. As the table shows, with the addition of the peak level of project-generated traffic, all of the study locations would operate at the same levels of service as under existing and future baseline (without project) conditions. All of the intersections would operate at an acceptable LOS D or better, as would the majority of the ramp junctions and mainline segments. The ramp junctions and mainline segments that currently operate at LOS E or F would also operate at the same LOS under 2008 existing and 2012 future baseline conditions. The

TABLE 5.5-12
SUMMARY OF LEVELS OF SERVICE (LOS) – PROJECT CONDITIONS[a]

Intersection	Existing Conditions (2008)		Existing Plus Project Conditions		2012 Without Project Conditions		2012 With Project Conditions	
	AM Peak LOS/Criteria[b]	PM Peak LOS/Criteria[b]	AM Peak LOS/Criteria[b]	PM Peak LOS/Criteria[b]	AM Peak LOS/Criteria[b]	PM Peak LOS/Criteria[b]	AM Peak LOS/Criteria[b]	PM Peak LOS/Criteria[b]
Mission Blvd. / Mohave Dr. (signal)	C / 21.4	D / 38.8	C / 21.4	D / 38.8	C / 24.4	D / 44.6	C / 24.6	D / 44.6
Mission Blvd. / Paseo Padre Pkwy. (signal)	B / 18.4	B / 12.3	B / 18.5	B / 12.3	C / 20.4	B / 13.8	C / 20.9	B / 13.8
Paseo Padre Pkwy. / Omega Dr. (side street stop-control)	B / 10.5	A / 9.2	B / 10.7	A / 9.2	B / 10.9	A / 9.2	B / 11.5	A / 9.4
Freeway Ramp Junction								
I-680 Northbound off-ramp diverge	C / 21.2	C / 28.9	C / 21.3	C / 28.9	C / 23.0	D / 31.4	C / 23.1	D / 31.4
I-680 Northbound on-ramp merge	B / 17.2	C / 21.1	B / 17.2	C / 21.1	B / 18.4	C / 22.6	B / 18.4	C / 22.6
I-680 Southbound off-ramp diverge	F / 37.8	D / 28.2	F / 37.9	D / 28.2	F / 40.9	D / 30.5	F / 40.9	D / 30.5
I-680 Southbound on-ramp merge	C / 22.4	C / 21.1	C / 22.4	C / 21.1	C / 23.8	C / 21.9	C / 23.8	C / 21.9
I-880 Northbound off-ramp diverge	B / 12.9	B / 13.6	B / 13.0	B / 13.6	B / 14.7	B / 15.5	B / 14.9	B / 15.5
I-880 Northbound on-ramp merge	C / 25.9	F / 33.9	C / 26.0	F / 34.0	D / 28.4	F / 37.0	D / 28.4	F / 37.1
I-880 Southbound off-ramp diverge	D / 33.3	F / 36.6	D / 33.3	F / 36.6	F / 35.2	F / 38.6	F / 35.3	F / 38.6
I-880 Southbound on-ramp merge	C / 20.8	C / 21.0	C / 20.8	C / 21.0	C / 21.8	C / 22.0	C / 21.8	C / 22.0
Freeway Mainline Segments								
I-680 NB, north of Mission Blvd.	C / 25.4	D / 30.6	C / 25.4	D / 30.8	D / 27.9	D / 34.8	D / 27.9	D / 35.0
I-680 NB, south of Mission Blvd.	D / 27.9	E / 39.5	D / 28.1	E / 39.5	D / 31.2	F / >45[c]	D / 31.4	F / >45[c]
I-680 SB, north of Mission Blvd.	D / 30.6	C / 22.2	D / 30.8	C / 22.2	E / 35.1	C / 24.2	E / 35.2	C / 24.2
I-680 SB, south of Mission Blvd.	D / 27.0	C / 24.5	D / 27.0	C / 24.5	D / 30.1	D / 26.9	D / 30.1	D / 27.0
I-880 NB, north of Mission Blvd.	C / 22.3	D / 29.9	C / 22.3	D / 30.0	C / 24.2	D / 34.0	C / 24.3	D / 34.1
I-880 NB, south of Mission Blvd.	C / 22.7	D / 27.7	C / 22.8	D / 27.7	C / 24.8	D / 31.1	C / 24.9	D / 31.1
I-880 SB, north of Mission Blvd.	D / 34.6	E / 42.4	D / 34.8	E / 42.4	E / 40.6	F / >45[c]	E / 40.9	F / >45[c]
I-880 SB, south of Mission Blvd.	C / 24.5	C / 25.0	C / 24.6	C / 25.1	D / 27.0	D / 27.5	D / 27.0	D / 27.6

NOTE: NB = northbound; SB = southbound
[a] Calculations by CHS Consulting Group.
[b] The LOS criterion for intersections is average delay, expressed in terms of seconds per vehicle, for the overall LOS/delay for signalized intersections, and for the worst LOS/delay for a stop-controlled turning movement at side street stop-controlled intersections. The LOS criterion for freeway ramp junctions and mainline segments is vehicle density, expressed in terms of passenger cars per mile per lane.
[c] The projected traffic flow rate would exceed the maximum capacity of the roadway, and queues would begin to form on the freeway. Vehicle density tends to increase sharply within the queue and may be considerably higher than the maximum value of 45 passenger cars per mile per lane for LOS E.

addition of project-generated trips would increase vehicle density by no more than 0.3 passenger cars per mile per lane, a minor change that the average motorist would not notice.

Project-generated traffic would contribute a maximum of 5 percent of the growth (net increase) between existing and future freeway traffic volumes, and a maximum of 0.4 percent of the total future freeway traffic volume. For northbound I-680 south of Mission Boulevard, construction traffic would account for about 3 percent of the growth between existing and future volumes, and 0.2 percent of the total future volume. For southbound I-680 north of Mission Boulevard, construction traffic would account for 4 percent of the growth between existing and future volumes, and 0.3 percent of the total future volume. For northbound I-880 south of Mission Boulevard, construction traffic would account for about 4.5 percent of the growth between existing and future volumes, and 0.3 percent of the total future volume. For southbound I-880 north of Mission Boulevard, construction traffic would account for 4.5 percent of the growth between existing and future volumes, and 0.3 percent of the total future volume.

The percent increase in daily traffic volumes on local-serving (low-volume) residential roadways would be noticeable to residents of those neighborhoods. Nevertheless, with the limited addition of construction-related vehicles, traffic volumes would remain at levels less than the carrying capacity of the local roadways. For example, current traffic volumes along Omega Drive are minimal. Inbound construction traffic during the peak period would turn left onto Omega Drive from Paseo Padre Parkway / Mission Boulevard intersection, increasing the existing volume for this movement from 4 to 19 vehicles during the AM peak hour. Outbound construction traffic during the peak period would turn right from Omega Drive to Paseo Padre Parkway / Mission Boulevard intersection, increasing the existing volume for this movement from 9 to 23 vehicles during the PM peak hour. These residential streets typically have a capacity of 600 to 800 vehicles per hour. While adding more vehicles per hour would be noticeable to the residents in the area, it would not cause significant traffic impacts along these roadways or at area intersections because project traffic would not substantially disrupt traffic flows or change the LOS for any of the affected roadways.

Although some freeway ramps and freeway segments would continue to operate at LOS F under project conditions (under both 2008 and 2012 conditions), the project impact would be considered *less than significant* because the changes to vehicle delays and vehicle densities resulting from construction traffic would not be substantial, and project traffic would not substantially disrupt traffic flows or change the LOS for any of the affected roadways.

Impact TR-3: Short-term increased potential traffic safety hazards for vehicles, bicyclists, and pedestrians on public roadways due to construction-related vehicles trips and construction within roadways.

Because construction activities temporarily suspend the normal function of roadways, the potential exists for an increase in traffic safety hazards during construction of the project. This increase in safety hazards would be due to the increased potential for:

- Conflicts between construction vehicles (with slower speeds and wider turning radii than autos) and vehicles, bicyclists, or pedestrians using the roadways
- Conflicts between the movement of traffic and the construction activities, particularly where traffic is routed into the travel lane adjacent to the work zone
- Confusion of drivers during one-lane, two-way traffic operation
- Confusion of bicyclists and pedestrians due to temporary alterations in bicycle and pedestrian circulation
- Distraction of drivers related to construction activities and nighttime lighting

Under the proposed project, traffic hazards could increase where construction traffic accesses a public ROW from the project area, and because of confusion of drivers and increased truck traffic during construction. Construction access from the project area is proposed along Mission Boulevard, the southbound I-680 loop off-ramp, and northbound I-680 loop on-ramp, as shown in Chapter 3, Project Description, Figure 3.9. Conflicts between construction vehicles and existing traffic at these construction access points could increase during high-volume periods on the freeway on-ramps and Mission Boulevard. Increased truck traffic could also cause safety hazards due to their slower speeds and wider turning radii, and motorists could become confused during changes in traffic patterns or distracted by adjacent construction activities.

Safety hazards could also occur where delivery and haul trucks share the roadway with other vehicles, bicyclists, and pedestrians. Much of the truck traffic would access I-680 in the immediate project vicinity, and this would not result in a safety hazard. However, some truck traffic would access I-880 via Mission Boulevard, which is identified as a truck haul route by the City of Fremont. If the delivery vehicles are oversized, delivery of materials could temporarily constrain and reduce the width of the travel lanes throughout the construction area.

Because construction activities associated with the project would increase the potential for the safety hazards, as described above, impacts related to traffic safety hazards would be *significant*. This impact would be reduced to a less-than-significant level with implementation of **Mitigation Measure M-TR-1, Traffic Control Plan**, which requires preparation of a traffic control plan. The traffic control plan, which would be submitted to Caltrans and the City of Fremont, as appropriate, would specify final construction access points and include measures addressing these safety hazards, such as implementing roadside safety protocols (e.g., posting "Road Work Ahead" and "Reduced Speed Zone" signs); using flaggers during peak travel hours to slow traffic speeds; scheduling truck trips outside of peak morning and evening commuting hours, to the extent possible, to reduce the number of conflicts experienced; controlling and monitoring the schedule times of delivery vehicles; and utilizing standard construction delivery protocols. The traffic control measures would reduce vehicle speeds in the work zone, effectively increasing the flow rate per lane, which would create safer conditions for slower moving construction vehicles turning into and out of the construction access points.

Impact TR-4: Short-term impaired access to adjacent roadways and land uses for both general and emergency response traffic as well as for bicyclists and pedestrians due to construction within roadways.

The project would involve construction activities within the SFPUC ROW between the North and South Shutoff Stations. Construction activities would not block access to adjacent land uses because all construction would occur within the ROW rather than in the roadways, except where the ROW crosses the two northbound on-ramps to I-680, Mission Boulevard, and Nugget Way – Nugget Place. During construction, access to Nugget Way – Nugget Place would be maintained via Tissiack Place. The ROW also crosses (underneath) I-680, and construction would not cause changes in highway operation because the pipeline would be installed beneath the freeway through an existing corrugated-metal pipe segment or via trenchless construction.

Where construction would cross the northbound diamond and loop on-ramps to I-680, access to I-680 would be affected because the two on-ramps would each be temporarily closed four nights during construction to install and remove the temporary bridges (a total of eight nights over an approximately 8-month period). Emergency access could also be impeded during closure of Mission Boulevard (nine nights over a 11-month period). However, as discussed in Impact TR-1, these roadways would be closed during the overnight hours between 10 p.m. and 6 a.m. on weekdays or Saturdays. Although this would impede emergency access on Mission Boulevard and to northbound I-680 from eastbound and westbound Mission Boulevard, detours would be active during the roadway closures to direct traffic to local streets and to the Auto Mall Parkway – Durham Road freeway interchange about two miles north via Warm Springs Boulevard, running parallel to I-680. These detours would provide alternative routing for emergency vehicles needing to travel on Mission Boulevard and northbound on I-680.

During the closure of Mission Boulevard, access would temporarily be reduced to businesses and residences that are either located on, or have access to their property on, the approximately one-mile stretch of Mission Boulevard between Paseo Padre Parkway on the east and Warm Springs Boulevard on the west. However, the SFPUC would provide local access to these businesses and residences during the temporary closures of Mission Boulevard, as described in Chapter 3, Project Description.

The project would also impair pedestrian and bicycle access and circulation along Mission Boulevard because the existing and temporary sidewalks would be closed during some stages of construction, and roadway shoulders would be removed during some stages of the traffic handling process. For pedestrian access, it is expected that either the north or south sidewalks along Mission Boulevard would be closed during certain traffic handling stages, but not both at any given time. Also, with the removal of the roadway shoulder during some stages of construction, bicyclists would share the roadway with vehicular traffic, impairing access and circulation for bicyclists.

Because emergency access on Mission Boulevard and to I-680 would be impeded without implementation of the detours, and pedestrian and bicycle flow could be impaired on Mission Boulevard, impacts related to impaired access to roadways would be *significant* (per the significance criterion pertaining to the adequacy of access). This impact would be reduced to a less-than-significant level with implementation of **Mitigation Measure M-TR-1, Traffic Control Plan**, which requires the contractor to prepare and implement a traffic control plan. Implementation of the traffic control plan in accordance with this measure would reduce the impacts of the short-term impaired access by requiring the construction contractor to notify local police and emergency responders of the Mission Boulevard and I-680 on-ramp closures. For bicycle and pedestrian traffic on Mission Boulevard, the traffic control plan would require the construction of safe crossings as well as signage notifying pedestrians (at both ends of the project area) of the available sidewalk. In addition, signs such as "Bicyclist Allowed Use of Full Lane" or "Share the Road" would be posted to ensure the safety of bicyclists traveling within the construction area. The plan would also call for drivers to be notified of the change in roadway operations to ensure the safety of pedestrians and bicyclists during times that traffic is being shifted during the construction of temporary bridges on Mission Boulevard.

The project would not conflict with the Fremont Bicycle Master Plan (City of Fremont, 2005) because the project's short-term effects on bicycle access and circulation end when construction activities end, and the project would not involve permanent changes to any designated (current or proposed) bicycle routes or changes to policies or programs in the Bicycle Master Plan.

Impact TR-5: Short-term displacement of on-street parking due to temporary increased parking demand or construction within roadways.

The SFPUC ROW and associated construction staging areas within the project area would accommodate construction worker vehicles and equipment. With the exception of crossing the two northbound I-680 on-ramps, Mission Boulevard, and Nugget Way – Nugget Place, construction would not occur in any streets. There is no on-street parking on the freeway on-ramps or affected portion of Mission Boulevard, and construction would occur only within a narrow band on Nugget Place. Parking for construction workers would primarily be limited to the project area (indicated in Chapter 3, Figure 3.9) that includes the ROW and staging areas, but it is anticipated that some construction workers would park in spaces on neighborhood streets at both the north end (Tissiack Way area) and south end (Mohave Drive area) of the ROW. Additional parking needed during peak construction activities could also be provided offsite in designated parking facilities, with workers transported by shuttle to the work site. As shown in Table 5.5-2, the average on-street parking occupancy in the Mohave Drive area is about 47 percent, with higher occupancy along Crawford Street (61 percent) and lower occupancy at the other immediate surrounding streets (Bradley Court and Bradley Street). The average parking occupancy in the Tissiack Way area is about 7 percent. Because the project would not reduce parking availability due to construction in roadways, and parking would occur in the ROW, staging areas, and on streets with relatively low parking occupancy within the project area or in an offsite designated parking facility, impacts on area parking would be *less than significant*.

Facility Siting, Operation, and Maintenance Impacts

Installation of the new BDPL No. 3X and improvements to BDPL No. 4 would not generate any long-term traffic volume increases. The project would require periodic maintenance, similar to existing operations. However, it is not expected that new trips related to maintenance would be generated. In the event any increase in traffic would be generated by operation and maintenance of the facilities, the increase would be minimal and would not result in a noticeable increase in traffic on adjacent streets. Therefore, the operation of the project would not result in impacts related to transportation and circulation.

5.5.4 Mitigation Measures

Mitigation Measure M-TR-1: Traffic Control Plan.

The SFPUC will require the construction contractor to prepare and implement a traffic control plan to reduce traffic impacts on the I-680 northbound diamond and loop on-ramps, Mission Boulevard, and detour routes, as well as to reduce potential traffic safety hazards and ensure adequate access for emergency responders. The SFPUC and construction contractor(s) will coordinate development and implementation of this plan with Caltrans and the City of Fremont, as appropriate. To the extent applicable, the traffic control plan will conform to the state's *Manual of Traffic Controls for Construction and Maintenance Work Areas*. The traffic control plan will include, but not be limited to, the following elements:

- Circulation and detour plans to minimize impacts on local street circulation during road closures. Flaggers and/or signage will be used to guide vehicles through and/or around the construction zone.
- Identification of truck routes designated by the City of Fremont. Haul routes that minimize truck traffic on local roadways and residential streets will be utilized to the extent possible.
- Sufficient staging areas for trucks accessing construction zones to minimize disruption of access to adjacent land uses, particularly at entries to onsite pipeline construction within residential neighborhoods.
- Control and monitoring of construction vehicle movement through the enforcement of standard construction specifications by onsite inspectors.
- Scheduling of truck trips outside the peak morning and evening commute hours to the extent possible.
- Limiting lane closures during peak hours to the extent possible. Approved lane closure periods are as follows:
  - *Single lane closures of Mission Boulevard*: weekdays and Sundays between 10 p.m. and 6 a.m. (westbound) and between 11 p.m. and 6 a.m. (eastbound), and Saturdays between 10 p.m. and 7 a.m. (westbound) and between 12 midnight and 7 a.m. (eastbound)

  - *Full closure of Mission Boulevard*: weekdays and Sundays between 11 p.m. and 6 a.m., and Saturdays between 12 midnight and 7 a.m.
  - *Northbound I-680 diamond on-ramp*: weekday or weekend evenings from 10 p.m. to 6 a.m.
  - *Northbound I-680 loop on-ramp*: weekday or weekend evenings from 12 midnight to 6 a.m.

- Restoring roads to the pre-project number of lanes, with all trenches covered with steel plates or the equivalent outside of allowed working hours (weekdays between 7 a.m. and 7 p.m. and Saturdays between 9 a.m. and 6 p.m., with occasional construction activities occurring on Sundays) or when work is not in progress.
- Maintaining pedestrian and bicycle access and circulation during project construction where safe to do so. If construction activities encroach on a bicycle lane, advance warning signs (e.g., "Bicyclists Allowed Use of Full Lane" and/or "Share the Road") will be posted that indicate bicycles and vehicles are sharing the lane. If construction activities encroach on a sidewalk, safe crossings and appropriate signage will be provided for pedestrians.
- Identification of detours for bicycles and pedestrians, where applicable, in all areas affected by project construction.
- Storage of all equipment and materials in designated contractor staging areas on or adjacent to the worksite, such that traffic obstruction is minimized.
- Implementation of roadside safety protocols. Advance "Road Work Ahead" warning and speed control signs (including those informing drivers of state-legislated double fines for speed infractions in a construction zone) will be posted to reduce speeds and provide safe traffic flow through the work zone.
- Coordination of construction with facility owners or administrators of police and fire stations (including all fire protection agencies), transit stations, hospitals, and schools. Facility owners or operators will be notified in advance of the timing, location, and duration of construction activities and the locations of detours and lane closures.
- Coordination of construction with local transit service providers, including temporary relocation of bus routes in work zones as necessary.
- Notification of local police and emergency responders of the ramp closures.
- Repair and restoration of roadway ROWs to their original condition after construction is completed.
- Use of portable changeable message signs to provide advance notice of lane closures.

5.5.5 References

Alameda-Contra Costa Transit District (AC Transit), Bus System Map. Available online at www.actransit.org, accessed February 4, 2009.

Alameda County Congestion Management Agency (ACCMA), *2007 Congestion Management Program,* 2007.

Alameda County Congestion Management Agency (ACCMA), Countywide Model, 2005 and 2015 Loaded Countywide Network Traffic Model, 2008.

California Department of Transportation (Caltrans), *2007 Traffic Volumes on California State Highways*, 2008.

California Department of Transportation and City and County of San Francisco (Caltrans and CCSF), *Cooperative Agreement, District Agreement No. 4-2200,* February 19, 2009.

CHS Consulting Group, Parking Inventory and Occupancy Surveys, conducted on March 8, 2008a.

CHS Consulting Group (contracting traffic counting vendor Baymetrics), Manual Traffic Counts, March 2008b

CHS Consulting Group, Automatic Traffic Counts, collected between January 6, 2009 and January 13, 2009.

City of Fremont, *City of Fremont General Plan Update 2030 (Transportation Background Report)*, 2008.

City of Fremont, Fremont Bicycle Master Plan. Available online at www.fremont.gov; adopted September 27, 2005.

City of Fremont, City of Fremont Truck Routes, Adopted by City Council on April 26, 1988, Amended by City Council on January 11, 2000. Map prepared by R. Chan on July 16, 2004.

Santa Clara Valley Transportation Authority (SCVTA), Bus & Rail Map and Schedule. Available online at www.vta.org, as of January 12, 2009.

Transportation Research Board (TRB), *2000 Highway Capacity Manual,* 2000.

URS Corporation, Final Conceptual Engineering Report, *Seismic Upgrade of Bay Division Pipelines No. 3 and No. 4 at the Hayward Fault,* October 14, 2008.

URS Corporation, Draft Lane Closure Report, *Seismic Upgrade of Bay Division Pipelines No. 3 and No. 4 at the Hayward Fault*, October 6, 2009.

5.6 Noise

This section provides an assessment of the potential noise and vibration impacts associated with construction and operation of the proposed project. It describes the existing noise environment, presents relevant noise regulations and standards, identifies sensitive noise receptors that could be affected by the proposed project, and evaluates the potential effects of project construction and operation on these receptors. Mitigation measures to reduce significant impacts to a less-than-significant level are identified.

5.6.1 Setting

5.6.1.1 Noise Descriptors

dB and dBA. Sound is characterized by various parameters that describe the oscillation rate of sound waves; the distance between successive troughs or crests; and the speed, pressure level, or energy content of a given sound. Sound pressure level has become the most common way to characterize the loudness of an ambient sound, and the decibel (dB) scale is used to quantify sound intensity. Because sound can vary in intensity by over 1 million times within the range of human hearing, a logarithmic loudness scale is used to keep sound intensity numbers at a convenient and manageable level. The human ear is not equally sensitive to all sound frequencies within the entire spectrum; therefore, human response is factored into sound descriptions in a process called "A-weighting." A-weighted decibels are expressed as "dBA," a scale of noise measurement that approximates the range of sensitivity of the human ear to sounds of different frequencies. On this scale, the normal range of human hearing extends from about 0 dBA to about 140 dBA. A 10-dBA increase in the level of a continuous noise represents a perceived doubling of loudness. The noise levels presented herein are expressed in terms of dBA unless otherwise indicated. **Table 5.6-1** lists representative sources of noise and their corresponding noise levels (in dBA).

Planning for acceptable noise exposure involves considering the types of activities to be conducted, and the corresponding noise sensitivities in a specified location for generalized land use. Some general guidelines (U.S. EPA, 1974) are as follows: sleep disturbance can occur at levels above 35 dBA; interference with human speech begins at about 60 dBA; and hearing damage can result from prolonged exposure to noise levels in excess of 85 to 90 dBA.

Leq, CNEL, and Ldn. Time variations in noise exposure are typically expressed in terms of a steady-state energy level (Leq) that represents the acoustical energy of a given measurement. Leq (24) is the steady-state energy level measured over a 24-hour period. Because community receptors are more sensitive to unwanted noise intrusion during the evening and at night, state law requires that, for planning purposes, an artificial dBA increment be added to "quiet time" noise levels to form a 24-hour noise descriptor called the Community Noise Equivalent Level (CNEL). CNEL adds a 5-dBA "penalty" during the evening hours (7 p.m. to 10 p.m.) and a 10-dBA penalty during nighttime hours (10 p.m. to 7 a.m.).

TABLE 5.6-1
TYPICAL SOUND LEVELS MEASURED IN THE ENVIRONMENT

Source of Sound	Noise Level (dBA)	Subjective Evaluation
Near Jet Engine	140	Deafening
Threshold of Pain	130	
Hard Rock Band (threshold of feeling)	120	
Accelerating Motorcycle (a few feet away)	110	
Loud Horn (10 feet away)	100	Very Loud
Noisy Urban Street	90	
Noisy Factory	85[a]	
School Cafeteria with Untreated Surfaces	80	Loud
Lawn Mower	70[b]	
Near Freeway Auto Traffic	60[b]	Moderate
Average Office	50[b]	
Soft Radio Music in Apartment	40	Faint
Average Residence without Stereo Playing	30	
Average Whisper	20	Very Faint
Rustle of Leaves in Wind	10	
Human Breathing	5	
Threshold of Audibility	0	

[a] For most people, exposure to continuous noise above 85 dBA is likely to result in diminished hearing.
[b] Range of speech is 50 to 70 dBA.

SOURCE: U.S. Department of Housing and Urban Development, Office of Community Planning and Development, 1985.

Another 24-hour noise descriptor, called the day-night noise level (Ldn), is similar to CNEL. While both add a 10-dBA penalty to all nighttime noise events between 10 p.m. and 7 a.m., Ldn does not add the evening 5-dBA penalty. In practice, Ldn and CNEL usually differ by less than 1 dBA at any given location for transportation noise sources.

Noise Attenuation. Sound level naturally decreases as a receiver moves farther away from the source. This basic attenuation rate is referred to as the "geometric spreading loss." The basic rate of geometric spreading loss depends on whether a given noise source can be characterized as a point source or a line source. For a point source, such as an idling truck or jackhammer, the noise level decreases by about 6 dB for each doubling of distance away from the source.

In many cases, noise attenuation from a point source increases by 1.5 dB (from 6 dB to 7.5 dB) for each doubling of distance, due to ground absorption and reflective wave canceling. These factors are collectively referred to as "excess ground attenuation." The basic geometric spreading loss rate is used where the ground surface between a noise source and a receiver is reflective, such as parking lots or a smooth body of water. The excess ground attenuation rate (7.5 dB per doubling of distance) is used where the ground surface is absorptive, such as soft dirt, grass, or scattered bushes and trees.

For a line source, such as a heavily traveled roadway, the noise level decreases by a nominal value of 3 dB for each doubling of distance between the source and the receiver. If the ground surface between source and receiver is absorptive rather than reflective, the nominal rate increases by 1.5 dB (from 3 dB to 4.5 dB) for each doubling of distance. Atmospheric effects, such as wind and temperature gradients, can also influence noise attenuation rates from both line and point sources of noise. However, unlike ground attenuation, atmospheric effects continually vary, and thus are difficult to predict.

Trees and vegetation, buildings, and barriers reduce the noise level that would otherwise occur at a given receptor distance. However, a vegetative strip must be dense and wide to have a noticeable effect on noise levels. For example, to attenuate traffic noise by 5 dB, a stand of trees must be at least 100 feet wide and dense enough to completely obstruct a visual path to the roadway (Caltrans, 1998). A row of structures can shield more distant receivers depending on the size and spacing of the intervening structures and site geometry. Generally, for an at-grade highway in an average residential area where the first row of houses covers at least 40 percent of the total area, the first row provides a reduction of approximately 3 dB, and each additional row provides a 1.5-dB reduction (Caltrans, 1998). Similar to the vegetative strips discussed above, noise barriers, which include natural topography and soundwalls, reduce noise by blocking the line of sight between the source and receiver. Generally, a noise barrier that breaks the line of sight between source and receiver will provide at least a 5-dB reduction in noise.

5.6.1.2 Vibration Descriptors

Vibrations caused by construction activities can be interpreted as energy transmitted in waves through the soil mass. These energy waves generally dissipate with distance from the vibration source (e.g., pile driving or sheetpile driving). Because energy is lost during its transfer from one particle to another, vibration that is distant from a source is usually less perceptible than vibration closer to the source. However, actual human and structure response to different vibration levels is influenced by a combination of factors, including soil type, distance between source and receptor, duration, and the number of perceived events.

If great enough, the energy transmitted through the ground as vibration can result in structural damage. To assess the potential for structural damage associated with vibration, the vibratory ground motion in the vicinity of the affected structure is measured in terms of peak particle velocity (PPV) in the vertical and horizontal directions (vector sum), typically in units of inches per second (in/sec). A freight train passing at 100 feet can cause vibrations of 0.1 in/sec PPV, while a strong earthquake can produce vibrations in the range of 10 in/sec PPV.

5.6.1.3 Sensitive Receptors

People in residences, schools, hospitals, and nursing homes are generally more sensitive to noise than people at commercial and industrial establishments. Consequently, the noise standards for these sensitive land uses and noise-sensitive activities are more stringent. Sensitive receptors in the vicinity of the proposed project include residences and childcare centers. In general, residences and schools are among the land uses considered to be the most sensitive to noise.

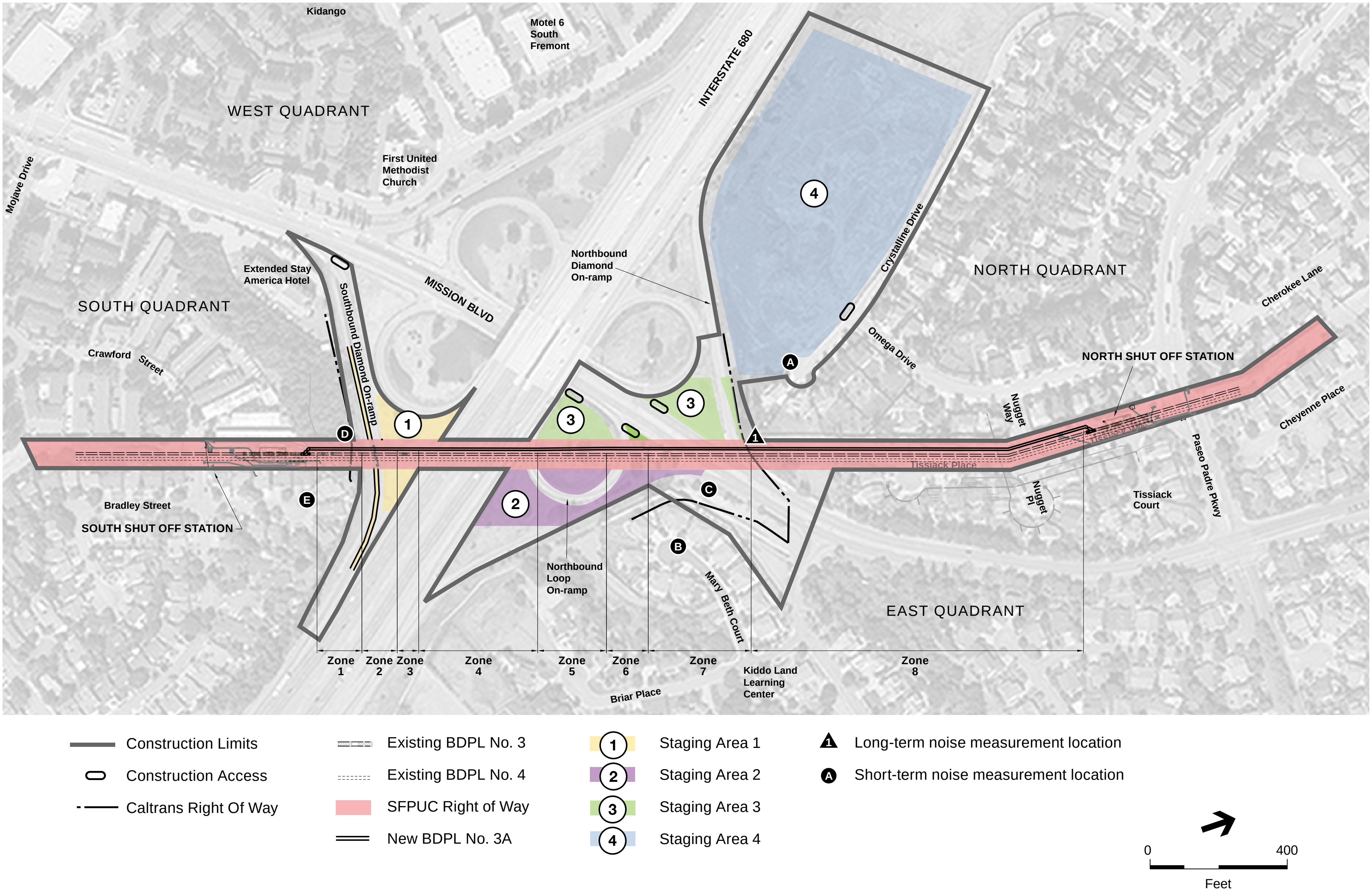
The project area, shown on **Figure 5.6-1**, traverses the Mission Boulevard/I-680 freeway interchange, and the noise-sensitive land uses located in this interchange are described below. (Figure 5.6-1 identifies the location of noise survey measurements taken for the proposed project, as discussed below.)

Receptors North of Mission Boulevard/I-680 Interchange

Residences are located along Omega Drive, Tissiack Way, Tissiack Place, Tissiack Court, Crystalline Drive, Nugget Place, Nugget Way, Cherokee Lane, and Cheyenne Place. The proximity of existing residences to the existing BDPL Nos. 3 and 4 right-of-way (ROW) are as follows:

- Residences along the east side of Omega Drive are immediately adjacent to the ROW, as close as 20 to 25 feet from the western ROW boundary.
- Residences along the west side of Tissiack Way and Tissiack Place are approximately 45 to 55 feet east of the eastern ROW boundary. One residence at the end of Tissiack Place is approximately 5 feet from the eastern ROW boundary.
- Residences along Tissiack Court, Nugget Way, and Nugget Place are not adjacent to the ROW boundary, but all are located within 200 to 250 feet of a ROW boundary.
- Three residences at the end of Crystalline Drive are approximately 70 to 100 feet from the western ROW boundary. Residences along the northeast side of Crystalline Drive are approximately 60 to 80 feet from Staging Area No. 4 (located between I-680 and Crystalline Drive).
- Residences along the east side of Cherokee Lane are immediately adjacent to the ROW, as close as 20 to 25 feet from the western ROW boundary. Staging could potentially occur in this segment of the ROW during construction.
- Residences along the west side of Cheyenne Drive are immediately adjacent to the ROW, several as close as 5 feet from the eastern ROW boundary, with one backyard fence extending into the ROW. Staging could potentially occur in this segment of the ROW during construction.

Wood and masonry fencing generally separates backyards from the BDPL Nos. 3 and 4 ROW where residences are adjacent to the ROW.



SOURCE: GlobeXplorer; URS, 2008a

Seismic Upgrade of BDPL Nos. 3 and 4 at Hayward Fault

Figure 5.6-1
Noise Measurement Locations

Receptors East of Mission Boulevard/I-680 Interchange

Residences on Mary Beth Court are as close as 125 feet east of the BDPL Nos. 3 and 4 eastern ROW boundary. Kiddo Land Learning Center (46280 Briar Place) is approximately 600 feet east of the ROW east boundary. A soundwall separates these two sensitive receptors from I-680 and the area of the proposed construction activities.

Receptors South of Mission Boulevard/I-680 Interchange

Residences along the north end of Bradley Street are approximately 20 feet from the eastern ROW boundary, while apartments on Crawford Street are approximately 40 feet from the western ROW boundary. A masonry soundwall extends along the south side of the I-680 freeway southbound diamond on-ramp between the freeway and the residences at the eastern end of Crawford Street. Wood fencing extends along residential backyard boundaries with the BDPL Nos. 3 and 4 ROW.

Receptors West of Mission Boulevard/I-680 Interchange

The sensitive land uses in this area are farther away from the proposed project than those within the other areas described above. Sensitive receptors in this area include Kidango, a childcare and development center (584 Brown Road) located approximately 1,450 feet west of the western ROW boundary.

5.6.1.4 Existing Noise Levels

The noise environment in the vicinity of the proposed project is primarily influenced by traffic noise on I-680 and Mission Boulevard. Areas east and south of this freeway interchange are protected by soundwalls, and are thus more affected by noise from local traffic than from the freeway.

A noise survey conducted for the proposed project on December 11 and 12, 2008 (ESA+Orion, 2009) included one long-term (24-hour) noise measurement (Location 1, on Figure 5.6-1) and five short-term (5- to 15-minute) noise measurements (Locations A through E, on Figure 5.6-1). The survey results, presented in **Table 5.6-2**, indicate that existing noise levels in the proposed project vicinity are acceptable for residential uses; the measurements ranged from 57 to 65 dBA (Leq) during the day in residential areas without soundwalls, and from 53 to 60 dBA (Leq) during the day in residential areas with soundwalls. During the night (10 p.m. to 7 a.m.), noise levels in the residential area without soundwalls averaged 59 dBA (Leq) at the SFPUC ROW (100 feet from the Mission Boulevard centerline, and 650 feet from the I-680 centerline). For the areas adjacent to the freeway interchange, topographic variations cause differences in freeway noise exposure.

TABLE 5.6-2
SUMMARY OF NOISE LEVEL MEASUREMENTS IN THE VICINITY OF PROPOSED PROJECT (dBA)

Location		Time Period	Noise Level
Long-term Measurement 1:	In BDPL Nos. 3 and 4 ROW, north of Mission Boulevard/I-680 freeway interchange, approximately 100 feet from Mission Boulevard centerline and 650 feet from I-680 freeway centerline (no freeway soundwall)	Thursday, 12/11/08 to Friday, 12/12/08	63 dBA (Day – 7:00 a.m. to 7:00 p.m.) 65 dBA (Evening - 7:00 p.m. to 10:00 p.m.) 59 dBA[a] (Night - 10:00 p.m. to 7:00 a.m.) 67 dBA (24-hour, Ldn and CNEL)
Short-term Measurement A:	North of Interchange: South end of Crystalline Drive, approximately 600 feet from I-680 freeway centerline (no freeway soundwall)	12/11/08 10:50 a.m. – 11:05 a.m.	57 dBA (15-minute Leq)
Short-term Measurement B:	East of Interchange: End of Mary Beth Court, approximately 250 feet from Mission Boulevard centerline and 600 feet from I-680 freeway centerline (behind freeway soundwall)	12/11/08 11:15 a.m. – 11:30 a.m.	53 dBA (15-minute Leq)
Short-term Measurement C:	East of Interchange: North of Mary Beth Court, approximately 100 feet from Mission Boulevard centerline and 650 feet from I-680 freeway centerline (in front of freeway soundwall)	12/11/08 11:35 a.m. – 11:40 a.m.	62 dBA (5-minute Leq)
Short-term Measurement D:	South of Interchange: BDPL Nos. 3 and 4 ROW, approximately 350 feet from I-680 freeway centerline (behind freeway soundwall)	12/11/08 11:55 a.m. – 12:10 p.m.	60 dBA (15-minute Leq)
Short-term Measurement E:	South of Interchange: North end of Bradley Court, approximately 350 feet from I-680 freeway centerline (behind freeway soundwall)	12/11/08 12:15 p.m. – 12:30 p.m.	56 dBA (15-minute Leq)

[a] The minimum hourly noise level measured was 54 dBA (Leq).

SOURCE: ESA+Orion, 2009

5.6.2 Regulatory Framework

There are no federal, state, or regional regulations regarding noise and vibration that are relevant to the proposed project. Therefore, this section focuses on relevant noise guidelines and regulations on the local (city) level. The Fremont Municipal Code contains noise regulation requirements, but does not include thresholds for vibration in residential zones or for construction activities. The *City of Fremont General Plan* (City of Fremont, 1991) includes noise and land use compatibility policies and guidelines. The *Fremont General Plan* guidelines are used for determining whether a noise environment is appropriate for a proposed or planned land use; however, these guidelines do not pertain to water facility projects because these project types are not considered to be noise-sensitive.

The Fremont Municipal Code regulates noise sources, such as mechanical equipment and amplified sounds, and prescribes hours of heavy equipment operation. Although the SFPUC receives intergovernmental immunity from the zoning and building ordinances of cities and counties, (refer to Chapter 4, Plans and Policies, for a detailed discussion of SFPUC's intergovernmental immunity), the noise impact assessment below considers the Fremont Municipal Code noise regulations (i.e., construction activities time limits) to determine the significance of project-related noise impacts under the California Environmental Quality Act (CEQA).

Fremont Municipal Code

Section 8-2205 of the Fremont Municipal Code specifies the following time limits for construction activities within 500 feet of residences, lodging facilities, nursing homes, and inpatient hospitals:

- Weekdays: 7 a.m. to 7 p.m.
- Saturdays: 9 a.m. to 6 p.m.
- Sundays: Prohibited

Beyond 500 feet of these facilities, construction hours are allowed from 6 a.m. to 10 p.m. on weekdays and 8 a.m. to 8 p.m. on weekends. When a project is located in a public ROW or easement or on publicly owned property, these hours can be modified to minimize disruption to the community as a whole, to facilitate the orderly flow of traffic, or to reduce negative impacts on commercial or residential activity. Fremont's Municipal Code does not specify noise limits for operation of stationary equipment beyond specified time limits within residential zones.

The Fremont Municipal Code also limits vibration levels to detectable levels in industrially zoned districts as well as specific types of uses (condominiums, recycling processing facilities, etc.); however, as stated above, it contains no vibration standards applicable to residential zones or construction activities.

5.6.3 Impacts

5.6.3.1 Significance Criteria

The City and County of San Francisco has not formally adopted significance standards for impacts related to noise and vibration, but generally considers that implementation of the proposed project would have a significant noise or vibration impact if it were to:

- Result in exposure of people to or generate noise levels in excess of standards established in the local general plan or noise ordinance or applicable standards of other agencies;
- Result in exposure of people to or generate excessive groundborne vibration or groundborne noise levels;
- Result in a substantial permanent increase in ambient noise levels in the project vicinity above levels that would exist without the project;
- Result in a substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels that would exist without the project;
- For a project located within an area covered by an airport land use plan (or, where such a plan has not been adopted, within two miles of a public airport or public use airport), expose people residing or working in the project area to excessive noise levels;
- For a project located within the vicinity of a private airstrip, expose people residing or working in the project area to excessive noise levels; or
- Be substantially affected by existing noise levels.

5.6.3.2 Approach to Analysis

Due to the nature of the proposed project, there would be no impacts related to the following criteria; therefore, no impact discussion is provided for these topics for the reasons described below:

> *Permanent increase in ambient noise levels*. The proposed project does not include the construction of any noise-producing facilities; therefore, there would be no impact related to a permanent increase in ambient noise levels.
>
> *Effects of existing noise levels*. The proposed project is a utility project, and none of the proposed facilities would be staffed. Therefore, the project is not a noise-sensitive land use, and impacts related to existing noise levels would not be applicable to the project.
>
> *Exposure to excessive noise near airports*. The proposed project is a utility project and not located within an airport land use plan area or in the vicinity of a private airstrip. Therefore, there would be no impacts related to the two criteria that apply to excessive noise near airports.

The noise impact assessment evaluates short-term impacts of the proposed project. Short-term impacts include those associated with project construction activities—including the excavation and installation of water pipelines, vaults, and connections, and the construction of temporary bridges and roads—and the management of equipment and materials in stockpile areas. For construction (short-term) noise, the potential for impacts was assessed by considering: (1) the proximity of project-related noise sources to sensitive receptors; (2) typical noise levels associated with construction equipment; (3) the potential for construction noise levels to interfere with daytime and nighttime activities; (4) the duration that sensitive receptors would be affected; and (5) whether proposed activities would occur outside the construction time limits of the local ordinances.

To address the CEQA significance criterion regarding "substantial noise increases" for construction noise, a "substantial" noise increase is defined as an increase in noise to a level that causes interference with activities during the day and/or night. One indicator that construction noise could interfere with daytime activities would be speech interference, and an indicator that construction noise could interfere with nighttime activities would be sleep interference. Temporary exposure (about two weeks or less) to noise from construction activities during the daytime above the speech interference threshold is generally considered to be less than significant. This analysis uses the following criteria to define potential "substantial" noise impacts:

- *Speech Interference*. Speech interference is an indicator of impact on typical daytime and evening activities. A speech interference threshold, in the context of impact duration and time of day, is used to identify substantial increases in noise from temporary construction activities. Noise peaks generated by construction equipment could result in speech interference in adjacent buildings if the noise level in the interior of the building exceeds 45 to 60 dBA. A typical building can reduce noise levels by 25 dBA with the windows closed (U.S. EPA, 1974). This noise reduction could be maintained only on a temporary basis in some cases, since it assumes windows must remain closed at all times. Assuming a 25-dBA reduction with the windows closed, an exterior noise level of 70 dBA Leq at receptors would maintain an acceptable interior noise environment of 45 dBA. It should be noted that such noise levels would be sporadic rather than continuous in nature, because different types of construction equipment would be used throughout the construction process. For this analysis, noise levels above the 70-dBA speech interference threshold that occur on consecutive work days for longer than about two weeks would be considered a significant impact.

- *Sleep Interference*. Based on available sleep criteria data, an interior nighttime level of 35 dBA is considered acceptable (U.S. EPA, 1974). Assuming a 25-dBA reduction with the windows closed, an exterior noise level of 60 dBA at receptors would maintain an acceptable interior noise environment of 35 dBA. Since a 15-dBA reduction would occur with windows open, an exterior noise level of 50 dBA Leq would be required to maintain an acceptable interior noise environment of 35 dBA. Given the sensitivity of residential receptors to nighttime noise, construction noise levels are considered substantial if they exceed the minimum ambient noise level at any time in the area that is not protected by a freeway soundwall (regardless of time duration), and if they exceed the Fremont Municipal Code limit of 50 dBA in areas protected by a freeway soundwall (also regardless of time duration), because such exceedances could cause sleep disturbance. If only daytime-occupancy businesses are present in areas where nighttime construction would be conducted, then there would be no nighttime impact, but impacts could occur at any nearby residential receptors if they are located close enough to nighttime construction activities.

- *Substantial Increase in Ambient Noise Levels*. For the purposes of this analysis, a temporary or periodic increase of 5-dB or more above ambient noise levels would be readily noticeable to most people, and would represent a substantial periodic increase in ambient noise levels in the project vicinity above levels that would exist without the project.

Project excavation and facility construction could result in vibration that could disturb local residents and cause cosmetic damage to buildings and structures. The impact assessment for vibration assesses whether construction would result in "excessive groundborne vibration." The vibration impact analysis presented below uses standard analytical methodologies, such as estimating vibration levels at sensitive receptors for a given vibration source and setback distance, comparing the estimated vibration level to recommended limits or significance thresholds, determining potentially significant impacts on nearby sensitive receptors, and providing mitigation where applicable.

For this analysis, the following criteria were used to determine the significance of construction-related vibration effects:

- The potential for building damage, including cosmetic damage
- The exposure of people to vibration in terms of sleep disturbance or interruption of normal living activity

This noise impact assessment estimates noise levels associated with project construction and compares construction noise levels against the speech interference threshold where daytime construction would occur and against the sleep interference threshold where nighttime construction would occur. The vibration impact assessment compares estimated construction vibration levels with vibration thresholds.

5.6.3.3 Impact Analysis

Summary of Impacts

Table 5.6-3 summarizes the potential noise and vibration impacts and the significance of project impacts before and after mitigation.

Construction Impacts

Impact NO-1: Disturbance from temporary construction-related noise increases.

Project-related construction activities would temporarily increase noise levels at adjacent or nearby sensitive receptors, which could result in exceedances of the 70-dBA speech interference criterion (as defined above in Section 5.6.3.2, Approach to Analysis) during the day and the 50-dBA sleep interference criterion (or ambient noise levels where such levels already exceed the 50-dBA criterion) during the night. Construction noise levels would vary at any given receptor depending on the type of activity, construction phasing, equipment type, duration of use, distance between the noise source and receptor, and the presence or absence of barriers between the noise source and receptor.

TABLE 5.6-3
SUMMARY OF IMPACTS – NOISE

Impact	Significance Determination Before Mitigation	Significance Determination After Mitigation
Impact NO-1: Disturbance from temporary construction-related noise increases.	S	SU
Impact NO-2: Consistency with Fremont Municipal Code time limits.	S	SU
Impact NO-3: Temporary noise disturbance along construction haul routes and detour routes due to road closures.	S	SU
Impact NO-4: Disturbance due to construction-related vibration.	S	SU

LS = Less than Significant impact
PS = Potentially Significant impact
S = Significant impact
SU = Significant and Unavoidable impact, even with mitigation incorporated
– = No mitigation required

For construction noise, a "substantial" noise increase is defined as short-term interference with activities during the day and night—e.g., speech interference in the daytime and sleep interference at night. Because there are different thresholds for determining the significance of noise impacts during the day and night, noise impacts associated with project construction are separated into two categories: daytime and nighttime construction.

With the exception of installing temporary bridges on Mission Boulevard and the I-680 northbound on-ramps, all project construction is proposed to occur on weekdays between 7 a.m. and 7 p.m. and on Saturdays between 9 a.m. and 6 p.m., although construction could occasionally occur on Sundays. Some construction activities associated with the installation and removal of the temporary bridges would require temporary and intermittent closure over approximately 11 months of Mission Boulevard (in both directions), the I-680 northbound diamond on-ramp, and the I-680 northbound loop on-ramp, and these activities would be conducted at night to avoid major traffic disruptions (see Chapter 3, Project Description, and Section 5.5, Transportation and Circulation). For Mission Boulevard, the closures would occur between 11 p.m. and 6 a.m. on weekday or Sunday evenings, or between 12 midnight and 7 a.m. on Saturday evenings. Full closure of Mission Boulevard would occur on up to nine nights over 11 months. The I-680 northbound loop on-ramp would be closed four times, between 12 midnight and 6 a.m. on weekday or weekend evenings; and the diamond on-ramp would be closed up to four times, between 10 p.m. and 6 a.m. on weekday or weekend evenings.

Characterization of Construction-Related Noise. Typical construction equipment generates maximum noise levels ranging from about 74 to 89 dBA at a distance of 50 feet from the source. The rate of attenuation (i.e., reduction) is about 6 dBA for every doubling of distance from a point source. **Table 5.6-4** indicates noise levels at 25, 50, and 100 feet from the noise source for typical construction equipment.

TABLE 5.6-4
NOISE LEVELS AND ABATEMENT POTENTIAL OF CONSTRUCTION EQUIPMENT NOISE AT 25, 50, AND 100 FEET (dBA)

	Noise Level at 25 Feet		Noise Level at 50 Feet		Noise Level at 100 Feet	
Equipment Types	Without Controls[a]	With Controls[a]	Without Controls[a]	With Control[a]	Without Controls[a]	With Controls[a]
Earthmoving						
Front Loaders	85	81	79	75	73	69
Backhoes	86	81	80	75	74	69
Dozers	86	81	80	75	74	69
Graders	91	81	85	75	79	69
Trucks (e.g., Delivery Trucks, Dump Trucks, Water Trucks)	94	81	88	75	82	69
Compactors	88	81	82	75	76	69
Materials Handling						
Concrete Mixers	91	81	85	75	79	69
Concrete Pumps	88	81	82	75	76	69
Cranes, Drill Rigs	89	81	83	75	77	69
Pavers	95	86	89	80	83	74
Rollers	80	80	74	74	68	69
Stationary						
Pumps	82	81	76	75	70	69
Generators	84	81	78	75	72	69
Compressors	87	81	81	75	75	69

[a] Estimated levels can be obtained by selecting quieter procedures or machines and implementing noise-control features that do not require major redesign or extreme cost (e.g., improved mufflers; equipment redesign; use of silencers, shields, shrouds, ducts, and engine enclosures).

SOURCES: U.S. Environmental Protection Agency, 1971; U.S. Department of Transportation, Federal Transit Administration, 2006.

Daytime construction. Speech interference is an indicator of impact on typical daytime and evening activities. A speech interference criterion, in the context of time of day, is used to identify substantial increases in noise from temporary construction activities. Noise generated by construction equipment could interfere with speech in adjacent buildings if the resultant noise level in the buildings' interior exceeds 60 dBA.[1]

Noise levels inside a typical building can be reduced by 25 dBA if the windows are closed (U.S. EPA, 1974). However, in some cases, this noise reduction could be maintained only temporarily because it assumes that windows remain closed at all times. With the windows open, an exterior noise level of 70 dBA at receptors would maintain an acceptable interior noise environment of 55 dBA. Such noise levels could occur for longer periods because receptors could

[1] For indoor noise environments, the highest steady noise level (background) that permits relaxed conversation with 100 percent intelligibility throughout the room is 45 dBA. Speech interference is considered to become intolerable when normal conversation is precluded at 3 feet, which occurs when steady background noise levels exceed 60 dBA. For this study, the U.S. EPA's reference to "steady A-weighted noise level" is assumed to be equivalent to the Leq noise descriptor. For outdoor environments, the highest continuous noise level that permits normal conversation at 3 feet with 95 percent sentence intelligibility is 66 dBA (U.S. EPA, 1974).

open windows and still carry on normal conversation across a room without having to raise their voices. It is important to note that maximum noise levels presented in this analysis would be sporadic rather than continuous in nature, because different types of construction equipment would be used throughout construction. For this analysis, a noise level above the 70-dBA speech interference criterion that occurs on consecutive work days for longer than about two weeks is considered to be a significant noise impact.

For the purpose of this EIR, the pipeline alignment between the North and South Shutoff Stations has been divided into the eight construction zones, starting at the South Shutoff Station and moving north, depending on the method(s) of construction to be used. Project construction activities would vary by zone over an approximately 27-month period (see Table 3.1 in Chapter 3, Project Description). Construction could also be conducted concurrently in two or more of the construction zones, depending on the construction phasing, and noise receptors would be different for each construction zone. For this analysis, project construction activities were separated by phase and type of construction activity because the noise impacts associated with each phase would depend on the time of day, types of construction equipment used, proximity to noise-sensitive receptors, and duration of construction. Estimated worst-case noise levels at the nearest noise-sensitive receptors for the following phases are summarized in **Table 5.6-5**:

- Mobilization and Preparation (including relocation of utilities): Areawide and Construction Zones 6, 7, and 8
- Points of Connection: Construction Zones 1 and 8
- Open-Cut Construction: Construction Zones 1 (Option B), 3, 5, and 8
- Trenchless Construction: Construction Zones 1 (Option A), 2 (Option A or B), and 4 (Options A or B)
- Cut-and-Cover Construction: Construction Zones 6 and 7
- BDPL No. 4 Improvements: Construction Zones 6 and 8 (Option A or B)
- Staging Area 4: Residences on Crystalline Drive adjacent to this staging area

This table presents the estimated noise levels at the nearest residential receptor (worst-case noise impact) for construction activities within each construction zone. These estimated noise levels were calculated on the basis that construction could occur within the entire ROW, and that, given the limited space, only one piece of heavy equipment could be located at the indicated minimum distance to a receptor at any given time (noise levels are listed by each type of equipment in Table 5.6-4). The noise estimates in this table represent the highest (worst-case) Leq noise level that would be generated by this piece of equipment assuming it operates at full throttle 100 percent of the time, which would also be equivalent to two pieces of equipment operating 50 percent of the time. However, in actuality, project construction activities would utilize different types of equipment at different stages, and this equipment would operate at variable levels (i.e., sometimes idling, sometimes operating at various throttle openings) and at different distances from any given receptor, and would likely result in lower noise levels. Residential

TABLE 5.6-5
ESTIMATED DAYTIME CONSTRUCTION NOISE LEVELS AT THE CLOSEST SENSITIVE RECEPTORS AND CONSISTENCY WITH SIGNIFICANCE CRITERION

Project and Receptor Location	Construction Duration[a] (Construction Hours)	Maximum Noise Source	Reference Hourly Leq in dBA at 50 feet[b]	Distance to Closest Receptor[c]	Distance Adjustment	Adjusted Leq	Attenuation Due to Existing Fencing	Adjusted Leq	Administrative and Source Control Reductions (Mitigation Measure M-NO-1a)[d]	Mitigated Leq With Mitigation Measure M-NO-1a	Exterior Speech Interference Threshold	Additional Mitigation Required?
Mobilization and Preparation (Site Preparation and Utilities Relocation)												
Areawide and Zones 6, 7, and 8; closest residential receptors on Omega Drive are 25 feet from ROW and 30 feet from edge of work area.	Total duration: 2 months Pipeline construction: ≤ 2 weeks[e] Activities in ROW: > 2 weeks (Construction to occur weekdays 7 a.m. to 7 p.m., Saturdays 9 a.m. to 6 p.m., occasional Sundays[f])	Backhoes, Loader	80	30	4	84	-5	**79**	-5	**74**	70	Provision of temporary noise barriers (Mitigation Measure M-NO-1b), but if barriers are not feasible or cannot feasibly lower noise levels by 4 dB, then no other feasible mitigation is available.
		Dump Trucks, Water Trucks	88	30	4	92	-5	**87**	-13	**74**	70	
		Cranes, Compactor	83	30	4	87	-5	**82**	-8	**74**	70	
		Paver	89	30	4	93	-5	**88**	-14	**74**	70	
		Pumps, Generators, Roller	78	30	4	82	-5	**77**	-3	**74**	70	
Points of Connection (Installation of Valve and Tee)												
Zone 1; closest residential receptors on Bradley Street are 20 feet from ROW and 25 feet from edge of work area.	Total duration: 3 months Excavation: 3 weeks Backfill: 2 weeks (Construction to occur weekdays 7 a.m. to 7 p.m., Saturdays 9 a.m. to 6 p.m., occasional Sundays)	Backhoes, Loader	80	25	6	86	-5	**81**	-5	**76**	70	Provision of temporary noise barriers (Mitigation Measure M-NO-1b), but if barriers are not feasible or cannot feasibly lower noise levels by 4 dB, then no other feasible mitigation is available.
		Dump Trucks, Water Trucks	88	25	6	94	-5	**89**	-13	**76**	70	
		Cranes, Compactor	83	25	6	89	-5	**84**	-8	**76**	70	
		Paver	89	25	6	95	-5	**90**	-14	**76**	70	
		Pumps, Generators, Roller	78	25	6	84	-5	**79**	-3	**76**	70	
Zone 8; closest residential receptors on Omega Drive are 25 feet from ROW and 30 feet from edge of work area.	Total duration: 3 months Excavation: 3 weeks Backfill: 2 weeks (Construction to occur weekdays 7 a.m. to 7 p.m., Saturdays 9 a.m. to 6 p.m., occasional Sundays)	Backhoes, Loader	80	30	4	84	-5	**79**	-5	**74**	70	Provision of temporary noise barriers Mitigation Measure M-NO-1b), but if barriers are not feasible or cannot feasibly lower noise levels by 4 dB, then no other feasible mitigation is available.
		Dump Trucks, Water Trucks	88	30	4	92	-5	**87**	-13	**74**	70	
		Cranes, Compactor	83	30	4	87	-5	**82**	-8	**74**	70	
		Paver	89	30	4	93	-5	**88**	-14	**74**	70	
		Pumps, Generators, Roller	78	30	4	82	-5	**77**	-3	**74**	70	
Open-Cut Construction												
Zone 1 (Option B); closest residential receptors on Bradley Street are 20 feet from ROW and 25 feet from edge of work area.	Pipeline construction: ≤ 2 weeks[e] Activities in ROW: > 2 weeks (Construction to occur weekdays 7 a.m. to 7 p.m., Saturdays 9 a.m. to 6 p.m., occasional Sundays)	Backhoes, Loader	80	25	6	86	-5	**81**	-5	**76**	70	Provision of temporary noise barriers (Mitigation Measure M-NO-1b), but if barriers are not feasible or cannot feasibly lower noise levels by 4 dB, then no other feasible mitigation is available.
		Dump Trucks, Water Trucks	88	25	6	94	-5	**89**	-13	**76**	70	
		Cranes, Compactor	83	25	6	89	-5	**84**	-8	**76**	70	
		Paver	89	25	6	95	-5	**90**	-14	**76**	70	
		Pumps, Generators, Roller	78	25	6	84	-5	**79**	-3	**76**	70	
Zones 3 and 5; closest residential receptors on Bradley Street and Mary Beth Court are 175 feet from edge of pipeline trench.	Pipeline construction: ≤ 2 weeks[e] Activities in ROW: > 2 weeks (Construction to occur weekdays 7 a.m. to 7 p.m., Saturdays 9 a.m. to 6 p.m., occasional Sundays)	Backhoes, Loader	80	175	-11	69	-5	**64**	-5	59	70	Additional mitigation not required because construction noise would not exceed 70-dBA criterion with source controls and existing fencing.
		Dump Trucks, Water Trucks	88	175	-11	77	-5	**72**	-13	59	70	
		Cranes, Compactor	83	175	-11	72	-5	**67**	-8	59	70	
		Paver	89	175	-11	78	-5	**73**	-14	59	70	
		Pumps, Generators, Roller	78	175	-11	67	-5	**62**	-3	59	70	
Zone 8; closest residential receptors on Omega Drive are 25 feet from ROW and 30 feet from edge of work area.	Pipeline construction: ≤ 2 weeks[e] Activities in ROW: > 2 weeks (Construction to occur weekdays 7 a.m. to 7 p.m., Saturdays 9 a.m. to 6 p.m., occasional Sundays)	Backhoes, Loader	80	30	4	84	-5	**79**	-5	**74**	70	Provision of temporary noise barriers (Mitigation Measure M-NO-1b), but if barriers are not feasible or cannot feasibly lower noise levels by 4 dB, then no other feasible mitigation is available.
		Dump Trucks, Water Trucks	88	30	4	92	-5	**87**	-13	**74**	70	
		Cranes, Compactor	83	30	4	87	-5	**82**	-8	**74**	70	
		Paver	89	30	4	93	-5	**88**	-14	**74**	70	
		Pumps, Generators, Roller	78	30	4	82	-5	**77**	-3	**74**	70	
Trenchless Construction												
Zone 1 (Option A); closest residential receptors on Bradley Street are 20 feet from ROW and 65 feet from driving pit.	Total duration: 5 months Pit excavation: 1 week Pit shoring: 1 week Backfill: 2 weeks (Weekdays 7 a.m. to 7 p.m., Saturdays 9 a.m. to 6 p.m., occasional Sundays)	Backhoes, Loader	80	65	-2	78	-5	**73**	-5	68	70	Additional mitigation not required because construction noise would not exceed 70-dBA criterion with source controls and existing fencing.
		Dump Trucks, Water Trucks	88	65	-2	86	-5	**81**	-13	68	70	
		Cranes, Compactor	83	65	-2	81	-5	**76**	-8	68	70	
		Paver, Jack & Bore Power Unit[f]	89	65	-2	87	-5	**82**	-14	68	70	
		Pumps, Generators	78	65	-2	76	-5	**71**	-3	68	70	
		Ventilation Fan Intake	67	65	-2	65	-5	60	-3	57	70	
Zone 2 (Options A or B); closest residential receptors on Bradley Street are 250 feet from driving pit.	Total duration: 2 or 2 ½ months Pit excavation: 1 week Pit shoring: 1 week Backfill: 2 weeks (Weekdays 7 a.m. to 7 p.m., Saturdays 9 a.m. to 6 p.m., occasional Sundays)	Backhoes, Loader	80	250	-14	66	-5	61	-5	56	70	Additional mitigation not required because construction noise would not exceed 70-dBA criterion with source controls and existing fencing.
		Dump Trucks, Water Trucks	88	250	-14	74	-5	69	-13	56	70	
		Cranes, Compactor	83	250	-14	69	-5	64	-8	56	70	
		Paver, Jack & Bore Power Unit[f]	89	250	-14	75	-5	70	-14	56	70	
		Pumps, Generators	78	250	-14	64	-5	59	-3	56	70	
		Ventilation Fan Intake	67	250	-14	53	-5	48	-3	45	70	

TABLE 5.6-5 (Continued)
ESTIMATED DAYTIME CONSTRUCTION NOISE LEVELS AT THE CLOSEST SENSITIVE RECEPTORS AND CONSISTENCY WITH SIGNIFICANCE CRITERION

Project and Receptor Location	Construction Duration[a] (Construction Hours)	Maximum Noise Source	Reference Hourly Leq in dBA at 50 feet[b]	Distance to Closest Receptor[c]	Distance Adjustment	Adjusted Leq	Attenuation Due to Existing Fencing	Adjusted Leq	Administrative and Source Control Reductions (Mitigation Measure M-NO-1a)[d]	Mitigated Leq With Mitigation Measure M-NO-1a	Exterior Speech Interference Threshold	Additional Mitigation Required?
Zone 4 (Options A or B); closest residential receptor on Mary Beth Court is 275 feet from driving pit.	Total duration: 2 or 7 ½ months Pit excavation: 1 week Pit shoring: 1 week Backfill: 2 weeks (Weekdays 7 a.m. to 7 p.m., Saturdays 9 a.m. to 6 p.m., occasional Sundays)	Backhoes, Loader	80	275	-15	65	-10	55	-5	50	70	Additional mitigation not required because receptors protected by soundwall and construction noise at receptors would be less than ambient noise levels.
		Dump Trucks, Water Trucks	88	275	-15	73	-10	63	-13	50	70	
		Cranes, Compactor	83	275	-15	68	-10	58	-8	50	70	
		Paver, Jack & Bore Power Unit[f]	89	275	-15	74	-10	64	-14	50	70	
		Pumps, Generators,	78	275	-15	63	-10	53	-3	50	70	
		Ventilation Fan Intake	67	275	-15	52	-10	42	-3	39	70	
Cut-and-Cover Construction												
Zone 6 (pipe installation); closest residential receptor on Mary Beth Court is 200 feet from edge of pipeline trench.	Total duration: 4 months Concrete encasement: 1 week Backfill: 1 week (Weekdays 7 a.m. to 7 p.m., Saturdays 9 a.m. to 6 p.m., occasional Sundays)	Backhoes, Loader	80	200	-12	68	-10	58	-5	53	70	Additional mitigation not required because receptors protected by soundwall and construction noise at receptors would be less than ambient noise levels.
		Dump Trucks, Water Trucks	88	200	-12	76	-10	66	-13	53	70	
		Cranes, Compactor	83	200	-12	71	-10	61	-8	53	70	
		Paver	89	200	-12	77	-10	67	-14	53	70	
		Pumps, Generators, Roller	78	200	-12	66	-10	56	-3	53	70	
Zone 7 (vault and pipe installation); closest residential receptor at the end of Crystalline Drive is 125 feet from edge of articulated vault.	Total duration: 24 months Excavate/remove existing CMP : 2 months Construct vault and install pipe: 10 months Backfill: 2 months (Weekdays 7 a.m. to 7 p.m., Saturdays 9 a.m. to 6 p.m., occasional Sundays)	Backhoes, Loader	80	125	-8	72	-7	65	-5	60	70	Additional mitigation not required because construction noise would not exceed 70-dBA criterion with source controls and existing fencing.
		Dump Trucks, Water Trucks	88	125	-8	80	-7	**73**	-13	60	70	
		Cranes, Compactor	83	125	-8	75	-7	68	-8	60	70	
		Paver	89	125	-8	81	-7	**74**	-14	60	70	
		Pumps, Generators, Roller	78	125	-8	70	-7	63	-3	60	70	
BDPL No. 4 Improvements												
Zone 6 (modify slip-joint vault and encase BDPL No. 4 at Trace B); closest residential receptors on Mary Beth Court are 120 feet from vault and BDPL No. 4.	Total duration: 2 months Remove vault: 1 week New concrete wall: 2 weeks Excavation/concrete/backfill: 3 weeks (Weekdays 7 a.m. to 7 p.m., Saturdays 9 a.m. to 6 p.m., occasional Sundays)	Backhoes, Loader	80	120	-8	72	-10	62	-5	57	70	Additional mitigation not required because receptors are protected by freeway soundwall.
		Dump Trucks, Water Trucks	88	120	-8	80	-10	70	-13	57	70	
		Cranes, Compactor	83	120	-8	75	-10	65	-8	57	70	
		Paver	89	120	-8	81	-10	**71**	-14	57	70	
		Pumps, Generators, Roller	78	120	-8	70	-10	60	-3	57	70	
Zone 8 (Options A or B); closest residential receptors on Omega Drive are 25 feet from ROW and 30 feet from edge of work area.	Total duration: 2 months Pit excavation: 1 week Pit shoring: 1 week Backfill: 2 weeks (Weekdays 7 a.m. to 7 p.m., Saturdays 9 a.m. to 6 p.m., occasional Sundays)	Backhoes, Loader	80	30	4	84	-5	**79**	-5	**74**	70	Provision of temporary noise barriers (Mitigation Measure M-NO-1b), but if barriers are not feasible or cannot feasibly lower noise levels by 4 dB, then no other feasible mitigation is available.
		Dump Trucks, Water Trucks	88	30	4	92	-5	**87**	-13	**74**	70	
		Cranes, Compactor	83	30	4	87	-5	**82**	-8	**74**	70	
		Paver, Jack & Bore Power Unit[f]	89	30	4	93	-5	**88**	-14	**74**	70	
		Pumps, Generators, Roller,	78	30	4	82	-5	**77**	-3	**74**	70	
		Ventilation Fan Intake	67	30	4	71	-5	**66**	-3	**63**	70	
Staging Areas												
Staging Area 4; closest residential receptors on Crystalline Drive are 90 feet from northern margin of Caltrans right-of-way.	Total duration: 27 months (Stockpile activities and deliveries to occur weekdays, 7 a.m. to 7 p.m., Saturdays 9 a.m. to 6 p.m., occasional Sundays)	Backhoes, Loader	80	90	-5	75	0	**75**	-5	70	70	Additional mitigation not required because construction noise would not exceed 70-dBA speech interference criterion with noise controls.
		Dump Trucks, Water Trucks	88	90	-5	83	0	**83**	-13	70	70	
Staging Area 4; closest residential receptor at east end of Crystalline Drive is 30 feet from feet from edge of Caltrans right-of-way.	Total duration: 27 Months (Stockpile activities and deliveries to occur weekdays, 7 a.m. to 7 p.m., Saturdays 9 a.m. to 6 p.m., occasional Sundays)	Backhoes, Loader	80	30	44	84	-5	**79**	-5	**74**	70	Restrict operation of heavy equipment and trucks within 90 feet of residence (Mitigation Measure M-NO-1c).
		Dump Trucks, Water Trucks	88	30	44	92	-5	**87**	-13	**74**	70	

NOTE: Noise levels in **BOLD** exceed the speech interference criterion.

[a] While the total duration for each zone is specified, actual noise-generating construction activities are expected to be intermittent during each phase over the entire construction duration.
[b] Reference noise levels represent noise levels for similar equipment types (without controls) listed in Table 5.6-4 at 50 feet. These estimates assume that one piece of equipment would be operated 100 percent of the time at full throttle at the closest possible distance to the receptor. While unlikely to occur, this worst-case assumption is intended to offset the variable proximity of multiple pieces of equipment operating in the vicinity with various throttle speeds and durations during any given hour.
[c] The distances represent the minimum distance between the receptor and the nearest project area boundary. The distances between a given receptor and multiple equipment noise sources would vary because the ROW is very narrow, limiting the potential for multiple pieces of equipment to simultaneously operate at the same proximity to a receptor.
[d] Source control reductions represent noise level reductions listed in Table 5.6-4 for the noisier equipment types with engine controls. These controls are included in Mitigation Measures M-NO-1a through M-NO-1d and would be required for all project construction activities.
[e] Construction activities associated with pipeline construction would occur adjacent to any given receptor for two weeks or less, but operation of heavy equipment along the entire ROW length in this zone would occur for longer than two weeks.
[f] Jack-and-bore equipment would include two winches and two hydraulic jacks operated at the bottom of the jacking pit, where noise would be shielded by pit walls. Therefore, the primary source of noise associated with jack-and-bore operations would be the power unit operating at the surface, at the top of the pit. Noise generation potential would depend on the size of the motor, and for the purpose of this worst-case analysis is assumed to be larger and louder than the crane that would be used to lift equipment and materials into and out of the pit.

SOURCE: ESA+Orion.

receptors located farther from the construction activities would be subjected to lower noise levels than those indicated in Table 5.6-5.

As indicated in Table 5.6-5, without control measures, noise levels at the nearest residential receptors would exceed the 70-dBA speech interference criterion (by up to 20 dBA) at the nearest adjacent receptors to Zones 1, 3, 5, 7, and 8 and Staging Area 4, depending on the type of equipment and distance to the receptor; this represents a *significant* impact. However, because construction noise levels would be highly variable from day to day, these worst-case noise levels would occur sporadically rather than continuously, and only when construction equipment is operating at full throttle at the indicated minimum distances from sensitive receptors. With implementation of **Mitigation Measure M-NO-1a, Noise Control Plan**, requiring implementation of noise reduction measures as part of a noise control plan, these construction noise impacts could be reduced to a less-than-significant level (below the 70-dBA speech interference criterion) in all zones except Zones 1 and 8 as well as Staging Area 4 (see Table 5.6-5, Mitigated Leq with Controls), and this is due to the close proximity of residential receptors (25 to 30 feet from work areas).

Daytime construction noise associated with all construction activities in Zones 1 and 8 would exceed the 70-dBA speech interference criterion at the nearest residences, even with implementation of the noise controls specified in **Mitigation Measure M-NO-1a, Noise Control Plan**. While the duration of pipeline construction in these zones would generally be two weeks or less adjacent to any given receptor, the entire length of the ROW within these zones would continue to be used by operators of heavy equipment to access other sections of the ROW throughout much of the construction period, which could periodically generate noise levels of over 70 dBA for longer than two weeks in areas adjacent to the ROW. Implementation of **Mitigation Measure M-NO-1b, Temporary Noise Barriers or Enclosures,** which requires the installation of temporary noise barriers or enclosures along the ROW boundary in these zones, could reduce noise levels to a less-than-significant level, but the feasibility of providing such barriers to achieve sufficient noise reductions is uncertain, due to the height and width of barriers and the amount of space necessary to provide adequate noise protection to the residences. Therefore, construction noise impacts are conservatively considered to be significant and unavoidable.

Staging Area 4 would be located along the south side of Crystalline Drive adjacent to a residential neighborhood. Residential receptors would be subjected to noise from earthmoving equipment associated with stockpiling activities (pipe and materials), haul trucks, and materials delivery trucks. As indicated in Table 5.6-5, noise generated by earthmoving equipment and trucks could exceed the 70-dBA speech interference criterion, and this impact would be *significant*. Implementation of **Mitigation Measure M-NO-1a, Noise Control Plan**, requiring implementation of noise reduction measures as part of a noise control plan, would reduce noise levels, but the reduced levels could still exceed the 70-dBA speech interference criterion. Therefore, implementation of **Mitigation Measure M-NO-1c, Setback Restrictions**, requiring a 90-foot setback for material stockpiles as well as equipment and truck operations, would also be necessary to reduce this impact to a less-than-significant level.

Additional parking areas for construction vehicles might be required in the SFPUC ROW in areas south of Zone 1 (south of the South Shutoff Station, approximately 480 feet south of Crawford Street) and north of Zone 8 (north of the North Shutoff Station, beyond Paseo Padre Parkway to Cayuga Way). These areas could be used over the duration of the 27 - month construction period, and adjacent residential receptors could be subjected to noise from parking vehicles. While noise from engines starting and doors closing (similar to noise in a parking lot) could be noticeable at these residences, such noise disturbances would occur primarily while workers are arriving and leaving (7 a.m. and 7 p.m. on weekdays and 9 a.m. and 6 p.m. on Saturdays) and would not significantly alter daytime ambient noise levels due to the short duration of occurrence at the beginning and end of each workday. Nevertheless, this noise would occur adjacent to the backyard of some residences and would cause an annoyance and such potential noise disturbances are considered a *significant* impact. Implementation of **Mitigation Measure M-NO-1a, Noise Control Plan**, which would prohibit worker vehicles from entering these parking areas before 7 a.m. on weekdays and 9 a.m. on Saturdays in accordance with the Fremont Municipal Code, would reduce this impact to a less-than-significant level. It should be noted that some workers may arrive before 7 a.m. on weekdays and 9 a.m. on Saturdays and they would likely park in on-street spaces until parking areas opened; however, the noise associated with cars parking in legal, on-street parking spaces would not be significantly different from any car parking on a public street.

Noise generated in Staging Areas 1, 2, and 3 would include equipment noise (as equipment is moved into and out of these areas) as well as noise from haul and delivery trucks (associated with material deliveries and stockpiling of excavated materials). These staging areas would be located within the freeway interchange vicinity, and noise generated in these areas is not expected to exceed the 70-dBA speech interference criterion due to distance (at least 140 feet from the nearest receptor) or the protection provided by freeway soundwalls. Therefore, impacts related to temporary construction-related noise increases would be *less than significant* for construction activities in Staging Areas 1, 2, and 3.

Nighttime Construction. Based on available sleep interference data, a continuous interior nighttime level of 35 dBA is considered acceptable (U.S. EPA, 1974). Assuming a 25-dBA reduction with windows closed, a continuous exterior nighttime noise level of 60 dBA at receptors would maintain an acceptable interior noise environment of 35 dBA. However, because the noise level would be reduced by only 15 dBA with open windows, an exterior nighttime noise level of 50 dBA would be required to maintain an acceptable interior noise environment of 35 dBA.

Noise measurements collected at the project site (Location 1, where there is no freeway soundwall) indicate that existing nighttime noise levels adjacent to the freeway are higher than the 50-dBA criterion, ranging from 54 to 63 dBA between 10 p.m. and 7 a.m. (the nighttime Leq is 59 dBA). Given the sensitivity of residential receptors to nighttime noise, construction noise levels are considered substantial, and therefore significant if they exceeded the minimum ambient noise level of 54 dBA at any time in the area that is not protected by a freeway soundwall (regardless of time duration), and if they exceeded the Fremont Municipal Code limit of 50 dBA in areas protected by a freeway soundwall (also regardless of time duration) because this could cause sleep disturbance.

Construction activities associated with the installation and removal of the temporary bridges on Mission Boulevard and the two northbound freeway on-ramps are proposed to occur temporarily at night so that traffic is not substantially disrupted on these roadways, and these activities would take place on an estimated 17 nights over approximately 11 months. For this nighttime construction, noise would primarily affect residences located at the ends of Crystalline Drive, Tissiack Court, and Mary Beth Court, each of which have a direct line-of-sight with the construction activities, and the nearest receptors are located 200 feet or less from work areas. Nighttime construction activities could include the operation of heavy equipment such as cranes, a drill rig, backhoes, loaders, dump and water trucks, a paver, pumps, and generators, but would not likely involve the operation of all this equipment. However, to evaluate worst-case conditions, noise levels at these noise-sensitive receptors were estimated for nighttime construction activities (assuming the use of all these types of equipment), as summarized in **Table 5.6-6**. Residential receptors located farther from the construction activities would be subjected to lower noise levels.

As shown in Table 5.6-6, construction noise levels would periodically exceed the minimum nighttime ambient noise levels of 54 dBA where receptors are not protected by a soundwall and the nighttime ordinance limit of 50 dBA where receptors are protected by a soundwall, and could cause sleep disturbance; this represents a *significant* impact. Even with implementation of **Mitigation Measure M-NO-1a, Noise Control Plan,** which requires implementation of noise reduction measures as part of a noise control plan, residential receptors with a direct line-of-sight to the work areas could still experience sleep disturbance because worst-case noise levels associated with construction activities could occasionally exceed existing nighttime ambient noise levels, causing brief but noticeable noise increases.

Because nighttime construction noise levels would exceed the sleep interference criterion (either 50 dBA or 54 dBA at receptors on Crystalline Drive when adjusted for ambient noise levels), impacts related to nighttime construction would be *significant*. Implementation of **Mitigation Measure M-NO-1b, Temporary Noise Barriers or Enclosures,** requiring the construction contractor to erect temporary noise barriers or enclosures if feasible, and **Mitigation Measure M-NO-1d, Nighttime Restrictions on Construction Activities**, requiring the contractor to restrict certain construction activities at night to the maximum extent feasible to reduce nighttime construction noise levels to the adjusted sleep interference criterion, could reduce this impact to a less-than-significant level. However, since some activities would have to be performed at night during the non-peak traffic periods, nighttime construction noise could occasionally exceed this criterion. Therefore, potential nighttime exceedances of the sleep interference criterion, if they occur, would be significant and unavoidable.

In addition, nighttime activities in Staging Areas 1, 2, 3, and 4 could exceed the 50-dBA sleep interference criterion and cause sleep disturbance, a *significant* impact. Implementation of **Mitigation Measure M-NO-1a, Noise Control Plan,** requiring implementation of noise reduction measures as part of a noise control plan, **Mitigation Measure M-NO-1c, Setback Restrictions**, requiring setbacks from residential receptors at Staging Area 4, and **Mitigation Measure M-NO-1d, Nighttime Operational Restrictions**, requiring the contractor to restrict certain construction activities at night to the maximum extent feasible to reduce nighttime construction noise levels to the adjusted sleep interference criterion, could reduce this impact to a less-than-significant level. However, since some activities would have to be performed at night during the non-peak traffic periods, nighttime construction activities in some staging areas could occasionally exceed this criterion. Therefore, potential nighttime exceedances of the sleep interference criterion, if they occur, would be significant and unavoidable.

Backup Alarms. Construction noise would also include noise from equipment backup alarms (including haul trucks), which are required by law to be audible above the surrounding ambient noise level at a distance of 200 feet.[2] The characteristics of the alarm tone mean that backup alarms are often designed to be 10 to 15 dBA higher than the worst-case construction/industrial operating environment. Therefore, backup alarms are typically designed to emit a sound as loud as 85 to 115 dBA, because the construction noise environment at 50 feet behind any piece of moving machinery may be as high as 70 to 90 dBA; this corresponds to a sound level of 73 to 103 dBA at 200 feet and 65 to 95 dBA at 500 feet.

Several new alarm technologies are currently under review by the California Department of Occupational Safety and Health (Cal-OSHA). Alarm devices known as "smart alarms" measure the ambient noise level and adjust their output accordingly, and "broadband alarms" produce what is known as white sound.[3] During construction for the proposed project, noise from backup alarms could cause substantial annoyance, and noise levels associated with these alarms would vary substantially at any given receptor depending on the proximity and orientation to the receptor as well as construction duration and time of day. This annoyance is considered to be a *significant* noise impact. The use of smart alarms or broadband alarms, if Cal-OSHA has approved them at the time of construction and the contractor determines such alarms would not present heightened safety risks, as well as other restrictions specified in **Mitigation Measure M-NO-1a.5** (part of Mitigation Measure M-NO-1a, Noise Control Plan) could reduce this impact to a less-than-significant level. However, it is not known whether these measures can be feasibly implemented. Therefore, this impact is considered to be significant and unavoidable.

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[2] The California Department of Occupational Safety and Health requires backup warning alarms that activate immediately upon reverse movement on all vehicles with a hauling capacity of 2.5 cubic yards or more that are used to haul dirt (8 CCR 1592). The regulations also require safety measures for equipment operating in areas where their backward movement would constitute a hazard to employees working in the area on foot and where the operator's rear vision is obstructed. These safety measures may be audible warning devices, a spotter or flagger directing the operator when backing up, procedures requiring the operator to dismount and circle the vehicle immediately prior to backing up, or prohibiting foot traffic in the area (Wilson Ihrig & Associates, Inc., 2007).

[3] Broadband sound, also known as "white sound," is composed of all frequencies in the audio spectrum. White sound has the unique characteristic that its source can be instantly locatable. Because white sound is multi-frequency, it does not rely on high sound pressure (decibels) to be heard, and competing, single frequencies cannot mask it. As a result, a white sound alarm is equally effective at lower decibels than the outmoded single-frequency alarms.

TABLE 5.6-6
ESTIMATED NIGHTTIME CONSTRUCTION NOISE LEVELS AT THE CLOSEST SENSITIVE RECEPTORS AND CONSISTENCY WITH SIGNIFICANCE CRITERION

Project and Receptor Location	Construction Duration[a] (Construction Hours)	Maximum Noise Source	Reference Hourly Leq in dBA at 50 feet[b]	Distance Between Closest Project and Receptor[c]	Distance Adjustment	Adjusted Leq	Attenuation Due to Existing Fencing	Adjusted Leq	Noise Reduction Measures (Mitigation Measure M-NO-1a[d])	Mitigated Leq With Controls	Minimum Nighttime Ambient	Reduction Needed by Additional Mitigation[e]	Mitigated Leq With Additional Mitigation
Cut-and-Cover Construction													
Zone 6 (Install and remove temporary bridge); closest residential receptor on Mary Beth Court is 200 feet from edge of bridge.	Total duration: 2 months Wall/bridge support: 6 weeks Bridge/support removal: 1-2 weeks (Construction to occur weekday and weekend nights)	Backhoes, Loader	80	200	-12	**68**	-10	**58**	-5	**53**	50	-3	50
		Drill Rig	83	200	-12	**71**	-10	**61**	-8	**53**	50	-3	50
		Dump Trucks, Water Trucks	88	200	-12	**76**	-10	**66**	-13	**53**	50	-3	50
		Cranes, Compactor	83	200	-12	**71**	-10	**61**	-8	**53**	50	-3	50
		Paver	89	200	-12	**77**	-10	**67**	-14	**53**	50	-3	50
		Pumps, Generators, Roller	78	200	-12	**66**	-10	**56**	-3	53	50	-3	50
Zone 7 - Stage 1 (Install temporary paving); closest residential receptors on Crystalline Drive is 125 feet from new on-ramp pavement.	Total duration: 1 month Paving: 1 week (Construction to occur weekday and weekend nights)	Backhoes, Loader	80	125	-8	**72**	-7	**65**	-5	**60**	54	-6	54
		Paver	89	125	-8	**81**	-7	**74**	-14	**60**	54	-6	54
		Dump Trucks, Water Trucks	88	125	-8	**80**	-7	**73**	-13	**60**	54	-6	54
		Roller	78	125	-8	**70**	-7	**63**	-3	**60**	54	-6	54
Zone 7 - Stage 2 (Install temporary bridge on diamond on-ramp); closest residential receptors on Crystalline Drive is 125 feet from edge of bridge.	Total duration: 2 months Wall/bridge support: 6 weeks Install and pave bridge: 1 week (Construction to occur weekday and weekend nights)	Backhoes, Loader	80	125	-8	**72**	-7	**65**	-5	**60**	54	-6	54
		Drill Rig	83	125	-8	**75**	-7	**68**	-8	**60**	54	-6	54
		Dump Trucks, Water Trucks	88	125	-8	**80**	-7	**73**	-13	**60**	54	-6	54
		Cranes, Compactor	83	125	-8	**75**	-7	**68**	-8	**60**	54	-6	54
		Paver	89	125	-8	**81**	-7	**74**	-14	**60**	54	-6	54
		Pumps, Generators, Roller	78	125	-8	**70**	-7	**63**	-3	**60**	54	-6	54
Zone 7 - Stage 3 (Install temporary bridge on westbound Mission Blvd.); closest residential receptors on Crystalline Drive is 160 feet from edge of bridge.	Total duration: 2 months Wall/bridge support: 7 weeks Install and pave bridge: 1 week (Construction to occur weekday and weekend nights)	Backhoes, Loader	80	160	-10	**70**	-7	**63**	-5	**58**	54	-4	54
		Drill Rig	83	160	-10	**73**	-7	**66**	-8	**58**	54	-4	54
		Dump Trucks, Water Trucks	88	160	-10	**78**	-7	**71**	-13	**58**	54	-4	54
		Cranes, Compactor	83	160	-10	**73**	-7	**66**	-8	**58**	54	-4	54
		Paver	89	160	-10	**79**	-7	**72**	-14	**58**	54	-4	54
		Pumps, Generators, Roller	78	160	-10	**68**	-7	**61**	-3	**58**	54	-4	54
Zone 7 - Stage 4 (Install temporary bridge on eastbound Mission Blvd.); closest residential receptors on Mary Beth Court is 180 feet from edge of bridge.	Total duration: 2 months Wall/bridge support: 7 weeks Install and pave bridge: 1 week (Construction to occur weekday and weekend nights)	Backhoes, Loader	80	180	-11	**69**	-10	**59**	-5	**54**	50	-4	50
		Drill Rig	83	180	-11	**72**	-10	**62**	-8	**54**	50	-4	50
		Dump Trucks, Water Trucks	88	180	-11	**77**	-10	**67**	-13	**54**	50	-4	50
		Cranes, Compactor	83	180	-11	**72**	-10	**62**	-8	**54**	50	-4	50
		Paver	89	180	-11	**78**	-10	**68**	-14	**54**	50	-4	50
		Pumps, Generators, Roller	78	180	-11	**67**	-10	**57**	-3	**54**	50	-4	50
Zone 7 - Stage 5 (Install temporary bridge on Mission Blvd.); closest residential receptors on Mary Beth Court is 160 feet from edge of bridge.	Total duration: 2 months Wall/bridge support: 7 weeks Install and pave bridge: 1 week (Construction to occur weekday and weekend nights)	Backhoes, Loader	80	160	-10	**70**	-10	**60**	-5	**55**	50	-5	50
		Drill Rig	83	160	-10	**73**	-10	**63**	-8	**55**	50	-5	50
		Dump Trucks, Water Trucks	88	160	-10	**78**	-10	**68**	-13	**55**	50	-5	50
		Cranes, Compactor	83	160	-10	**73**	-10	**63**	-8	**55**	50	-5	50
		Paver	89	160	-10	**79**	-10	**69**	-14	**55**	50	-5	50
		Pumps, Generators, Roller	78	160	-10	**68**	-10	**58**	-3	**55**	50	-5	50
Zone 7 - Stage 6 (Remove temporary bridges); closest residential receptors on Crystalline Drive is 125 feet from edge of bridge.	Total duration: 2 months Bridge/support removal: 4 weeks Reconstruct pavement and reroute traffic: 4 weeks (Construction to occur weekday and weekend nights)	Backhoes, Loader	80	125	-8	**72**	-7	**65**	-5	**60**	54	-6	54
		Drill Rig	83	125	-8	**75**	-7	**68**	-8	**60**	54	-6	54
		Dump Trucks, Water Trucks	88	125	-8	**80**	-7	**73**	-13	**60**	54	-6	54
		Cranes, Compactor	83	125	-8	**75**	-7	**68**	-8	**60**	54	-6	54
		Paver	89	125	-8	**81**	-7	**74**	-14	**60**	54	-6	54
		Pumps, Generators, Roller	78	125	-8	**70**	-7	**63**	-3	**60**	54	-6	54

NOTE: Noise levels in **BOLD** exceed either the sleep interference criterion or minimum ambient noise level.

[a] While the total duration for each zone is specified, actual noise-generating construction activities are expected to be intermittent during each phase of construction.
[b] Reference noise levels represent noise levels for similar equipment types (without controls) listed in Table 5.6-4 at 50 feet. These estimates assume that one piece of equipment would be operated 100 percent of the time at full throttle at the closest possible distance to the receptor. While unlikely, this worst-case assumption is intended to offset the variable proximity of multiple pieces of equipment operating in the vicinity with various throttle speeds and durations during any given hour.
[c] The distances represent the minimum distance between the receptor and the nearest project area boundary. The distances between a given receptor and multiple equipment noise sources would vary because the ROW is very narrow, limiting the potential for multiple pieces of equipment to operate simultaneously at the same proximity to a receptor.
[d] Source control reductions represent noise level reductions listed in Table 5.6-5 for the noisier equipment types with engine controls. These controls are included in Mitigation Measures M-NO-1a through M-NO-1d and would be required for all construction activities.
[e] Additional noise reductions could involve a combination of temporary barriers, enclosures, and limitations on certain construction activities (see Mitigation Measures M-NO-1b and M-NO-1d.

SOURCE: ESA+Orion

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Impact NO-2: Consistency with Fremont Municipal Code hourly limits for construction activities.

The Fremont Municipal Code specifies the following time limits for construction activities: 7 a.m. to 7 p.m. on weekdays; 9 a.m. to 6 p.m. on Saturdays; and prohibited on Sundays. All but one stage of project construction (installation and removal of the temporary bridges) is proposed to occur on weekdays between 7 a.m. and 7 p.m. and on Saturdays between 9 a.m. and 6 p.m., which would be consistent with these time limits. However, limited construction also could occur on Sundays. At least some of the construction activities associated with installation and removal of the temporary bridges would occur at night, between 10 p.m. and 6 a.m. on weekday and Sunday evenings and between 10 p.m. and 7 a.m. on Saturdays, to avoid traffic disruption on the I-680 on-ramps and Mission Boulevard. Because this construction activity would occur outside of the time limits of the Fremont Municipal Code, impacts related to consistency with Fremont Municipal Code time limits would be *significant and unavoidable*.

Impact NO-3: Temporary noise disturbance along construction haul routes and detour routes due to road closures.

Haul and delivery trucks. Truck noise levels depend on vehicle speed, load, terrain, and other factors. The effects of construction-related truck traffic would depend on the level of background noise already occurring at a particular receptor site. In quiet noise environments such as residential neighborhoods protected by freeway soundwalls (Leq averaging 50 dBA), one truck per hour would be noticeable, even though such a low volume would not measurably increase noise levels. In slightly noisier environments such as the freeway interchange vicinity in front of soundwalls (Leq averaging 60 dBA), the threshold level is higher, and 10 trucks per hour would be required to noticeably increase the noise exposure. In moderately noisy environments (Leq averaging 70 dBA), a noise increase would be perceptible with the addition of 100 trucks per hour (Caltrans, 1998).

In quiet environments or during quieter times of the day, truck noise is mainly a single-event disturbance because, although the hourly average noise level associated with short single events is not very high, individual noise peaks of 80 to 85 dBA at 50 feet are common during a truck passage. However, in noisy environments or during less noise-sensitive hours, truck noise is perceived as part of the total noise environment rather than as an individual disturbance. Therefore, noise levels associated with hourly haul truck volumes (rather than a single passing truck) are estimated below.

Haul and delivery truck volumes associated with the proposed project would vary from day to day, with the highest volumes generally occurring during the excavation, concrete placement, and backfilling stages of construction. When haul and delivery truck noise is considered on an hourly basis rather than as a single noise event, noise levels generated by an average of 126 off-site haul truck trips per day (highest volume week), or 16 trucks per hour when averaged over eight hours per day, would generate noise levels of 62 dBA (Leq) at 50 feet from the road centerline when trucks are operating along local streets to access the site from the freeway. Such a noise level would generally not exceed daytime ambient noise levels in the interchange vicinity (measured at about 63 dBA (Leq). However, it would increase daytime ambient noise levels on residential streets providing access to the project site (ranging from 56 to 60 dBA, Leq) by up to 8 dB (up to 65 dBA, Leq) as well as exceed nighttime ambient noise levels (a minimum of 54 dBA and average of 59 dBA, Leq) by up to 10 dB (64 dBA, Leq) if all 126 truck trips per day occurred on the same route. Although truck traffic noise levels would not exceed the daytime 70-dBA speech interference threshold, they would exceed the nighttime 50-dBA sleep interference threshold and would be more than 5dB above ambient noise levels. Therefore, noise impacts associated with off-site haul and truck traffic would be *significant* because noise from these trucks could substantially increase noise levels above existing ambient noise levels, and could exceed the 50-dBA sleep interference threshold if truck traffic occurred in the evening.

On-site Trucks would operate along the BDPL Nos. 3 and 4 ROW as well as between the ROW and staging areas. Because three of the four staging areas would be located within the interchange, onsite trucks (up to 82 trips per day based on the highest volume week) would generate noise levels of 60 dBA (Leq) when traveling between work zones and staging areas, which would be lower than existing ambient noise levels in the freeway vicinity, and therefore less than significant. However, trucks accessing Staging Area 4 would travel along one of two routes: (1) BDPL Nos. 3 and 4 ROW to Nugget Way, Omega Drive, and Crystalline Drive; or (2) BDPL Nos. 3 and 4 ROW along a temporary road paralleling the northbound diamond on-ramp to Staging Area 4. Residences along the route through the neighborhood are located as close as 40 to 50 feet from the centerline of the truck route. Based on the peak-week estimate of 82 onsite trucks per day, or 10 trucks per hour, onsite trucks could generate noise levels of approximately 60 dBA (Leq) along this access route, which would exceed daytime ambient noise levels along these streets (measured at 57 dBA, Leq at the south end of Crystalline Drive). Each passing truck could be noticeable to residential receptors along the route as a single-event noise (individual noise peak of 80 to 85 dBA), and receptors would also be subject to an increase of 5-dB above ambient noise levels (approximately 62 dBA, Leq[4]), which would be a *significant* impact. If off-site haul and delivery trucks use this same route and overlap with staging area-related on-site truck traffic, ambient noise levels could increase by up to 3 dBA more (65 dBA, Leq).

Noise increases from on-site truck traffic would also be noticeable along the second possible route to Staging Area 4 that includes a temporary road paralleling the northbound diamond on-ramp to Staging Area 4. Along this route, trucks could travel as close as 30 feet from the residence at the end of Crystalline Drive, and this closer proximity of trucks would result in noise increases that are approximately 3 dB higher (63 dBA, Leq) than noise increases that would occur using the first route (Nugget Way, Omega Drive, and Crystalline Drive). When combined with existing daytime ambient noise level of 57 dBA (Leq) measured at the end of Crystalline Drive, use of this

[4] When the estimated increase in truck-related noise of 60 dBA (Leq) is added to the ambient noise level of 57 dBA (Leq), the resulting combined noise level would be 62 dBA (Leq), which represents a 5 dB increase over the existing ambient noise level of 57 dBA (Leq).

route would result in noise levels of approximately 64 dBA (Leq)[5] at this residence, and this would represent an increase of 7 dB above ambient noise levels. Although this second route would subject substantially fewer homes to haul truck noise than the first routes and truck traffic noise levels would not exceed the daytime 70-dBA speech interference threshold, the increase of 7dB above ambient noise levels (approximately 64 dBA, Leq) would be a *significant* impact. If off-site haul and delivery trucks use this same route and overlap with staging area-related on-site truck traffic, ambient noise levels could increase by up to 3 dBA more (67 dBA, Leq).

The SFPUC would implement **Mitigation Measure M-NO-3, Haul and Delivery Truck Operation Limits**, which requires time restrictions on haul and delivery trucks to the maximum extent possible and recommends that the access road be located as far from nearby residences as possible to reduce noise levels at the residence at the end of Crystalline Drive. However, noise levels from haul and delivery truck traffic could be substantially above ambient noise levels on residential streets during the day and the feasibility of locating the second access route further from residences is uncertain because it depends on approval by CalTrans. Therefore, impacts related to noise increases from haul and delivery trucks along both routes would be significant and unavoidable. However, it should be noted that the above noise levels represent traffic noise during the peak week of construction when the most construction activities would be taking place at one time, and would not occur over the entire 27-month construction period. In addition, the noise levels are conservatively estimated assuming that all off-site and on-site haul trucks would use the residential streets or second access route in the northern project area. It is likely that much of the off-site haul and delivery traffic could actually access the project area via access points in Staging Areas 1 and 3 (see Figure 3.9 in Chapter 3, Project Description).

Impacts Related to Nighttime Deliveries. As discussed in Chapter 3, Project Description, nighttime construction would be required approximately 17 times in 11 months to install and remove the temporary bridges on the I-680 northbound on-ramps and Mission Boulevard. This nighttime construction would be necessary to avoid major traffic disruptions on the affected roadways during installation and removal of the temporary bridges. However, noise from nighttime deliveries (particularly if Staging Are 4 is used) would exceed the nighttime 50-dBA sleep interference threshold or the 54-dBA nighttime threshold in the vicinity of the Crystalline Drive residence. Therefore, noise increases associated with haul and delivery trucks accessing the site along residential streets or along a temporary road paralleling the northbound diamond on-ramp to Staging Area 4 during nighttime hours would be *significant*. Implementation of **Mitigation Measure M-NO-3, Haul and Delivery Truck Operation Limits**, which requires time restrictions to the maximum extent possible, would reduce potential noise impacts from haul and delivery truck operations to Staging Area 4, but not necessarily to a less-than-significant level, since nighttime truck deliveries would be necessary. Therefore, nighttime noise impacts along the truck route to Staging Area 4 would be significant and unavoidable.

5 When the estimated increase in truck-related noise of 63 dBA (Leq) is added is added to the ambient noise level of 57 dBA (Leq), the resulting combined noise level would be 64 dBA (Leq), which represents a 7 dB increase over the existing ambient noise level of 57 dBA (Leq).

Traffic Detour. The proposed temporary bridges on the two northbound freeway on-ramps would be installed and removed at night to avoid substantial traffic disruption on these roadways, and could involve temporary closure of the on-ramps (approximately four times for each on-ramp over approximately 11 months). As part of these road closures, traffic would be diverted to Warm Springs Boulevard and the Durham Road – Auto Mall Parkway interchange to the north. Land uses along the detour route (Mission Boulevard to Warm Springs Road to Auto Mall Parkway) are predominantly industrial, with some commercial uses. Diversion of nighttime traffic to this route is not expected to cause any significant noise increases at noise-sensitive receptors. Therefore, impacts related to changes in the noise environment due to the proposed traffic diversion associated with the temporary closure of the two northbound freeway ramps would be *less than significant*.

Full closure of Mission Boulevard at I-680 would be required during the nighttime hours for a total of nine nights over 11-months. Such closure would divert westbound traffic from Mission Boulevard to Durham Road – Auto Mall Parkway (north of the site) and Warm Springs Boulevard. Eastbound traffic would be diverted to Paseo Padre Parkway (just north of the site) then to Durham Road – Auto Mall Parkway (north of the site) and Warm Springs Boulevard, and some traffic could also be diverted onto other local roadways such as South Grimmer Boulevard. Since land uses along Auto Mall Parkway and Warm Springs Boulevard are predominantly industrial with some commercial uses, no significant noise impacts on these streets would result from the proposed traffic detours. However, there are residential uses along Durham Road (east of I-680) and Paseo Padre Parkway located as close as 50 feet from the centerlines of these roadways. Based on the traffic volumes presented in Section 5.5, Transportation and Circulation, the proposed temporary diversion of Mission Boulevard traffic onto these roadways could result in noise increases of 7 to 9 dBA on Durham Road during the hours of 11 p.m. to 5 a.m. On Paseo Padre Parkway, traffic noise increases would be 5 to 8 dBA at 11 p.m., with no change at 5 a.m. If some traffic is diverted onto other streets such as South Grimmer Boulevard, noise increases could also be noticeable to adjacent residents, depending on the extent of the resulting noise increases.

Based on existing traffic volumes on these streets and project-related traffic increases, nighttime noise levels would range from 58 dBA to 66 dBA (Leq) at 50 feet from the Durham Road centerline and from 41 dBA to 55 dBA (Leq) at 50 feet from the Paseo Padre Parkway centerline. Such noise levels would result in interior noise environments of up to 41 dBA (Leq) at 50 feet on Durham Road (west of Paseo Padre Parkway) and 30 dBA (Leq) at 50 feet on Paseo Padre Parkway (with the windows closed). As indicated above in Section 5.6.3.2, Approach to Analysis, available sleep criteria data indicate that an interior nighttime level of 35 dBA is considered acceptable. Therefore, incremental increases could cause sleep interference effects along Durham Road even with the windows closed. However, noise levels along Paseo Padre Parkway are not expected to exceed the 35-dBA interior sleep interference threshold (with windows closed). Although these increases would be temporary and short term in nature (occurring for one night at a time, and only nine times over 11 months during installation and removal of temporary bridges on Mission Boulevard), noise increases along Durham Road are considered significant, given the residential nature of this street and quiet nighttime noise environment. Since all possible detour routes would affect residential uses, there are no feasible alternative routes that would reduce this impact to a less-than-significant level. Therefore, temporary noise increases at residences located along detour routes and other affected streets during the nighttime hours would result in a *significant and unavoidable* noise impact.

Impact NO-4: Disturbance due to construction-related vibration.

Construction of the proposed project could cause vibration that could disturb local residents and cause cosmetic damage to buildings and structures. The second significance criterion above identifies "excessive groundborne vibration" as a significant impact.

In general, cosmetic or threshold damage to residential buildings can occur with transient vibrations over 0.5 in/sec PPV.[6] The American Association of State Highway and Transportation Officials guidelines include a discussion regarding the potential fatigue and damage caused by sources of continuous vibration, such as vibratory compactors and vibratory pile drivers, and indicate that such vibration could be limited to a level of 0.4 in/sec PPV to avoid threshold damage in most buildings. It is important to be aware that vibratory pile drivers could be operated at frequencies near "building resonance" (10 to 50 Hz), thus increasing the potential for cosmetic damage. Based on this information, Wilson Ihrig & Associates recommends that vibratory methods operating at frequencies near building resonance (10 to 50 Hz) be limited for activities within 200 feet of buildings, irrespective of the anticipated vibration amplitude (WIA, 2009).

While no known historic structures are located in the project vicinity, if present, the vibration sensitivity depends on several factors, including construction type and quality, local geologic and soil conditions, and historical context. Older buildings and monuments with a demonstrated historical significance can be sensitive to the slightest cosmetic damage, while other buildings serve a historical purpose but do not warrant preservation techniques. For the purpose of this evaluation, it is assumed that historic structures, if any exist in the project area, are either non-reinforced masonry structures or non-engineered timber structures with plaster (FTA, 2006, Category III), which could be subject to an impact criterion of 0.2 in/sec (WIA, 2009).

Much lower vibration levels (exceeding 0.012 in/sec PPV) can cause disturbance or annoyance, and this threshold is typically applied to construction activities during the more sensitive nighttime hours. Exceedance of this annoyance threshold at night could result in sleep disturbance, depending on proximity to the receptor.

Based on these criteria, the following significance thresholds were applied in this analysis:

- Transient vibration sources: 0.5 in/sec PPV

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6 Transient sources, such as blasting or drop balls, create a single isolated vibration event. Continuous/frequent intermittent sources include impact pile drivers, pogo-stick compactors, crack-and-seat equipment, vibratory pile drivers, and vibratory compaction equipment.

- Continuous or intermittent vibration sources (vibratory compactors and vibratory pile drivers): 0.4 in/sec PPV for new construction
- Continuous or intermittent vibration sources (vibratory compactors and vibratory pile drivers): 0.3 in/ sec PPV at older residential structures (Caltrans, 2004)
- Equipment operated in proximity to non-engineered buildings of historical importance: 0.2 in/sec PPV
- Activities causing annoyance (pertains to nighttime construction only): 0.012 in/sec PPV

Table 5.6-7 presents vibration levels that could be expected at distances of 25, 50, and 100 feet from the vibration equipment that would be used for project construction, assuming typical construction activities and normal propagation conditions.

TABLE 5.6-7
VIBRATION LEVELS FOR CONSTRUCTION EQUIPMENT AT 25, 50, AND 100 FEET

	Peak Particle Velocity		
Equipment[a]	**25 Feet (in/sec)**	**50 Feet (in/sec)**	**100 Feet (in/sec)**
Large Bulldozer	0.089	0.031	0.011
Loaded Trucks	0.076	0.027	0.010
Jackhammer	0.035	0.012	0.004
Small Bulldozer	0.003	0.001	0.000
Vibratory Roller	0.210	0.074	0.026

NOTE: Vibration propagation characteristics depend on a number of factors, including the type and condition of geologic materials, depth of construction, and type of construction equipment and activity.

[a] Vibration levels for construction equipment at 25 feet are based on measured data near various types of equipment and assume normal propagation conditions. The following propagation adjustment was applied to estimate vibration levels at 50 and 100 feet:

$PPV_{equip} = PPV_{ref} \times (25/D)^{1.5}$

where:

PPV (equip) is the peak particle velocity in in/sec of the equipment adjusted for distance
PPV (ref) is the reference vibration levels in in/sec at 25 feet as listed above
D is the distance from the equipment to the receiver

SOURCE: U.S. Department of Transportation, Federal Transit Administration, 2006.

The Federal Transit Administration measurement data presented in Table 5.6-7 demonstrate that vibration levels generated by most heavy construction equipment are not expected to exceed the 0.4 in/sec PPV threshold for new construction and the 0.3 in/sec PPV threshold for older residential structures for continuous vibration at a distances of 25 feet or more. However, the threshold vibration level of 0.4 in/sec PPV for new construction and the 0.3 in/sec PPV threshold for older residential structures could be exceeded if vibratory equipment, such as large vibratory rollers/compactors, were operated closer than 25 feet from structures. In addition, the threshold vibration level of 0.2 in/sec PPV for historic structures (if present in the project vicinity) could be exceeded if vibratory equipment were operated within distances of 25 feet. If construction-related vibration levels exceeded these thresholds at adjacent structures, cosmetic damage to residential buildings could occur, resulting in a *significant* impact. Implementation of **Mitigation Measures**

M-NO-4a, Vibration Limits, and **M-NO-4b, Preconstruction Building Crack Survey**, would limit vibration levels associated with equipment operations and address any adverse vibration effects on existing homes, thus reducing this impact to a less-than-significant level.

For any nighttime construction activities, it is more appropriate to apply the annoyance threshold of 0.012 in/sec PPV. Table 5.6-7 indicates that nighttime operation of most equipment, including loaded trucks, large bulldozers, and large vibratory rollers/compactors, would exceed the annoyance threshold in areas within 50 feet. In addition, operation of vibratory equipment, such as large vibratory rollers/compactors, could result in vibration levels in excess of this nighttime annoyance threshold within at least 500 feet. Therefore, impacts related to disturbances from construction-related vibration during the night would be *significant*. Implementation of **Mitigation Measure M-NO-4a, Vibration Limits,** limiting vibration levels associated with nighttime operation of heavy equipment to the maximum extent feasible, would reduce this impact but not necessarily to a less-than-significant level because it does not guarantee that nighttime vibration limits would not be exceeded. Although this exceedance would only potentially occur on 17 nights during the 11 months required for temporary bridge installation and removal on Mission Boulevard and the I-680 on-ramps, the potential nighttime vibration impact is considered significant and unavoidable.

Facility Siting, Operation, and Maintenance Impacts

Following completion of proposed improvements to BDPL No. 3 and 4, pipeline operations would be consistent with existing operations, and pipeline maintenance would occur as needed. While project facilities would be monitored regularly in accordance with the standard inspection schedule, the frequency of monitoring or maintenance activities would not change substantially from current conditions. Therefore, the project would not result in any noise impacts as a result of facility siting, operation, or maintenance.

5.6.4 Mitigation Measures

Mitigation Measure M-NO-1a: Noise Control Plan.

The SFPUC will ensure that construction contract specifications require the contractor to submit a noise control plan for construction activities throughout the project area (prepared by a qualified noise consultant) to the SFPUC for review and approval at least 28 days before construction begins. The SFPUC will require the qualified noise consultant to be a board-certified Institute of Noise Control Engineering member or other qualified consultant or engineer approved by the SFPUC Project Construction Manager. The SFPUC will verify that the noise control plan contains at least the following elements:

1. Best available noise control techniques (including mufflers, intake silencers, ducts, engine enclosures, and acoustically attenuating shields or shrouds) will be used for all equipment and trucks to minimize construction noise impacts.

2. If impact equipment (e.g., jack hammers, pavement breakers, rock drills) is used during project construction, hydraulic- or electric-powered equipment will be used wherever feasible to avoid the noise associated with compressed-air exhaust from pneumatic-powered tools. However, where use of pneumatic-powered tools is unavoidable, an exhaust muffler will be used on the compressed-air exhaust (a muffler can lower noise levels from the exhaust by up to about 10 dBA). External jackets will be used on the tools themselves, where feasible, to achieve a reduction of 5 dBA. Quieter procedures, such as drilling rather than impact equipment, will be used whenever feasible.

3. Pile holes will be predrilled (instead of driven) to reduce potential noise and vibration impacts.

4. Access to designated worker vehicle parking areas on the SFPUC ROW will be restricted so that no vehicles enter or leave designated off-street parking areas before or after the hours specified by the Fremont Municipal Code (7 a.m. to 7 p.m. on weekdays; 9 a.m. to 6 p.m. on Saturdays; prohibited on Sundays).

5. To minimize noise impacts associated with backup alarms: (1) smart or broadband alarms will be utilized where feasible, if they have been approved by Cal-OSHA at the time of construction and the contractor determines that they would not present a heightened safety risk; (2) haul and delivery routes as well as stockpile locations will be configured in all staging areas where possible to minimize the use of backup alarms;[7] and (3) operation of equipment requiring the use of backup beepers will be avoided near sensitive receptors to the extent feasible, particularly during nighttime hours (10 p.m. to 7 a.m.).

6. Stationary noise sources will be located as far from buildings occupied by sensitive receptors as feasible to maintain noise levels from these sources at or below the 70-dBA outdoor speech interference criterion, the 50-dBA or 54-dBA outdoor sleep interference criteria (adjusted for ambient noise levels, if equipment would operate at night). Measures that could achieve this include providing adequate muffling and/or acoustically lined enclosures and facing enclosure openings or venting away from sensitive receptors.

7. A designated project liaison will be responsible for responding to noise complaints during construction. The name and phone number of the liaison will be conspicuously posted at construction areas and on all advanced notifications. This person will take steps to resolve complaints, including periodic noise monitoring if necessary. Results of the noise monitoring will be presented at regular project meetings with the project contractor, and the liaison will coordinate with the contractor to modify, to the extent feasible, any construction activities that generate excessive noise levels.

8. A reporting program will be required that documents complaints received, corrective actions taken to resolve problems, and the effectiveness of these actions.

7 For example, the route for delivery trucks entering and leaving the site should be designed so that trucks drive through the staging area without having to back up and turn around.

Mitigation Measure M-NO-1b: Temporary Noise Barriers or Enclosures.

The noise control plan will specify that wherever necessary and feasible, temporary noise barriers or enclosures will be erected in Zones 1 and 8 to maintain construction noise levels at or below the 70-dBA daytime speech interference criterion and 50-dBA or 54-dBA nighttime sleep interference criteria (adjusted for ambient noise levels) to the maximum extent feasible.

Mitigation Measure M-NO-1c: Setback Restrictions.

The noise control plan will specify that material stockpiles as well as equipment and truck operations in Staging Area 4 will be located at least 90 feet from all residential receptors on Crystalline Drive. In addition, haul and delivery routes as well as stockpile locations will be configured in all staging areas to minimize the use of backup alarms.

Mitigation Measure M-NO-1d: Nighttime Restrictions on Construction Activities.

The noise control plan will specify that construction activities (such as equipment and truck operations associated with pipeline connections and temporary bridges on Mission Boulevard and the I-680 on-ramps) are to be prohibited in the staging and work areas at night (10 pm to 7 a.m.) to the maximum extent possible to meet the 50-dBA or 54-dBA nighttime sleep interference criteria (adjusted for ambient noise levels). If possible, pipeline construction activities will be conducted during the daytime hours only.

Mitigation Measure M-NO-3: Haul and Delivery Truck Operation Limits.

Except during the times (approximately 17 nights over 11 months) that nighttime construction is required for the construction or removal of the temporary bridges on Mission Boulevard and the I-680 on-ramps, the contractor will limit haul and delivery truck operations in all areas to the daytime hours specified in the Fremont Municipal Code (7 a.m. to 7 p.m. on weekdays; 9 a.m. to 6 p.m. on Saturdays; and prohibited on Sundays) to the maximum extent feasible. In addition, the access road to Staging Area 4 should be located so that it affects the fewest number of residences as possible (e.g., if possible, the access road should be extended from the northbound diamond on-ramp to Staging Area 4), and is as far away as possible from the home at the end of Crystalline Drive to minimize truck-related noise impacts.

Mitigation Measure M-NO-4a: Vibration Limits.

As part of the contract specifications, the contractor will provide advanced information regarding construction methods for incorporation into the noise control plan (required under Measure M-NO-1a) to ensure that construction complies with the vibration specifications at any affected building: 0.5 in/sec PPV for transient vibration sources; 0.4 in/sec PPV for continuous sources (e.g., vibratory compacting or sheetpiling) at new construction and 0.3 in/sec PPV for older residential structures; and 0.2 in/sec PPV for non-engineered buildings of historic importance. Nighttime construction activities (10 p.m. to 7 a.m.) will not exceed the vibration performance standard of 0.012 in/sec PPV at any affected building to the maximum extent feasible.

Mitigation Measure M-NO-4b: Preconstruction Building Crack Survey.

With the prior authorization of the property owner, the contractor will conduct a preconstruction building crack survey at all potentially affected residences or similar structures within 100 feet of activities where vibratory equipment will be operated.

5.6.5 References

California Department of Transportation (Caltrans), *Technical Noise Supplement, a Technical Supplement to the Traffic Noise Analysis Protocol*, Available online at http://www.dot.ca.gov/hq/env/noise/pub/Technical%20Noise%20Supplement.pdf. October 1998.

California Department of Transportation, *Transportation and Construction-Induced Vibration Guidance Manual*, prepared by Jones & Stokes, June 2004.

City of Fremont, *General Plan*, 1991, as amended through February 10, 1996.

ESA+Orion, *SFPUC Seismic Upgrade of BDPL Nos. 3 and 4 at Hayward Fault Project (CS-834B13), Environmental Technical Memorandum – Noise*. February 5, 2009.

U.S. Department of Housing and Urban Development, Office of Community Planning and Development, *The Noise Guidebook*. Available online at www.hud.gov/offices/cpd/energyenviron/environment/resources/guidebooks/noise/index.cfm. 1985.

U.S. Department of Transportation, Federal Transit Administration (FTA), "Transit Noise and Vibration Impact Assessment." DTA-VA-90-1003-06. Available online at www.fta.dot.gov/documents/FTA_Noise_and_Vibration_Manual.pdf. May 2006.

U.S. Environmental Protection Agency (U.S. EPA), *Noise from Construction Equipment and Operations, Building Equipment, and Home Appliances*, December 1971.

U.S. Environmental Protection Agency (U.S. EPA), *Information on Levels of Environmental Noise Requisite to Protect Public Health and Welfare with an Adequate Margin of Safety (Condensed Version)*, Washington D.C. (EPA/ONAC 550/9-74-004), 1974.

Wilson Ihrig & Associates, Inc. (WIA), *Final Technical Memo, Crystal Springs Pipeline No. 2, Noise and Vibration Study, Impacts and Mitigation*, September 24, 2009.

Wilson Ihrig & Associates, Inc. (WIA), *San Francisco Public Utilities Commission, New Crystal Springs Bypass Tunnel Focused Environmental Impact Review, Noise and Vibration Study, Final Technical Report*, July 23, 2007.

5.7 Air Quality

This section addresses the air quality impacts that would result from implementation of the proposed project, including potential increases in criteria air pollutants and greenhouse gases. Mitigation measures to reduce the severity of significant impacts are identified. The principal air emissions would be short-term, as they would occur during the construction phase of this pipeline project. Construction-related air emissions were evaluated in accordance with the Bay Area Air Quality Management District (BAAQMD) California Environmental Quality Act (CEQA) Guidelines for assessing and mitigating air quality impacts (BAAQMD, 1999), as well as proposed new guidelines scheduled to be adopted in early 2010 (BAAQMD, 2009b). Post-construction pipeline operations would remain essentially unchanged; therefore, emissions associated with operation and maintenance of Bay Division Pipelines (BDPL) Nos. 3 and 4 are discussed qualitatively.

5.7.1 Setting

5.7.1.1 Meteorology

On an annual basis, temperatures in Fremont average 60 degrees Fahrenheit, with summer highs in the upper 70s and winter lows in the low 40s. August and September are the warmest months, and December and January are the coldest. January and February are the wettest months with an average of 3.4 inches of rain each month; July and August average 0.1 inch of rain per month or less. Although Fremont averages 18 inches of rainfall annually, precipitation varies markedly from year to year. Thus, the rainfall total in one month of a heavy-precipitation year may exceed that of an entire annual total during a drought.

Winds are an important element in characterizing the air quality setting of any project. Wind controls both the microscale dispersion of any locally generated air emissions and their regional trajectory. Winds during warmer months are typically out of the northwest, averaging nearly 10 miles per hour. During the day, localized emissions are readily carried in a southeastward direction up against the East Bay hills. At night, emissions are less readily ventilated and travel in more random directions. During the day, there is usually little potential for large-scale stagnation. However, winds at night are often less than 2 to 3 miles per hour. Local radiation temperature inversions during the night (when the ground is cooler than the air) can combine with these light winds to create localized air stagnation near major air pollution emissions sources (e.g., freeways).

5.7.1.2 Ambient Air Quality

The project area is located within the San Francisco Bay Area Air Basin (SFBAAB). Within the SFBAAB, the BAAQMD operates a regional monitoring network that measures the ambient concentrations of six criteria air pollutants[1]: ozone, carbon monoxide (CO), particulate matter (PM_{10} and $PM_{2.5}$), nitrogen dioxide (NO_2), and sulfur dioxide (SO_2). Existing and probable future

[1] Criteria air pollutants are commonly occurring air pollutants known to be deleterious to human health and for which extensive health-effects criteria documents are available.

air quality in the project area can generally be inferred from examining ambient air quality measurements taken by the BAAQMD at its Fremont monitoring station over the past several years. **Table 5.7-1** is a five-year summary of monitoring data (2004 - 2008) from this station. Table 5.7-1 compares measured pollutant concentrations against the most stringent applicable ambient air quality standards (both state and federal standards are described in Section 5.7.2, Regulatory Framework). Sulfur dioxide is not included in Table 5.7-1 because this pollutant is not monitored at the Fremont monitoring station.

TABLE 5.7-1
FREMONT AMBIENT AIR QUALITY MONITORING SUMMARY (2004–2008)

Pollutant	Most Stringent Applicable Standard	Number of Days Standards were Exceeded and Maximum Concentrations Measured				
		2004	2005	2006	2007	2008
Ozone						
Maximum 1-hour concentration (ppm)		0.09	0.105	0.102	0.079	0.112
Days 1-hour standard exceeded	>0.09 ppm[a]	0	1	4	0	1
Maximum 8-hour concentration (ppm)		0.07	0.078	0.074	0.068	0.079
Days 8-hour standard exceeded	>0.07 ppm[a]	–	1	3	0	3
Days 8-hour standard exceeded	>0.075 ppm[b]	0	0	0	0	1
Carbon Monoxide						
Maximum 8-hour concentration (ppm)		1.7	2.0	1.8	1.6	1.4
Days 8-hour standard exceeded	>9 ppm[a,b]	0	0	0	0	0
Nitrogen Dioxide						
Maximum 1-hour concentration (ppm)		0.06	0.069	0.063	0.058	0.062
Days 1-hour standard exceeded	>0.18 ppm[a]	0	0	0	0	0
Suspended Particulates (PM_{10})						
Maximum 24-hour concentration (μg/m^3)		49	54	57	61	-[c]
Days 24-hour standard exceeded	>50 μg/m^3 [a]	0	1[d]	1[d]	1[d]	-
Suspended Fine Particulates ($PM_{2.5}$)						
Maximum 24-hour concentration (μg/m^3)		40	33.4	43.9	51.2	28.6
Days 24-hour standard exceeded	>65 μg/m^3 [e]	0	0	2[e]	2[e]	0
Annual Average (μg/m^3)		9.4	9.0	10.3	8.7	9.3
Annual standard exceeded?	>12 μg/m^3 [a]	No	No	No	No	No

NOTES: "–" indicates that data are not available.

ppm = parts per million; μg/m^3 = micrograms per cubic meter

[a] State standard, not to be exceeded.
[b] Federal standard, not to be exceeded.
[c] PM_{10} monitoring was discontinued on June 30, 2008 at this station.
[d] Because PM_{10} is only sampled every sixth day, actual days over the standard can be estimated to be six times the number shown.
[e] Federal standard, reduced from 65 μg/m^3 to 35 μg/m^3 in 2006.

SOURCE: BAAQMD, 2009a.

Ozone

Ozone is a secondary air pollutant produced in the atmosphere through a complex series of photochemical reactions involving reactive organic gases (ROG) and nitrogen oxide (NO_X). The main sources of NO_X and ROG, often referred to as ozone precursors, are combustion processes (including motor vehicle engines) and the evaporation of solvents, paints, and fuels. Automobiles are the single largest source of ozone precursors in the Bay Area. Ozone is a regional air pollutant because its precursors are transported and diffused by wind concurrently with ozone production through the photochemical reaction process, resulting in regional dispersion of ozone. Ozone causes eye irritation, airway constriction, and shortness of breath, and can aggravate existing respiratory diseases such as asthma, bronchitis, and emphysema (BAAQMD, 1999). Table 5.7-1 shows that, according to published data, the more stringent applicable standards have very infrequently been exceeded during the past five years in Fremont.

Carbon Monoxide

CO is an odorless, colorless gas usually formed as the result of the incomplete combustion of fuels. The single largest source of CO is motor vehicles; the highest emissions occur during low travel speeds, stop-and-go driving, cold starts, and hard acceleration. Exposure to high concentrations of CO reduces the oxygen-carrying capacity of the blood and can cause dizziness and fatigue, impair central nervous system function, and induce angina in persons with serious heart disease (BAAQMD, 1999). Table 5.7-1 shows that no exceedances of CO standards were recorded in Fremont between 2004 and 2008. Maximum 8-hour CO levels average less than 25 percent of the allowable 8-hour standard.

Suspended and Inhalable Particulate Matter (PM_{10} and $PM_{2.5}$)

Particulate matter is a class of air pollutants that consists of solid and liquid airborne particles in an extremely small size range. Particulate matter is measured in two size ranges: PM_{10} for particles less than 10 microns in diameter, and $PM_{2.5}$ for particles less than 2.5 microns in diameter. Motor vehicles generate about half of all Bay Area particulates, through tailpipe emissions as well as brake pad and tire wear. Other sources of fine particulates include wood burning in fireplaces and stoves, industrial facilities, and ground-disturbing activities such as construction. Fine particulates small enough to be inhaled into the deepest parts of the human lung can cause adverse health effects. Among the criteria pollutants that the BAAQMD regulates, particulates appear to represent the most serious overall health hazard. Studies have shown that elevated particulate levels contribute to the death of approximately 200 to 500 people per year in the Bay Area. High levels of particulates have also been known to exacerbate chronic respiratory ailments such as bronchitis and asthma, and have been associated with increased emergency room visits and hospital admissions (BAAQMD, 1999).

Table 5.7-1 shows that exceedances of the state PM_{10} standard occur relatively infrequently in Fremont. The state 24-hour PM_{10} standard is estimated to have been exceeded a maximum of 1 day per year between 2004 and 2008. The less stringent federal 24-hour PM_{10} standard of 150 micrograms per cubic meter was not exceeded at the Fremont monitoring station during this period (see Section 5.7.2.1, Federal Standards, for a discussion of federal air quality standards).

In 2006, the U.S. Environmental Protection Agency (U.S. EPA) adopted a new standard for $PM_{2.5}$, which represents the fine fraction of particulate matter. California's annual average standard went into effect in 2003. Table 5.7-1 presents the $PM_{2.5}$ data from the Fremont station for 2004 through 2008. The federal 24-hour $PM_{2.5}$ standard was not exceeded until the standard was reduced in 2006 from 65 to 35 micrograms per cubic meter. The more stringent standard was exceeded twice in 2006 and twice again in 2007, but no exceedances occurred in 2008. Because $PM_{2.5}$ is usually monitored every third day, the federal 24-hour standard is estimated to have been exceeded approximately six times in each of these two years with published data.

Other Criteria Air Pollutants

The standards for NO_2, SO_2, and lead are being met in the Bay Area, and pollutant trends suggest that the air basin will continue to meet these standards for the foreseeable future (BAAQMD, 2009).

Toxic Air Contaminants

Diesel exhaust is an important concern in the Bay Area and throughout California. The California Air Resources Board (CARB) identified diesel engine particulate matter as a toxic air contaminant (TAC). The exhaust from diesel engines includes hundreds of different gaseous and particulate components, many of which are toxic. Many of these toxic compounds adhere to the diesel soot particles, which are very small and can penetrate deeply into the lungs. Diesel engine particulate matter has been identified as a human carcinogen. Mobile vehicles such as trucks, buses, and automobiles are some of the primary sources of diesel emissions. Studies show that diesel particulate matter (DPM) concentrations are much higher near heavily traveled highways and intersections. BAAQMD analysis shows that the cancer risk from exposure to diesel exhaust is much higher than the risk associated with any other toxic air pollutant routinely measured in the region (BAAQMD, 1999).

5.7.1.3 Greenhouse Gases and Climate Change

Gases that trap heat in the atmosphere are referred to as greenhouse gases (GHGs) because they capture heat radiated from the sun as it is reflected back into the atmosphere, much like a greenhouse. The principal GHGs include carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), ozone (O_3), and water vapor (H_2O).[2]

The accumulation of GHGs has been implicated as a driving force in global climate change. Climate change is commonly used interchangeably with "global warming" and the "greenhouse effect." Definitions of climate change vary between and across regulatory authorities and the scientific community, but in general can be described as the changing of the earth's climate caused by natural fluctuations and anthropogenic activities that alter the composition of the global atmosphere.

2 Ozone that is not directly emitted but formed from other gases in the troposphere (the lowest level of the earth's atmosphere) also contributes to the retention of heat.

While the primary GHGs in the atmosphere are naturally occurring, the levels of CO_2, CH_4, and N_2O that currently exist are largely the result of human activities, which have accelerated the rate at which these compounds occur within the earth's atmosphere. CO_2 is the "reference gas" for climate change—i.e., emissions of GHGs are typically reported in "carbon-dioxide-equivalent" measures. Emissions of CO_2 are largely by-products of fossil fuel combustion, whereas CH_4 results from off-gassing associated with agricultural practices and landfills. Other GHGs with much greater heat-absorption potential than CO_2—including hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride—are generated in certain industrial processes. There is international scientific consensus that human-caused increases in GHGs have contributed, and will continue to contribute, to global warming (although the magnitude and rate of the warming is uncertain). The effects of climate change on the natural environment in California may include, but are not limited to: sea level rise; extreme heat conditions that are more frequent and of longer duration; reduced snowpack; an increase in high-ozone days; a higher rate of large forest fires, and more drought years. Secondary effects are likely to include a global rise in sea level, impacts on agriculture, changes in disease vectors, and changes in habitat and biodiversity.

The California Energy Commission (CEC) estimated that, in 2004, California produced 500 million gross metric tons of carbon-dioxide-equivalent GHG emissions (about 550 million U.S. tons).[3] The CEC found that transportation is the source of 38 percent of the state's GHG emissions; this is followed by electricity generation (both in-state and out-of-state) at 23 percent and industrial sources at 13 percent (CEC, 2006; 2007).

In 2007 in the Bay Area, fossil fuel consumption in the transportation sector (on-road motor vehicles are the single largest source of the Bay Area's GHG emissions) accounted for approximately 41 percent of the Bay Area's 102.6 million metric tons of GHG emissions. Off-road equipment sources accounted for 3 percent of total emissions. Industrial and commercial sources were the second largest contributors of GHG emissions, with about 34 percent of total emissions. Residential fuel usage accounted for about 7 percent of the Bay Area's GHG emissions, followed by electricity generation/cogeneration at 15 percent (BAAQMD, 2008a).

5.7.1.4 Sensitive Receptors

Land uses such as schools, children's daycare centers, hospitals, and convalescent homes are considered to be more sensitive than the general population to poor air quality because the population groups associated with these uses have increased susceptibility to respiratory distress. People engaged in strenuous work or exercise are also more sensitive to poor air quality. Residential areas are considered more sensitive to air quality conditions than commercial and industrial areas, because people generally spend longer periods of time at their residences, resulting in greater exposure to ambient air quality conditions.

3 Every greenhouse gas has a global warming potential (GWP), a measurement of the impact that the particular gas has on "radiative forcing" (i.e., the additional heat/energy that is retained in the earth's ecosystem through the addition of this gas to the atmosphere). Carbon-dioxide-equivalents provide a universal standard of measurement against which the effects of releasing (or avoiding the release of) different GHGs can be evaluated. CH_4 has a GWP of 21 and NO_x has a GWP of 310, meaning that their effect on global warming would be 21 and 310 times, respectively, greater than an equivalent amount of CO_2.

Sensitive receptors in the vicinity of the proposed project include single- and multi-family homes near the southern portion of the project area, single-family developments located both east and west of the northern project area, and the Kiddo Land Learning Center (46280 Briar Place, located 700 feet from the right-of-way, or ROW). The childcare facility is privately owned, and provides services for preschoolers and school-aged children.

5.7.2 Regulatory Framework

The Clean Air Act Amendments of 1970 established national ambient air quality standards, and individual states retained the option to adopt more stringent standards and to include other pollution sources. California had already established its own air quality standards when federal standards were established, and because of the unique meteorological problems in California, there is considerable diversity between the state and national ambient air quality standards, as shown in **Table 5.7-2**. California ambient standards tend to be at least as protective as national ambient standards, and are often more stringent.

The ambient air quality standards are intended to protect the public health and welfare, and they specify the concentration of pollutants (with an adequate margin of safety) to which the public can be exposed without adverse health effects. They are designed to protect those segments of the public most susceptible to respiratory distress, known as sensitive receptors, including asthmatics, the very young, the elderly, people weak from other illness or disease, or persons engaged in strenuous work or exercise. Healthy adults can tolerate occasional exposure to air pollution levels that are somewhat above the ambient air quality standards before adverse health effects are observed.

5.7.2.1 Federal Standards

The 1977 Clean Air Act (last amended in 1990, 42 United States Code 7401 et seq.) requires that regional planning and air pollution control agencies prepare a regional air quality plan to outline the measures by which both stationary and mobile sources of pollutants will be controlled to achieve all standards within the deadlines specified in the Clean Air Act. In 1982, the Association of Bay Area Governments (ABAG), the Metropolitan Transportation Commission (MTC), and the BAAQMD jointly prepared the *Bay Area Air Quality Plan* for the SFBAAB. The plan predicted attainment of the federal clean air standards within the SFBAAB by 1987, a somewhat optimistic forecast considering federal clean air standards were not attained throughout the entire air basin until 1991. The *Bay Area Air Quality Plan* was incorporated into California's state implementation plan (SIP), a plan required under the federal Clean Air Act. A SIP must contain control strategies that demonstrate attainment of national ambient air quality standards by specific Clean Air Act deadlines.

The SFBAAB's current attainment status with respect to federal standards is summarized in Table 5.7-2. In general, the Bay Area experiences low concentrations of most pollutants when compared to federal standards, except for ozone and particulate matter (PM_{10} and $PM_{2.5}$), for which standards are exceeded periodically. The Bay Area's attainment status for ozone has

TABLE 5.7-2
STATE AND FEDERAL AMBIENT AIR QUALITY STANDARDS AND ATTAINMENT STATUS
SAN FRANCISCO BAY AREA AIR BASIN

		(State) SAAQS[a]		(Federal) NAAQS[b]	
Pollutant	**Averaging Time**	**Standard**	**Attainment Status (SFBAAB)**	**Standard**	**Attainment Status**
Ozone	1-hour	0.09 ppm	**N**	NA	[c]
	8-hour	0.07 ppm	**N**	0.075 ppm	**N**[d]
Carbon Monoxide	1 hour	20 ppm	A	35 ppm	A
	8 hour	9.0 ppm	A	9 ppm	A
Nitrogen Dioxide	1 hour	0.18 ppm	A	NA	NA
	Annual	0.030 ppm	A	0.053 ppm	A
Sulfur Dioxide	1 hour	0.25 ppm	A	NA	NA
	24 hour	0.04 ppm	A	0.14 ppm	A
	Annual	NA	NA	0.03 ppm	A
Particulate Matter	24 hour	50 μg/m³	**N**	150 μg/m³	U
	Annual[e]	20 μg/m³	**N**	NA	NA
Fine Particulate Matter	24 hour	NA	NA	35 μg/m³	**N**[f]
	Annual	12 μg/m³	**N**	15 μg/m³	A
Sulfates	24 hour	25 μg/m³	A	NA	NA
Lead	30 day	1.5 μg/m³	A	NA	NA
	Quarter	NA	NA	1.5 μg/m³	A
Hydrogen Sulfide	1 hour	0.03 ppm	U	NA	NA

NOTES: A = attainment; **N** = nonattainment; U = unclassified; NA = not applicable or no applicable standard; ppm = parts per million; μg/m³ = micrograms per cubic meter

[a] SAAQS = state ambient air quality standards (California). The SAAQS for ozone, carbon monoxide (except Lake Tahoe), sulfur dioxide (1-hour and 24-hour), nitrogen dioxide, particulate matter, and visibility-reducing particles are values that are not to be exceeded. All other state standards shown are values not to be equaled or exceeded.

[b] NAAQS = national ambient air quality standards. NAAQS, other than ozone and particulates, and those based on annual averages or annual arithmetic means, are not to be exceeded more than once a year. The 1-hour ozone standard is attained if, during the most recent three-year period, the average number of days per year with maximum hourly concentrations above the standard is equal to or less than one. The 8-hour ozone standard is attained when the three-year average of the fourth highest daily concentration is 0.08 ppm or less. The 24-hour PM10 standard is attained when the three-year average of the 99th percentile of monitored concentrations is less than the standard. The 24-hour PM2.5 standard is attained when the three-year average of 98th percentile is less than the standard.

[c] The national 1-hour ozone standard was revoked by the U.S. EPA on June 15, 2005.

[d] In 2008, the U.S. EPA lowered the 8-hour federal standard for ozone to 0.075 ppm. EPA will issue final designations based on this standard, at which point the Bay Area Air Basin is expected to be designated as nonattainment.

[e] State standard = annual geometric mean; national standard = annual arithmetic mean.

[f] Effective April 2009.

SOURCE: BAAQMD, 2009a.

changed several times over the past decade, first from “nonattainment” to “attainment” in 1995, then back to “unclassified nonattainment” in 1998 for the 1-hour federal ozone standard. In June 2004, the Bay Area was designated as “marginal nonattainment” for the 8-hour ozone standard. In 2008, the U.S. EPA lowered the 8-hour ozone standard from 0.08 part per million (ppm) to 0.075 ppm. The SFBAAB attainment status may be downgraded to remove the “marginal” designation when the EPA issues final designations based on the revised standard in 2010. In 1998, after many years without violations of any CO standards, the attainment status for CO in the SFBAAB was upgraded to “attainment.”

In response to the U.S. EPA’s redesignation of the basin for the 1-hour federal ozone standard to nonattainment, the BAAQMD, ABAG, and MTC were required to develop an ozone attainment plan to meet this standard. The *1999 Ozone Attainment Plan* (OAP) was prepared and adopted by these agencies in June 1999 (BAAQMD, ABAG, and MTC, 1999). However, in March 2001, the U.S. EPA proposed and took final action to approve portions of the 1999 OAP and disapprove other portions, while also making the finding that the Bay Area had not attained the national 1-hour ozone standard. As a result, a revised OAP was prepared and adopted in October 2001 (BAAQMD, 2001). The 2001 plan amended and supplemented the 1999 plan, and provided for attainment of the federal 1-hour ozone standard by 2006, the attainment deadline. In June 2005, the federal 1-hour ozone standard was revoked by the U.S. EPA, and was replaced by the 8-hour standard.

The 2001 OAP contains control strategies for stationary and mobile sources. The adopted mobile-source control program was estimated to significantly reduce volatile organic compound (VOC) and NO_X emissions between 2000 and 2006 by reducing emissions from on- and off-road diesel engines (including construction equipment). In addition to emission reduction requirements for engines and fuels, the OAP identified 28 transportation control measures to reduce automobile emissions, including improved transit service and transit coordination, new carpool lanes, signal timing, freeway incident management, and increased state gas tax and bridge tolls.

5.7.2.2 State Standards

In 1988, California passed the California Clean Air Act (California Health and Safety Code Sections 39600 et seq.), which, like its federal counterpart, called for the designation of areas as attainment or nonattainment, based on state ambient air quality standards rather than the federal standards. The SFBAAB attainment status with respect to state standards is summarized in Table 5.7-2. As shown in the table, the Bay Area experiences low concentrations of most pollutants when compared to state standards, except for ozone, PM_{10}, and $PM_{2.5}$, for which standards are exceeded periodically. All current basinwide air quality plans address required progress toward meeting state standards for these parameters.

California Air Resources Board

CARB is the state agency responsible for regulating air quality. The CARB’s responsibilities include establishing state ambient air quality standards, emissions standards, and regulations for mobile emissions sources (e.g., autos, trucks), and overseeing the efforts of countywide and multi-county air pollution control districts, which have primary responsibility over stationary sources. The emission standards most relevant to the proposed project are those related to on- and off-road heavy-duty diesel engines. The CARB also regulates vehicle fuels with the intent of reducing emissions; it has set emission reduction performance requirements for gasoline (California reformulated gasoline) and limited the sulfur and aromatic content of diesel fuel to make it burn cleaner. The CARB also sets the standards used to pass or fail vehicles in smog-check and heavy-duty truck inspection programs.

In 2005, the CARB approved the Airborne Toxic Control Measure to Limit Diesel-Fueled Commercial Motor Vehicle Idling to reduce emissions of toxic and criteria pollutants by limiting the idling of new heavy-duty diesel vehicles, which altered five sections of Title 13 of the California Code of Regulations (CCR). The relevant changes with respect to the proposed project are in Section 2485. Pertinent requirements of the measure include:

(c) The driver of any vehicle subject to this section:

(1) will not idle the vehicle's primary diesel engine for greater than five minutes at any location, except as noted below; and

(2) will not operate a diesel-fueled auxiliary power system to power a heater, air conditioner, or any ancillary equipment on that vehicle during sleeping or resting in a sleeper berth for greater than five minutes at any location when within 100 feet of a restricted area, except as noted below.

"Restricted area" means any real property zoned for individual or multi-family housing that has one or more such units. There are 12 exceptions to this requirement (e.g., emergency situations, military, adverse weather conditions, etc.), including when a vehicle's power takeoff is being used to run pumps, blowers, or other equipment; when a vehicle is stuck in traffic, stopped at a light, or under direction of a police officer; when a vehicle is queuing beyond 100 feet from any restricted area; and when an engine is being tested, serviced, or repaired.

More recently, in April 2009, the CARB passed the "the Low Carbon Fuel Standard" requiring fuel manufacturers to cut the "carbon intensity" of fuels sold in the state by 10 percent by 2020, thereby diversifying the type of fuels used for transportation and lowering the amount of GHGs released for every unit of energy produced. The new regulation is aimed at diversifying the variety of fuels used for transportation. It will boost the market for alternative-fuel vehicles and achieve 16 million metric tons of GHG emission reductions by 2020. The standard applies to a manufacturers' overall mix of fuel and is not a per-gallon requirement. The regulation takes effect incrementally, starting in 2010 (CARB, 2009).

Bay Area Air Quality Management District

The BAAQMD is the regional agency responsible for air quality regulation within the SFBAAB, regulating air quality through planning and review activities. The BAAQMD has permit authority over most types of stationary emission sources and can require stationary sources to obtain permits, impose emission limits, set fuel or material specifications, or establish operational limits to reduce air emissions. The BAAQMD regulates new or expanding stationary sources of toxic air contaminants.

In September 2005, the BAAQMD, in cooperation with the MTC and ABAG, prepared the *Bay Area 2005 Ozone Strategy* (BAAQMD, 2006). The Ozone Strategy is a roadmap showing how the San Francisco Bay Area will achieve compliance with the state 1-hour ozone standard as expeditiously as practicable, and how the region will reduce transport of ozone and ozone precursors to neighboring air basins. The 2005 Ozone Strategy describes how the Bay Area will fulfill California Clean Air Act planning requirements for the state 1-hour ozone standard through the proposed control strategy. The control strategy includes stationary-source control measures to be implemented through BAAQMD regulations; mobile-source control measures to be implemented through incentive programs and other activities; and transportation control measures to be implemented through transportation programs in cooperation with the MTC, local governments, transit agencies, and others. An update of the 2005 Ozone Strategy is currently in progress as part of the 2009 Clean Air Plan, which has the following objectives:

- Comply with California Clean Air Act requirements
- Develop an integrated plan that addresses multiple pollutants
- Adopt control strategies to minimize public health risk
- Achieve state standards as soon as practical
- Update previously adopted control strategies
- Reduce transport to downwind air basins
- Report on progress and update baseline and trends

The 2009 Clean Air Plan and associated CEQA documentation are under preparation.

The BAAQMD is currently in the process of adopting new CEQA Air Quality Guidelines, which include quantitative CEQA significance thresholds for construction-related emissions of criteria pollutants, precursors, TACs, and GHGs (BAAQMD, 2009c and 2009d). The BAAQMD has not yet adopted these guidelines or quantitative significance thresholds for construction-related emissions, although the BAAQMD expects to adopt these new guidelines in early 2010.

5.7.2.3 Climate Change and GHG Emissions

Federal

With respect to GHGs, the U.S. Supreme Court ruled on April 2, 2007 that CO_2 is an air pollutant as defined under the CAA, and that the U.S. EPA has the authority to regulate GHG emissions. No federal regulations or policies regarding GHG emissions have been adopted that would be applicable to the proposed project.

State

Executive Order S-3-05 (2005)

In 2005, in recognition of California's vulnerability to the effects of climate change, Governor Schwarzenegger announced the following GHG emission reduction targets, as established through

Executive Order S-3-05: by 2010, reduce GHG emissions to 2000 levels; by 2020, reduce GHG emissions to 1990 levels; and by 2050, reduce GHG emissions to 80 percent below 1990 levels.

Assembly Bill 32 (2006)

In 2006, California passed the California Global Warming Solutions Act of 2006 (Assembly Bill No. 32; California Health and Safety Code Division 25.5, Section 38500, et seq. [AB 32]). AB 32 requires the CARB to design and implement emission limits, regulations, and other measures to reduce statewide GHG emissions to 1990 levels by 2020 (representing a 25 percent reduction in emissions). The reduction would be achieved through an enforceable statewide cap on global warming emissions and reduction measures that would be phased in starting by 2012, and also through discrete early action measures that could be adopted as regulations and made effective by 2010, like the Low Carbon Fuel Standard (see details above).

Project construction is proposed for 2012 through 2014. Therefore, these measures (many of which pertain to construction-related equipment operations) would become effective before the project is implemented. Some proposed early action measures will require new legislation to implement, some will require subsidies, some have already been developed, and some will require additional effort to evaluate and quantify. AB 32 primarily establishes a timeframe for the CARB to adopt emissions limits, rules, and regulations, but does not provide thresholds or methodologies for analyzing a project's impacts regarding global climate change.

CARB Scoping Plan (2008)

Pursuant to AB 32, the CARB adopted the Scoping Plan in December 2008, which is the state's plan to achieve GHG reductions in California required by AB 32. The Scoping Plan contains the main strategies California will implement to achieve reduction of 169 million metric tons (MMT) of carbon dioxide equivalent (CO_2E), or approximately 30 percent from the state's projected 2020 emission level of 596 MMT of CO_2E under a business-as-usual scenario, and a reduction of 42 MMT CO_2E, or almost 10 percent, from 2002 to 2004 average emissions.

The Scoping Plan also includes CARB-recommended GHG reductions for each emissions sector of the state's GHG inventory. The largest proposed GHG reductions are expected to be achieved from improving emission standards for light-duty vehicles (estimated reductions of 31.7 MMT CO_2E), implementation of the Low Carbon Fuel Standard (15.0 MMT CO_2E), energy efficiency measures in buildings and appliances and the widespread development of combined heat and power systems (26.3 MMT CO_2E), and a renewable portfolio standard for electricity production (21.3 MMT CO_2E). CARB has not yet determined what amount of GHG reductions from local government operations will be recommended; however, the Scoping Plan does state that land use planning and urban growth decisions will play an important role in the state's GHG reductions because local governments have primary authority to plan, zone, approve, and permit how land is developed to accommodate population growth and the changing needs of their jurisdictions. The CARB is also developing an additional protocol for community emissions. CARB further acknowledges that decisions on how land is used will have large impacts on the GHG emissions that will result from the transportation, housing, industry, forestry, water, agriculture, electricity, and natural gas emission sectors. The Scoping Plan states that the ultimate GHG reduction assignment to local government operations is to be determined. With regard to land use planning, the Scoping Plan expects approximately 5.0 MMT CO2e will be achieved associated with implementation of SB 375, which is discussed further below.

Other Bills and Executive Orders

There are several other senate bills and executive orders that have been passed over the past several years and they relate to: reducing GHG emissions from electricity generation (Senate Bills 1078, 107, and 1368, Executive Order S-14-08); establishing guidelines for mitigating GHG emissions or the effects of GHG emissions under CEQA by 2010 (Senate Bill 97); aligning regional transportation planning efforts, regional GHG reduction targets, and land use and housing allocation through adoption of a Sustainable Communities Strategy (SCS) or Alternative Planning Strategy (APS) (Senate Bill 375); establishing targets for reducing GHG emissions to the 2000 level by 2010 and to the 1990 level by 2020, and to 80 percent below the 1990 level by 2050 (Executive Order S-3-05); providing land use planning guidance related to sea level rise and other climate change impacts (Executive Order S-13-08); and establishing a Low-Carbon Fuel Standard and coordinating actions of the California Energy Commission, the CARB, the University of California, and other agencies to develop and propose protocols for measuring the life-cycle carbon intensity" of transportation fuels.

Local

Bay Area Air Quality Management District Climate Protection Program

The BAAQMD established a climate protection program to reduce pollutants that contribute to global climate change and affect air quality in the SFBAAB. The climate protection program includes measures that promote energy efficiency, reduce vehicle miles traveled, and develop alternative sources of energy all of which assist in reducing emissions of GHG and in reducing air pollutants that affect the health of residents. BAAQMD also seeks to support current climate protection programs in the region and to stimulate additional efforts through public education and outreach, technical assistance to local governments and other interested parties, and promotion of collaborative efforts among stakeholders.

City and County of San Francisco

In February 2002, the City and County of San Francisco (CCSF) Board of Supervisors passed the *Greenhouse Gas Emissions Reduction Resolution* (Number 158-02) committing the CCSF to a GHG emissions reduction goal of 20 percent below 1990 levels by the year 2012. The resolution also directed the San Francisco Department of the Environment (SFDE), the SFPUC, and other appropriate CCSF agencies to complete and coordinate analysis and planning for a local action plan targeting GHG emission reduction activities. In September 2004, the SFDE and the SFPUC published the *Climate Action Plan for San Francisco: Local Actions to Reduce Greenhouse Gas Emissions* (SFDE and SFPUC, 2004). The plan describes recommended emissions reduction actions in the key target sectors—transportation, energy efficiency, renewable energy, and solid waste management—to meet stated goals by 2012. The plan presents proposals to reduce annual

CO_2 emissions by 2.5 million tons by 2012 (20 percent below 1990 emissions)—such as greening vehicle fleets; increasing energy efficiency in public and private buildings; developing renewable energy technologies (e.g., solar, wind, fuel cells, tidal power); and expanding residential and commercial recycling programs. The roadmap to achieving these goals requires the cooperation of a number of city, regional, and state agencies as well as private-sector partners. Although the Board of Supervisors has not formally committed the CCSF to perform the actions addressed in the plan, and many of the actions require further development and commitment of resources, the plan serves as a blueprint for GHG emission reductions, and several actions are now in progress.

In May 2008, CCSF adopted a Greenhouse Gas Reduction Ordinance amending the San Francisco Environment Code to establish GHG emission targets and action plans, to authorize the SFDE to coordinate efforts to meet these targets, and to make environmental findings. The ordinance establishes the following GHG emission reduction limits for San Francisco and the target dates to achieve them:

- Determine 1990 CCSF GHG emissions by 2008, the baseline level with reference to which target reductions are set
- Reduce GHG emissions by 25 percent below 1990 levels by 2017
- Reduce GHG emissions by 40 percent below 1990 levels by 2025
- Reduce GHG emissions by 80 percent below 1990 levels by 2050

The ordinance also specifies requirements for CCSF departments to prepare climate action plans that assess and report GHG emissions and prepare recommendations to reduce emissions. As part of this, the San Francisco Planning Department is required to: (1) update and amend the CCSF's applicable *General Plan* elements to include the emission reduction limits set forth in this ordinance and policies to achieve those targets; (2) consider a project's impact on the CCSF's GHG reduction limits specified in this ordinance as part of its review under CEQA; and (3) work with other CCSF departments to enhance the "transit first" policy to encourage a shift to sustainable modes of transportation, thereby reducing emissions and helping to achieve the targets set forth by this ordinance.

San Francisco Public Utilities Commission

The SFPUC is also developing energy-efficiency and renewable generation projects. To date, several renewable generation projects have been constructed, and many more are in the planning, design, or construction phases. For instance, in 2002, the SFPUC installed a small reciprocating engine to use biogas recovered from the Oceanside Water Treatment Control Plant. In 2003, a 2 megawatt biogas plant began operation at the Southeast Water Treatment Control Plant. Both of these plants use sewage-produced methane that would otherwise be flared-off. In addition, the SFPUC has completed several solar electric projects for City facilities. The first project, a 675-kilowatt solar electric photovoltaic system, is located on the Moscone Convention Center's roof. This project generates 826,000 kilowatt-hours of electricity per year and provides a solar showplace for visitors.

Additional solar electric photovoltaic projects in operation include a 255-kilowatt project at the Southeast Water Pollution Control Plant and a 245-kilowatt project at Pier 96 (the Norcal recycling facility). Five other solar electric photovoltaic projects are currently under construction. The SFPUC has also installed instrumentation at 19 sites on City buildings and schools to collect data about the availability of sunlight, as well as instruments to measure wind speed and ambient temperature. The variability in solar incidence is based on microclimate and geography, and when used in conjunction with availability of appropriate space suggests potential future solar electric photovoltaic project sites.

The SFPUC also manages and implements energy-efficiency projects in municipal buildings and facilities and provides energy-efficiency services such as energy audits and design and construction management. Energy retrofit technologies include energy-efficient lighting; Heating, Ventilation, and Air Conditioning (HVAC); motors; controls; and energy management systems.

Municipal energy-efficiency and renewable generation projects are funded by Hetch Hetchy power sales net revenue as well as state grants and loans, among other funding mechanisms. Funds that the SFPUC designates for energy projects are appropriated in a project account called the Mayor's Energy Conservation Account (MECA). MECA is a financing mechanism allowing the SFPUC to make a loan to a city department to fund an energy project. For energy-efficiency projects, loans can be paid back though the department's energy savings. As of 2007, the SFPUC had invested $24 million in energy-efficiency projects and estimates that this reduced peak demand by approximately 3,800 kilowatts and CO_2 emissions by approximately 11,000 tons/year. Municipal solar electric photovoltaic projects have been funded by SFPUC Power Enterprise such that client departments pay the same rate for solar power as they would normally pay for that power from the city's Hetch Hetchy hydroelectric generation. To date, 2 megawatts of municipal solar plants have been installed or are under construction for an investment (before rebates) of about $20 million.

Municipal energy-efficiency projects recently completed or underway include: lighting retrofits at Moscone Convention Center (North and South), San Francisco General Hospital, mental health clinics, city parking garages, Golden Gate Park, and West Portal Library; Department of Parking and Traffic light-emitting diode (LED) traffic signal conversions; efficient refrigerators at Housing Authority facilities; motor replacements at the Southeast Wastewater Treatment Plant; and efficient lighting, HVAC, building shell, and energy management control upgrades at the new Moscone West Convention Center. As part of the Department Climate Action Plans under the 2008 Greenhouse Gas Reduction Ordinance, each department is to identify whether its buildings are suitable for solar installation and develop a funding plan for such capital improvements.

The SFPUC is also looking at several Bay Area sites for wind power development and has installed wind monitoring equipment at five sites in and around the City. Additional data are being obtained for City property in the Sierra foothills.

5.7.3 Impacts

5.7.3.1 Significance Criteria

The CCSF has not formally adopted significance standards for impacts related to air quality, but generally considers that implementation of the proposed project would have a significant impact if it were to:

- Conflict with or obstruct implementation of the applicable air quality plan;
- Violate any air quality standard or contribute substantially to an existing or projected air quality violation;
- Result in a cumulatively considerable net increase of any criteria pollutant for which the project region is in nonattainment under an applicable federal or state ambient air quality standard (including releasing emissions that exceed quantitative thresholds for ozone precursors);
- Expose sensitive receptors to substantial pollutant concentrations;
- Create objectionable odors affecting a substantial number of people;
- Conflict with the state goal of reducing GHG emissions in California to 1990 levels by 2020, as set forth by the timetable established in AB 32, such that the project's GHG emissions would result in a substantial contribution to global climate change; or
- Conflict with San Francisco's *Climate Action Plan* such that it would impede implementation of the local GHG reduction goals established by the 2008 *Greenhouse Gas Reduction Ordinance*.

5.7.3.2 Approach to Analysis

The air quality impact analysis considers construction and operational impacts associated with the proposed project. Construction air emissions are evaluated in accordance with the adopted BAAQMD guidelines for assessing and mitigating air quality impacts (BAAQMD, 1999). In anticipation of the BAAQMD's expected adoption of new guidelines and quantitative significance thresholds for construction-related emissions, this EIR also includes a quantitative analysis of the project's construction-related emissions based on the proposed BAAQMD CEQA Air Quality Guidelines (which include qualitative and quantitative significance thresholds), and worst-case assumptions for the project's construction emissions as discussed below.

Under the current (1999) guidelines, the BAAQMD does not require quantification of construction-related fugitive dust emissions, but provides guidance for quantification and considers the significance of a project's impact based on the extent of control measures that are proposed to be implemented. For example, if appropriate mitigation measures are implemented for each project to control fugitive dust emissions, the BAAQMD considers potentially significant project-related impacts and potentially significant contributions to cumulative impacts to be less than significant.

The current guidelines similarly consider temporary construction equipment exhaust emissions to have been included in the regional emissions "budget" for on- and off-road sources. By virtue of this inclusion, the CEQA Guidelines do not consider these emissions to be "new" to the air basin. Therefore, the emissions from the project would not prevent attainment or maintenance of the CO and ozone standards within the Bay Area. If measures are implemented to maintain such equipment in good working order, the BAAQMD considers potentially significant project-related and potentially significant contributions to cumulative regional exhaust emissions impacts to be less than significant under current guidelines.

As indicated above (under Section 5.7.2, Regulatory Framework), the BAAQMD has not adopted quantitative thresholds of significance for construction-related exhaust emissions at this time. However, the BAAQMD is currently considering the adoption of new CEQA Air Quality Guidelines as well as quantitative CEQA significance thresholds for construction-related exhaust emissions of criteria pollutants, ozone precursors, TACs, and GHGs (BAAQMD, 2009c and 2009d). The BAAQMD expects to adopt these new guidelines and thresholds of significance in early 2010. Therefore, in anticipation of the BAAQMD's expected adoption of new guidelines and quantitative significance thresholds for construction-related exhaust emissions, this EIR also includes a quantitative analysis of the project's construction-related exhaust emissions based on the draft BAAQMD CEQA Air Quality Guidelines (which include qualitative and quantitative significance thresholds) (BAAQMD, 2009c and 2009d), and worst-case assumptions for the project's construction emissions. According to the draft BAAQMD thresholds of significance, the proposed project would result in a significant impact if it were to produce construction-related emissions of criteria pollutants as follows:

- more than 54 pounds per day of ROGs or NOx, or
- 54 pounds per day of PM2.5 (exhaust emissions only), or
- 82 pounds per day of PM10 (exhaust emissions only).

Under the draft BAAQMD guidelines, construction emissions of fugitive dust are analyzed in the same manner as the current (1999) guidelines (i.e., implementation of Best Management Practices (BMPs) would lower impact to a less-than-significant level).

In addition, the draft guidelines do not change the BAAQMD's current guidelines for TACs, which are:

- an increased cancer risk of more than 10 in 1 million for a person with maximum exposure potential, and
- a chronic non-cancer hazard index (HI) of 1.0 or greater.

However, the draft guidelines apply these thresholds of significance to construction projects, whereas under the current guidelines these thresholds apply only to operational impacts. Further, the draft guidelines add an additional threshold to both construction-related and operational emissions:[4]

- an increase in ambient $PM_{2.5}$ of more than 0.3 micrograms per cubic meter.

There are no adopted numerical significance thresholds for GHG emissions. Preliminary draft CEQA Guidelines Amendments for GHG emissions were issued by the Governor's Office of Planning and Research (OPR) on January 8, 2009 (California Governor's Office of Planning and Research, 2009). These draft amendments propose the following criteria: (1) generate GHG emissions, either directly or indirectly, that could have a significant impact on the environment, based on any applicable threshold of significance; or (2) conflict with any applicable plan, policy, or regulation of an agency adopted for the purpose of reducing the emission of GHGs. These two criteria are considered in the impact evaluation under Impact AQ-4, below.

For GHG emissions during construction, no state or regional government agency has adopted a methodology or quantitative threshold (similar to those for priority pollutants) that can be applied to a specific development or construction project to evaluate the significance of its contribution to these emissions. The draft BAAQMD thresholds of significance do not include a construction GHG threshold at this time because BAAQMD has not identified sufficient evidence to determine a level at which construction emissions are significant (BAAQMD, 2009c). The draft guidelines recommend a case-by-case consideration of construction GHG emissions and encourage project applicants to quantify and disclose GHG emissions, and implement construction GHG reduction strategies where feasible. The BAAQMD has also indicated that it plans to develop a list of BMPs, such as alternative fuels, use of local materials, and recycling of construction and demolition waste, to provide lead agencies with strategies that reduce greenhouse gas emissions from construction (BAAQMD, 2009c).

The current and draft BAAQMD guidelines also provide significance thresholds for criteria pollutant emissions associated with project operation. However, with implementation of the project, pipeline operations would remain essentially unchanged. Further, water storage, transmission, and treatment facilities are not typically a source of "traditional" air pollution emissions. Therefore, direct and secondary emissions associated with operation of project facilities are discussed qualitatively.

5.7.3.3 Impact Analysis

Impact Summary

Table 5.7-3 summarizes the potential air quality impacts associated with construction and operation of the proposed project.

[4] The draft thresholds of significance (BAAQMD, 2009d) specify a 1,000-foot radius zone of influence for evaluating risks and hazards impacts of an individual project, but draft guidelines (BAAQMD, 2009c) do not indicate how this zone of influence should be applied to assessment of construction-related impacts.

TABLE 5.7-3
SUMMARY OF IMPACTS – AIR QUALITY

Impact	Significance Determination Before Mitigation	Significance Determination After Mitigation
Impact AQ-1: Construction emissions of criteria pollutants.	S/S*	LS/SU*
Impact AQ-2: Exposure to diesel particulate matter during construction.	LS/PS*	-/SU*
Impact AQ-3: Odors generated during project construction or operation.	LS/LS*	–
Impact AQ-4: GHG emissions and conflicts with applicable plans, policies, or regulations adopted for the purpose of reducing GHG emissions.	LS/LS*	–

LS = Less than Significant impact
PS = Potentially Significant impacts = Significant impact
SU = Significant and Unavoidable impact, even with mitigation incorporated
– = Mitigation not required
* Significance determination under current BAAQMD CEQA Guidelines / significance determination under draft BAAQMD CEQA Guidelines

Construction Impacts

Impact AQ-1: Construction emissions of criteria pollutants.

Project construction would generate fugitive dust (including PM_{10} and $PM_{2.5}$) due to various construction activities, including excavation, grading, demolition, and vehicle travel on both paved and unpaved surfaces. Other criteria pollutants would also be generated from the exhaust emissions of construction equipment and vehicles. Without controls, emissions of these criteria pollutants could affect the SFBAAB attainment status relative to state and federal air quality standards. This impact would be temporary, and would span the approximately 27-month duration of planned construction.

The SFPUC has not determined the precise construction method at several locations. At the Agua Fria Creek Crossing, either a trenchless or open-cut excavation technique would be used. Placement of the proposed BDPL No. 3X beneath I-680 and the southbound diamond on-ramp would involve the use of an existing corrugated-metal pipe or trenchless construction, depending on the condition of the corrugated-metal pipe segments. The design of the articulated vault for BDPL No. 3X at the Trace B crossing of the Hayward fault has not been finalized, and it has not been determined whether BDPL No. 4 would be sliplined or replaced at the Trace C crossing. Where several alternatives are under consideration, the more emissions-intensive activity is evaluated in this analysis.

Fugitive Dust. As noted previously, neither the current or draft BAAQMD guidelines require quantification of construction dust emissions. Under both sets of guidelines, any project's construction-related impacts are considered to be adequately mitigated if BAAQMD-recommended dust control measures are implemented. The extent of dust control measures required by the BAAQMD depends on the size of the project. Construction of the proposed project would disturb a total of 29 acres, and the project's fugitive dust emissions could contribute to the SFBAAB nonattainment status for particulate matter and are therefore considered to be *significant*. Under both the current and draft guidelines, the impact associated with fugitive dust emissions would be reduced to a less-than-significant level with implementation of **Mitigation Measure M-AQ-1a, BAAQMD Dust Control Measures**, which requires the use of BAAQMD-recommended dust control measures (BAAQMD, 1999), as appropriate for proposed construction activities, to reduce PM_{10} emissions during construction. This mitigation measure includes basic control measures that are applicable to all construction sites (e.g., twice daily watering, hauling parameters), enhanced control measures for construction sites greater than four acres (e.g., stock pile controls, reseeding), and optional control measures when construction activities occur in close proximity to occupied homes (e.g., wheel washing, construction limits during windy days, signage with information on how to file complaints), which would be the case for several construction elements of the proposed project. All three levels of control measures are specified because the project area is greater than four acres, and construction would be conducted in close proximity to homes in Zones 1 and 8 as well as Staging Area 4.

Combustion Equipment Emissions. Exhaust emissions from combustion equipment and vehicles would be generated from multiple sources including, heavy mobile equipment and delivery/haul trucks, worker commute vehicles, and semi-stationary sources such as air compressors and generators. Similar to fugitive dust emissions, under the current guidelines, the BAAQMD considers exhaust emissions to be *significant*, but mitigated to a less-than-significant level with implementation of **Mitigation Measure M-AQ-1b, BAAQMD Exhaust Control Measures**.

However, the draft BAAQMD CEQA Guidelines include new quantitative significance thresholds for construction-related exhaust emissions. Therefore, this analysis includes a quantitative analysis of the project's construction exhaust emissions to determine the project's consistency with the proposed thresholds. In accordance with the draft BAAQMD CEQA Guidelines, the CARB computer model URBEMIS2007 was used to calculate construction activity exhaust emissions based on the following main assumptions: (1) the proposed project would be constructed from mid-2012 to mid-2014; (2) the anticipated schedule is approximately 27 construction months; (3) the temporary bridges across Mission Boulevard and the I-680 northbound diamond on-ramp, and the subsequent articulated vault construction and pipeline placement, would entail 20 months of activity; and (4) this Zone 7 activity would occur simultaneously with several other construction phases. **Table 5.7-4** summarizes the assumed equipment fleet for a maximum activity day.

For the exhaust emissions calculation, every piece of combustion equipment listed in Table 5.7-4 is assumed to be used on a maximum activity day, although it is assumed that peak daily emissions would occur at 50 percent of maximum per year for the entire construction duration (worst case). However, this assumption overestimates actual peak activity day exhaust emissions, because construction would occur sequentially in some construction zones, different equipment would be in use at any given time in the various zones, and on some days construction would

TABLE 5.7-4
MAXIMUM EQUIPMENT INCLUDED IN ESTIMATION OF CONSTRUCTION-RELATED EMISSIONS

Equipment	Zones 1 and 8	Zone 2	Zone 6	Zone 7	Maximum Total
Cranes	2	2	2	2	8
Backhoes	2	2	2	2	8
Drill Rig	–	–	1	1	2
Forklift	2	1	2	2	7
Generator Set	2	–	3	3	8
Welder	2	1	3	3	9
Compactor	–	1	1	1	3
Loader	–	1	2	2	5
Water Truck	–	–	1	1	2

SOURCE: Chapter 3, Project Description, Table 3.1.

only occur in one zone. For the calculation, all truck exhaust emissions from spoils hauling, structural fill importing, and materials deliveries[5] were incorporated into the peak daily calculation. Suspended particulate emissions (PM_{10} and $PM_{2.5}$) include particulates in exhaust emissions as well as dust emissions that would be generated during excavation activities.

Estimated peak daily and annual emissions of criteria pollutants, based on the above assumptions, are summarized and compared to the proposed construction activity BAAQMD CEQA Guideline thresholds (BAAQMD, 2009d) presented in **Table 5.7-5**. This table shows that project-related construction emissions would exceed daily thresholds for NO_X, an ozone precursor, but not for any of the other criteria pollutants. Project construction is estimated to result in 322.1 pounds per peak activity day of NO_X emissions, which would contribute to the region's nonattainment status for ozone and would exceed the proposed BAAQMD CEQA threshold of 54 pounds per day. When compared to the draft thresholds, the project's construction-related emissions would be *significant*. To reduce NOx emissions, the SFPUC would implement BAAQMD-specified exhaust control measures in accordance with **Mitigation Measure M-AQ-1b, BAAQMD Exhaust Control Measures**. This mitigation measure requires the SFPUC to implement BAAQMD-specified exhaust control measures, including the use of grid power in place of diesel generators, implementation of state-specified truck idling limitations and requirements for stationary compression ignition engines, requirements for low-emissions tune-ups, and use of low sulfur fuels. While implementation of Mitigation Measure M-AQ-1b would

5 Assumed truck volumes: 102 spoils truck trips (15 cubic yards per trip) x 20 miles per round-trip and 24 delivery truck trips (10 cubic yards per trip) x 10 miles per round-trip.

TABLE 5.7-5
PEAK CONSTRUCTION ACTIVITY CRITERIA POLLUTANT EMISSIONS

	ROG	NO_X	CO	SO_2	PM_{10}	$PM_{2.5}$	CO_2
Maximum Emissions (pounds per day) – Unmitigated	32.3	322.1	140.7	0.1	12.7	11.6	45,875
Maximum Emissions (pounds per day) – Mitigated[a]	32.3	277.8	140.7	0.1	2.9	2.6	45,875
BAAQMD Proposed CEQA Guideline Threshold (pounds/day)	54	54	547	219	82	54	–
Average Annual Emissions (tons/year)	2.1	20.9	9.1	0.0	0.8	0.8	2,982

[a] Specified mitigated emissions levels are calculated using the URBEMIS model and are based on implementation of exhaust control measures specified in Mitigation Measure M-AQ-1b, BAAQMD Exhaust Control Measures.

SOURCE: URBEMIS 2007 Computer Model (see Appendix C for model output).

reduce emissions from construction equipment exhaust, mitigated NO_X levels, presented in Table 5.7-5, would still be 277.8 pounds per day and would remain above the BAAQMD's proposed significance threshold of 54 pounds per day for NO_X, requiring additional mitigation. Implementation of **Mitigation Measure M-AQ-1c Additional Exhaust Control Measures** in accordance with the draft guidelines, could reduce NO_X levels by an additional 30 to 40 percent (to approximately 167 to 194 pounds per day). However, the NOx emissions would not be reduced to below the draft BAAQMD significance threshold of 54 pounds per day, even with implementation of this mitigation measure. Therefore, this impact would be significant and unavoidable after mitigation.

Impact AQ-2: Exposure to diesel particulate matter during construction.

Combustion emissions from construction equipment and vehicles (i.e., heavy equipment and delivery/haul trucks, worker commute vehicles, air compressors, and generators) would be generated during project construction, and could potentially expose sensitive receptors to DPM. Onsite construction emissions are evaluated under Impact AQ-1. Offsite emissions include those generated by worker vehicles and by diesel haul/delivery trucks used during construction, particularly trucks used to transport excavated materials from the project area and clean fill to the project area. Emissions from construction worker commute trips would be minor compared to the emissions generated by construction equipment and haul/delivery trucks. In addition to these offsite emissions, diesel-powered equipment would release DPM in proximity to homes located adjacent to the ROW. Diesel trucks would also release DPM along construction site access routes.

DPM contains substances that are known carcinogens. Diesel exhaust contains both pulmonary irritants and hazardous compounds that may affect sensitive receptors such as young children, senior citizens, or those susceptible to respiratory disease. The BAAQMD does not have an adopted methodology for estimating impacts from diesel exhaust or determining the significance of a project's contribution. However, under both the current and draft guidelines, the BAAQMD considers a risk of 1 in a million to be insignificant, and a risk of 10 in a million to be significant. Both sets of guidelines also consider a chronic non-cancer hazard index (HI) of 1.0 or greater[6] to be significant.

Excess individual cancer risk is evaluated by assuming that a receiver remains at the same spot outside their home for 24 hours per day, 365 days per year, for 70 years. This assumption obviously does not reflect human behavior. Any health risk assessment based on this exposure assumption is meaningful only in comparing relative risk as a function of location, but not in an absolute sense.

A screening-level individual cancer analysis was conducted using the U.S. EPA SCREEN3 computer model to compare the added risk from the project-related construction activities to the baseline conditions. For this analysis, peak daily DPM emissions from project activities (included in Table 5.7-5) were conservatively assumed to occur on 260 workdays. Receptors were assumed to remain at the same location outdoors during every hour of the construction duration and for every hour of the day for 70 years. The SCREEN3 model results (included in Appendix D) included an estimation of the 1-hour and annual average DPM concentration in project-related exhaust emissions and the individual cancer risk and chronic non-cancer risk associated with these emissions. The results are presented in **Table 5.7-6**.

TABLE 5.7-6
INDIVIDUAL CANCER RISK FROM DPM EXPOSURE

Parameter	DPM Exposure from Project Construction Activities
1-Hour ($\mu g/m^3$)	6.58
Annual ($\mu g/m^3$)	0.658
70-Year Average ($\mu g/m^3$)	0.013[a]
Cancer Risk ($x10^{-6}$)[c]	4.0
Chronic Non-cancer Hazard Index	0.13

DPM = diesel particulate matter
$\mu g/m^3$ = microgram per cubic meter

a 260 workdays/365 days/year/70 years
b assume no fleet improvements for the next 70 years
c 300 x 10^{-6} per $\mu g/m^3$ (70-year average)

SOURCE: U.S. EPASCREEN3 Computer Model (see Appendix D for model output).

6 For non-cancer health risks, a factor called a hazard index (HI) is used to evaluate risk. The hazard index is the ratio of potential exposure to the substance and the level at which no adverse health effects are expected. An HI of less than one indicates that no adverse health effects are expected from exposure; an HI of more than one indicates that adverse health effects are possible.

Using this conservative assessment, the proposed project would result in an estimated 11.6 pounds per day of DPM emissions during peak construction activity. With extremely conservative assumptions, the screening-level excess individual cancer risk would be 4 in a million from project construction, while the chronic non-cancer hazard index would be 0.13. However, there is a large degree of conservatism introduced by this assessment because it assumes that a person would remain on their front porch downwind of the construction area for every day/hour of construction activity. Nevertheless, for the purpose of worst-case analysis, it is assumed that the project would result in an additional 4 in a million lifetime excess cancer risk from project construction activities. Because the increase in cancer and chronic non-cancer risks would be less than the current BAAQMD threshold of 10 in a million and a hazard index of 1.0, the project would not result in exposure of sensitive receptors to substantial DPM emissions, and impacts related to exposure to DPM emissions would be *less than significant* under the existing guidelines.

More than 90 percent of DPM emissions are comprised of particulates that are less than 2.5 microns ($PM_{2.5}$; SCAQMD, 2006). Therefore, the project's estimated annual increase in DPM emissions of 0.658 micrograms per cubic meter would also comprise the project's increase in $PM_{2.5}$. Because the increase in annual average $PM_{2.5}$ emissions would exceed the proposed BAAQMD threshold of 0.3 micrograms per cubic meter, sensitive receptors could be exposed to substantial $PM_{2.5}$ emissions, a *potentially significant* impact, although it should be noted that this draft threshold has not yet been adopted by the BAAQMD. This impact could be reduced to a less-than-significant level with implementation of **Mitigation Measure M-AQ-2, Use of Soot Filters**, which requires the use of soot filters on diesel equipment. Implementation of this mitigation measure would reduce project emissions by approximately 80 percent, so that mitigated project emissions (approximately 0.142 micrograms per cubic meter) would not exceed the BAAAMD threshold of 0.3 micrograms per cubic meter.

However, the draft BAAQMD significance thresholds specify a 1,000-foot radius zone of influence for the analysis of project impacts, in addition to use of the above thresholds. The draft BAAQMD guidelines do not provide guidance on how to apply this zone of influence when assessing a project's construction-related impacts. However, if all existing sources within 1,000 feet of the project site were to be considered in the impact assessment (as these thresholds imply), the above BAAQMD proposed thresholds could be exceeded from I-680 and Mission Boulevard alone and addition of project emissions would further aggravate exceedance of these thresholds (see Chapter 6, Other Topics Required by CEQA, for a discussion of emissions from trucks on I-680 and Mission Boulevard). Due to these uncertainties for applying the proposed 1,000-foot zone of influence to construction-related impacts, the project's incremental increase in DPM and $PM_{2.5}$ emissions is conservatively considered to be *potentially significant and unavoidable.*

Impact AQ-3: Odors generated during project construction and operation.

Objectionable nuisance odor problems are not expected to result from project construction as construction machinery would move up and down the alignment during construction, and would not remain stationary, thereby not allowing diesel fumes to accumulate in one area. There are no other objectionable odors expected from project construction. Therefore, the project's impacts related to objectionable odors during construction would be *less than significant*.

Objectionable nuisance odor problems are not expected to result from project operation because of the low biological content (and consequent anaerobic activity) of the potable water contained in the pipelines, as well as the enclosed nature of project facilities. Therefore, the project's impacts related to objectionable odors during operation would be *less than significant*.

Impact AQ-4: GHG emissions and conflicts with any applicable plans, policies, or regulations adopted for the purpose of reducing GHG emissions.

Project construction activities are estimated to occur over an approximately 27-month period, and the resulting exhaust emissions from off-road equipment, on-road trucking, and construction worker commuting traffic during this period are expected to contribute minimally to long-term regional increases in GHGs. No state or regional air quality agency has adopted a methodology or quantitative threshold that can be applied to a specific development or construction project to evaluate the significance of an individual project's contribution to GHG emissions, such as those that exist for priority pollutants. As described above, the BAAQMD does not have an adopted threshold of significant for construction-related GHG emissions, but does recommend that GHG emissions from construction equipment be quantified and disclosed. Pursuant to BAAQMD recommendations, this analysis quantifies the amount of GHGs that would be emitted with project implementation in relation to the total GHG emissions in the Bay Area and the state. The results of the URBEMIS2007 computer model presented in Table 5.7-5 indicate that average annual construction activities could generate 2,982 tons of CO_2 emissions in one year. Including other non-CO_2 GHG emissions, this amount equates to 3,006 "short" tons (2,733 metric tons) of CO_2-E emissions over a 12-month construction period.

The 2004 statewide annual GHG inventory is estimated at 500 million metric tons of CO_2-E emissions, while the 2007 Bay Area inventory is estimated at approximately 102.6 million metric tons. Emissions associated with project construction would represent approximately 5.5×10^{-4} (0.00055) percent of the statewide total, and approximately 2.7×10^{-3} (0.0027) percent of the Bay Area inventory.

Neither the current or draft BAAQMD guidelines specify a quantitative threshold for construction GHG emission). However, the contribution of GHG emissions from the proposed project would be extremely small in terms of both the statewide and Bay Area GHG emissions. The proposed project would implement SFPUC GHG-reduction actions specified above in Section 5.7.2.3, Climate Change and GHG Emissions, and would also be subject to existing CARB regulation (CCR Title 13, Section 2485), which limits idling of diesel-fueled commercial motor vehicles, and compliance with this regulation would further reduce GHG emissions associated with project construction vehicles. The project would not directly generate operational emissions (such as those generated at power plants or other industrial facilities) or result in a significant increase in energy demand that would result in 'secondary' GHG emissions.

Given the small amount of GHGs that would be emitted from the project during construction and operation, the proposed project would not conflict with the state's goals of reducing GHG emissions to 1990 levels by 2020, nor would it conflict with San Francisco's *Climate Action Plan's* goal of reducing GHG emissions established by the 2008 *Greenhouse Gas Reduction Ordinance*. In addition, the SFPUC is committed to implementing specific GHG reduction actions during construction, as described above in Section 5.7.2.3, Climate Change and GHG Emissions. Therefore, this impact would be *less than significant*. In addition, the SFPUC would implement exhaust control measures (**Mitigation Measure M-AQ-1b, BAAQMD Exhaust Control Measures** and **Mitigation Measure M-AQ-1c Additional Exhaust Control Measures**) that would further reduce construction-related GHG emissions.

Facility Siting, Operation, and Maintenance Impacts

Once the proposed improvements are completed, the SFPUC would continue to operate BDPL No. 3X and 4 in the same manner as before the project. Therefore, existing operational and maintenance practices for the BDPL system would continue at the same levels following completion of the proposed project, including regularly scheduled maintenance of project facilities. Air pollutant emissions associated with this maintenance traffic would similarly remain the same as existing conditions. As a result, project operation would have no impact related to compliance with air quality standards, emissions of criteria pollutants, exposure of sensitive receptors to pollutant concentrations, or greenhouse gas emissions.

5.7.4 Mitigation Measures

Mitigation Measure M-AQ-1a: BAAQMD Dust Control Measures

To reduce particulate emissions associated with project construction, the SFPUC or its contractor will implement the following BAAQMD-specified dust controls for the duration of construction activities:

1. <u>*BAAQMD Basic Control Measures*</u>
    - All active construction areas (including parking areas, soil piles, staging areas, graded areas, and unpaved access roads) will be watered at least twice daily.
    - All trucks hauling soil, sand, and other loose debris will be covered or will be required to maintain at least 2 feet of freeboard on public roads.

- All unpaved access roads, parking areas, and staging areas at construction sites will either be paved or watered three times daily, or be will have nontoxic soil stabilizers applied.

- All paved access roads, parking areas, and staging areas at construction sites will be swept daily (wet power vacuum street cleaners). All visible mud or dirt track-out onto adjacent public roads will be removed using wet power vacuum street cleaners at least once per day.

2. BAAQMD Enhanced Control Measures

   - All inactive construction areas (previously graded areas inactive for 10 days or more) will be hydroseeded or nontoxic soil stabilizers will be applied.

   - Exposed stockpiles (dirt, sand, etc.) will be enclosed, covered, and watered, or nontoxic soil binders will be applied.

   - As feasible, traffic speeds on unpaved roads will be limited to 15 miles per hour.

   - Sandbags or other erosion control measures will be employed to prevent silt runoff to public roadways.

   - Disturbed vegetation areas will be replanted as quickly as possible.

3. BAAQMD Optional Control Measures. These measures may be altered, supplemented or deleted during the BAAQMD's review process.

   - Wheel washers will be installed for all exiting trucks, or all trucks and equipment leaving the site will be washed off.

   - Excavation and grading activity will be suspended when winds exceed 25 miles per hour.

   - Post a publically visible sign with a telephone number and person to contact at the SFPUC about dust complaints. This person will respond and take corrective action within 48 hours. The phone number of the BAAQMD will also be visible to ensure compliance with applicable regulations.

Mitigation Measure M-AQ-1b: BAAQMD Exhaust Control Measures.

To limit exhaust emissions associated with the project, the SFPUC will implement the following BAAQMD-specified exhaust controls:

- Where feasible, grid power will be used rather than diesel generators to connect to grid power.

- Contract specifications will include CCR Title 13, Sections 2480 and 2485, which limit the idling of all diesel-fueled commercial vehicles (weighing over 10,000 pounds, both California- and non-California-based trucks) to 30 seconds at a school and five minutes at any other location. In addition, the use of diesel auxiliary power systems and main engines will be limited to five minutes when within 100 feet of homes or schools while the driver is resting.

- Contract specifications will include CCR Title 17, Section 93115, Airborne Toxic Control Measure for Stationary Compression Ignition Engines, which specifies fuel and fuel additive requirements; emission standards for operation of any stationary, diesel-fueled, or compression-ignition engine; and operation restrictions within 500 feet of school grounds when school is in session.

- A schedule of low-emissions tune-ups will be developed, and such tune-ups will be performed on all equipment, particularly for haul and delivery trucks. A log of required tune-ups will be maintained, and a copy of the log will be submitted to the SFPUC on a monthly basis for review.

- Low-sulfur fuels will be used in all stationary and mobile equipment.

Mitigation Measure M-AQ-1c: Additional Exhaust Control Measures.

To limit exhaust emissions associated with the project, the SFPUC will implement the following BAAQMD-specified exhaust controls in addition to those controls specified in Mitigation Measure M-AQ-1b:

- The SFPUC will implement additional mitigation measures to reduce exhaust emissions of NO_X from construction activities. The SFPUC will ensure that construction contract specifications include a requirement that on-road diesel trucks used to transport spoils consist of 2004 or newer model-year trucks with factory-built engines. All on-road diesel trucks will be required to have emission control labels as specified in 13 CCR 2183(c). The construction contract specifications will require that the contractor submit to the SFPUC a comprehensive inventory of all on-road trucks used to haul spoils. The inventory will include each vehicle's license plate number, the engine production year, and a notation of whether the truck is in possession of an emission control label as defined in 13 CCR. The contractor will update the inventory and submit it monthly to the SFPUC throughout the duration of the project.

- The SFPUC will ensure that construction contract specifications include a requirement that all off-road terrestrial diesel construction equipment (with the possible exception of certain types of very specialized construction equipment for which controls are not commercially available), is equipped with Tier 2 or 3 diesel engines as defined in 13 CCR 2485 and are equipped with Level 3 Diesel Emission Control Strategies as defined in 13 CCR 2700–2710. The construction contract specifications will require the contractor to submit a comprehensive inventory of all off-road construction equipment that will be used an aggregate of 8 hours or more during any portion of project construction. The inventory will include each vehicle's license plate number, horsepower rating, engine production year, and projected hours of use or fuel throughput for each piece of equipment. The contractor will update the inventory and submit it monthly to the SFPUC throughout the duration of the project.

Mitigation Measure M-AQ-2: Use of Soot Filters.

The SFPUC will include in the contract specifications a requirement that the construction vehicle fleet be equipped with soot filters (particulate traps).

5.7.5 References

Bay Area Air Quality Management District (BAAQMD), BAAQMD CEQA Guidelines, Assessing the Air Quality Impacts of Projects and Plans, revised, December 1999.

Bay Area Air Quality Management District (BAAQMD), Revised San Francisco Bay Area Ozone Attainment Plan for the 1-Hour National Ozone Standard. Adopted October 24, 2001.

Bay Area Air Quality Management District (BAAQMD), Bay Area 2005 Ozone Strategy. Adopted January 4, 2006.

Bay Area Air Quality Management District (BAAQMD), Source Inventory of Bay Area Greenhouse Gas Emissions. December 2008a.

Bay Area Air Quality Management District (BAAQMD), Annual Bay Area Air Quality Summaries, 2004–2008, available online at http://www.baaqmd.gov/pio/aq_summaries/index.htm, as of November 2009a.

Bay Area Air Quality Management District (BAAQMD), Ambient Air Quality Standards and Bay Area Attainment Status, available online at http://www.baaqmd.gov/Divisions/Planning-and-Research/Emission-Inventory-and-Air-Quality-Related/Air-Quality-Standards.aspx, as of November 22, 2009b.

Bay Area Air Quality Management District (BAAQMD), *California Environmental Quality Act, Final Draft Air Quality Guidelines,* available online at http://www.baaqmd.gov/~/media/Files/Planning%20and%20Research/CEQA/Final_Draft_BAAQMD_CEQA_Guidelines_November_12_2009.ashx, as of November 22, 2009c.

Bay Area Air Quality Management District (BAAQMD), *California Environmental Quality Act Guidelines Update, Proposed Thresholds of Significance*, available online at http://www.baaqmd.gov/~/media/Files/Planning%20and%20Research/CEQA/Proposed%20BAAQMD%20CEQA%20Air%20Quality%20Thresholds-Nov%202009.ashx, as of November 2, 2009d.

Bay Area Air Quality Management District (BAAQMD), Association of Bay Area of Governments (ABAG), and the Metropolitan Transportation Commission (MTC), 1999 Ozone Attainment Plan, June 1999.

California Air Resources Board (CARB), News release on Low Carbon Fuel Standard, available online at http://www.arb.ca.gov/newsrel/nr042309b.htm, as of April 23, 2009.

California Energy Commission (CEC), Inventory of California Greenhouse Gas Emissions and Sinks, December 2006.

California Energy Commission (CEC), Inventory of California Greenhouse Gas Emissions and Sinks: 1990 to 2004 – Final Staff Report, Publication CEC-600-2006-013-SF, Update January 23, 2007.

San Francisco Department of the Environment and San Francisco Public Utilities Commission (SFDE and SFPUC), *Climate Action Plan for San Francisco, Local Actions to Reduce Greenhouse Emissions*, September 2004.

South Coast Air Quality Management District (SCAQMD), *Final Methodology to Calculate PM2.5 and PM2.5 Significance Thresholds, Appendix A – Updated CEIDARS Table with PM2.5 Fractions,* October 2006), available online at http://www.aqmd.gov/CEQA/handbook/PM2_5/PM2_5.html, as of November 24, 2009.

5.8 Utilities and Service Systems

This section provides an assessment of potential impacts on utilities and service systems in the vicinity of the proposed project. Utilities and service systems discussed in this section include natural gas, electricity, telecommunications, stormwater drainage, water supply distribution systems, wastewater collection and treatment systems, and solid waste disposal. Mitigation measures to reduce potentially significant or significant impacts to a less-than-significant level are identified. Potential impacts related to energy and power issues are addressed in Section 5.13, Mineral and Energy Resources.

5.8.1 Setting

Table 3.2 in Chapter 3, Project Description, lists utility lines that cross the right-of-way (ROW) of BDPL Nos. 3 and 4 within the project area. These utilities are discussed below along with solid waste disposal facilities within the greater San Francisco Bay Area that could be used for disposal of construction-related wastes.

5.8.1.1 Public Utilities

Natural Gas

Natural gas in Fremont is served through a network of regional natural gas pipelines owned by Pacific Gas and Electric Company (PG&E). Natural gas pipelines in the project vicinity generally range from 2 to 6 inches in diameter. Two existing gas lines would conflict with the proposed improvements: an inactive 6-inch-diameter steel gas line along Mission Boulevard and a 2-inch-diameter plastic gas line along Nugget Way (URS, 2008).

Electricity

PG&E provides electricity to the city of Fremont. Electrical conduits and associated street lighting along Mission Boulevard and the associated I-680 on-ramps are owned by Caltrans. Two existing electrical lines conflict with the proposed BDPL No. 3X alignment: an underground 21-kilovolt PG&E primary line along Nugget Way and underground PG&E 240-/480-volt electrical line along Mission Boulevard that provides service for nearby street lights. An electrical conduit also crosses the BDPL Nos. 3 and 4 ROW above the existing corrugated-metal pipeline segment CMP2.

Telecommunications

AT&T, Comcast, XO Communication, and MCI/OSP National Support Investigations provide communication services in the project vicinity. The proposed pipeline alignment would cross two existing AT&T lines, at Mission Boulevard and Nugget Way, respectively. At Mission Boulevard, six 4-inch conduits run east and west within a 2-foot by 3-foot cement box.

Stormwater Drainage

Stormwater drainage infrastructure within the project area consists of typical storm drain inlets and drainage conveyance pipes that are owned by Caltrans and the City of Fremont. Near the southbound diamond on-ramp to I-680, an 18-inch storm drain line owned by Caltrans crosses the existing BDPL Nos. 3 and 4 ROW.

Two creeks, Agua Caliente and Agua Fria Creeks, traverse the proposed pipeline alignment. Within most of the project area, Agua Caliente Creek is contained within an 8-foot by 10-foot concrete culvert owned by Caltrans. The Agua Caliente Creek culvert runs at varying depths of at least 20 feet below ground surface.

Agua Fria Creek enters the project area at a culvert beneath I-680. Downstream of this culvert, approximately 1,000 feet of creek—including the 80-foot section that crosses the BDPL Nos. 3 and 4 ROW—flows as a natural drainage to the culvert at the west end of the Extended Stay Hotel parking lot. The remainder of the creek is contained in either a belowground concrete storm drain or an engineered flood control channel that discharges to Coyote Creek, which ultimately flows to San Francisco Bay approximately 3.2 miles to the west.

The Alameda County Flood Control and Water Conservation District maintains all of the creeks, culverts, and larger stormwater pipelines in the project area. The City of Fremont maintains the inlets and smaller stormwater lines.

Water Supply Distribution Systems

The Alameda County Water District (ACWD) provides potable water to the cities of Fremont, Newark, and Union City. ACWD's supply sources include the State Water Project (40 percent), water purchased from the SFPUC (20 percent), and local groundwater supplies from the Niles Cone Groundwater Basin (40 percent) (ACWD, 2009).

Several water distribution lines owned by ACWD and Caltrans are within the project area. Two potable water mains belonging to ACWD run along both the north and south sides of Mission Boulevard and across the BDPL Nos. 3 and 4 ROW; these water mains are 30 and 12 inches in diameter, respectively. Caltrans owns several small irrigation lines within the landscaped areas of the Mission Boulevard/I-680 intersection that also cross the ROW.

Wastewater Collection and Treatment Systems

Wastewater collection and treatment services in Fremont are provided by Union Sanitary District, which also serves Newark and Union City. The proposed pipeline alignment crosses one sanitary sewer line at Mission Boulevard with a pipeline diameter of 10 inches, and one sanitary sewer line at Nugget Way with a pipeline diameter of 8 inches. The sewer lines operate by gravity.

Solid Waste Disposal

Solid waste disposal facilities located in Alameda and Santa Clara Counties could be utilized to dispose of project-related construction waste. The eight active landfills within Alameda and Santa Clara Counties are the Altamont Landfill and Resource Recovery Center, Vasco Road Sanitary Landfill, City of Palo Alto Refuse Disposal Site, Guadalupe Sanitary Landfill, Kirby Canyon Recycling and Disposal Facility, Newby Island Landfill, Zanker Material Processing Facility, and Zanker Road Resource Recovery Operations Landfill. Active landfills in Alameda and Santa Clara Counties and their characteristics are listed in **Table 5.8-1**. The total remaining capacity of these landfills is approximately 145,828,000 cubic yards (CIWMB, 2009a).

5.8.2 Regulatory Framework

5.8.2.1 California Public Utilities Commission

The California Constitution vests the California Public Utilities Commission (CPUC) with the sole authority to regulate privately owned and investor-owned public utilities. This exclusive power extends to all aspects of utility regulation, including facility location, design, construction, maintenance, and operation. CPUC provisions require regulated utilities to work closely with local governments and give due consideration to their concerns.

5.8.2.2 California Integrated Waste Management Act of 1989

The California Integrated Waste Management Act of 1989 (Public Resources Code [PRC], Division 30), enacted through Assembly Bill (AB) 939 and modified by subsequent legislation, requires all California cities and counties to implement programs to reduce, recycle, and compost at least 50 percent of wastes by the year 2000 (PRC Section 41780). A jurisdiction's diversion rate is the percentage of total waste that it diverts from disposal through reduction, reuse, and recycling programs. The state determines compliance with this mandate to divert 50 percent of generated waste (which includes both disposed and diverted waste) through a complex formula. This formula requires cities and counties to conduct empirical studies to establish a "base-year" waste generation rate against which future diversion is measured. The actual determination of the diversion rate in subsequent years is arrived at through deduction instead of direct measurement. Rather than counting the amount of material recycled and composted, the city or county tracks the amount of material disposed of at landfills and then subtracts that amount from the base-year amount; the difference is assumed to be diverted (PRC Section 41780.2). As of 2006, the most recent year for which jurisdiction summary information is available, Fremont's diversion rate was 63 percent; this rate is consistent with AB 939 (CIWMB, 2009b).

5.8.2.3 Utility Notification Requirements

Title 8, Section 1541 of the California Code of Regulations requires excavators to determine the approximate locations of subsurface installations such as sewer, telephone, fuel, electric, and water lines (or any other subsurface installations that may reasonably be encountered during excavation work) prior to opening an excavation.

TABLE 5.8-1
ACTIVE LANDFILLS IN ALAMEDA AND SANTA CLARA COUNTIES

Jurisdiction	Total Estimated Permitted Capacity[a] (cubic yards)	Total Estimated Capacity Used[b] (cubic yards)	% Used[b]	Remaining Estimated Capacity[a,c] (cubic yards)	Remaining Capacity Date[c]	% Remaining Capacity[b]	Closure Date[a,d]	Waste Types Accepted/Permitted
Alameda County								
Altamont Landfill and Resource Recovery	62,000,000	16,280,000	26%	45,720,000	As of 08/22/05	74%	1/1/2029	Ash, construction/demolition, contaminated soil, green materials, industrial, mixed municipal, other designated, tires, shreds
Vasco Road Sanitary Landfill	31,942,205	22,071,501	69%	9,870,704	As of 03/01/2006	31%	1/1/2015	Contaminated soil, industrial, mixed municipal, other designated, green materials, construction/demolition
Santa Clara County								
City of Palo Alto Refuse Disposal Site	7,758,854	6,969,672	90%	789,182	As of 05/01/05	10%	12/30/2011	Construction/demolition, industrial, mixed municipal
Guadalupe Sanitary Landfill	16,500,000	3,837,211	23%	12,662,789	As of 06/11/01	77%	1/1/2010	Construction/demolition, green materials, industrial, mixed municipal
Kirby Canyon Recycling and Disposal Facility	36,400,000	20,871,507	57%	57,270,507	As of 06/11/01	43%	12/31/2022	Construction/demolition, industrial, tires, green materials, mixed municipal
Newby Island Landfill	50,800,000	32,525,047	64%	18,274,953	As of 9/30/06	36%	6/1/2025	Construction/demolition, contaminated soil, green materials, industrial, mixed municipal, sludge (biosolids), tires
Zanker Material Processing Facility	540,100	0	0%	540,100	As of 04/01/04	100%	12/31/2018	Construction/demolition, other designated
Zanker Road Resource Recovery Operations Landfill	3,200,000	2,500,000	78%	700,000	As of 05/16/06	22%	01/01/2029	Construction/demolition, green materials, industrial, tires

[a] Capacity information from Solid Waste Information System (SWIS) Facility/Site Listings (CIWMB, 2009a).
[b] Calculated using CIWMB 2009a data.
[c] Remaining capacity is the estimated volumetric capacity as reported to the Financial Assurances Branch annually by the owner/operator of the facility, or the most current information from a new or revised permit or closure plan. The remaining capacity date is from the SWIS Facility/Site Listings and represents the date of the document used to retrieve remaining capacity information.
[d] The closure date is the estimated date when the facility will reach its permitted capacity. That date is found in or estimated from information in the current permit or permit application, including the approved closure plan for the facility.

California law (California Government Code Section 4216 et seq.) requires owners and operators of underground utilities to become members of and participate in a regional notification center, such as Underground Service Alert—Northern California (USA North). USA North receives planned excavation reports from public and private excavators, and transmits that information to all participating members who may have underground facilities at the location of an excavation. USA members mark or stake their facilities, provide information, or give clearance to dig.

5.8.2.4 Alameda County Requirements for Demolition and Construction Waste

Alameda County Measure D (the Alameda County Source Reduction and Recycling Initiative Charter Amendment) requires that Alameda County prepare a source reduction and recycling plan for reaching a 75 percent diversion goal by 2010, exceeding the 50 percent diversion goal for individual jurisdictions mandated by AB 939. The plan identifies specific programs, objectives, and strategies. The Alameda County Source Reduction and Recycling Board, created by Measure D, implements this plan.

Additionally, the Alameda County Waste Management Authority adopted the *Alameda County Integrated Waste Management Plan* (2003), which identifies waste diversion plans and programs. The plan promotes interjurisdictional cooperation to achieve the goal of 75 percent by 2010. This goal includes the diversion of construction and demolition waste, and the Waste Management Authority encourages member cities to mandate construction and demolition debris recycling. A model ordinance requires 100 percent diversion of all Portland cement concrete and asphalt concrete and an average of at least 50 percent diversion of all other construction and demolition debris.

The Waste Management Authority is also responsible for implementing the *Alameda County Hazardous Waste Management Plan* (1995) which seeks to protect public health and safety and the environment by eliminating land disposal of untreated hazardous wastes; helping businesses and households reduce the production of hazardous wastes and manage their remaining wastes effectively; and reducing hazardous waste volumes generated countywide.

5.8.2.5 City of Fremont Requirements for Demolition and Construction Waste

The City of Fremont is a member of the Alameda County Waste Management Authority. Article 9 of Fremont's integrated waste management ordinance (Ordinance No. 2112, Section 2, 2-28-95) requires construction/demolition projects with a total permit valuation greater than $300,000 to reuse or recycle 100 percent of asphalt and concrete and 50 percent of remaining debris. This requirement reflects the model ordinance contained in the *Alameda County Integrated Waste Management Plan*. The Waste Management Authority developed the model ordinance to promote achievement of its 75 percent diversion goal by 2010, which exceeds the 50 percent diversion goal of AB 939.

To comply with these requirements, construction/demolition permit applicants must submit a waste handling plan to the Fremont Environmental Services Division for approval prior to demolition/construction. The plan must list the amount and type of debris that will be generated by a project. Within 30 days after completion of demolition/construction activities, the project sponsor must submit a debris diversion and disposal report to the Fremont Environmental Services Division documenting the actual tonnage or volume of material recycled and disposed of (City of Fremont, 2009).

The SFPUC is not subject to the Fremont building code (for a detailed discussion of intergovernmental immunity, refer to Chapter 4, Plans and Policies, Section 4.2.1.1, Extraterritorial Lands) and, therefore, would not obtain building or demolition permits from the City of Fremont which trigger the waste handling plan submission requirements discussed above. However, these local requirements are relevant to the significance criteria under CEQA, which require an analysis of a proposed project's compliance with federal, state, or local statutes and regulations related to solid waste.

5.8.3 Impacts

5.8.3.1 Significance Criteria

The City and County of San Francisco has not formally adopted significance standards for impacts related to utilities and service systems, but generally considers that implementation of the proposed project would have a significant impact on these systems if it were to:

- Exceed wastewater treatment requirements of the applicable Regional Water Quality Control Board;
- Require or result in the construction of new water or wastewater treatment facilities or expansion of existing facilities, the construction of which could cause significant environmental effects;
- Require or result in the construction of new stormwater drainage facilities or expansion of existing facilities, the construction of which could cause significant environmental effects;
- Have insufficient water supply available to serve the project from existing entitlements and resources, or require new or expanded water supply resources or entitlements;
- Result in a determination by the wastewater treatment provider that would serve the project that it has inadequate capacity to serve the project's projected demand in addition to the provider's existing commitments;
- Be served by a landfill with insufficient permitted capacity to accommodate the project's solid waste disposal needs; or
- Be out of compliance with federal, state, or local statutes and regulations related to solid waste.

This section specifically addresses impacts on utilities and service systems, including solid waste disposal. Due to the nature of the proposed project, this EIR applies the following additional criterion, in addition to those described above, and considers that the project would have a significant effect on utilities and service systems if it were to:

- Disrupt operation or require relocation of local utilities.

5.8.3.2 Approach to Analysis

Due to the nature of the proposed project, there would be no impacts related to the following criteria, or the following impacts would not be applicable to the project; therefore, no impact discussion is provided for these topics for the reasons described below:

> *Water and wastewater treatment requirements and wastewater treatment capacity.* The proposed project would result in improvements to BDPL Nos. 3 and 4, which are existing components of the SFPUC regional water system. No new water supply facilities would be constructed and the existing facilities would not be expanded or enlarged under the proposed project. The project would also have no effect on wastewater treatment requirements as designated by the San Francisco Bay Regional Water Quality Control Board, and would not require construction or expansion of wastewater facilities or increase wastewater demand. Thus, impacts related to water and wastewater treatment and capacity are *not applicable* to the project.
>
> *Stormwater drainage facilities.* The proposed project would include connections to the Agua Caliente culvert beneath Mission Boulevard and I-680 and would require protection and relocation of other storm drainage facilities owned by the city of Fremont and Caltrans in the vicinity of the I-680 northbound diamond and loop on-ramps. Minor upgrades could also be made to the curbs and gutters of the storm drain system on Mission Boulevard to manage flows in the event of a break in BDPL No. 4. However, construction of new stormwater drainage facilities or expansion of existing stormwater facilities would not be required to accommodate increased flows during construction. During operation, substantial increased flows to the system would only be anticipated after a major seismic event, and not during normal operation and maintenance activities. Therefore, there would be *no impact* related to the need for new stormwater drainage facilities or expansion of existing facilities as a result of project implementation. Impacts related to the relocation of existing stormwater conveyance facilities during construction are discussed below. Stormwater drainage issues as they relate to hydrology and water quality are addressed in Section 5.11, Hydrology and Water Quality.
>
> *Sufficient water supply.* The project would not use large amounts of water, require additional water supply, or require new or expanded water supply resources or entitlements during construction or operation. Thus, impacts related to water supply are *not applicable* to the project.

The analysis of project effects related to utilities and service systems focuses on temporary construction-related impacts. Project implementation would not have a direct, long-term impact on public utilities. However, during construction, short-term temporary disruption of service could occur if existing utilities were accidentally damaged during relocation or other project-related construction activities. Nevertheless, as discussed in Chapter 3, Project Description, the SFPUC would enter into agreements with utility providers for relocation of underground utilities that cross the BDPL Nos. 3 and 4 ROW to ensure that disruptions to service do not occur. Project implementation would not have direct long-term impacts on the demand for public utilities.

This analysis also identifies potential impacts on landfill capacity due to the disposal of construction waste. The largest potential source of solid waste is excavated soil. While it is expected that much of the soil would be reused onsite as backfill and that most of the excess soil would be recycled or reused offsite, a portion of the excess soil could be disposed of in landfills; thus, the potential effects of such disposal on the available capacity of local landfills are included in the analysis.

5.8.3.3 Impact Analysis

Summary of Impacts

Table 5.8-2 summarizes the potential utilities and service system impacts and the significance of project impacts before and after mitigation.

TABLE 5.8-2
SUMMARY OF IMPACTS – UTILITIES AND SERVICE SYSTEMS

Impact	Significance Determination Before Mitigation	Significance Determination After Mitigation
Impact UT-1: Relocation or temporary damage to or disruption of existing regional or local public utilities.	PS	LS
Impact UT-2: Reduction in solid waste landfill capacity.	LS	–
Impact UT-3: Impacts related to compliance with federal, state, and local statutes and regulations related to solid waste.	S	LS

LS = Less than Significant impact
PS = Potentially Significant impact
S = Significant impact
SU = Significant and Unavoidable impact, even with mitigation incorporated
– = Mitigation not required

Construction Impacts

Impact UT-1: Relocation or temporary damage to or disruption of existing regional and local public utilities.

As discussed in Chapter 3, Project Description, a number of underground utility lines cross the BDPL Nos. 3 and 4 ROW where construction would occur, including water supply, natural gas, electrical, sanitary sewer, and storm drainage lines (see Table 3.2 in Chapter 3). Without protection or relocation, these utilities could be damaged, resulting in safety hazards and/or disruption of utility service. The SFPUC has identified potentially affected utilities that would require protection and/or relocation. The affected utilities and preliminary plans for management of these utilities are as follows:

- The Caltrans/city of Fremont storm drain system in Zone 7 would be slightly modified to accommodate temporary roadway alignments used to detour traffic around the construction zone. These modifications could include temporary relocation and/or construction of new storm drainage pipes and drop inlet structures.

- The 10-inch sanitary sewer line In Zone 7, which is owned and operated by Union Sanitation District, would be relocated to avoid conflicts with the construction of the proposed BDPL No. 3X.

- The 8-inch sanitary sewer line in Zone 8, which is owned and operated by the Union Sanitation District, would remain in service, but would be protected during construction.

- The 12-inch and a 30-inch water supply distribution pipeline owned by ACWD would be relocated in Zone 7. The replacement pipelines would connect to the existing water lines on either side of the BDPL No. 3 and 4 ROW.

- The 6-inch natural gas pipeline on Mission Boulevard (Zone 7) owned by PG&E would be removed to allow for project construction activities. The line would be replaced when BDPL No. 3X construction is completed. Only temporary service interruptions are anticipated for the removal of the 6-inch pipeline on Mission Boulevard.

- The 2-inch gas pipeline owned by PG&E on Nugget Way (Zone 8) would be supported in place during construction. If the "support in place" option is not feasible, removal of this gas line would require a gas truck to temporarily supply gas to local residents for up to two months.

- The 2-inch electrical line in Zone 8 would be de-energized. New underground pull boxes[1] would be installed on the north side of the BDPL Nos. 3 and 4 ROW and between the existing BDPL No. 3 and No. 4 at Nugget Way, and the portion that conflicts with the BDPL No. 3X construction would be demolished. This line would be replaced after the new BDPL No. 3X is installed. The backup option is to de-energize this line and support the electrical line in place during construction.

- The 2-inch PG&E electrical line along Mission Boulevard in Zone 7 would be de-energized. Pull boxes would be installed underground on the south side of the BDPL Nos. 3 and 4 ROW and along Mission Boulevard, approximately 140 feet to the north of the ROW. Temporary power would be installed and the portion that conflicts with the BDPL No. 3X construction would be demolished. This line would be replaced after the new BDPL No. 3X is installed. Only temporary interruption of service would be required to make these changes.

- The AT&T communication line in Zone 7 (Mission Boulevard) would be relocated approximately 5 to 8 feet from its current position and temporarily supported/hung from supports above the construction work area. It might also be necessary to remove and alter the existing 2-foot by 3-foot cement conduit boxes and manholes and to splice the existing cable to the new cable for the line crossing Mission Boulevard. The line in Zone 8 (Nugget Way) would be supported in place during construction.

- The Agua Caliente culvert beneath Mission Boulevard and I-680 would be modified to accept drainage from the modified slip-joint vault and the proposed articulated vault. In addition, upgrades could also be made to the curbs and gutters of the storm drain system on Mission Boulevard to accommodate flows in the event that BDPL No. 4 ruptured at this location.

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[1] An underground electrical pull box provides an access point in long runs of cable to make it easier to pull the cable from one end of the run to the other.

- City of Fremont street lighting in Zone 7 would be denergized and the portion that conflicts with the BDPL No. 3X construction would be demolished. This lighting would be replaced after the new BDPL No. 3X is installed. The city of Fremont or construction contractor would provide temporary street lighting during construction.
- The 18-inch Caltrans storm sewer line in Zone 2 would not be affected during construction, but would be protected from damage.

Either the SFPUC or utility provider would be responsible for relocating and protecting these utilities during construction. For each affected utility provider, an agreement would be completed by the SFPUC and utility agency, as specified in Chapter 3 (see Section 3.7.4, Other Actions). The agreement would specify appropriate procedures for managing the utilities to avoid damage and disruption to service or for providing alternate service if service disruption were required. However, due to the presence of numerous known underground utility lines within and adjacent to the project area, relocation of existing utilities, potential damage to these existing utilities, and/or temporary service disruptions would be considered a *potentially significant* impact. These impacts would be reduced to a less-than-significant level with implementation of Mitigation Measures **M-UT-1a, Preconstruction Utility Identification and Coordination; M-UT-1b, Protection of Other Utilities During Construction; M-UT-1c, Advance Notification; and M-UT-1d, Emergency Response Plan and Notification.** These measures require the SFPUC to appropriately locate and mark utility locations; protect existing utilities during construction; provide nearby residents, owners, and businesses advance warning of any utility disruptions; and prepare an emergency response plan identifying measures to be taken in the event of a leak or explosion resulting from a utility rupture.

Impact UT-2: Reduction in solid waste landfill capacity.

Project implementation would result in the generation of waste materials, including construction debris, demolition materials, and excavated spoils that could reduce landfill capacity. The largest potential source of solid waste would be excavated soil. The solid waste facilities listed in Table 5.8-1 are permitted to accept construction/demolition waste, including clean soil, and have a total remaining capacity of approximately 145 million cubic yards. With the exception of the Guadalupe Sanitary Landfill and the City of Palo Alto Refuse Disposal Site, all landfills listed in Table 5.8-1 are able to accept clean excavated materials during the period of 2012 through 2014, which coincides with the project schedule. Three landfills (Newby Island Landfill in Santa Clara County, and Altamont Landfill and Resource Recovery and Vasco Road Sanitary Landfill in Alameda County) are permitted to accept contaminated soil.

As discussed in Chapter 3, Section 3.5.7, Fill Placement, the estimated cut and fill quantities for the entire project would be approximately 41,600 cubic yards and 13,300 cubic yards, respectively, resulting in approximately 28,300 cubic yards of soil requiring offsite reuse or disposal. As further discussed in Section 5.12, Hazards and Hazardous Materials, an environmental site assessment for the project area (AEW, 2009) indicated that the excavated soil has a low potential to contain hazardous materials; in addition, analysis of soil samples from the geotechnical investigation (WIP, 2004) indicated that the soil would likely be suitable for reuse as construction fill or could be disposed of at a conventional disposal facility. If reuse is not viable, the soil would be disposed of at a conventional disposal site such as the Newby Island Landfill, Altamont Landfill and Resource Recovery, or Vasco Road Sanitary Landfill. The quantity of soil that would require offsite disposal represents a negligible fraction of the total remaining landfill capacity; therefore, impacts related to a reduction in solid waste landfill capacity would be *less than significant.*

Impact UT-3: Impacts related to compliance with federal, state, and local statutes and regulations related to solid waste.

This analysis focuses on compliance with federal and state statutes related to solid waste as a significance threshold, but also includes consideration of local regulations.

The CIWMB found that Fremont achieved the State of California's 50 percent solid waste diversion goal between 1999 and 2006[2] (CIWMB, 2009b). Project construction would result in the generation of an estimated 28,300 cubic yards of soil requiring offsite reuse or disposal. While the precise quantity of total waste materials to be disposed of in nearby landfills (which, in addition to excavated soil, includes certain construction debris and demolition materials) is not known at this time, the SFPUC intends to reuse or recycle 100 percent of asphalt and concrete and 50 percent of remaining debris in accordance with the City of Fremont's waste management ordinance (see Section 3.5.8, Removal of Construction and Demolition Debris in Chapter 3, Project Description). Compliance with these requirements would be consistent with Fremont's waste diversion rates for the purpose of calculating compliance with the California Integrated Waste Management Act. However, if the total amount of construction related waste were not reused or recycled in accordance with the City of Fremont's waste management ordinance, impacts related to compliance with federal, state, and local solid waste statutes would be considered *significant*. Development of a waste management plan (**Mitigation Measure M-UT-3, Waste Management Plan**), which requires the reuse or recycling of 100 percent of asphalt and concrete and 50 percent of remaining debris would ensure that the amount of excavated soil and construction debris brought to local landfills would be reduced to a less than significant level.

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2 Diversion rates for 2007 and 2008 are not available as of July 1, 2009.

Facility Siting, Operation, and Maintenance Impacts

Following completion of proposed improvements to BDPL Nos. 3 and 4, pipeline operations would be consistent with existing operations, and pipeline maintenance would occur as needed. While project facilities would be monitored regularly in accordance with the standard inspection schedule, the frequency of monitoring or maintenance activities would not change substantially from current conditions and operation of the improved pipelines would have a less-than-significant effect on utilities and service systems.

5.8.4 Mitigation Measures

Mitigation Measure M-UT-1a: Preconstruction Utility Identification and Coordination.

Prior to construction activities, the SFPUC or its contractor(s) will locate overhead and underground utility lines, such as natural gas, electricity, sewer, telephone, fuel, and water lines, that may be encountered during excavation work. Pursuant to state law, the SFPUC or its contractor(s) will notify USA North to locate underground utilities prior to conducting any ground-disturbing activities. Information regarding the exact location of existing utilities will be marked and confirmed before construction activities begin. Utilities may be located by customary techniques such as geophysical methods and hand excavation.

The SFPUC or its contractor(s) will notify all affected utility service providers in advance of the project construction plans and schedule. The SFPUC or its contractor(s) will make arrangements with these entities regarding the protection, relocation, or temporary disconnection of services prior to the start of construction, and promptly reconnect services, as required.

Mitigation Measure M-UT-1b: Protection of Other Utilities during Construction.

Detailed specifications will be prepared as part of the design plans to include procedures for the excavation, support, and fill of areas around subsurface utilities, cables, and pipes. If it is not feasible to avoid an overhead utility line during pipeline construction, the SFPUC or its contractor(s) will coordinate with the affected utility owner to either temporarily or permanently support the line, or to de-energize the line while temporarily supporting the overhead line.

Mitigation Measure M-UT-1c: Advance Notification.

Two to four days prior to construction, the SFPUC or its contractor(s) will provide advance notification to residents and businesses that could be affected by a potential utility service disruption. The notification will provide information about the timing and duration of the potential service disruption.

Mitigation Measure M-UT-1d: Emergency Response Plan and Notification.

The SFPUC or its contractor(s) will develop an emergency response plan prior to commencing construction activities that identifies response measures in the event of a leak or explosion resulting from a utility rupture. In addition, the SFPUC or its contractor(s) will notify local fire departments any time damage to a gas utility results in a leak or suspected leak, or whenever damage to any utility results in a threat to public safety.

Mitigation Measure M-UT-3: Waste Management Plan.

The SFPUC will require construction contractor(s) to prepare a waste management plan and submit the plan to the SFPUC for review and approval. A copy of the plan will be given to the City of Fremont. The plan will include:

- Identification of the types of debris that will be generated by the project and how all waste streams will be handled
- Actions to reuse or recycle construction debris and clean excavated soil to the extent feasible
- Actions to divert 100 percent of asphalt and concrete and 50 percent of remaining construction debris from disposal in a landfill.

Upon project completion, the contractor will be required to submit a debris diversion and disposal report to the SFPUC documenting the actual tonnage or volume of material recycled and disposed of, and stating that the waste reuse, recycling, and disposal requirements set forth above have been achieved.

5.8.5 References

AEW Engineering, Inc., *Final Regulatory Agency Database, Aerial Photograph, and Historic Map Review Report, Seismic Upgrade of BDPL Nos. 3 and 4 at Hayward Fault Project, Alameda County, California,* February, 2009.

Alameda County Waste Management Authority, *Alameda County Integrated Waste Management Plan*, February 26, 2003.

Alameda County Waste Management Authority, *Alameda County Hazardous Waste Management Plan*, November, 1995.

Alameda County Water District (ACWD), Alameda County Water District Fact Sheet. Available online at http://www.acwd.org/fact_sheet.php5. Accessed February 8, 2009.

California Integrated Waste Management Board (CIWMB), Solid Waste Information System (SWIS) Solid Waste Facility/Site Search. Available online at http://www.ciwmb.ca.gov/SWIS/Search.aspx. Accessed September 24, 2009a.

California Integrated Waste Management Board (CIWMB), Jurisdiction Diversion Rate Summary for Fremont. Available online at http://www.ciwmb.ca.gov/LGTools/MARS/DrmcMain.asp?VW=In. Accessed July 1, 2009b.

City of Fremont, Environmental Services Division, Waste Handling Guidelines. Revised January 2009.

URS Corporation, *Final Conceptual Engineering Report, Seismic Upgrade of Bay Division Pipelines Nos. 3 and 4 at Hayward Fault*. Prepared for the San Francisco Public Utilities Commission, October 14, 2008.

Water Infrastructure Partners (WIP), Geotechnical Investigation, Seismic Upgrade of BDPL Nos. 3 and 4 at the Hayward Fault Zone Crossing, May 18, 2004.

5.9 Biological Resources

This section discusses the potential impacts on biological resources associated with construction and operation of the proposed project. The existing biological setting is described, regulations and guidelines relevant to biological resources are presented, the potential effects on biological resources are analyzed, and mitigation measures for significant impacts are identified.

5.9.1 Setting

5.9.1.1 Methodology

The information on natural communities, plant and animal species, and sensitive-status biological resources presented in this section is based on California Department of Fish and Game (CDFG) and U.S. Fish and Wildlife Service (USFWS) data on the Niles and Milpitas U.S. Geological Survey (USGS) 7.5-minute topographic quadrangle maps (CDFG, 2008b; USFWS, 2008) and reconnaissance-level site visits conducted by biologists of Darnell Shaw Environmental to assess the potential occurrence of these resources in the project area (DSE, 2009b). Site visits were conducted in March, June, and July 2007, and January, March, and October 2008.

A tree survey conducted in December 2008 addressed trees that could potentially be affected by construction activities. Trees were identified to the species level, measured, assessed for health, and tagged (ESA+Orion, 2009). Wetlands within the project area were delineated in accordance with the routine onsite method described in the U.S. Army Corps of Engineers (Corps) Wetlands Delineation Manual (Environmental Laboratory, 1987) and guidance provided in the Arid West Interim Regional Supplement to this manual (Corps, 2006). The results of the wetland delineation, which are being verified by the Corps, are reported in the *Delineation of Waters of the United States, Including Wetlands, Seismic Upgrade of Bay Division Pipeline Nos. 3 and 4 at Hayward Fault, Fremont, California* (DSE, 2009a).

5.9.1.2 Natural Communities and Wildlife Habitat

The plant species that exist in the project area comprise a range of natural communities that provide habitat for various wildlife species. **Table 5.9-1** lists these natural communities and their acreages. **Figure 5.9-1** shows the distribution of these communities within the project area.

Ruderal

Ruderal communities occur over approximately 47 percent of the project area, in parts of the SFPUC right-of-way (ROW) and in Staging Area 4. They occur on compacted, plowed, or otherwise disturbed soil of "waste" areas, such as abandoned farms or development sites. Ruderal plant species are usually non-native annuals that produce many seeds in a short amount of time; they are typically pioneer species—i.e., the first to colonize a disturbed area. Ruderal plant species in the project area include: black mustard (*Brassica nigra*); shortpod mustard (*Hirschfeldia incana*); wild mustard (*Brassica kaber*); broadleaf filaree (*Erodium botrys*); redstem filaree

TABLE 5.9-1
NATURAL COMMUNITIES IN THE PROJECT AREA

Natural Community	Acres
Ruderal	14.1
Non-Native Annual Grassland	8.3
Other (paved or bare)	6.2
Central Coast Riparian Scrub	0.4
Freshwater Seep	0.3
Total	**29.3**

SOURCE: DSE, 2009b.

(*Erodium cicutarium*); white stem filaree (*Erodium moschatum*); cheeseweed (*Malva parviflora*); and many of the annual grasses found in the non-native annual grassland.

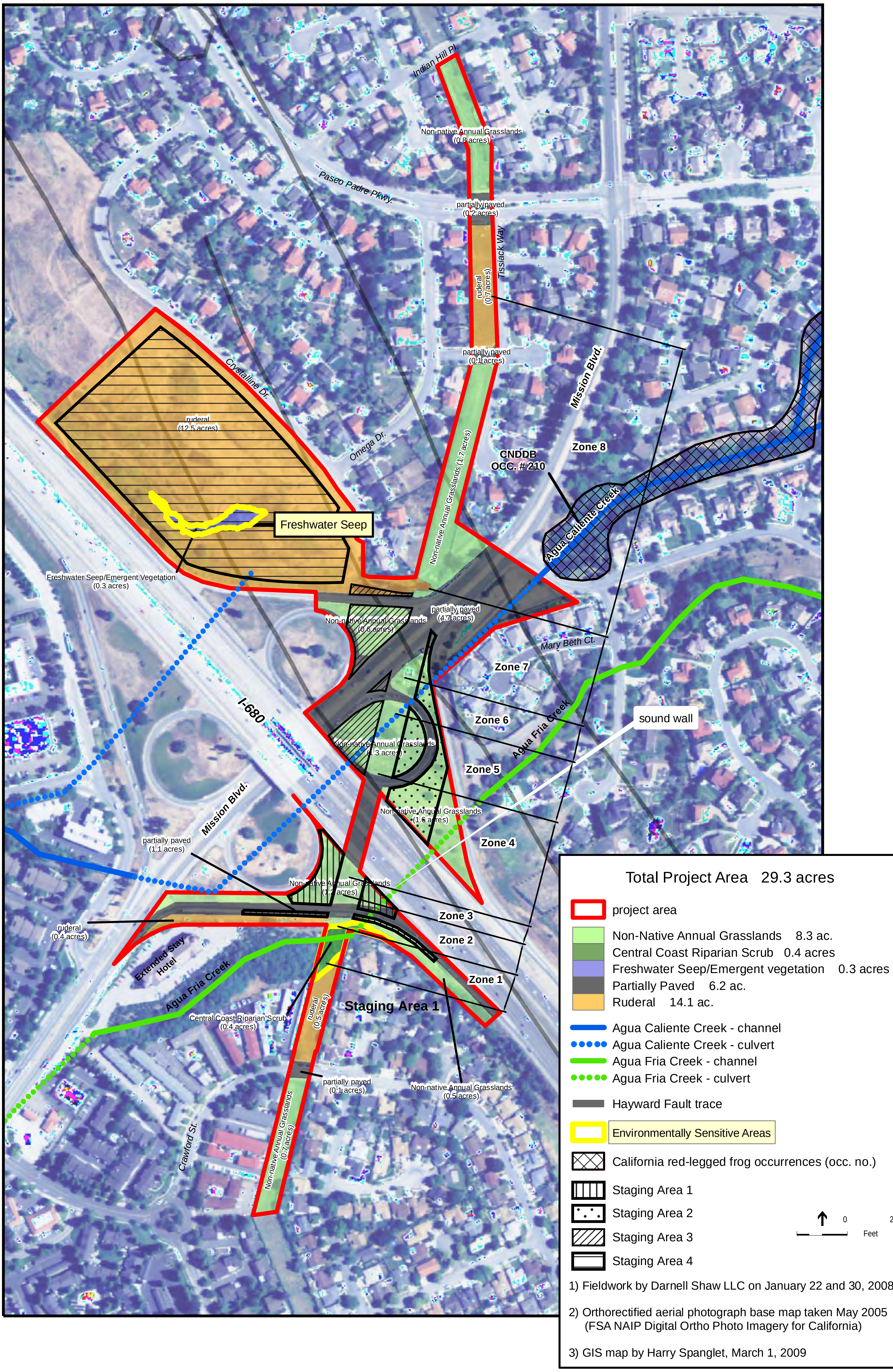
Wildlife common to ruderal communities include western fence lizard (*Sceloporus occidentalis*); gopher snake (*Pituophis catenifer*); and California ground squirrel (*Spermophilus beecheyi*). Ruderal communities can provide foraging habitat for bird and mammal predators such as the red-shouldered-hawk (*Buteo lineatus*); red-tailed hawk (*Buteo jamaicensis*); white-tailed kite (*Elanus leucurus*) (pair observed in the project area); and non-native red fox (*Vulpes vulpes*) (individual observed in the project area). Other wildlife species observed in this natural community are California mule deer (*Odocoileus hemionus californicus*) and red-winged blackbird (*Agelaius phoeniceus*) (bicolored form).

Non-native Annual Grassland

Non-native annual grassland occurs over approximately 28 percent of the project area, and is the second most common type. It occurs along much of the ROW and within Staging Areas 1, 2, and 3. The non-native annual grassland species within the project area are homogenous and limited in diversity. Non-native grasses most common in this natural community in the project area are: slender wild oat (*Avena barbata*); wild oat (*Avena fatua*); ripgut brome (*Bromus diandrus*); Mediterranean barley (*Hordeum marinum* ssp. *gussonianum*); soft cheat grass (*Bromus hordeaceus*), hare barley (*Hordeum murinum* ssp. *leporinum*); foxtail barley (*Hordeum jubatum*); perennial ryegrass (*Lolium perenne*); Italian ryegrass (*Lolium multiflorum*); and Harding grass (*Phalaris aquatica*).

Non-native herbs observed in the annual grassland include: bristly ox-tongue (*Picris echioides*); broadleaf filaree; redstem filaree; white stem filaree; cutleaf geranium (*Geranium dissectum*); cheeseweed; and buttercup oxalis (*Oxalis pes-caprae*).

Western fence lizard, common garter snake (*Thamnophis sirtalis*), black-tailed jack rabbit (*Lepus californicus*), and California ground squirrel are common breeding animals in non-native annual grassland. These grassland areas are important foraging territory for raptors.



SOURCE: DSE, 2009b

Seismic Upgrade of BDPL Nos. 3 and 4 at Hayward Fault

Figure 5.9-1
Habitat and Vegetation within the Project Area

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Central Coast Riparian Scrub

Central Coast riparian scrub occurs over approximately 2 percent of the project area where the ROW crosses Agua Fria Creek. This natural community is a closed-canopy, scrubby, riparian thicket along Agua Fria Creek. Red willow (*Salix laevigata*) is the most common species. Other native species commonly found in this natural community in the project area are: arroyo willow (*Salix lasiolepis*), blue elderberry (*Sambucus mexicana*), California wild grape (*Vitis californica*), black walnut (*Juglans hindsii*),[1] California blackberry (*Rubus ursinus*), nightshade (*Solanum* ssp.), giant horsetail (*Equisetum telmateia* ssp. *braunii*), mugwort (*Artemisia douglasiana*), and stinging nettle (*Urtica holosericea*). The most common non-native species in this area are giant reed (*Arundo donax*) and common periwinkle (*Vinca major*). Other non-native species present are: bull thistle (*Cirsium vulgare*), Italian thistle (*Carduus pycnocephalus*), wild radish (*Raphanus sativus*), black mustard (*Brassica nigra*), prickly lettuce (*Lactuca serriola*), wild oat; slender wild oat, sweet fennel (*Foeniculum vulgare*), and Himalayan blackberry (*Rubus discolor*).

Within the project area, Agua Fria Creek is incised approximately 6 to 10 feet below its adjoining terrace. The Alameda County Flood Control and Water Conservation District has installed sand bags to protect the south bank, which reduces the total cover of this community.

Characteristic amphibian and reptile species typical of this natural community are Pacific chorus frog (*Hyla regilla*) and common garter snake (*Thamnophis sirtalis*), respectively. Central Coast riparian scrub provides suitable nesting habitat for numerous migratory passerine (songbird) and raptor species, such as red-shouldered hawk and Townsend's warbler (*Dendroica townsendi*). Resident birds typical of this community include spotted towhee (*Pipilo maculatus*) and white-crowned sparrow (*Zonotrichia leucophrys*). Typical mammals are deer mouse (*Peromyscus maniculatus*) and non-native Norway rat (*Rattus norvegicus*). Birds and mammals observed in this area are: western scrub-jay (*Aphelocoma californica*), northern mockingbird (*Mimus polyglottos*), song sparrow (*Melospiza melodia*), European starling (*Sturnus vulgaris*) (a non-native species), and fox squirrel (*Sciurus niger*) (a non-native species – one pair found). Also evident was a feral cat (*Felis catus*) colony being fed by humans, the occurrence of which reduces the overall quality of habitat for wildlife due to increased predation.

This natural community composes about 0.4 acre (see Figure 5.9-1), straddling Agua Fria Creek. It is contiguous with additional Central Coast riparian scrub outside the project area along both banks of Agua Fria Creek for another 900 feet downstream, to the point where the creek enters artificial channels, through which it flows to discharge into Coyote Creek, approximately three miles to the southwest.

[1] Only native occurrences of Northern California black walnut are on California Native Plant Society List 1B.1; the occurrences in the project area are not native (CDFG, 2008b).

Freshwater Seep

In Staging Area 4, a freshwater seep (approximately 1 percent of the project area) —described in the project wetlands delineation (DSE, 2009a)—contains red willow; coast live oak (*Quercus agrifolia*); broadleaf cattail (*Typha latifolia*) (emergent vegetation); climbing bedstraw (*Galium porrigens*), and tall flatsedge (*Cyperus eragrostis*). The Corps verified jurisdiction of this wetland during a site visit in March 2009. Typical wildlife species associated with this plant community are Pacific chorus frog, common garter snake, western kingbird (*Tyrannus verticalis*), and western harvest mouse (*Reithrodontomys raviventris*). Biologists observed no wildlife species during site visits.

5.9.1.3 Fish Habitat

Agua Fria Creek is a third-order[2] intermittent stream that drains a 1.79-square-mile watershed. The upper watershed is undeveloped, composed mostly of steep slopes of annual grassland used for livestock grazing. The middle portion of the watershed (i.e., the location of the project site) is predominantly residential development (DSE, 2009c).

Agua Fria Creek enters the project area at the box culvert under Interstate 680 (I-680) and daylights on the west side of I-680, south of the southbound I-680 onramp. From this point, the creek is contained within its natural bed for approximately 1,000 feet (approximately 80 feet of the creek is in the project area) and enters a box culvert at the west end of the Extended Stay America Hotel (see Figure 5.9-1). The remainder of the creek is contained either in a belowground storm drain or engineered flood control channels that eventually discharge to Coyote Creek as discussed in Section 5.11, Hydrology and Water Quality (DSE, 2009c).

The reach of Agua Fria Creek within the project area flows through its natural bed, and has a well-developed riparian corridor with shallow pools, rootwad, small woody debris, and overhanging vegetation. As observed in July 2007, this portion of the creek included a series of three pools and two riffles that led to a fourth pool. Substrate of the pools was 100 percent silt with high levels of algae and an average estimated depth of 2 feet. The two riffles were slow moving, with an average depth of 3 to 4 inches, and a substrate of 70 percent gravel, 20 percent sand, and 10 percent silt (DSE, 2009c).

In the project area, it is unlikely that Agua Fria Creek is suitable habitat for anadromous fish (e.g., salmonids, or fish in the *Salmonidae* family) because the upstream area is too steep to support rearing of juveniles, and in the lower reaches the flow is too low for smolts (salmonids that are beginning their migration from a freshwater to a marine environment) to reach Coyote Creek (Smith, 2009).

Agua Fria Creek within the project area provides potential suitable habitat for resident fish based on historical temperature ranges from 9 to 16 degrees Celsius (DSE, 2009c) and observed flow, although acceptable ranges for dissolved oxygen have not been verified. No fish were observed during site visits to the project area.

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[2] The "stream order" is determined by the number of its tributaries.

5.9.1.4 Sensitive Natural Communities, Critical Habitat, and Other Sensitive Habitats

Sensitive natural communities and habitats are those recognized by federal, state, or local agencies as priorities for protection due to their exceptional attributes such as rarity and important biological function. The CDFG lists no special-status natural communities[3] that occur within the project area (CDFG, 2003). The Federal Endangered Species Act (FESA) formally defines critical habitat as a specific area that is essential to the conservation and/or recovery of a federally listed species. No critical habitat for listed species has been designated within the project area.

Some wildlife species, such as black-tailed deer, require specialized habitat for giving birth and might return to suitable habitat year after year. Such nursery sites for native fish and wildlife are considered sensitive habitat for the purpose of this analysis. There is no nursery site for native wildlife within the project area. The potential for nursery sites for native fish is described above under Section 5.9.1.3, Fish Habitat.

5.9.1.5 Wildlife Movement Corridors

Wildlife movement corridors link areas of suitable wildlife habitat that are otherwise separated by rugged terrain, changes in vegetation, areas of human disturbance, or urban development. The fragmentation of natural habitat by development creates isolated "islands" of vegetation that may not provide sufficient area to accommodate sustainable populations, thereby adversely affecting genetic and species diversity. Movement corridors mitigate the effects of this fragmentation by allowing animals to move between remaining habitats, which in turn allows depleted populations to be replenished and promotes genetic exchange between separate populations.

Some portions of the project area could possibly serve as a wildlife movement corridor for native resident and migratory species, including the pipeline ROW itself and Agua Fria Creek. The Central Coast riparian scrub along Agua Fria Creek provides a small area (0.4 acre) of habitat for migratory neotropical birds, some of which might use the project area en route north in the spring or south in the fall.

The Central Coast riparian scrub in the project area is at the east end of a larger unit (estimated at 5 acres) of riparian habitat along Agua Fria Creek that is outside the project area to the west. Although in broad terms Agua Fria provides for wildlife movement, it is not in itself a fully functioning wildlife corridor (see Figure 5.9-1). The presence of I-680 and its culvert is not necessarily an impediment to wildlife movement. However, the canopy on the northeast side of the highway is fragmented and runs adjacent to multiple residences. Furthermore, upstream stretches of the creek are compromised by additional culverts and roads.

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[3] The communities deemed "rare and worthy of consideration" in the referenced CDFG publication.

The pipeline ROW is regularly mowed for maintenance (including fire hazard reduction) and does not support vegetation that would protect animals from predation or otherwise make the ROW attractive for animal movement. Wildlife species typically avoid areas that provide little cover. Therefore, the pipeline ROW does not provide a corridor that would typically be utilized by or function as an active corridor for native resident and migratory animals.

The boundary between Staging Areas 3 and 4 (see Figure 5.9-1) could possibly serve as a corridor for common wildlife species that are adapted to ruderal habitats—such as raccoon (*Procyon lotor*); California ground squirrels, black-tailed deer, and opossums (*Didelphis virginiana*)—allowing for movement from Staging Area 3 and surrounding residential areas into Staging Area 4, which contains ruderal habitat. Because Staging Area 4 is surrounded by I-680 and development, this potential wildlife corridor is not a link to significant natural habitat beyond the project area.

5.9.1.6 Wetlands and Other Waters of the United States and the State

Both the U.S. Environmental Protection Agency (U.S. EPA) and the State Water Resources Control Board (SWRCB) have established a "no-net-loss" policy to preserve wetlands because of their important ecological functions: habitat for wildlife, protection from flooding, and maintenance of water quality. Wetlands and "other waters" (e.g., rivers, streams, natural ponds) that fall under the jurisdiction of the United States are a subset of "waters of the United States,"[4] and receive protection under Section 404 of the Clean Water Act (CWA). Section 401 of the CWA requires state water quality certification when federal CWA permits are issued. The Porter-Cologne Water Quality Control Act protects waters of the state, generally considered to be any surface water or groundwater within the boundaries of the state. The state wetland definition is broader and includes waters that are not considered waters of the United States under the federal definition.

Three features that are classified as waters of the United States are delineated within the project area (DSE, 2009a). There is a 0.29-acre freshwater seep within Staging Area 4 mapped as wetlands. Agua Fria Creek was mapped as 0.07 acre of "other waters" of the United States and classified as an intermittent stream (DSE, 2009a). The creek is generally unvegetated, but has small patches of wetland vegetation (primarily giant reed). Agua Caliente Creek, an intermittent stream, is also identified as "other waters" of the United States. All of these features are waters of the state. These features are shown in Figure 5.9-1. As described in Section 5,9, Hydrology and

[4] The term "waters of the United States," as defined in the Code of Federal Regulations (33 CFR 328.3[a]; 40 CFR 230.3[s]), includes: (1) all waters that are currently used, were used in the past, or may be susceptible to use in interstate or foreign commerce, including all waters that are subject to the ebb and flow of the tide; (2) all interstate waters, including interstate wetlands; (3) all other waters, such as intrastate lakes, rivers, streams (including intermittent streams), mud flats, sand flats, wetlands, sloughs, prairie potholes, wet meadows, playa lakes, or natural ponds, the use, degradation, or destruction of which could affect interstate or foreign commerce, including any such waters that are or could be used by interstate or foreign travelers for recreational or other purposes; or from which fish or shellfish are or could be taken and sold in interstate or foreign commerce; or which are used or could be used for industrial purposes by industries in interstate commerce; (4) all impoundments of waters otherwise defined as waters of the United States under the definition; (5) tributaries of waters identified in numbers (1) through (4); (6) territorial seas; and (7) wetlands adjacent to waters (other than waters that are themselves wetlands) identified in numbers (1) through (6).

Water Quality, Agua Caliente Creek traverses most of the project area as an underground, culverted stream (see Section 5.11.1.1 Surface Water Features).

5.9.1.7 Special-Status Species

Special-status plants or animals are rare, and therefore more susceptible to extinction. They are of esthetic, ecological, educational, historical, recreational, and scientific value.

For purposes of this EIR, special-status species include:

- Plant and wildlife species listed as rare, threatened, or endangered under the FESA or the California Endangered Species Act (CESA);
- Species that are candidates for listing under either federal or state law;
- Species formerly designated by the USFWS as species of concern or by the CDFG as species of special concern;
- Species protected by the federal Migratory Bird Treaty Act (16 United States Code [USC] Sections 703–711);
- Bald and golden eagles protected by the federal Bald Eagle Protection Act (16 USC 668); or
- Species such as candidate and California Native Plant Society (CNPS) List 1 and 2 species that may be considered rare or endangered pursuant to the criteria in Section 15380(b) of the California Environmental Quality Act (CEQA) Guidelines.

The potential presence of these species in the project area is discussed below.

Special-Status Plants

Table 5.9-2 presents the name, listing status, habitat, and period of identification (flowering period) for each of the 14 plant species with the potential to occur in the project vicinity (i.e., on the area covered by the Milpitas or Niles USGS quadrangles) that are recognized as rare, threatened, endangered, or otherwise sensitive by the USFWS, CDFG, or CNPS. This table also evaluates the potential for each species to occur within the project area. As summarized in Table 5.9-2, none of the listed species have the potential to occur within the project area because it contains no suitable habitat. Furthermore, there are no recorded occurrences of these special-status plant species in the project area, and none were observed during the reconnaissance-level site visits that coincided with the identification period of these plants.

Special-Status Animals

Table 5.9-3 presents the name, listing status, and habitat of the 21 animal species potentially occurring in the project vicinity (i.e., the area covered by the Milpitas or Niles USGS quadrangles) that are recognized as rare, threatened, endangered, or are otherwise considered sensitive. This table also evaluates the potential for each species to occur within the project area. As summarized

TABLE 5.9-2
SPECIAL-STATUS PLANT SPECIES POTENTIALLY OCCURRING IN THE PROJECT VICINITY

Common Name *(Scientific Name)*	**Status** Federal/State/ CNPS	**Habitats**	**Period of Identification**	**Potential to Occur in Project Area**
Special-Status Plant Species Listed or Proposed for Listing				
Robust spineflower (*Chorizanthe robusta* var. *robusta*)	E/-/1B.1	Chaparral, coastal scrub, coastal dunes, cismontane woodland	April – September	**None;** no suitable habitat
Contra Costa goldfields (*Lasthenia conjugens*)	E/-/1B.1	Vernal pools, swales, low depressions in open grassy areas	March – June	**None;** no suitable habitat
California seablite (*Suaeda californica*)	E/-/1B.1	Salt marshes, coastal swamps	July – October	**None;** no suitable habitat
Other Special-Status Plant Species				
Alkali milk-vetch (*Astragalus tener* var. *tener*)	-/-/1B.2	Alkaline soils in vernal pools, valley and foothill grassland	March – June	**None;** no suitable habitat
Brittlescale (*Atriplex depressa*)	-/-/1B.2	Alkaline or clay soil in playas, meadows, seeps, valley and foothill grassland, vernal pools	May – October	**None;** no suitable habitat
San Joaquin spearscale (*Atriplex joaquiniana*)	-/-/1B.2	Alkaline soils in meadows, seeps, playas, alkaline valley and foothill grassland	April – October	**None;** no suitable habitat
Chaparral harebell (*Campanula exigua*)	-/-/1B.2	Chaparral, rocky soil, usually serpentine	May – June	**None;** no suitable habitat
Congdon's tarplant (*Centromadia parryi* ssp. *congdonii*)	-/-/1B.2	Alkaline soil in valley and foothill grasslands	May – October	**None;** no suitable habitat
Santa Clara red ribbons (*Clarkia concinna* ssp. *automixa*)	-/-/4.3	Chaparral, cismontane woodland	May – June (sometimes April and July)	**None;** no suitable habitat
Point Reyes bird's-beak (*Cordylanthus maritimus* ssp. *palustris*)	-/-/1B.2	Coastal marshes and swamps	June – October	**None;** no suitable habitat
Hoover's button-celery (*Eryngium aristulatum* var. *hooveri*)	-/-/1B.1	Vernal pools	July	**None;** no suitable habitat
Hall's bush-mallow (*Malacothamnus hallii*)	-/-/1B.2	Chaparral, coastal scrub	May – September	**None;** no suitable habitat
Prostrate vernal pool navarretia (*Navarretia prostrata*)	-/-/1B.1	Alkaline floodplains, vernal pools	April – July	**None;** no suitable habitat
Most beautiful jewel-flower (*Streptanthus albidus* ssp. *peramoneus*)	-/-/1B.2	Open grassy or barren slopes, often serpentine soils	April – September	**None;** no suitable habitat

STATUS DEFINITIONS:

Federal
E = listed as endangered under the federal Endangered Species Act
\- = no listing status

State
\- = no listing status

California Native Plant Society
1B.1 = species: rare, threatened, or endangered in California and elsewhere, seriously endangered in California
1B.2 = species: rare, threatened, or endangered in California and elsewhere, fairly endangered in California
4.3 = limited distribution (Watch List), not very endangered in California

SOURCE: DSE, 2009b

TABLE 5.9-3
SPECIAL-STATUS ANIMAL SPECIES POTENTIALLY OCCURRING IN THE PROJECT VICINITY

Common Name *(Scientific Name)*	Status Federal/State/ CDFG	Habitat	Potential to Occur in Project Area
WILDLIFE SPECIES LISTED OR PROPOSED FOR LISTING			
Invertebrates			
Vernal pool fairy Shrimp *(Branchinecta lynchi)*	E/-/-	Vernal pools	**None**; project area does not contain suitable habitat
Bay checkerspot butterfly *(Euphydryas editha bayensis)*	T/-/-	Native grasslands on outcrops of serpentine soil	**None**; project area does not contain suitable habitat
Amphibians			
California tiger salamander *(Ambystoma californiense)*	T/CE/SSC	Needs underground refuges, such as mammal burrows, and vernal pools or other seasonal water sources	**None**; CNDDB closest occurrence within 3 miles of the project area; however, development and I-680 block access to project area; no breeding habitat present
California red-legged frog *(Rana aurora draytonii)*	T/-/SSC	Permanent source of deep water with dense, shrubby, or emergent riparian vegetation	**Low (transient only);** nearest CNDDB record is approximately 50 feet east on Agua Caliente Creek; Agua Fria Creek not connected to Agua Caliente Creek; no suitable breeding habitat within project area
Fish			
Central California Coastal Steelhead *(Oncorhynchus mykiss irideus)*	T/-/-	Cold, flowing water	**None**; project area does not contain accessible suitable habitat
Reptiles			
Alameda whipsnake *(Masticophis lateralis euryxanthus)*	T/T/-	Chaparral, northern coastal sage scrub, coastal sage, and adjacent annual grassland and riparian areas	**None**; project area does not contain suitable habitat
Birds			
Golden eagle *(Aquila chrysaetos)*	-/FP/SSC	Foothills, plains and open country, open mountains	**None**; project area does not contain suitable habitat
Western snowy plover *(Charadrius alexandrinus nivosus)*	T/-/SSC	Beaches, dunes, lagoon margins, shores of alkaline and saline lakes, river bars	**None**; project area does not contain suitable habitat
White-tailed kite *(Elanus leucurus)*	-/FP/-	Open fields, grasslands, low foothill or valley areas with valley or coast live oaks, riparian areas, marshes	**Moderate**; project area contains marginally suitable nesting habitat; pair observed during site visit
Mammals			
San Joaquin kit fox *(Vulpes macrotis mutica)*	E/T/-	Annual grasslands in the San Joaquin Valley, often away from human disturbance	**None**; project area does not contain suitable habitat
OTHER SPECIAL-STATUS ANIMALS			
Invertebrates			
California brackish water snail *(Tryonia imitator)*	-/-/- [a]	Freshwater and brackish water habitats	**None**; project area does not contain suitable habitat

TABLE 5.9-3 (Continued)
SPECIAL-STATUS ANIMAL SPECIES POTENTIALLY OCCURRING IN THE PROJECT VICINITY

Common Name *(Scientific Name)*	**Status** Federal/State/ CDFG	**Habitat**	**Potential to Occur in Project Area**
OTHER SPECIAL-STATUS ANIMALS (cont.)			
Reptiles			
Western pond turtle *(Actinemys marmorata)*	-/-/SSC	Ponds, marshes, rivers, streams, and irrigation ditches with aquatic vegetation	**None**; no basking sites, flow of Agua Fria Creek is insufficient
Birds			
Cooper's hawk *(Accipiter cooperii)*	-/-/- [a]	Mature forest, open woodlands, wood edges, river groves	**Low**; nearest CNDDB record is approximately 6 miles northeast of project area
Tricolored blackbird *(Agelaius tricolor)*	- /- /SSC	Cattails or tule marshes and extensive reed beds, fields, streamside trees	**Moderate**; nearest record within 1 mile to the west of project area; none were observed during site visits
Burrowing owl *(Athene cunicularia)* [burrowing sites and some wintering sites]	-/-/SSC	Nests in burrows dug by mammals in prairie and grassland	**Low;** numerous CNDDB records nearby, but few if any suitable existing burrows at the project site
Great blue heron *(Ardea herodias)* [rookeries]	-/-/- [a]	Rookeries (colonial nests) in tall trees isolated from human disturbance near shallow estuaries and fresh and saline emergent wetlands	**None**; project area does not contain suitable habitat for rookeries
Salt marsh common yellowthroat *(Geothlypis trichas sinuosa)*	-/-/SSC	Salt marshes, saline emergent wetlands, brackish marshes, freshwater marshes, riparian woodland	**Low**; little marsh habitat
Alameda song sparrow *(Melospiza melodia pusillula)*	-/-/SSC	Tidal marshes	**None**; project area does not contain suitable habitat; none observed during field visit
Mammals			
Yuma myotis *(Myotis yumanensis)*	-/-/- [b]	Open forests and woodlands, roosts in buildings, caves, mines, crevices	**None**; project area does not contain suitable roosting habitat
San Francisco dusky-footed woodrat *(Neotoma fuscipes annectens)*	-/-/SSC	Forests	**Low**; nearest CNDDB record is about 7 miles north of project area
Salt-marsh wandering shrew *(Sorex vagrans halicoetes)*	-/-/SSC	Salt marshes that are about 6 to 8 feet above sea level, dense pickleweed	**None**; project area does not contain suitable habitat

NOTE: CDFG = California Department of Fish and Game; CNNDB = California Natural Diversity Database

STATUS DEFINITIONS:

Federal
E = listed as endangered under the federal Endangered Species Act
T = listed as threatened under the federal Endangered Species Act
- = no listing status

State/CDFG
E = listed as endangered under the California Endangered Species Act
T = listed as threatened under the California Endangered Species Act
CE= candidate for listing under the California Endangered Species Act as endangered
SSC = species of special concern in California
FP = fully protected

[a] CDFG Watch List: CNDDB Conservation Status Rank S-3; vulnerable in California
[b] This species is a medium-low Western Bat Working Group (2009) Priority for Region 5 (California)

SOURCE: DSE, 2009b

in Table 5.9-3, seven listed species have the potential to occur within the project area, because it contains suitable habitat or because these species were observed within the project area during the reconnaissance-level site visits. These seven species, and their potential to occur in the project area, are discussed below. An eighth species, California tiger salamander (*Ambystoma californiense*), is also discussed due to the proximity of known occurrences of this federally listed species.

Federally and State-Listed, Proposed, Candidate, or Fully Protected Fish and Wildlife Species

California tiger salamander (*Ambystoma californiense*). California tiger salamander is federally listed as threatened, is a candidate for listing as endangered under CESA and is designated as a California species of special concern (CDFG, 2008a, 2009). When not breeding, adults live and forage in upland small mammal burrows or cracks in soil. Breeding occurs in a vernal pool or similar ephemeral water body, including stock ponds, where no bullfrogs (predators of California tiger salamander eggs and larvae) are present. The closest California Natural Diversity Database (CNDDB) record for California tiger salamander is from 1998, in an artificial pond within the upper watershed of Agua Fria Creek, approximately one linear mile upstream of the project area. There is no suitable breeding habitat for California tiger salamanders in the project area due to the urban and ruderal nature of the area, and the lack of small seasonal water sources (such as small ponds); in addition, there is no suitable upland habitat for adults in the project area, as the ruderal habitat and annual grasslands have no small mammal burrows or cracks in the soil, which the species uses as refugia. Based on the lack of suitable habitat, there is no potential for this species to occur within the project area.

California red-legged frog (*Rana aurora draytonii*). California red-legged frog is federally listed as threatened, and is designated as a California species of special concern (CDFG, 2008a). Typically, the California red-legged frog inhabits permanent water sources such as streams, lakes, and ponds, and breeds in standing or slow-moving water. Within the project area, Agua Fria Creek does not provide suitable breeding habitat as the water flow is too low and pools are not sufficiently deep for egg-laying or larvae. During dry parts of the year, the California red-legged frog is known to disperse from its breeding habitat to forage in upland refugia, which could be nearly any area within one to two miles of a breeding site that stays moist and cool through the summer (USFWS, 2005b). These refugia include rodent holes or cracks in the soil, thickets of coyote brush or California blackberry, and root masses associated with willows (Jennings and Hayes, 1994). The California red-legged frog can also be transient in paved areas (USFWS, 2002).

The closest CNDDB record (CDFG, 2008b) for California red-legged frog is from Agua Caliente Creek in 1996[5] (see Figure 5.9-1; hatched area is the polygon of occupied habitat extant in the CNDDB). The continued presence of this species is presumed here, about 50 feet from the nearest portion of the project area. There are no CNDDB records for California red-legged frog in Agua

[5] During the reconnaissance-level site visits conducted for the project, no California red-legged frogs were observed. During a focused California red-legged frog survey in 1999 for the development of the adjacent Extended Stay America Hotel, no California red-legged frogs were recorded (H.T. Harvey and Associates, 1999).

Fria Creek. Although movement of California red-legged frogs from habitat on Agua Caliente Creek to Agua Fria Creek might be impeded by unsuitable habitat (about 350 feet of residential development, including paved streets) between the creeks, California red-legged frog movement would not be completely barred. Also, habitat elements similar to Agua Caliente Creek (stable creek drainage, riparian vegetation) exist within the Central Coast riparian scrub corridor of Agua Fria Creek. Therefore, Agua Fria Creek, while not suitable breeding habitat, is presumed to support nonbreeding individual frogs.

White-tailed kite (*Elanus leucurus*). White-tailed kite is a fully protected species under Section 3511 of the California Fish and Game Code, and is also protected by the federal Migratory Bird Treaty Act (MBTA) and Migratory Bird Treaty Reform Act (USFWS, 2005a). White-tailed kites nest in riparian and oak woodlands and forage in nearby grasslands, pastures, agricultural fields, and wetlands. A pair of white-tailed kites was observed at the northern end of Staging Area 4 during a site visit in March 2008. The nearest CNDDB occurrence is east of Alviso, about five miles south of the project area. Within the project area, there is potentially suitable nesting habitat for the white-tailed kite in the Central Coast riparian scrub.6 Based on the presence of suitable nesting habitat and the observation of a pair of white-tailed kites, the presence of this species within the project area is confirmed.

Other Special-Status Species

Cooper's hawk (*Accipiter cooperii*). The Cooper's hawk is designated by the CDFG as Conservation Status Rank S-3 (vulnerable in California). It nests in dense stands of riparian deciduous forest. Breeding season is from March though August, and it is a year-round resident in California (Mayer and Laudenslayer, 1988). The Central Coast riparian scrub within the project area has a low potential to support nesting habitat for this species, because it is only a narrow corridor (extending 40 feet on either side of the creek), and not a dense riparian forest. There are nesting records from 2006 at Niles Canyon and Mission Boulevard, about 6.5 miles to the northeast. This species was not observed during site visits. Based on the low potential to support nesting, there is a low potential for this species to nest in the project area.

Tricolored blackbird (*Agelaius tricolor*). Tricolored blackbird is a state species of special concern. Its primary habitat is cattail or tule marshes, and it forages in adjacent fields. The tricolored blackbird breeds only in colonies (often of several thousand pairs) in extensive reed beds, occasionally in trees along streams, and in nettles, blackberries, thistles, and even grain and alfalfa fields. Tricolored blackbirds are year-round residents in California. Breeding season is from March through early August, and potentially in the fall as well (Shuford and Gardali, 2008).

[6] As a general rule in this EIR, species for which habitat associations are well known are distinguished from the much larger suite of species protected as migratory birds. The MBTA protects over 800 species, and many of the latter group are habitat generalists and highly tolerant of disturbance. House finches and chickadees, for example, could occur in almost any woody vegetation in the project area, including trees in residential backyards adjacent to the project.

The closest CNDDB record dates from 1985, located approximately one mile west of the project area at the Mission Boulevard/I-880 interchange. The species was not found nesting in western Alameda or Santa Clara Counties in 2008 (Kelsey, 2008). Within the project area, suitable habitat for the tricolored blackbird occurs within the riparian corridor of Agua Fria Creek and the seep in Staging Area 4, but no tricolored blackbirds were observed during the reconnaissance-level site visits in 2007 and 2008. Based on its historic presence in the project vicinity and suitable habitat, the tricolored blackbird has a moderate potential to nest in or forage in the project area.

Burrowing owl (*Athene cunicularia*). The burrowing owl is designated as a state species of special concern. It inhabits open grasslands and shrub lands with perches, and frequently shelters and breeds in ground squirrel burrows in California. This species can also occur in urban areas near human activity, as long as suitable burrows exist (Shufard and Gardali, 2008). The burrowing owl forages in open areas for insects and small vertebrates. In California, this species can be a year-round resident. Breeding season is typically March through August, but has been reported to start in February and continue into December in California. Within the project area, the ruderal community of Staging Area 4 offers marginally suitable habitat (only one suitable burrow was observed). There are seven CNDDB records within a three-mile radius of the project area.

No burrowing owls or their sign (i.e., burrows with owl pellets, other prey remains, feathers), were observed in or near the project area during the 2007 and 2008 site visits. Based on their occurrence in the vicinity and presence of marginally suitable habitat in Staging Area 4, the burrowing owl has a low potential to nest in the project area in Staging Area 4.

Saltmarsh common yellowthroat (*Geothlypis trichas sinuosa*). This is a state species of special concern. Its primary habitat in the vicinity of the project area is the tidal marshes of San Francisco Bay. Although it is not present within the project area, this species is known to nest in isolated patches of habitat, including seeps such as the one identified in Staging Area 4. In the San Francisco Bay Area, the salt marsh common yellowthroat is a year-round resident at its breeding locations, and breeding season is from mid March to late July (Shuford and Gardali, 2008). There are a number of CNDDB occurrences within about three miles of the project area in the vicinity of Coyote Hills Regional Park. No salt marsh common yellowthroats were observed during site visits. There is low potential for this species to nest at the freshwater seep in Staging Area 4.

San Francisco dusky-footed woodrat (*Neotoma fuscipes annectens*). This state species of special concern prefers moderate canopy in evergreen vegetation with shrubs present. The Central Coast riparian scrub may contain suitable habitat for this species, although no nests were observed during the site visits. Breeding season is from December to September (Mayer and Laudenslayer, 1988). Based on the distance to the nearest occurrence (about seven miles to the north along Alameda Creek in Niles Canyon) and the lack of observed nests, there is a low potential for the San Francisco dusky-footed woodrat to occur within the project area's Central Coast riparian scrub.

Trees

Within the project area, trees that are considered under the City of Fremont's tree ordinance (discussed below in Section 5.9.2, Regulatory Framework) include: 41 native trees; 3 exceptionally adapted trees (Peruvian/California pepper trees – *Schinus molle*), and 17 non-native trees (Lombardy poplars – *Populus nigra 'Italica'*). Two additional Lombardy poplar trees measuring less than 18 inches in diameter at breast height (DBH) may be protected under the tree ordinance if they are deemed exceptionally adapted to the Fremont area by the city arborist. Additionally, five native red willow trees in the riparian zone of Agua Fria Creek have a DBH of greater than 2 inches but less than 6 inches. No tree in the study area is designated a landmark tree, either in the City of Fremont General Plan or by the City of Fremont as a tree of exceptional value due to its growth form (Museum of Local History, 2009). The minimum DBH criterion for landmark tree designation is 54 inches, which is not met by any of the trees in the project area. The scattered oaks growing within the project area do not constitute oak woodland.

5.9.2 Regulatory Framework

5.9.2.1 Federal Regulations

Federal Waters

Wetlands and other waters (e.g., rivers, streams, and natural ponds) are a subset of "waters of the United States," and receive protection under Section 404 of the CWA. The regulations and policies of various federal agencies (e.g., Corps, U.S. EPA, USFWS, and NMFS) mandate that the filling of wetlands be avoided unless it can be demonstrated that no practicable alternatives exist. The Corps has primary federal responsibility for administering Section 404 of the CWA, which governs specified activities in waters of the United States, including wetlands. The Corps requires a permit if a project proposes alteration of waters of the United States, such as the filling of wetlands. The Corps typically requires mitigation for impacts on wetlands before it will issue a permit. The U.S. EPA has the ultimate authority for designating dredge and fill material disposal sites, and can veto the Corps' issuance of a permit to fill jurisdictional waters of the United States.

Federal Endangered Species Act

The Federal Endangered Species Act (FESA) protects fish and wildlife species, and their habitats, identified by USFWS or NMFS as threatened or endangered. *Endangered* refers to species, subspecies, or distinct population segments that are in danger of extinction through all or a significant portion of their range. *Threatened* refers to species, subspecies, or distinct population segments that are likely to become endangered in the near future.

The FESA is administered by the USFWS and NMFS. In general, NMFS is responsible for protection of ESA-listed marine species and anadromous fishes, whereas listed, proposed, and candidate wildlife and plant species and commercial fish species are under USFWS jurisdiction. Pursuant to Section 7 of FESA, a federal lead agency conducting, funding, or permitting an action must consult USFWS and/or NMFS, as appropriate, to ensure that the proposed action will not jeopardize endangered or threatened species or destroy or adversely modify designated critical habitat. If a proposed project "may affect" a listed species or designated critical habitat, the federal lead agency is required to prepare a biological assessment (BA) evaluating the nature and severity of the expected effect. The agency with jurisdiction over the listed species (either the USFWS or NMFS) then reviews the Biological Assessment and issues a Biological Opinion (the agency's determination as to whether or not the proposed project will jeopardize the listed species), which stipulates the conditions under which the project may proceed; an incidental take permit is also issued identifying the number of individuals of the listed species allowed to be harmed by project activities without violating the terms of the permit.

The FESA of 1973 was amended in 1982 under Section 10 of the act to permit the "taking" of federally listed species when such taking is incidental to an otherwise lawful activity (16 USC 1539). It was the intent of Congress to resolve the issues of onsite taking of listed species or critical habitat by creating the habitat conservation plan (HCP) process. An HCP accompanies a permit application to "take" a certain number of threatened and endangered species or acres of their habitat over a certain period of time, and demonstrates that the permit applicant would compensate for the taking so as to achieve "no net reduction" in the species' chances for survival. (There are no adopted HCPs in the project area, and no HCPs are under preparation.)

Under the FESA, critical habitat is formally designated by the Secretary of Interior (or Commerce, as appropriate) for survival and recovery of listed species. Critical habitat is not automatically designated for FESA-listed species, so many listed species have no formal critical habitat. The project area does not include designated critical habitat for any FESA-listed species.

Bird Species Protection

The MBTA prohibits killing, possessing, or trading in migratory birds, except in accordance with regulations prescribed by the Secretary of the Interior. This act covers whole birds, parts of birds, and bird nests and eggs. For projects that would not result in the direct mortality of birds, the MBTA is generally interpreted in CEQA analyses as protecting active nests of species identified by the USFWS (2005a).

5.9.2.2 State Regulations

State Water Resources

The Regional Water Quality Control Board (RWQCB) regulates waters of the state under the Porter-Cologne Water Quality Control Act. Under Section 401 of the federal CWA, an applicant for a Section 404 permit from the Corps must first obtain certification from the appropriate state agency that the project is consistent with the state's water quality standards and criteria. In California, the SWRCB delegated the authority to grant certification to the nine RWQCBs. The San Francisco Bay RWQCB has a policy of no-net-loss of wetlands, and typically requires mitigation for impacts on wetlands before it will issue a water quality certification. Dredging, filling, or excavation of waters constitutes a discharge of waste to waters of the state, and prospective dischargers are required to submit a report of waste discharge to the RWQCB and comply with other requirements of the Porter-Cologne Water Quality Control Act. Agua Fria

Creek and the freshwater seep in Staging Area 4 meet the definition for both waters of the state and waters of the United States.

Under Sections 1600–1616 of the California Fish and Game Code, the CDFG regulates activities that substantially divert, obstruct the natural flow of, or change rivers, streams, and lakes. The jurisdictional limits of the CDFG are defined in Section 1602 of the California Fish and Game Code as the bed, channel, or bank of any river, stream, or lake. The CDFG regulates activities that would result in the deposit or disposal of debris, waste, or other materials into any river, stream, or lake, and requires a streambed alteration agreement for activities that are proposed within or near a river, stream, or lake. Agua Fria Creek and Agua Caliente Creek within the project area meets the CDFG definition of a stream.

California Riparian Habitat Conservation Program

The loss of noteworthy natural communities can diminish valued ecosystem functions, such as the roles of marshes in water filtration or of riparian woodlands in riverbank stabilization. Natural community classification is used by a wide variety of government agencies, private conservation organizations, and private biological consultants to help identify and prioritize species preservation, acquisition, or designation activities. The CDFG has identified many natural communities within California (distinct from the organisms they support) as rare and/or sensitive (CDFG, 2003). The California Wildlife Conservation Board oversees the California Riparian Habitat Conservation Program, part of the mission of which is to protect riparian habitat. The project area does not contain natural communities recognized by the CDFG, but does contain riparian habitat.

California Endangered Species Act

Under the CESA, the CDFG has the responsibility for maintaining lists of:

- Threatened and endangered species
- Candidate species, which are species for which the California State Fish and Game Commission has formally accepted a petition for listing, but for which it has not yet issued a ruling
- Species of special concern, which are animal species whose populations have diminished and may be considered for listing if declines continue

Pursuant to the requirements of the CESA, an agency reviewing a proposed project within its jurisdiction must determine the potential for any state-listed endangered or threatened species to be present in the project area, and determine whether the project will have a potentially significant impact on such species. In addition, the CDFG encourages informal consultation on any proposed project that could affect a candidate species. Actions otherwise prohibited under the CESA can be legalized in two ways: (1) under the state's Natural Community Conservation Planning Act (Fish and Game Code Sections 2800–2840), which is somewhat broader in its orientation and objectives than the CESA or FESA; and (2) for the potential taking of individual animals (as opposed to habitat) listed under the CESA, obtaining an incidental take permit pursuant to Section 2081 of the Fish and Game Code.

California Fully Protected Species

California law (Fish and Game Code Sections 3511, 4700, 5050, and 5515) allows the designation of a species as fully protected. This is a greater level of protection than is afforded by the CESA; such designation means that the listed species cannot be taken at any time.

California Native Plant Protection Act

The California Native Plant Protection Act (Fish and Game Code Sections 1900–1913) underlies the language and intent of Section 15380(d) of the CEQA Guidelines. Vascular plants listed as rare or endangered by the CNPS (CNPS, 2001) are defined as follows:

- List 1A: Plants presumed extinct
- List 1B: Plants rare, threatened, or endangered in California and elsewhere
- List 2: Plants rare, threatened, or endangered in California, but more numerous elsewhere
- List 3: Plants about which more information is needed – a review list
- List 4: Plants of limited distribution – a watch list

In general, plants appearing on CNPS List 1A, 1B, or 2 are considered to meet the criteria of Section 15380 of the CEQA Guidelines. There is no potential for plants listed as List 1A, List 1B, List 2, List 3, or List 4 to occur within the project area. Therefore, this act would not apply to the proposed project.

Bird Species Protection

Independent of the MBTA, birds of prey are protected in California under the state Fish and Game Code, Section 3503.5, which prohibits the possession or destruction of birds of prey or their nest or eggs. Disturbance that causes nest abandonment and/or loss of reproductive effort is considered "taking" by the CDFG.

5.9.2.3 Local Regulations

Tree Protection

The City of Fremont protects trees via a tree preservation ordinance (Title IV, Chapter 5 of the Fremont Municipal Code) and prohibits the removal of the following types of trees, except when expressly permitted:

- A tree having a DBH of 6 inches or more and located on a vacant or undeveloped lot.
- A tree having a DBH of 6 inches or more and located on a developed lot that is the subject of a contemplated or pending application for a development project.

- A native tree [defined as any native oak (*Quercus* spp.); coast redwood (*Sequoia semervirens*); California buckeye (*Aesculus californica*); madrone (*Arbutus menziesii*); California sycamore (*Platanus racemosa*); big-leaf maple (*Acer macrophyllum*); red-bud (*Cercis occidentalis*); and California bay (*Umbellularia californica*)] or tree of exceptional adaptability to the Fremont area [defined as Fremont cottonwood (*Populus fremontii*) California pepper (*Schinus molle*); European olive (*Olea europaea*); black walnut and deodar cedar (*Cedrus deodara*)] having a DBH of 10 inches or more.

- A tree having a DBH of 18 inches or more.

- A tree required by the city to be planted or retained as mitigation for the removal of a tree.

- A tree planted or retained as a condition of any city-conferred development project approval.

- One of six or more trees of the same species that are located on the same lot (that are each 6 inches or more in DBH).

- A landmark tree; this status can be conferred on a tree either by the Fremont City Council after referral by the city landscape architect based on aesthetics, or by the City of Fremont General Plan if the tree is described as a primary historic resource. The minimum DBH criterion for landmark tree designation is 54 inches.

Section 4-5104(c)(5) of the tree preservation ordinance states that a public utility is exempt from tree removal permit requirements when building or maintaining its facilities, except when a landmark tree would be removed or damaged.

5.9.3 Impacts

5.9.3.1 Significance Criteria

The City and County of San Francisco has not formally adopted significance standards for impacts related to biological resources, but generally considers that implementation of the proposed project would have a significant impact if it were to:

- Have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special-status species in local or regional plans, policies, or regulations, or by the CDFG or USFWS;

- Have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, or regulations, or by the CDFG or USFWS;

- Have a substantial adverse effect on federally protected wetlands as defined by Section 404 of the CWA (including but not limited to marsh, vernal pool, and coastal) through direct removal, filling, hydrological interruption, or other means;

- Interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites;

- Conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance; or

- Conflict with the provisions of an adopted habitat conservation plan, natural community conservation plan, or other approved local, regional, or state conservation plan.

5.9.3.2 Approach to Analysis

Due to the nature of the proposed project, there would be no impacts related to the following criterion; therefore, no impact discussion is provided for this topic for the reasons described below:

> *Conflicts with the provisions of an adopted plan*. There are no adopted habitat conservation plans, natural community conservation plans, or other approved plan for the project area; therefore, impacts related to conflicts with such a plan are not applicable and are not further discussed.

Impacts on biological resources are evaluated based on the likelihood that special-status species, sensitive habitats, wildlife corridors, and protected trees are present within the project area (as described in Section 5.9.1, Setting), and the likely effects that construction or facility siting, operation, and maintenance might have on these resources. Special-status resources that have no potential or are unlikely to occur in the project area (as presented in Tables 5.9-2 and 5.9-3) are not considered in the impact analysis. **Table 5.9-4** summarizes the sensitive natural resources in the project area.

For the purposes of this EIR, the word "substantial" as used in the significance criteria above is defined by the following three principal components:

- Magnitude and duration of the impact (e.g., substantial/not substantial)
- Uniqueness of the affected resource (rarity)
- Susceptibility of the affected resource to disturbance

5.9.3.3 Impact Summary

Summary of Impacts

Table 5.9-5 summarizes the potential biological resource impacts and the significance of project impacts before and after mitigation.

Construction Impacts

Impact BI-1: Impacts on wetlands, aquatic resources, and riparian habitats.

As discussed in the Section 5.9.1, Setting, a three features were delineated as waters of the United States within the project area, including a 0.29-acre freshwater seep within Staging Area 4 mapped as jurisdictional wetlands, 0.07 acre of Agua Fria Creek and Agua Caliente Creek, which are mapped as "other waters" of the United States and classified as an intermittent stream (DSE,

TABLE 5.9-4
SUMMARY OF BIOLOGICAL RESOURCES WITHIN THE PROJECT AREA

Project Location	Waters of the United States, Riparian Habitat	Sensitive Habitats	Common Habitats	Landmark Tree	Special-Status Plant Species	Special Animal Species	Special-Species Habitat	Substantial Wildlife Corridor, Migratory Habitat, or Wildlife Nursery
South Shutoff Station	No	No	Non-native annual grassland	No	no	No	No	No
Zone 1	Yes	No	Ruderal	No	no	Yes; low potential for nesting CH, TCB, WTK; nesting MBTAB; CRLF; and DFW	Yes	No
Zone 2	No	No	Paved, non-native annual grassland	No	No	No	No	No
Zone 3	No	No	Non-native annual grassland	No	No	Limited nesting MBTAB	No	No
Zone 4	No	No	Paved, non-native annual grassland	No	No	No	No	No
Zone 5	No	No	Paved, non-native annual grassland	No	No	Limited nesting MBTAB	No	No
Zone 6	No	No	Paved, non-native grassland	No	No	Limited nesting MBTAB	No	No
Zone 7	Yes	No	Paved	No	No	Limited nesting MBTAB	No	No
Zone 8	No	No	Paved, non-native annual grassland, ruderal	No	No	Limited nesting MBTAB	No	No
North Shutoff Station	No	No	Ruderal	No	No	No	No	No
Staging Area 1	No	No	Non-native annual grassland	No	No	Limited nesting MBTAB	No	No
Staging Area 2	No	No	Non-native annual grassland	No	No	Limited nesting MBTAB	No	No
Staging Area 3	No	No	Non-native annual grassland, paved	No	No	Limited nesting MBTAB	No	No
Staging Area 4	Yes	No	Freshwater seep, ruderal, non-native annual grassland	No	No	Yes; low potential for nesting BO, SMCYT, limited nesting MBTAB	Yes; WTK foraging	No

NOTES:
BO=burrowing owl; CH=Cooper's hawk; CRLF=California red-legged frog; DFW=dusky-footed woodrat; SMCYT=salt marsh common yellowthroat; TCB=tricolored blackbird; WTK=white-tailed kite; MBTAB=bird species covered by the Migratory Bird Treaty Act

SOURCE: ESA+Orion

TABLE 5.9-5
SUMMARY OF IMPACTS – BIOLOGICAL RESOURCES

Impact	Significance Determination Before Mitigation	Significance Determination After Mitigation
Impact BI-1: Impacts on wetlands, aquatic resources, and riparian habitats.	S	LS
Impact BI-2: Impacts on special-status species – direct mortality and/or habitat effects.	S	LS
Impact BI-3: Pipeline and trench dewatering effects on riparian habitat and/or aquatic resources.	S	LS
Impact BI-3: Conflicts with local policies or ordinances protecting biological resources.	S	LS

LS = Less than Significant impact
PS = Potentially Significant impact
S = Significant impact
SU = Significant and Unavoidable impact, even with mitigation measure(s) incorporated
– = Mitigation not required

2009a). Approximately 0.4 acre straddling Agua Fria Creek is mapped as Central Coast riparian scrub. The potential for construction activities to affect jurisdictional waters of the United States and riparian habitat is evaluated below, including an assessment of impacts associated with both options for crossing Agua Fria Creek (trenchless construction beneath the creek and open-cut excavation across the creek).

Potential Impacts on Agua Caliente Creek. The Agua Caliente Creek culvert passes beneath Zone 7. This creek is identified as "other waters" of the United States. However, as described in Chapter 3, Project Description, the culvert would be protected during construction, and aside from connections to the culvert to facilitate drainage, construction activities would not affect the culvert (see Section 3.5, Project Construction and Table 3.2 Affected Utilities and Approach to Relocation/Protection). Modifications that would be made to the culvert include the connection of drains from the modified slip joint vault, new articulated vault, and perforated BDPL No. 3. These connection would be made where the culvert is located below ground, and would not affect wetlands, aquatic resources, or riparian habitat, therefore impacts related to these resources resulting from connections to the Agua Caliente Creek culvert would be *less than significant*.

Potential Impacts on Freshwater Seep. The freshwater seep is located in Staging Area 4 and represents about 3 percent of the approximately 10-acre staging area. The staging area would be graded and used for construction staging, including temporary storage of soil and materials. These activities could disturb freshwater seep vegetation, degrade wildlife habitat value, and disrupt natural hydrology. However, as described in Chapter 3, Project Description, the entire seep, plus a 30-foot buffer zone around the mapped seep boundary, would be fenced off from the surrounding staging area. Grading and storage would be prohibited within this boundary. Since this portion of Staging Area 4 would be avoided, impacts on the jurisdictional freshwater seep in Staging Area 4 would be *less than significant*.

Potential Impacts on Agua Fria Creek and Riparian Habitat using Trenchless Construction. For trenchless construction of the new BDPL 3X beneath Agua Fria Creek, the drive pit would be dug on the south side of the creek just north of the shutoff vault, and the receiving pit would be dug on the north side of the creek adjacent to the freeway soundwall. As described in Chapter 3, Project Description, the driving pit for trenchless construction would extend approximately 30 feet into the riparian corridor of Agua Fria Creek on the south side of the creek, and the receiving pit would extend approximately 10 feet into the riparian corridor on the north side, requiring the removal of approximately five red willows. Construction of these pits would result in a permanent loss of 0.08 acre of riparian habitat because, in accordance with the SFPUC's Right of Way Integrated Vegetation Management Policy (SFPUC, 2007) prohibiting willows within the ROW and specifying that other trees must be farther than 15 or 25 feet from the pipelines (see in Chapter 4, Plans and Policies, Section 4.2.2.2), the trees removed for excavation of the drive pit and receiving pit would not be replaced within the ROW, but would be replaced in a nearby location or at a suitable offsite location (see Impact BI-4 and Mitigation Measure M-BI-5a). Avoidance of this habitat is not feasible because of the limited space between the south shutoff vault (where the new BDPL No. 3X would be connected to the existing BDPL No. 3) and the riparian corridor on the south, and between the freeway soundwall and the riparian corridor on the north. This option for crossing Agua Fria Creek would minimize the loss of riparian habitat to 0.08 acre compared to crossing the creek with open-cut excavation (described below), which would involve the permanent loss of 0.4 acre of riparian habitat.

Trenchless construction would avoid direct impacts on Agua Fria Creek because construction would occur beneath the creek, but could result in potential effects on the creek and its aquatic resources if a frac-out[7] occurred during construction or if drill cuttings, drilling mud, or materials containing bentonite were otherwise released to the creek. Other construction activities could also affect aquatic resources in Agua Fria Creek, including removal of vegetation resulting in increased erosion and sedimentation, as well as spills of fuel and lubricants during construction. All of these activities could result in temporary disturbance of aquatic plant and animal communities and loss of wildlife habitat value.

Because of the permanent removal of riparian habitat where the drive and receiving pits would be constructed, and potential temporary effects on Agua Fria Creek during construction, impacts related to the loss of jurisdictional waters, aquatic resources, and riparian habitat would be *significant*. Impacts on riparian habitat would be reduced to a less-than-significant level with implementation of **Mitigation Measure M-BI-1, Protection and Compensation for Loss of Jurisdictional Waters and Riparian Habitat**. This measure requires the SFPUC to provide protection to minimize impacts on adjacent riparian habitat on either side of the ROW and

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7 A frac-out occurs when excessive drilling pressure causes drilling mud to propagate toward the surface from the trenchless operation. The risk of a frac-out can be reduced through proper geotechnical assessment and drill planning and execution. The extent of a frac-out can be limited through careful monitoring and by having appropriate equipment and response plans ready in the event that one occurs.

compensation for the permanent loss of riparian habitat within the ROW. Additional impacts related to water quality and aquatic resources (including erosion, sedimentation, and potential releases of hazardous materials or drilling materials) would be reduced to a less-than-significant level with implementation of **Mitigation Measure M-HY-1, Construction Water Quality Best Management Practices** (see Section 5.11, Hydrology and Water Quality). In addition, construction at the Agua Fria Creek crossing would be completed in accordance with a Section 1602 Lake and Streambed Alteration Agreement from the CDFG.

Potential Impacts on Agua Fria Creek and Riparian Habitat using Open-Cut Construction. For open-cut construction of the new BDPL No. 3X, a 10-foot-wide trench would be excavated across the creek and adjacent riparian corridor. If construction occurs when there is flow in the creek, Agua Fria Creek would be dewatered via a temporary dewatering system that would be built to create a dry work area during construction, as described in Chapter 3, Project Description. This system would likely entail constructing a sandbag cofferdam around the worksite together with a flume pipe to sustain downstream flow at all times. Control measures would be implemented to prevent downstream pollution and sedimentation and to maintain the natural flow and temperature of the stream downstream of the construction area. After the new pipeline is installed, the trench would be backfilled; the soil would be compacted to near its former density; and the cofferdams would be removed.

Excavation across the creek would result in the permanent loss of 0.4 acre of Central Coast riparian scrub, and the trees within the riparian habitat (13 red willows, 9 arroyo willows, 3 Northern California black walnuts, and 1 blue elderberry) would be removed from the ROW and would not be replaced in this location in accordance with the SFPUC's Right of Way Integrated Vegetation Management Policy, which prohibits the presence of willows and black walnut trees within the ROW (see Chapter 4, Plans and Policies, Section 4.2.2.2) and specifies that other trees must be farther than 15 or 25 feet from the pipelines. Twenty-one of these trees that meet the City of Fremont size and species criteria for protection would be replaced at a nearby location or at a suitable offsite location (see Impact BI-4 and Mitigation Measure M-BI-5a). Avoidance of the riparian habitat is not feasible because this habitat overlies the existing SFPUC ROW where construction of the new BDPL No. 3X would occur. The amount of habitat loss cannot be minimized to less than 0.4 acre because it would be necessary to perform construction activities within the entire 80-foot-wide ROW where this riparian habitat is present.

Open-cut excavation across Agua Fria Creek would also result in the temporary loss of approximately 0.07 acre of "other waters" of the United States (the streambed of Agua Fria Creek within the ROW) while the streamflow is diverted around the excavation area. Other activities could also affect aquatic resources in Agua Fria Creek, including the removal of vegetation (although most vegetation is the non-native giant reed), resulting in increased erosion and sedimentation, as well as spills of fuel and lubricants during construction. All of these activities could result in temporary disturbance of aquatic plant and animal communities, loss of wildlife habitat value, and disruption of natural hydrology.

Because of the permanent removal of riparian habitat within the ROW, temporary loss of "other waters" of the United States within the streambed of Agua Fria Creek, and potential temporary effects on Agua Fria Creek and its aquatic resources during construction, impacts related to the loss of jurisdictional waters, aquatic resources, and riparian habitat would be *significant*. Impacts on riparian habitat and "other waters" of the United States would be reduced to a less-than-significant level with implementation of **Mitigation Measure M-BI-1, Protection and Compensation for Loss of Jurisdictional Waters and Riparian Habitat**. This measure requires the SFPUC to provide protection for riparian habitat adjacent to the ROW, compensate for the permanent loss of riparian habitat, and restore Agua Fria Creek to its preconstruction condition. Additional impacts related to water quality and aquatic resources (including erosion, sedimentation, and potential releases of hazardous materials) and associated mitigation measures would be reduced to a less-than-significant level with implementation of **Mitigation Measure M-HY-1, Construction Water Quality Best Management Practices** (see Section 5.11, Hydrology and Water Quality). In addition, the stream crossing would be completed in accordance with a Section 1602 Lake and Streambed Alteration Agreement, Section 404 permit from the Corps, and Section 401 Water Quality Certification from the RWQCB.

Impact BI-2: Impacts on special-status species – direct mortality and/or habitat effects.

The federally and state-listed species and other special-status species that have potential to occur within the project area are: California red-legged frog (federally listed as threatened, state species of special concern); burrowing owl (state species of special concern); Cooper's hawk (CDFG watch list); white-tailed kite (California fully protected); tricolored blackbird (state species of special concern); salt marsh common yellowthroat (state species of special concern); other birds protected by the Migratory Bird Treaty Act; and San Francisco dusky-footed woodrat (state species of special concern). The proposed project could have an adverse effect on these species, either directly or through habitat modification as discussed below.

California Red-Legged Frog. As described in Section 5.9.1, Setting, Agua Fria Creek could potentially support nonbreeding individual California red-legged frogs. Construction activities in Zone 1 could thus cause direct mortality from site clearing and excavation activities at Agua Fria Creek. Therefore, impacts on California red-legged frog are considered *significant*, but would be reduced to a less-than-significant level with implementation of **Mitigation Measure M-BI-2a, Protection Measures for Key Special-Status Species and Other Species of Concern,** and **Mitigation Measure M-BI-2b, Avoidance and Minimization Measures for California Red-Legged Frog**. Mitigation Measure M-BI-2a requires general protection measures for the frog, including an environmental training program so that workers are alerted to the possible presence of California red-legged frog and know the importance of avoiding and not harming the species. Mitigation Measure M-BI-3b requires an approved biologist to survey the Central Coast riparian scrub and aquatic habitat of Agua Fria Creek before work begins and for a biologist to be present during all construction activities in Zone 1. In addition, the measure includes the installation of exclusion fencing at appropriate locations in Zone 1 to prevent California red-legged frogs from entering the active work area. The biologist would contact the USFWS if frogs are found. Implementation of these mitigation measures would reduce potential impacts on California red-legged frog to a less-than-significant level by minimizing the possibility of harming frogs in the unlikely event that they were present during any phase of construction.

Migratory Birds. Birds protected by the Migratory Bird Treaty Act—such as passerines or raptors, and including white-tailed kite, Cooper's hawk, burrowing owl, salt marsh common yellowthroat, and tricolored blackbird (all also special-status species)—might nest within the Central Coast riparian scrub (Zone 1), the freshwater seep in Staging Area 4, and in trees within Staging Areas 1, 2, and 3 and Zones 3, 5, 6, 7, and 8. Vegetation clearing, including tree removal, could destroy nests in these areas. Destruction of the nests of migratory birds would be *significant* if the nests were occupied when site clearing occurred. Implementation of **Mitigation Measure M-BI-2a** and **Mitigation Measure M-BI-2c, Avoidance and Minimization Measures for Nesting Raptors and Migratory Birds**, would reduce this impact to a less-than-significant level for all species except white-tailed kite, Cooper's hawk, and burrowing owl. Mitigation Measure M-BI-2a requires general protection measures, including an environmental training program, and Mitigation Measure M-BI-2c restricts site clearing activities to periods outside of the nesting season.

White-Tailed Kite and Cooper's Hawk. Both white-tailed kite and the Cooper's hawk have a potential to occur within the Central Coast riparian scrub habitat (Zone 1). These species are sensitive to human activity, and construction activity within 500 feet of an active nest could disrupt the breeding habits of these species, representing a *significant* impact. This impact would be reduced to a less-than-significant level with implementation of **Mitigation Measure M-BI-2c, Avoidance and Minimization Measures for Nesting Raptors and Migratory Birds**, which would require the SFPUC to avoid construction activities during the breeding season where feasible. If that is not possible, a nesting survey would be required in Central Coast riparian scrub habitat within 500 feet of any construction activities, and, if an active nest is found, a suitable buffer would be established where no work could take place until after young have fledged. This measure would avoid adverse effects by eliminating the possibility of disrupting the active nests of these bird species.

Burrowing Owl. There is low potential for burrowing owl to shelter underground or nest within the project area. Although no burrowing owls were observed during field surveys, there is marginally suitable habitat within Staging Area 4, as discussed in Section 5.9.1, Setting, and the owls could move onto the site prior to project implementation in 2012. If burrowing owls were present, use of this area for staging could result in direct mortality and temporary habitat loss, which would be a *significant* impact. This impact would be reduced to a less-than-significant level with implementation of **Mitigation Measures M-BI-2d, Avoidance and Minimization Measures for Western Burrowing Owls**, and M-HY-1, Construction Water Quality Best Management Practices. Mitigation Measure M-BI-**2d** would require the SFPUC to perform a preconstruction survey for burrowing owls, and if the species were found, to implement measures to avoid impacts on individual birds and active nests, such as restricting construction within a 250-foot radius of the nest. Mitigation Measure M-HY-1 would require the SFPUC to restore the site to its pre-project conditions, including regrading and revegetation that would restore suitable habitat for the burrowing owl.

San Francisco Dusky-Footed Woodrat. The San Francisco dusky-footed woodrat is not currently present in the Central Coast riparian scrub (Zone 1). In the unlikely event that it were to colonize before construction begins, the population could be affected by vegetation clearing in the Central Coast riparian scrub, which could cause direct mortality and temporary loss of habitat. If a midden (i.e., nest) were destroyed during reproductive season, it might have a substantial adverse effect on a special-status species by causing the population to drop below self-sustaining levels, which would be a *significant* impact. **Mitigation Measure M-BI-2a, Protection Measures for Key Special-Status Species and Other Species of Concern,** and **Mitigation Measure M-BI-2e, Mitigation for San Francisco Dusky-Footed Woodrat Middens,** would reduce this impact to a less-than-significant level. Mitigation Measure M-BI-2a requires general protection measures, including a worker awareness training program, and Mitigation Measure M-BI-2e requires the SFPUC to determine whether San Francisco dusky-footed woodrats are present prior to construction and, if so, to implement measures to avoid harm to individuals and middens during the breeding season. Implementation of this mitigation measure would reduce this impact to a less-than-significant level.

Impact BI-3: Pipeline and trench dewatering effects on riparian habitat and/or aquatic resources.

During construction, water would be discharged to Agua Fria Creek as the result of dewatering of construction trenches and draining and disinfection of pipelines following completion of construction activities. Groundwater produced during construction dewatering of trenches would be discharged to Agua Fria Creek and Agua Caliente Creek either directly or via the storm sewer system. Prior to construction work on these pipelines, both BDPL No. 3 and BDPL No. 4 would require draining. In addition, these pipelines and the new BDPL No. 3X would require disinfection prior to being put into use. As discussed in Section 5.11, Hydrology and Water Quality (see Impact HY-4), the volume of groundwater produced during dewatering would be minimal, but a total of approximately 16.4 million gallons of water from pipeline draining and disinfection would be discharged to Agua Fria Creek.

Without appropriate management, a release of this volume of water could adversely affect the creeks and the aquatic organisms in the creeks in various ways. First, unregulated discharges could result in erosion within the Central Coast riparian scrub habitat associated with Agua Fria Creek. In addition, releasing a large volume of cold water into a stream with much warmer water could cause thermal shock and mortality of aquatic organisms, especially in summer under low-flow conditions when the receiving water temperatures are much higher than those in the pipeline. Both chlorine and chloramines (which are chemicals used to treat water) can be toxic to fish, aquatic mollusks and crustaceans, and other aquatic animal species when released in large volumes. All of the effects mentioned above could result in a *significant* impact on riparian habitat and aquatic resources. However, implementation of **Mitigation Measure M-HY-1, Construction Water Quality Best Management Practices** (see Section 5.11, Hydrology and Water Quality), in addition to implementation of the requirements in RWQCB Order No. R2-2008-0102 and SFPUC

Erosion Control Standard Operation Procedures (discussed in Section 3.7.2), would reduce this impact to a less-than-significant level. Practices that would be implemented in accordance with Mitigation Measure M-HY-1 and RWQCB Order No. R2-2008-0102 include (but are not limited to) erosion control, dechlorination procedures, discharge flow limits, and project-level water quality measures, as described in Section 3.7.2.

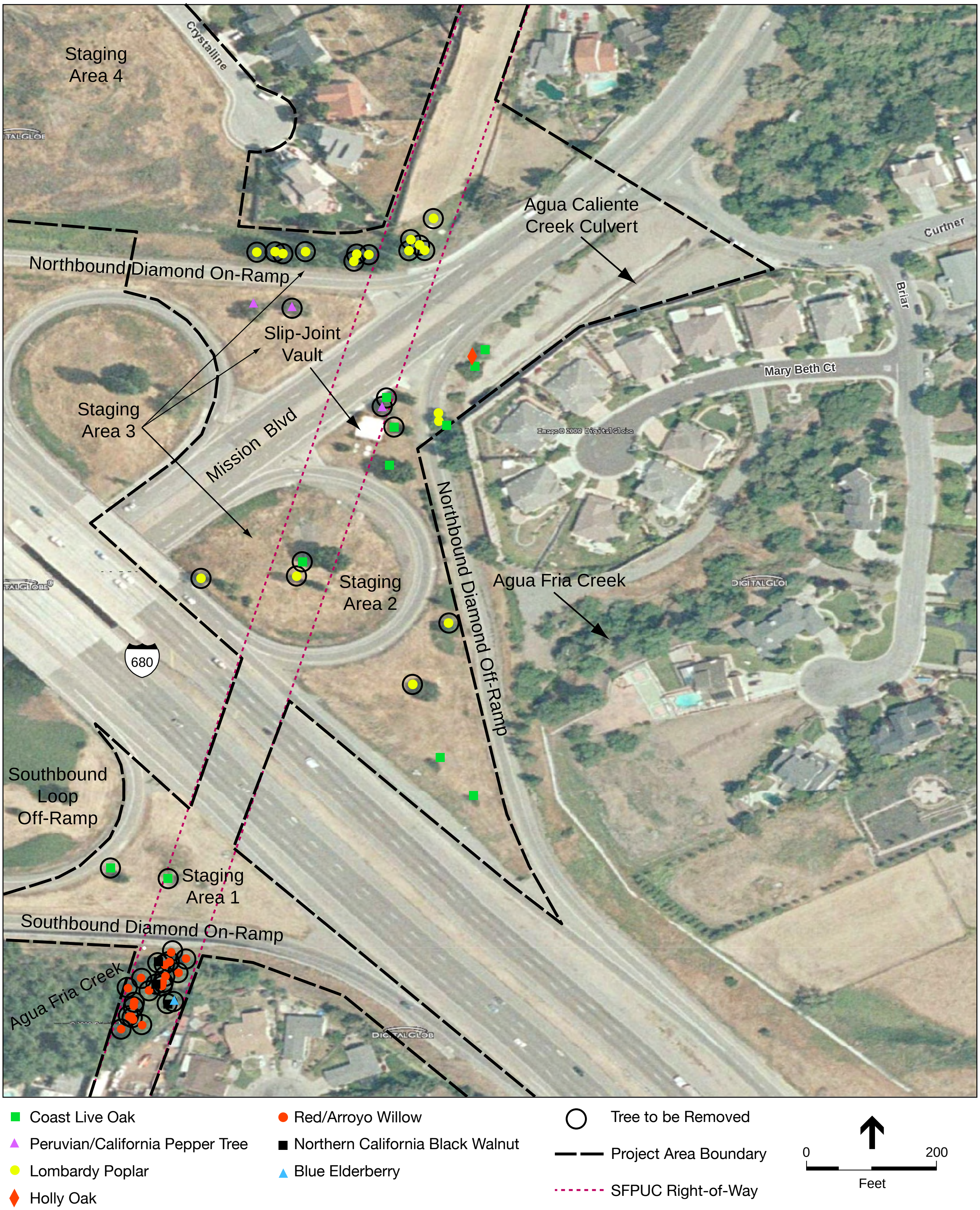
Impact BI-4: Conflicts with local policies or ordinances protecting biological resources.

Up to 49 trees would be removed during project construction and 44 of these trees meet the City of Fremont size and species criteria for protection. The protected trees that would be removed and their locations are summarized in **Table 5.9-6,** and the locations of trees that would be removed are shown on **Figure 5.9-2**. In addition, grading or trenching within the dripline of any trees remaining in place could result in tree mortality or reduced tree vigor. Because trees meeting protection criteria would be removed and the remaining trees could be damaged by construction activities, impacts related to conflicts with local policies or ordinances protecting biological resources would be *significant.*

TABLE 5.9-6
SUMMARY OF TREES THAT MEET CITY OF FREMONT PROTECTION CRITERIA AND WOULD BE REMOVED WITH PROJECT IMPLEMENTATION

Construction Area	Trees to be Removed
Zone 1	8 red willows 9 arroyo willows 3 Northern California black walnut trees 1 blue elderberry tree
Zone 5	1 coast live oak 1 Lombardy poplar
Zone 6	2 coast live oak 1 Peruvian/California pepper tree
Zone 8	5 Lombardy poplars
Staging Area 1	2 coast live oak
Staging Areas 2 and 3	3 Lombardy poplar 1 Peruvian/California pepper tree
Staging Area 4	7 Lombardy poplar

SOURCE: ESA+Orion, 2009



SOURCE: ESA+Orion

Seismic Upgrade of BDPL Nos. 3 and 4 at Hayward Fault

Figure 5.9-2
Trees to be Removed

In order for the SFPUC to construct the new BDPL No. 3X, it would be necessary to remove the trees listed in Table 5.9-6. The City of Fremont's tree preservation ordinance (Section 4-5104[c][5]) exempts public utilities such as the SFPUC from tree protection measures if trees are removed or damaged by a public utility in the course of building or maintaining the public utility's facilities. Furthermore, as discussed in Chapter 4, Plans and Policies (Section 4.2.1.1, Extraterritorial Lands), California Government Code Section 53090 et seq. provides that the SFPUC receives intergovernmental immunity from the zoning and building laws of other cities and counties. Under CEQA, however, the SFPUC would implement mitigation measures for the removal and protection of these trees, as discussed below.

Depending on the method of construction used to cross Agua Fria Creek (trenchless or open-trench excavation), up to 21 trees that meet Fremont's tree protection ordinance[8] criteria would be removed from the Agua Fria Creek riparian corridor where it crosses the BDPL Nos. 3 and 4 ROW, including 8 red willows, 9 arroyo willows, 3 Northern California black walnut trees, and 1 blue elderberry tree. In accordance with the SFPUC's Right of Way Integrated Vegetation Management Policy prohibiting willows and black walnut trees within the ROW (see in Chapter 4, Plans and Policies, Section 4.2.2.2), these trees would not be replaced within the ROW. However, the trees would be replaced at a nearby location or at a suitable offsite location, or the SFPUC would provide compensation for tree removal, in accordance with **Mitigation Measure M-BI-4a, Tree Replacement/Compensation.**

The SFPUC would also implement mitigation measures for the removal and protection of the remaining trees in the project area. These measures include **Mitigation Measure M-BI-4a, Tree Replacement/Compensation,** which requires replacement or compensation for protected trees that are removed, and **Mitigation Measure M-BI-4b, Tree Protection Measures,** which requires the contractor to implement measures that would protect the remaining trees in the project area by establishing a Tree Protection Zone, marked by orange construction fencing, and implementing other measures to protect tree roots and limbs during construction. These mitigation measures meet the intent of the protection measures afforded to trees by the Fremont tree ordinance. Although replacement trees would not be placed within 25 feet of BDPL Nos. 3, 3X, or 4 in accordance with the SFPUC Right of Way Integrated Vegetation Management Policy (described in Chapter 4, Plans and Policies), trees removed from within the ROW would be replaced in an appropriate location outside of the ROW in the same general vicinity. If the SFPUC provides compensation for tree removal in-lieu of replacement, the tree ordinance specifies that the funds would be use to plant or upgrade street trees throughout the City, beautify or enhance public spaces by planting trees, or to fund administrative activities related to implementation of the ordinance. With implementation of Mitigation Measures M-BI-4a and M-BI-4b, impacts related to conflicts with local policies or ordinances protecting biological resources would be less than significant.

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[8] Although there were 26 trees surveyed within the ROW, only 21 of these trees meet the Fremont tree protection ordinance criteria based on their diameter.

Facility Siting, Operation, and Maintenance Impacts

Following completion of construction activities, pipeline operations and maintenance would be consistent with existing operations and maintenance activities. While project facilities would be monitored regularly in accordance with the standard inspection schedule (see Chapter 3, Project Description, Section 3.6, Operations and Maintenance), the frequency of monitoring or maintenance activities would not change substantially from current conditions. Therefore, the project would not result in any impacts on biological resources as a result of facility siting, operation, or maintenance activities.

5.9.4 Mitigation Measures

Mitigation Measure M-BI-1: Protection and Compensation for Loss of Jurisdictional Waters and Riparian Habitat.

The SFPUC will implement measures to restore "other waters" of the United States that would temporarily be lost if open-cut excavation is used to cross Agua Fria Creek, and will implement measures to protect existing riparian habitat on either side of the BDPL Nos. 3 and 4 ROW and compensate for permanent loss of riparian habitat at Agua Fria Creek.

To restore "other waters" of the United States if open-cut construction is used to cross Agua Fria Creek, the SFPUC will divert all upstream flow around the construction area in a manner, such as use of a temporary pipeline, that maintains natural flow in the creek downstream of the construction area, avoids downstream erosion, and supports aquatic life.

At the completion of construction, the SFPUC will restore the creek by removing the cofferdams and reestablishing the pre-construction topography of the channel. To protect riparian habitat on either side of the BDPL Nos. 3 and 4 ROW, the SFPUC will implement measures during construction to protect wildlife and adjacent riparian resources including flagging the perimeter of the worksite to prevent damage to adjacent riparian habitat, and prohibiting stockpiling of materials or soil within the creek bank, or the riparian area surrounding the creek.

It will not be possible to restore Central Coast riparian scrub on-site within the BDPL Nos. 3 and 4 ROW because establishment of riparian trees is not consistent with the SFPUC Right of Way Integrated Vegetation Management Policy (SFPUC, 2007). The SFPUC will restore temporarily disturbed habitat to the extent that is feasible and consistent with the SFPUC Right of Way Integrated Vegetation Management Policy. At the completion of construction, all temporary fences, barriers, and flagging will be removed, and the excavated area will be revegetated with native riparian plant species that are consistent the SFPUC Right of Way Integrated Management Policy. To establish vegetation, SFPUC will remove and store topsoil during construction and replace topsoil when construction is complete; reestablish original natural contours; and plant the appropriate vegetation. Revegetation success criteria and a monitoring schedule will be developed by a qualified restoration specialist and will require approval from the CDFG. An annual monitoring report will be submitted to the CDFG. If the site meets the success criteria within the schedule agreed to with the CDFG, the mitigation site will be determined to be self-sustaining, and no further monitoring will be required. If the site does not meet the success criteria, then SFPUC will consult with the CDFG to determine and implement appropriate steps to facilitate the site as self-sustaining.

To mitigate for permanent loss of riparian habitat (0.08 acre for trenchless construction or 0.4 acre for open-cut construction), the SFPUC will compensate for the loss at a minimum ratio of 1:1. Compensation could take the form of purchasing credits at a mitigation bank approved by the CDFG or restoring Central Coast riparian scrub habitat at a location acceptable to the CDFG. If the SFPUC purchases credits at a mitigation bank, its obligation will be fully met.

If the SFPUC fulfills the requirement for compensation through habitat restoration, the land will be preserved in perpetuity with a commitment that the land not be used for any purpose that conflicts with the primary purpose of maintaining wildlife and riparian habitat. The success criteria and monitoring schedule will be developed by a qualified restoration specialist and will require approval from the CDFG. An annual monitoring report will be submitted to the CDFG. If the site meets success criteria within the schedule agreed to with the CDFG, the mitigation site will be determined to be self-sustaining, and no further monitoring or reporting will be required. If the site does not meet the success criteria, then SFPUC will consult with the CDFG to determine and implement appropriate steps to facilitate the site as self-sustaining.

Mitigation Measure M-BI-2a: Protection Measures for Key Special-Status Species and Other Species of Concern.

As a part of all construction activities, the SFPUC will implement the following measures for the protection of biological resources:

- Before any construction activities begin, workers will attend a training session developed by a qualified biologist for all construction personnel. The contractor education program will address the potential presence of endangered or threatened wildlife species, how to identify the species, the species' sensitivity to human activities, the legal protection afforded these species, the penalties for violating these legal protections, worker responsibilities, applicable mitigation measures, and the roles and authority of the qualified biologist. Each worker will be presented with an illustrated fact sheet and will be responsible for complying with the guidelines as set forth therein. Any new workers coming onto the site will first undergo such training prior to starting work. Participants will be required to sign a form acknowledging their attendance and understanding of the materials presented.

Mitigation Measure M-BI-2b: Avoidance and Minimization Measures for California Red-Legged Frog.

During construction work in Zone 1 (the vicinity of Agua Fria Creek), the SFPUC will have a biological monitor present at all times, and will implement the following measures:

- Within one week before work in Zone 1 begins (including redirecting and dewatering of Agua Fria Creek if open-cut excavation is used to cross the creek, vegetation removal, and staging of equipment and supplies), the qualified biologist will supervise the installation of exclusion fencing along the boundaries of the work area at Agua Fria Creek, as deemed necessary by the qualified biologist to prevent California red-legged frogs or other animals from entering the work area. The construction contractor will install fencing with a minimum height of 3 feet with buried footings or sealed tightly to the pavement to prevent California red-legged frogs from crawling under and entering the site.

- A qualified biologist will survey the excluded area again within 48 hours before the onset of initial ground-disturbing activities. The biological monitor will periodically monitor the exclusion fencing to confirm proper maintenance and inspect for frogs. If frogs are found, the SFPUC will halt construction and contact the USFWS for instructions on how to proceed. Construction will resume after approval from the USFWS.

- During project activities, excavations deeper than 2 feet will be covered overnight or an escape ramp will be installed; openings such as pipes where California red-legged frogs might seek refuge will be covered when not in use; and all trash that may attract predators or hide California red-legged frogs will be properly contained on a daily basis, removed from the worksite, and disposed of regularly. Following construction, the construction contractor will remove all trash and construction debris from work areas.

Mitigation Measure M-BI-2c: Avoidance and Minimization Measures for Nesting Raptors and other Migratory Birds.

Construction activities will occur outside of the raptor nesting season (March 1 through August 31), to the greatest extent possible, to avoid disrupting nesting raptors, including Cooper's hawk and white-tailed kite, within the Central Coast riparian scrub (Zone 1); and Staging Areas 2, 3, and 4; and Zones 5, 6, and 8. However, if this is not possible and construction activities take place during the nesting season, the following measures will apply:

- Preconstruction surveys will be conducted for active raptor nests in suitable nesting habitat within 500 feet of the construction area (access permitting). Surveys will be conducted by a qualified biologist within 14 days prior to the start of construction.

- In consultation with the CDFG and/or USFWS, trees with unoccupied raptor nests (stick nests or cavities) may only be removed prior to March 1 or after August 31.

- Active raptor nests located within 500 feet of the project will be identified and mapped, to the extent allowed by access.

If an active raptor nest is located, work activities will be delayed within 300 feet of the nest location until avoidance measures have been implemented. Appropriate avoidance measures will include the following (alternatively, equally effective measures may be developed as a result of consultation with the CDFG):

- If a qualified wildlife biologist determines that construction and maintenance activities will not affect an active nest or disrupt breeding behavior, activities may proceed without restriction.

- A no-disturbance buffer may be established around the nest location to avoid disturbance or destruction of the nest site until after the breeding season or after a qualified wildlife biologist determines that the young have fledged (usually late July through August).

- The extent of no-disturbance buffers will be determined by a qualified wildlife biologist in consultation with the applicable resource agencies (i.e., the USFWS and/or CDFG) and will depend on the level of noise or disturbance, the line-of-sight between the nest and the disturbance, ambient levels of noise and other disturbances, and other topographical or artificial barriers in order to avoid disrupting nesting raptors.

To avoid impacts on nesting migratory birds (i.e., those species protected by the MBTA), construction activities will occur outside of the migratory bird nesting season (February 1 through August 15) within the Central Coast riparian scrub (Zone 1); Staging Areas 2, 3, and 4; and Zones 5, 6, and 8, to the greatest extent possible. If construction activities take place during the nesting season, the following measures will apply:

- Preconstruction surveys will be conducted for active migratory bird nests within 100 feet of the construction area.

- If an active migratory bird nest is located, work activities will be delayed within 100 feet of the nest location until avoidance measures have been implemented. Appropriate avoidance measures will include the following (alternatively, equally effective measures may be developed as a result of consultation with the CDFG):

  – If the qualified wildlife biologist determines that construction and maintenance activities will not affect an active nest, activities may proceed without restriction.

- A no-disturbance buffer may be established around the nest location to avoid disturbance or destruction of the nest site until after the breeding season or after a qualified wildlife biologist determines that the young have fledged.

- The extent of no-disturbance buffers will be determined by a qualified wildlife biologist in consultation with the applicable resource agencies (i.e., the USFWS and/or CDFG) and will depend on the level of noise or disturbance, the line-of-sight between the nest and the disturbance, ambient levels of noise and other disturbances, and other topographical or artificial barriers.

Mitigation Measure M-BI-2d: Avoidance and Minimization Measures for Western Burrowing Owls.

Measures to avoid and minimize impacts on western burrowing owl will be implemented in Staging Area 4 as described below (alternatively, equally effective measures may be developed as a result of consultation with the CDFG):

- *Breeding Season Surveys*. If construction starts during the breeding season (February 1 to August 31) or if the project schedule permits, a qualified biologist will survey for burrows and burrowing owls during the breeding season immediately preceding construction. Surveys will be conducted within 500 feet of the project boundary (access permitting) in accordance with the California Burrowing Owl Consortium (1993) guidelines. Any burrows will be inspected for signs of owl activity (tracks, pellets, feathers, etc.). The locations of burrowing owl sightings, occupied burrows, and burrows with signs of owl activity will be marked on a map of the project area at a scale sufficient to accurately show the distance of active burrows to the limits of construction. Surveys will be conducted on at least four separate dates during the breeding season in areas where suitable burrows are present. If possible, surveys will be conducted during the peak of the burrowing owl breeding season, generally between April 15 and July 15.

- If occupied owl burrows are found within the survey area, a determination will be made by a qualified biologist, in consultation with the CDFG, as to whether or not work will affect the occupied burrows or disrupt reproductive behavior.
- If it is determined that construction will not affect occupied burrows or disrupt breeding behavior, construction will proceed without any restrictions or mitigation measures.
- If it is determined that construction will physically affect occupied burrows or disrupt reproductive behavior during the breeding season (February 1 through August 31), then avoidance is the only mitigation available. Construction will be stopped within 250 feet of occupied burrows until it is determined that the subject owls are not nesting or until a qualified biologist determines that juvenile owls are self-sufficient or are no longer using the natal burrow as their primary source of shelter.

- *Winter Surveys*. If birds are not observed during breeding season surveys, or if breeding season surveys are infeasible due to project scheduling, or if construction will occur during the wintering season, a winter survey will be conducted to identify nonbreeding residents of the project site. Winter surveys will be conducted within 500 feet of the Staging Area 4 (access permitting) during the period when wintering owls are most likely to be present (December 1 to January 31). The locations of burrowing owl sightings, occupied burrows, and burrows with signs of owl activity will be marked on a map of the project area at a scale sufficient to accurately show the distance of active burrows to the limits of construction.
  - If occupied owl burrows are found within the survey area, a determination will be made by a qualified biologist, in consultation with the CDFG, as to whether or not work will affect the occupied burrows.
  - If it is determined that construction will not affect occupied burrows, construction will proceed without any restrictions or mitigation measures.
  - If it is determined that construction will affect occupied burrows, the subject owls will be passively relocated from the occupied burrow(s) using one-way doors prior to the onset of the breeding season. Owls will be encouraged to relocate to alternate burrows that are at least 160 feet from the construction limits. One alternate natural or artificial burrow for each burrow excavated will be in place at least one week before one-way doors are installed on occupied burrows. One-way doors will be in place for a minimum of 48 hours before burrows are excavated.
- *Fall Surveys*. If surveys must be conducted between September 1 and November 30 (which is outside of the timeframes specified above), a qualified biologist will conduct a survey for burrows and burrowing owls no more than 30 days prior to ground-disturbing activity. If necessary, resident owls will be passively relocated from occupied burrows, as above.

Winter surveys will be conducted during December and January if construction activities are still ongoing beyond November 30.

Mitigation Measure M-BI-2e: Mitigation for San Francisco Dusky-Footed Woodrat Middens.

To avoid impacts on breeding woodrats, the SFPUC will remove middens that would be affected by construction during the nonbreeding season (i.e., September 1 through November 30) and will discourage re-nesting. Immediately preceding construction and in the nonbreeding season, a biologist will survey the area to be disturbed within the Central Coast riparian scrub (Zone 1). If San Francisco Dusky-footed woodrat middens (i.e., nests) are present and would be affected, the middens will be disassembled by hand and the midden material (i.e., sticks) will be removed and disposed of offsite. During the breeding season (December 1 to August 31), if a midden is reconstructed in a previously cleared area that will be affected by construction, a qualified biologist will trap and relocate woodrats out of the construction area (using live traps) prior to the start of construction, or prior to restarting construction, in that area. In addition, the biologist will attempt to relocate the midden material to the same area where the woodrats are released. The trapping, location for release of woodrats, and placement of midden materials will be determined in consultation with the CDFG.

Mitigation Measure M-BI-4b: Tree Replacement/Compensation.

For each removed tree protected by the City of Fremont and located outside of the riparian corridor of Agua Fria Creek, the SFPUC will plant a 24-inch box size replacement tree of similar species or of a native species. Removed trees that are located within the existing BDPL Nos. 3 and 4 ROW will be replaced outside the ROW, but in the same general vicinity. If replanting trees on the same site is not feasible, the SFPUC will find a suitable alternative location, or the SFPUC will pay the City of Fremont a fee in lieu of onsite replacement, for each tree that is not replaced onsite. In order to ensure success of the replacement trees, a qualified professional will monitor the planted trees annually for five years following planting. If the monitoring indicates that a tree has not survived, or is not being maintained in a healthy condition, corrective actions such as additional plantings will be initiated. If a fee in lieu of onsite replacement is paid to the City of Fremont, the SFPUC will not be required to monitor trees.

Native trees to be removed that are located within the existing BDPL Nos. 3 and 4 ROW along or adjacent to Agua Fria Creek (in Zone 1) will be replaced at a nearby location or suitable offsite location determined by the SFPUC, or the SFPUC will pay the City of Fremont a fee in lieu of replacement.

Mitigation Measure M-BI-4a: Tree Protection Measures.

For trees to be retained at the construction site, a qualified professional will review and approve all tree protection measures to be implemented prior to the start of construction and will also conduct inspections during construction. Measures to be implemented may include: establishing and demarcating a Tree Protection Zone that will be avoided to the greatest extent possible; pruning low limbs to provide for equipment access and work; placing mulch to prevent compaction from machinery; wrapping tree trunks in protective material to avoid contact with machinery; and cleanly cutting, trimming, and covering roots as soon as possible if they are severed. Post-construction monitoring of trees subject to root or limb pruning will be done according to the professional's recommendations. If it becomes necessary to remove a tree originally meant to be retained, its removal will be mitigated consistent with Mitigation Measure M-BI-5a.

Mitigation Measure M-HY-1: Construction Water Quality Best Management Practices.

(See Section 5.11, Hydrology and Water Quality)

5.9.5 Impacts of Mitigation Measures

The above mitigation measures would, for the most part, be implemented within the project area and the impacts of their implementation would be similar to those of the proposed project, and implementation of these measures would not result in significant impacts beyond those disclosed for the project itself (see Sections 5.2 through 5.13). However, implementation of Mitigation Measure M-BI-1 could require off-site compensation for loss of riparian habitat through purchasing credits at a mitigation bank or restoration of Central Coast riparian scrub habitat at an off-site location acceptable to the CDFG. In addition, implementation of Mitigation Measure M-BI-4a could require replacement of trees at a nearby location. Therefore secondary impacts may occur in association with implementation of these mitigation measures.

Although the compensation site and final tree replacement locations have not been determined, implementation of these mitigation measures could potentially result in short-term impacts. It is speculative to precisely identify the potential impacts related to their implementation. However, for disclosure purposes, it is assumed that implementation could potentially result in short-term impacts related to aesthetics (construction-related impacts on scenic vistas, scenic resources, or the visual character of the surroundings); cultural resources (impacts on archaeological and paleontological resources and human remains); transportation and circulation (temporary increases in traffic and safety hazards as well as impaired emergency access); noise (construction-related noise); air quality (construction-related emissions of criteria pollutants, diesel particulate matter, and greenhouse gases); utilities and service systems (disruption of local or regional public utilities); biological resources (impacts on special-status species); geology and soils (erosion and loss of topsoil, and alteration of topography); hydrology and water quality (construction-related erosion and release of hazardous materials, and alteration of drainage patterns); hazardous materials (potential to encounter hazardous materials in the soil and groundwater); and mineral and energy resources (use of fuel and energy during construction). However, impacts related to implementation of these measures would be temporary and similar to the proposed project and would be mitigated to a less than significant level with the mitigation measures of the proposed project. Overall, implementation of Mitigation Measures M-BI-1 and M-BI-4a would not result in any additional significant effects beyond those disclosed for the proposed project. Further, compensation for loss of riparian habitat in accordance with Mitigation Measure M-BI-1 would result in an overall net increase in habitat value in the long term.

5.9.6 References

California Burrowing Owl Consortium, *Burrowing Owl Survey Protocol and Mitigation Guidelines*, http://www.dfg.ca.gov/wildlife/species/docs/boconsortium.pdf, 1993.

California Department of Fish and Game (CDFG), *List of California Terrestrial Natural Communities recognized by the California Natural Diversity Database*, http://www.dfg.ca.gov/biogeodata/cnddb/pdfs/SPAnimals.pdf, 2003.

California Department of Fish and Game (CDFG), *Special Animals,* Biogeographic Data Branch, California Natural Diversity Database, February, 2008a.

California Department of Fish and Game (CDFG), California Natural Diversity Database (CNDDB), Location Summary for Seismic Upgrade of BDPL Nos. 3 and 4 at Hayward Fault in Fremont, CA, Locations for Species of Concern, April 9, 2008b.

California Department of Fish and Game (CDFG), California Fish and Game Commission Notice of Candidacy, California Tiger Salamander (*Amybstoma californiense*) http://www.fgc.ca.gov/regulations/new/2009/ctsntccandidacy.pdf, 2009.

California Native Plant Society (CNPS), *Inventory of Rare and Endangered Vascular Plants of California-6th Edition*, *CNPS* Press, 2001.

Darnell Shaw Environmental (DSE), *Delineation of Waters of the United States, Including Wetlands, Seismic Upgrade of Bay Division Pipeline Nos. 3 and 4 at Hayward Fault, Fremont, California* Prepared for the San Francisco Public Utilities Commission, August, 2009a.

Darnell Shaw Environmental (DSE), *Biological Resources Report, Seismic Upgrade of Bay Division Pipeline Nos. 3 and 4 at Hayward Fault, Fremont, California***,** Prepared for the San Francisco Public Utilities Commission, October, 2009b.

Darnell Shaw Environmental (DSE), *Hydrologic Conditions Report Seismic Upgrade of the Bay Division Pipelines No. 3 and 4 at the Hayward Fault Project Area Fremont, California.*, October, 2009c.

ESA+Orion, *Seismic Upgrade of BDPL No. 3 and No. 4 at the Hayward Fault Arborist Report*, Prepared for the San Francisco Public Utilities Commission, 2009.

Environmental Laboratory, *U.S. Army Corps of Engineers Wetlands Delineation Manual,* (Technical Report Y-87-1), Vicksburg, MS: U.S. Army Waterways Experiment Station, 1987.

H.T. Harvey and Associates, *Highway 680/Mission Boulevard Early Assessment California Red-Legged Frog*, Alviso, CA, 1999.

Jennings, Mark R. and Marc P. Hayes, *Amphibian and Reptile Species of Special Concern in California,* Final Report to the California Department of Fish and Game, 1994.

Kelsey, Rodd, *Results of the Tricolored Blackbird 2008 Census, Audubon California, Sacramento, California,* 2008.

Museum of Local History (Fremont, California), Landmark Trees of Fremont, http://www.museumoflocalhistory.org/Landmark/index.htm, accessed February 10, 2009.

Mayer K.E. and W.F. Laudenslayer, Jr. (eds.), *A Guide to Wildlife Habitats of California*, State of California, Resources Agency, Department of Fish and Game, Sacramento, CA, 1988.

San Francisco Public Utilities Commission (SFPUC), Right of Way Integrated Vegetation Management Policy, 2007. Available online at http://sfwater.org/detail.cfm/MC_ID/13/MSC_ID/170/C_ID/90, Website accessed 2008.

Shufard, W.D. and Gardali, T., editors, *California Bird Species of Special Concern: A Ranked Assessment of Species, Subspecies and Populations of Birds of Immediate Conservation Concern in California, Studies of Western Birds No. 1*, Western Field Ornithologists, Camarillo, California and California Department of Fish and Game, Sacramento, CA, 2008.

Smith, Jerry, San Jose State University, Department of Biology, Telephone conversation with Sally de Becker, ESA+Orion, February 6, 2009.

U.S. Army Corps of Engineers (Corps), *Interim Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Arid West Region,* Final Report, December, Vicksburg, MS: U.S. Army Engineer Research and Development Center, 2006.

U.S. Fish and Wildlife Service (USFWS), *Recovery plan for the California Red-legged Frog*, (Rana draytonii), 2002.

U.S. Fish and Wildlife Service (USFWS), *Final List of Bird Species to Which the Migratory Bird Treaty Act Does Not Apply,* Federal Register 70: 12710, 50 CFR Part 17, 2005a.

U.S. Fish and Wildlife Service (USFWS), *Revised Guidance on Site Assessments and Field Surveys for the California Red-legged Frog,* August 2005b.

U.S. Fish and Wildlife Service (USFWS), *Customized species list letter: Species List for Seismic Upgrade of Bay Division Pipelines Nos. 3 and 4 at the Hayward Fault in Fremont, California*, March 28, 2008.

Western Bat Working Group, *Regional Bat Species Priority Matrix*. Available online at http://www.wbwg.org/speciesinfo/species_matrix/spp_matrix.pdf, accessed February 5, 2009.

5.10 Geology and Soils

This section addresses the geology and soils impacts that would result from implementation of the proposed project. Construction-related impacts include potential erosion and loss of topsoil, slope instability, and alteration of topography. This section also discusses the seismic impacts related to the proposed project, including fault rupture, seismically induced groundshaking, seismically induced ground failure, and seismically induced landslides, but these impacts would be less than significant with implementation of the design features included in the proposed project.

5.10.1 Setting

5.10.1.1 Regional Physiography

California has been divided into 12 geomorphic provinces that are topographic-geologic groupings of convenience based primarily on landforms and geologic history (Norris and Webb, 1976). The proposed project is located in the Coast Ranges province, which extends approximately 600 miles, from the Santa Ynez River in Santa Barbara County to the Oregon border in northern Humboldt County. The province consists of northwest-trending mountain ranges, broad basins, and elongated valleys generally parallel to the San Andreas fault. In the Coast Ranges, older consolidated rocks are characteristically exposed in the mountains but are buried beneath younger, unconsolidated alluvial fan and fluvial sediments in the valleys and lowlands. In the coastal lowlands, these younger sediments commonly interfinger with marine deposits.

The Coast Ranges are generally divided in two sub-provinces, north and south of San Francisco Bay. The proposed project is located in the southern Coast Ranges sub-province. The major geographic features in this sub-province include: the Diablo Range, Santa Cruz Mountains, San Francisco Peninsula, and San Francisco Bay. Significant physiographic features include San Francisco Bay and the broad alluvial fans (or flatlands) that were formed between the mountain ranges and the bay.

5.10.1.2 Site Geology

The project site is located in a region of complexly folded and faulted geologic units, predominantly sedimentary, that range in age from recent to approximately 130 to 140 million years old. The majority of the project site is immediately underlain by Pleistocene- to Holocene-age (less than 1.8 million years) alluvium and alluvial fan deposits[1] from Agua Caliente and Agua Fria Creeks (*Qa* and *Qf*), as shown on **Figure 5.10-1** (USGS, 2006). Much of Staging Area 4 and a portion of the northern BDPL Nos. 3 and 4 right-of-way (ROW) is underlain by pre-Quaternary Deposits (*br*), which include early Pleistocene-age Irvington Gravels. Regionally,

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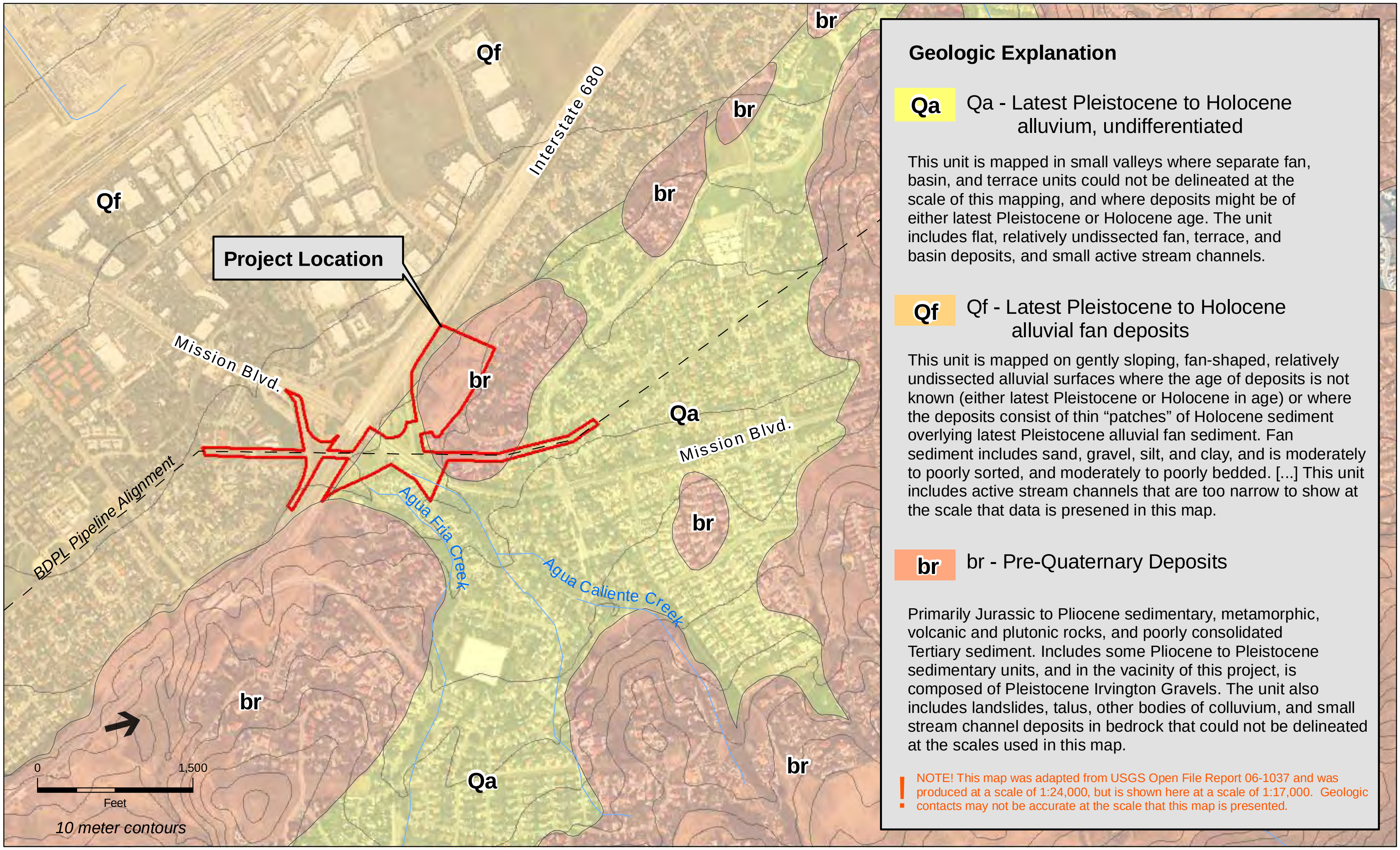
1 Alluvium consists of unconsolidated mixtures of gravel, sand, clay, and silt typically deposited by streams. An alluvial fan is a fan-shaped deposit formed where a fast flowing stream flattens, slows, and spreads, typically at the exit of a canyon onto a flatter plain.



SOURCE: USGS, 2006; ESA + Orion

Seismic Upgrade of BDPL Nos. 3 and 4 at Hayward Fault

Figure 5.10-1
Site Geology

the alluvial deposits consist of brown dense gravelly and clayey sand or clayey gravel with sandy clay present in the upper portions (Helley and Graymer, 1997). These deposits are located along most stream channels in Alameda County. They are distinguished from younger alluvial fans and fluvial deposits[2] by higher topographic position and stronger soil profile development. The Irvington Gravels regionally consist of poorly to well-consolidated, distinctly bedded pebbles and cobbles, gray pebbly sand, and gray coarse-grained, cross-bedded sand (Helley and Graymer, 1997).

The 2008 geotechnical investigation conducted for the proposed project indicates the presence of 8 to 25 feet of fill materials overlying the alluvial deposits and Irvington Gravels (URS, 2008b). The fill materials generally consist of mixtures of clays, silts, and sand that sometimes include gravel. Below this fill, the alluvial materials and Irvington Gravels (encountered to a depth of 100 feet, the total depth of investigation) generally include a mixture of clays, silts, sandy silts, sandy clays, and sands that sometimes include gravel.

5.10.1.3 Geologic Hazards

Slope Failure

Slope failures, commonly referred to as landslides, include many phenomena that involve the downslope displacement and movement of material, triggered either by static (i.e., gravity) or dynamic (i.e., earthquake) forces. Exposed rock slopes undergo rockfalls, rockslides, or rock avalanches, while soil slopes experience soil slumps, rapid debris flows, and deep-seated rotational slides. Slope stability can depend on a number of complex variables, including the geology, structure, and amount of groundwater, as well as external processes such as climate, topography, slope geometry, and human activity. The factors that contribute to slope movements include those that decrease the resistance in the slope materials and those that increase the stresses on the slope. Landslides can occur on slopes of 15 percent or less, but the probability is greater on steeper slopes that exhibit old landslide features such as scarps, slanted vegetation, and transverse ridges.

The best available predictor of where slides and earth flows might occur is the distribution of past movements (Nilsen and Turner, 1975). In 1997, the U.S. Geological Survey (USGS) released a preliminary map and geographic information system (GIS) database that provides a summary of the distribution of landslides evident in the landscape of the San Francisco Bay region (USGS, 1997). The map is a digitized nine-county compilation of existing landslides that has been used to divide the area into four landslide zones, including "mostly landslides," "many landslides," "few landslides," and "flatland." The project area is located within an area identified as flatland, defined as "areas of gentle slope at low elevations that have little or no potential for the formation of slumps, landslides, or earth flows, except along stream banks and terrace margins." The nearest historical landslides are located approximately 1,000 feet to the south of the BDPL No. 3 and 4 ROW in an area mapped as Irvington Gravels.

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[2] Fluvial deposits include sediments deposited in a stream channel, along a stream bank, or on a floodplain.

Soils

Problematic soils, such as those that are expansive and corrosive, can damage structures and buried utilities and increase maintenance requirements. Expansive soils are characterized by their ability to undergo significant volume change (i.e., to shrink and swell) due to variations in moisture content. Changes in soil moisture can result from rainfall, landscape irrigation, utility leakage, roof drainage, and/or perched groundwater.[3] Expansive soils are typically very fine grained and have a high to very high percentage of clay. Expansion and contraction of expansive soils in response to changes in moisture content can lead to differential and cyclical movements that can cause damage and/or distress to structures and equipment.

The corrosivity of soils is commonly related to several key parameters, including soil resistivity, the presence of chlorides and sulfates, oxygen content, and pH. Typically, the most corrosive soils are those with the lowest pH and highest concentration of chlorides and sulfates. Wet/dry conditions can result in a concentration of chlorides and sulfates as well as movement in the soil, both of which tend to break down the protective corrosion films and coatings on the surfaces of building materials. High-sulfate soils are also corrosive to concrete and may prevent complete curing, reducing its strength considerably. Low pH and/or low-resistivity soils can corrode buried or partially buried metal structures. Depending on the degree of corrosivity of the subsurface soils, building materials such as concrete, reinforcing steel in concrete structures, and bare-metal structures exposed to these soils can deteriorate, eventually leading to structural failures.

Soil surveying by the U.S. Department of Agriculture, Natural Resources Conservation Service (NRCS) has provided information on surface and near-surface subsurface soil materials in the project area. **Table 5.10-1** lists each soil type identified in the project area, based on the NRCS web soil survey, and includes key properties for each soil type, including shrink/swell potential and corrosion potential to concrete and uncoated steel. As noted in Table 5.10-1, the soils identified in the project area generally include clays and loams.[4] These soils exhibit a low to high shrink/swell potential, a moderate to high corrosivity to uncoated steel, and a low corrosivity to concrete. However, soil conditions in the project area may have been altered by ground-disturbing activities, including the installation of BDPL Nos. 3 and 4 and associated features as well as other nearby construction.

The shrink/swell potential of a soil[5] can be correlated to its plasticity index, an engineering term that indicates the expansiveness of a soil. Based on the 2008 site-specific geotechnical investigation for the project (URS, 2008b), the plasticity index of soils at the project site ranges from 15 to 45, which correlates to soils with moderate to high swelling potential.

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3 Perched groundwater is a local saturated zone above the water table that typically exists above an impervious layer (such as clay) of limited extent.

4 Loam soil is composed of sand, silt, clay, and organic matter in evenly mixed particles of various sizes.

5 Shrink/swell potential is the relative change in soil volume to be expected with changes in moisture content, that is, the extent to which the soil shrinks as it dries out or swells when it gets wet. The extent of shrinking and swelling is influenced by the amount and kind of clay in the soil. Shrinking and swelling of soils causes much damage to building foundations, roads and other structures. A high shrink/swell potential indicates a hazard to maintenance of structures built in, on, or with material having this rating. Moderate and low ratings lessen the hazard accordingly.

TABLE 5.10-1
SOIL TYPES IDENTIFIED IN THE PROJECT AREA AND KEY SOIL PROPERTIES

Unit ID	Map Unit Name	Shrink/Swell Potential	Risk of Corrosion	
			Concrete	Uncoated Steel
113aw	Diablo clay, 9 to 15 percent slopes	High	Low	High
DaB	Danville silty loam, 3 to 10 percent slopes	Moderate	Low	Moderate
DvC	Diablo clay, very deep, 3 to 15 percent slopes	High	Low	High
YmB	Yolo loam, 3 to 10 percent slopes	Low	Low	High
112	Danville silty loam, 2 to 9 percent slopes	Moderate	Low	High
113	Diablo clay, 9 to 15 percent slopes	High	Low	High

SOURCE: NRCS, 2009.

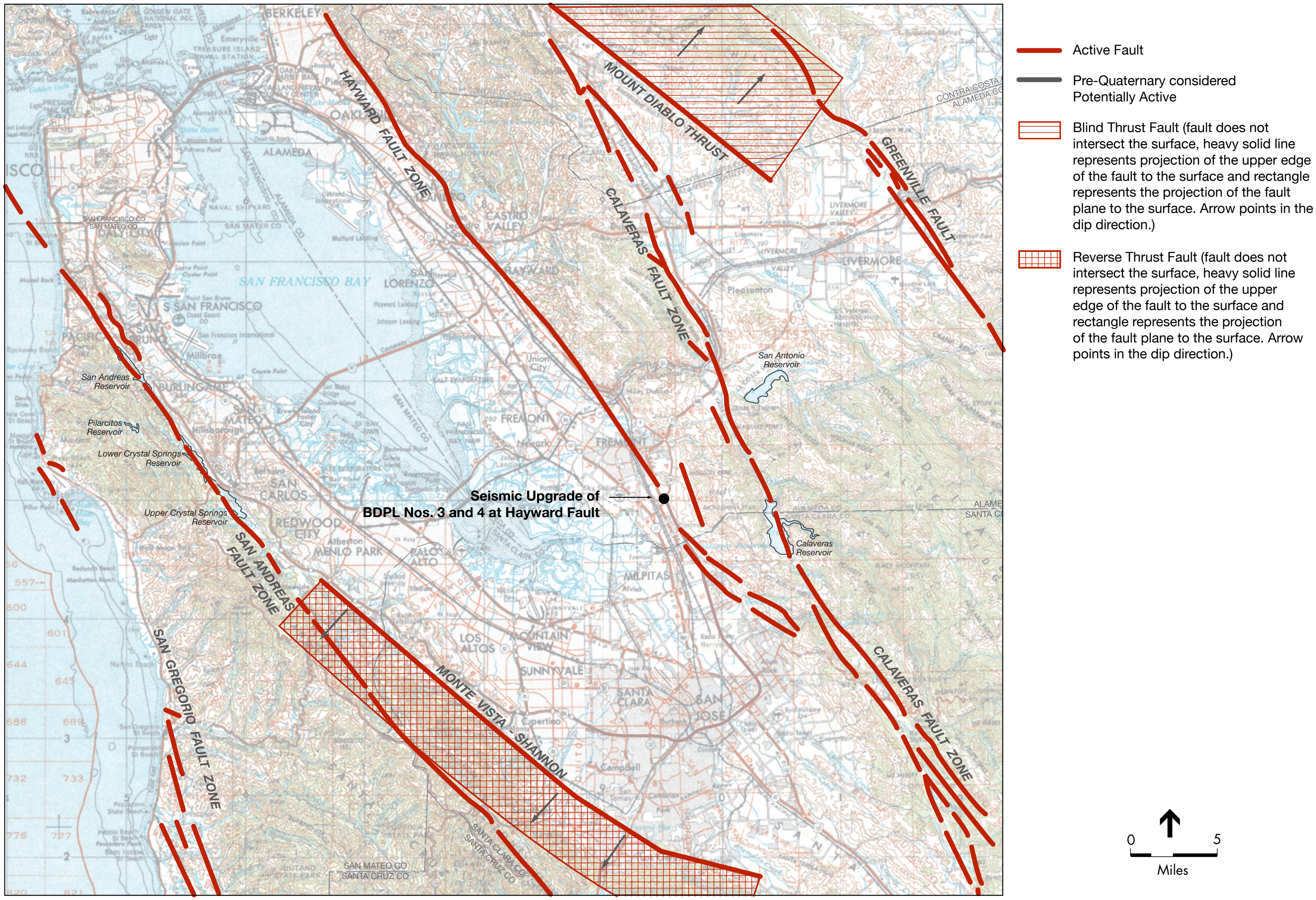
5.10.1.4 Regional Faulting and Seismic Hazards

Seismicity

The San Francisco Bay Area is situated near the boundary between two major tectonic plates, the Pacific Plate to the southwest and the North American Plate to the northeast. Since the Miocene epoch (approximately 23 million years ago), about 200 miles of right-lateral movement[6] has occurred along the San Andreas Fault Zone to accommodate the relative movement between these two plates. The movement between the Pacific Plate and the North American Plate generally occurs across a 50-mile zone extending from the San Gregorio fault in the southwest to the Great Valley Thrust Belt to the northeast. In addition to the right-lateral slip movement between the two tectonic plates, portions of the North American Plate have moved towards each other during the last 3.5 million years, resulting in compressional forces at the latitude of San Francisco Bay (Fenton and Hitchcock, 2001).

Figure 5.10-2 shows the locations of active[7] and potentially active[8] faults in the San Francisco Bay region. The San Andreas, San Gregorio, Hayward, Rodgers Creek, Calaveras, and Greenville strike-slip faults[9] are active faults of the San Andreas system that predominantly accommodate lateral movement between the North American and Pacific tectonic plates. Active blind- and reverse-thrust faults[10] in the San Francisco Bay region that accommodate compressional movement include the Monte Vista–Shannon and Mount Diablo, faults.

6 The Pacific Plate and the North American Plate are moving past each other along the San Andreas Fault Zone, "right-lateral movement" means that they are moving to the right relative to each other.
7 An active fault is one that shows geologic evidence of movement within Holocene time (approximately the last 11,000 years).
8 A potentially active fault is one that shows geologic evidence of movement during the Quaternary (approximately the last 1.6 million years).
9 Strike-slip faults involve the two blocks moving parallel to each other without a vertical component of movement.
10 A reverse fault is one with predominantly vertical movement in which the upper block moves upward in relation to the lower block; a thrust fault is a low-angle reverse fault. Blind-thrust faults are low-angled subterranean faults that have no surface expression.



SOURCE: ESA+Orion JV, 2006. Fault information based on: California Geological Survey (CGS), /Probabilistic Seismic Hazard Assessment For The State Of //California//, Appendix A: Fault Source Parameters/, revised in 2002, from CDMG Open File-Report 96-08, accessed at http://www.consrv.ca.gov/CGS/rghm/psha/ofr9608/, 2002.

Seismic Upgrade of BDPL Nos. 3 and 4 at Hayward Fault

Figure 5.10-2
Major Regional Faults

The USGS estimates that there is a 63 percent probability of a strong earthquake (magnitude 6.7 or higher) occurring on one of the regional faults in the 30-year period between 2003 and 2032, with a 31 percent chance of such an earthquake within the Rodgers Creek–Hayward fault system (USGS, 2008). BDPL Nos. 3 and 4 cross the southern segment of the Hayward fault, and based on a site-specific seismic investigation performed in support of the proposed project, the probable earthquake on this south section of the fault has a moment magnitude[11] of Mw 6.9 (WIP, 2004). The other faults with the greatest potential to affect the BDPL Nos. 3 and 4 within the project area are the San Andreas and Calaveras faults. The Calaveras fault parallels the Hayward fault, approximately 7 kilometers to the east of the project site, and the San Andreas fault is approximately 29 kilometers to the west of the project site. Each of these faults is capable of generating large (greater than Mw 7) earthquakes.

Fault Rupture

Surface rupture occurs when movement on a fault deep within the earth breaks through to the surface. Surface ruptures associated with the 1906 San Francisco earthquake extended for more than 260 miles, with displacements of up to 21 feet. However, not all earthquakes result in surface rupture. The Loma Prieta earthquake of 1989 caused major damage in the San Francisco Bay Area, but the fault movement did not break through to the ground surface.

Fault rupture almost always follows preexisting faults, which are zones of weakness. Rupture may occur suddenly during an earthquake or slowly in the form of fault creep. Sudden displacements are more damaging to structures because they can displace structures and are accompanied by shaking. Fault creep is the slow rupture of the earth's crust. In highly developed areas of Contra Costa and Alameda Counties, the Hayward fault exhibits fault creep, which offsets and deforms curbs, streets, buildings, and other structures that lie on the fault trace.

BDPL Nos. 3 and 4 cross three mapped traces of the Hayward fault (Trace A on the west, Trace C on the east, and Trace B between the two) near the intersection of Interstate 680 (I-680) and Mission Boulevard (see Figure 3.2 in Chapter 3, Project Description). In the event of sudden rupture, the ground on either side of one of the fault traces could move both horizontally and vertically. This movement could occur within the primary rupture zone along each trace of the Hayward fault. In addition, both Traces B and C have secondary rupture zones on either side of the primary rupture zone where ground deformation could also occur (see Figure 3.3 in Chapter 3). It was determined through site-specific seismic evaluations that most of the ground displacement would occur on Trace B (WLA, 2008).

The creep rate along Trace B over the last 40 years is estimated at 0.13 feet per decade, but has been higher (0.20 feet per decade) over the last 9 years (WLA, 2008). Traces A and C do not appear to be experiencing creep.

[11] An earthquake is classified by the amount of energy released, expressed as the magnitude of the earthquake. Traditionally, magnitudes have been quantified using the Richter scale. However, seismologists now use a moment magnitude (Mw) scale because it provides a more accurate measurement of the size of major and great earthquakes.

Groundshaking

The intensity of the seismic shaking, or strong ground motion, during an earthquake is dependent on the distance between the project area and the epicenter of the earthquake, the magnitude of the earthquake, and the geologic conditions underlying and surrounding the project area. Earthquakes occurring on faults closest to the project area would most likely generate the largest ground motions.

The intensity of earthquake-induced ground motions and the potential forces affecting structures within the project area can be described in terms of "peak ground acceleration," which is represented as a fraction of the acceleration of gravity (g).[12] **Table 5.10-2** presents the site-specific peak ground accelerations for the 10 percent, 5 percent, and 2 percent probabilities of exceedance in 50 years (475-, 975-, and 2,475-year return periods, respectively), based on the 2008 site-specific seismic analysis for the proposed project (URS, 2008b). All of the peak ground accelerations are greater than 0.60, and could cause widespread damage such as severe structural and foundation damage and slope failure. Because of its proximity, the Hayward fault is the primary contributor to the ground motions that would be experienced in the project area. The Calaveras fault also contributes to the ground motions because it can generate frequent, moderate-sized earthquakes.

TABLE 5.10-2
SUMMARY OF PROBABILISTIC PEAK GROUND ACCELERATIONS

Return Period (years)	Peak Ground Acceleration (g)[a]
475	0.69
975	0.84
2475	1.05

[a] g = acceleration due to gravity is referred to as 1g (equal to 980 centimeters per second squared). The values presented in the table represent the fraction of the acceleration due to gravity that would be expected to occur within the project area for the given return period.

SOURCE: URS, 2008b.

Liquefaction

Liquefaction is a phenomenon in which saturated granular sediments temporarily lose their shear strength during periods of earthquake-induced, strong groundshaking. The susceptibility of a site to liquefaction is a function of the depth, density, and water content of the granular sediments and the magnitude of earthquakes likely to affect the site. Saturated, unconsolidated silts, sands, silty sands, and gravels within 50 feet of the ground surface are most susceptible to liquefaction. Liquefaction-related phenomena include vertical settlement from densification, lateral spreading, ground oscillation, flow failures, loss of bearing strength, subsidence, and buoyancy effects.

12 Acceleration of gravity (g) = 980 centimeters per second squared. 1.0 g of acceleration is a rate of increase in speed equivalent to a car traveling 328 feet from rest in 4.5 seconds.

Regionally, Holocene-aged alluvial sediments, such as the alluvial sediments mapped within the project area, are prone to liquefaction; the USGS considers the alluvial sediments to have a moderate liquefaction potential (USGS, 2006). Older sediments deposited during the Pleistocene epoch, such as the Irvington Gravels that are also mapped in the project area, are generally not liquefiable because they are more consolidated; the USGS considers the Irvington Gravels to have very low liquefaction susceptibility. Artificial fills, especially those placed on the San Francisco Bay margins prior to about 1950, may also be highly prone to liquefaction, depending on the degree of compaction, saturation, and cohesion of the fill. The USGS estimates that about 20 to 30 percent of future liquefaction effects would occur within geologic units assigned a moderate liquefaction potential, and less than 2 percent of future liquefaction effects would occur within geologic units assigned a very low liquefaction potential.

Liquefaction susceptibility is mapped by the USGS on a regional basis, based on general characteristics of the geologic formations mapped and it is necessary to conduct a site-specific geotechnical investigation to evaluated liquefaction hazards on a project-specific basis. The 2008 site-specific geotechnical investigation (URS, 2008b) indicated that there is a very low potential for liquefaction in the project area because most of the sediments (including the fill, alluvial sediments, and Irvington Gravels) consist of cohesive soils that are not susceptible to liquefaction, and those sediments that are not cohesive contain sufficient fine-grained materials to resist liquefaction.

Lateral Spreading

Of the liquefaction hazards, lateral spreading generally causes the most damage. This is a phenomenon where large blocks of intact, nonliquefied soil move downslope on a liquefied substrate of large aerial extent (Youd and Perkins, 1978). The mass moves toward an unconfined area, such as a descending slope or stream-cut bluff, and this movement can occur on slope gradients as gentle as 1 degree. Drainages and swales between hill slopes are generally filled by unconsolidated alluvium, colluvium,[13] landslide debris, and slope wash and can experience lateral spreading. Based on the cohesive nature of the soils in the vicinity of Agua Fria Creek and the very low potential for liquefaction, there is a low potential for lateral spreading along the banks of the creek.

Earthquake-Induced Settlement

Settlement of the ground surface can be accelerated and accentuated by earthquakes. During an earthquake, settlement can occur as a result of the relatively rapid rearrangement, compaction, and settling of subsurface materials (particularly loose, noncompacted, and variable sandy sediments). Settlement can occur both uniformly and differentially (i.e., where adjoining areas settle at different rates). Areas are susceptible to differential settlement if underlain by compressible sediments, such as poorly engineered artificial fill or bay mud. The potential for earthquake-induced settlement in the project area would be low because most of the sediments

[13] Colluvium is a loose deposit of rock debris accumulated through the action of gravity at the base of a cliff or slope.

consist of cohesive soils that are not susceptible to settlement, and those sediments that are not cohesive contain sufficient fine-grained materials to resist settlement.

Seismic Slope Instability/Ground Cracking

Earthquake motions can also induce substantial stresses in slopes, causing earthquake-induced landslides or ground cracking when the slope fails. Earthquake-induced landslides can occur in areas with steep slopes that are susceptible to strong ground motion during an earthquake. The 1989 Loma Prieta earthquake triggered thousands of landslides over an area of 770 square miles.

The California Geological Survey (CGS) has mapped a narrow zone of potential earthquake-induced landslides on the south side of the southbound diamond on-ramp to I-680 where the BDPL Nos. 3 and 4 cross Agua Fria Creek (CGS, 2004). This zone is defined as an area where "previous occurrence of landslide movement, or local topographic, geological, geotechnical, and subsurface water conditions indicate a potential for permanent ground displacement..."

5.10.2 Regulatory Framework

5.10.2.1 State Regulations

Alquist-Priolo Earthquake Fault Zoning Act

The Alquist-Priolo Earthquake Fault Zoning Act was passed in 1972 to mitigate the hazard of surface faulting to structures for human occupancy. In accordance with this act, the state geologist established regulatory zones, called "earthquake fault zones," around the surface traces of active faults and has published maps showing these zones. Within these zones, buildings for human occupancy cannot be constructed across the surface trace of active faults. Each earthquake fault zone extends approximately 200 to 500 feet on either side of the mapped fault trace because many active faults are complex and consist of more than one branch that may experience ground surface rupture.

Title 14 of the California Code of Regulations (CCR), Section 3601(e), defines buildings intended for human occupancy as those that would be inhabited for more than 2,000 hours per year. Although the proposed project crosses the Alquist-Priolo Earthquake Fault Zone for the Hayward fault, the project does not include any buildings that meet this criterion for human occupancy. Therefore, this act does not apply to the proposed project.

Seismic Hazards Mapping Act

The Seismic Hazards Mapping Act was passed in 1990 following the Loma Prieta earthquake to reduce threats to public health and safety and to minimize property damage caused by earthquakes. The act directs the Department of Conservation to identify and map areas prone to the earthquake hazards of liquefaction, earthquake-induced landslides, and amplified groundshaking. For structures intended for human occupancy, the act requires that project sponsors perform site-specific geotechnical investigations to identify potential seismic hazards and formulate mitigation measures prior to permitting most developments designed for human occupancy within the Zones of Required Investigation. Based on seismic hazard mapping, the proposed project would not be constructed in an area prone to liquefaction (CGS, 2004). There is a small area within the project boundaries where earthquake-induced landslides could occur, but the project does not propose the construction of any structures for human occupancy.

Building Codes

The California Building Code (CBC), which is codified in CCR Title 24, Part 2, was promulgated to safeguard the public health, safety, and general welfare by establishing minimum standards related to structural strength, egress facilities, and general building stability. The purpose of the CBC is to regulate and control the design, construction, quality of materials, use/occupancy, location, and maintenance of all building and structures within its jurisdiction. Title 24 is administered by the California Building Standards Commission, which, by law, is responsible for coordinating all building standards. Under state law, all building standards must be centralized in Title 24 or they are not enforceable.

The CBC is based on the International Building Code. The 2007 CBC is based on the 2006 International Building Code published by the International Code Conference. In addition, the CBC contains necessary California amendments that are based on the American Society of Civil Engineers (ASCE) Minimum Design Standards 7-05. ASCE 7-05 provides requirements for general structural design and includes means for determining earthquake loads as well as other loads (flood, snow, wind, etc.) for inclusion in building codes. The provisions of the CBC apply to the construction, alteration, movement, replacement, and demolition of every building or structure or any appurtenances connected or attached to such buildings or structures throughout California.

The earthquake design requirements take into account the occupancy category of the structure, site class, soil classifications, and various seismic coefficients, all of which are used to determine a Seismic Design Category (SDC) for a project. The SDC is a classification system that combines the occupancy categories with the level of expected ground motions at the site and ranges from SDC A (very small seismic vulnerability) to SDC E/F (very high seismic vulnerability and near a major fault). Design specifications are then determined according to the SDC.

5.10.2.2 SFPUC General Seismic Design Requirements

The SFPUC's *General Seismic Design Requirements* (SFPUC, 2006) set forth consistent criteria for the seismic design and retrofit of all facilities and components of the regional water system. In accordance with these design requirements, every Water System Improvement Program (WSIP) project must have project-specific design criteria based on the seismic environment and importance of the facility in achieving water service delivery goals in the event of a major earthquake.[14] The design criteria are generally based on the referenced codes, standards, and

[14] In the *General Seismic Design Requirements*, the term "major earthquake" is defined as an earthquake of Richter magnitude 7.8 or larger on the San Andreas fault, 7.1 or larger on the Hayward fault, or 6.8 or larger on the Calaveras fault.

industry publications; however, in some cases, design criteria would exceed these requirements for facilities such as the proposed project that are located in a severe seismic environment and are needed to achieve water service delivery goals.

Under these design requirements, each facility is evaluated for its necessity in meeting the water service delivery goals and assigned a seismic performance class for the purpose of determining appropriate seismic design criteria. Facilities needed to achieve a basic level of service within 24 hours of a major earthquake are assigned a seismic performance class of Critical. This class includes structures and components of the storage, distribution, treatment, and control system, either with redundancy or without redundancy, that have common-cause failure modes (such as the same fault crossing) and for which the failure would result in an unacceptable service level. Facilities that may experience damage but should be capable of restoration to service within 30 days are assigned a seismic performance class of Important. This class includes structures and components of the storage, distribution, treatment, and control systems that have some level of redundancy or for which failure would not result in an unacceptable service level. BDPL Nos. 3 and 4 are considered Critical facilities.

5.10.3 Impacts

5.10.3.1 Significance Criteria

The City and County of San Francisco (CCSF) has not formally adopted significance standards for impacts related to geology, soils, and seismicity, but generally considers that implementation of the proposed project would have a significant impact on these systems if it were to:

- Expose people or structures to potential substantial adverse effects, including the risk of loss, injury, or death involving:
  - Rupture of a known earthquake fault, as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map issued by the state geologist for the area or based on other substantial evidence of a known fault (refer to Division of Mines and Geology Special Publication 42),
  - Strong seismic groundshaking,
  - Seismic-related ground failure, including liquefaction, or
  - Landslides;
- Result in substantial soil erosion or the loss of topsoil;
- Be located on a geologic unit or soil that is unstable, or that would become unstable as a result of the project, and potentially result in onsite or offsite landslide, lateral spreading, subsidence, liquefaction, or collapse;
- Be located on expansive soil, as defined in Table 18-1-B of the Uniform Building Code, creating substantial risks to life or property;

- Have soils incapable of adequately supporting the use of septic tanks or alternative wastewater disposal systems where sewers are not available for the disposal of wastewater; or
- Substantially change the topography or any unique geologic or physical features of the site.

5.10.3.2 Approach to Analysis

Due to the nature of the proposed project, there would be no impacts related to the following criterion; therefore, no impact discussion is provided for this topic for the reasons described below:

> *Soils incapable of supporting septic tanks or alternative wastewater disposal systems*. The proposed project would not result in the production or disposal of wastewater. Therefore, impacts related to the capacity of soils in the project area to support septic tanks or alternative wastewater disposal systems are not applicable.

Although tunneling could be required for trenchless construction in Construction Zones 1, 3, and 5, such tunneling would not likely result in offsite landslide, lateral spreading, subsidence, liquefaction, or collapse because of the small diameter of the tunnels. Therefore, these potential impacts from tunneling are not further discussed.

The proposed project would reduce the vulnerability of BDPL Nos. 3 and 4 to earthquakes by installing a new pipeline, BDPL No. 3X, parallel to BDPL No. 3 and reinforcing BDPL No. 4 where it crosses the Hayward fault. Because the seismic criteria and procedures included in the SFPUC's *General Seismic Design Requirements* (described above) would be incorporated into the design of the project, impacts related to seismic hazards, including fault rupture, ground motions generated by earthquakes (groundshaking), seismic-related ground failure (liquefaction and settlement), and landslides would be less than significant, as discussed below. These design requirements require a site-specific investigation and development of project-specific design criteria based on the seismic performance class of the facility as well as the site-specific geologic and seismic hazards. Implementation of the SFPUC's *General Seismic Design Requirements* would ensure that water service delivery goals are achieved in the event of a major earthquake without related geology and soils impacts.

Other impacts analyzed include slope instability during construction, erosion during construction, alteration of topography, and expansive and corrosive soils. These impacts would be less than significant with implementation of legally required measures and features included in the design of the proposed project, as discussed below. Although the presence of corrosive soils is not specifically identified as a significance criterion, potential impacts related to corrosive soils are discussed because, without proper project design, such soils can cause substantial damage to building materials.

5.10.3.3 Impact Analysis

Summary of Impacts

Table 5.10-3 summarizes the potential impacts related to geology and soils and the significance of project impacts before and after mitigation.

TABLE 5.10-3
SUMMARY OF IMPACTS – GEOLOGY AND SOILS

Impact	Significance Determination Before Mitigation	Significance Determination After Mitigation
Impact GE-1: Soil erosion and loss of topsoil.	PS	LS
Impact GE-2: Slope instability during construction.	LS	–
Impact GE-3: Substantial alteration of topography.	LS	–
Impact GE-4: Surface fault rupture.	LS	–
Impact GE-5: Seismically induced groundshaking.	LS	–
Impact GE-6: Seismically induced ground failure, including liquefaction and settlement.	LS	–
Impact GE-7: Seismically induced landslides and other slope failures.	LS	–
Impact GE-8: Expansive or corrosive soils.	LS	–

LS = Less than Significant impact
PS = Potentially Significant impact
S = Significant impact
SU = Significant and Unavoidable impact, even with mitigation incorporated
– = Mitigation not required

Construction Impacts

Impact GE-1: Soil erosion and loss of topsoil.

Without proper soil stabilization controls, construction activities such as excavation, backfilling, and grading can increase the potential for soil loss and erosion by wind and stormwater runoff through the removal of stabilizing vegetation and exposure of areas of loose soil. Newly constructed and compacted engineered slopes can also undergo substantial erosion through dispersed sheet-flow runoff, and more concentrated runoff can cause the formation of small erosional channels and larger gullies, each compromising the integrity of the slope and resulting in significant soil loss.

The proposed project would not involve substantial construction on an existing slope or result in newly created slopes that would substantially increase the potential for long-term erosion. However, soil disturbance, including excavation and grading, would occur within much of the 29 acres of the project ROW and staging areas, and vegetation could be disturbed by construction machinery using the project area for parking, stockpiling, and accessing materials. Therefore, the geologic impacts of the project related to soil erosion would be *potentially significant* unless appropriate measures are implemented. This impact would be reduced to a less-than-significant level with implementation of **Mitigation Measure M-HY-1, Construction Water Quality Best Management Practices;** this measure requires exposed slopes and areas affected by construction to be reseeded to prevent erosion of exposed soil after construction as well as maintenance of post-construction site conditions to avoid any unintended drainage channels, erosion, or areas of sedimentation (also see Section 5.11, Hydrology and Water Quality). Potential water quality effects due to erosion during construction are addressed in Impact HY-1 (see Section 5.11, Hydrology and Water Quality).

Grading of the proposed staging areas and excavation within the BDPL Nos. 3 and 4 ROW could result in the loss of topsoil if these activities were to occur where this soil horizon is well developed and resulted in offsite disposal of this soil or the mixing of the topsoil with other soil horizons. However, all of the excavation and grading would occur in a previously disturbed area where the soil has already been moved during highway or pipeline construction and large amounts of fill are present; therefore a well developed topsoil horizon is not present. Impacts related to the loss of topsoil would be *less than significant*.

Impact GE-2: Slope instability during construction.

Although the proposed project is located in an area designated as “flatland” by the USGS (USGS, 1997), the CGS has mapped a narrow zone of potential earthquake-induced landslides on the south side of the southbound diamond on-ramp to I-680 where BDPL Nos. 3 and 4 cross Agua Fria Creek (CGS, 2004). The receiving pit for the trenchless crossing of Agua Fria Creek would be constructed near this zone and would involve excavation to a depth of 30 feet.

However, a boring installed within this zone as part of the site-specific geotechnical investigation encountered fill and alluvium, but no landslide deposits (URS, 2008b). Furthermore, the USGS has not mapped this area as landslide prone (Nilsen and Turner, 1975). Based on these factors, impacts related to slope instability during construction would be *less than significant*.

Impact GE-3: Substantial alteration of topography.

The proposed project is located in a relatively flat area and would not result in a substantial alteration of topography during construction because all excavations would be backfilled to the original grade following the installation of the proposed belowground facilities. Therefore, impacts related to the substantial alteration of topography would be *less than significant.*

Facility Siting, Operation, and Maintenance Impacts

Impact GE-4: Surface fault rupture.

Although construction of the proposed project would not alter the seismic environment or increase the risk of fault rupture, there is the potential for proposed improvements to be damaged by surface fault rupture where the pipelines cross three traces of the Hayward fault. As stated in Chapter 3, Project Description, there is a high probability (over 91 percent) that the BDPL Nos. 3 and 4 would break due to fault offset in the event of a major earthquake on the Hayward fault under existing conditions (URS, 2008a). A rupture of the pipelines at this location would most likely result in flood damage, public safety hazards, and temporary loss of potable water supply to downstream customers for domestic consumption, commercial uses, hospitals, and firefighting purposes. Additionally, severe erosion from flooding could potentially cause the closure of Mission Boulevard, I-680, and local roadways. Although construction of the North and South Shutoff Stations on either side of the Hayward fault in 2007 (see Figure 3.3 in Chapter 3) has substantially reduced the anticipated physical damage from pipeline breakage, the SFPUC's overall level of service goals would still not be satisfied without construction of the proposed project, because service to downstream customers would be disrupted if both pipelines were to rupture.

To maintain the SFPUC's Water System Improvement Program level of service goals, described in Section 2.1.3, SFPUC Water System Improvement Program (see Chapter 2, Introduction and Background) in the event of a major earthquake on the Hayward fault, the proposed project includes construction of the new BDPL No. 3X between the North and South Shutoff Stations with design features to accommodate fault displacement at the crossing of each trace of the Hayward fault. The accepted design criteria for each fault crossing are as follows (WLA, 2008):

- 1.0 foot of horizontal displacement and 0.7 feet of vertical displacement at Trace A
- 6.5 feet of horizontal displacement and 0 feet of vertical displacement at Trace B
- 0.5 feet of horizontal displacement and 0.5 feet of vertical displacement at Trace C

These design criteria are established to accommodate up to 100 years of fault creep as well as sudden rupture in the event of an earthquake.

Improvements to the existing BDPL No. 4 would be made to minimize the potential for failure of the pipeline in the event of a major earthquake on the Hayward fault, prevent damage to the new BDPL No. 3X should BDPL No. 4 fail, and reduce the potential environmental, life safety, and property damage effects of the rupture. These improvements include encasing the pipeline outside of the existing slip-joint vault to ensure that breakage at Trace B of the Hayward fault would occur within the vault; potential construction of a new slip joint in the vault; and construction of improvements to divert water from the breakage point to existing surface water features, including a drain to Agua Caliente Creek, perforation of the existing BDPL No. 3 once it has been abandoned, blowoff panels to direct excess flows into surface water drainage, and potential modifications to the Fremont storm sewer system in the vicinity of the vault. BDPL No. 4 would also be sliplined or replaced at the Trace C crossing to avoid pipe breakage at this crossing. Although these improvements would not prevent breakage of the existing BDPL No. 4, they would control the location of any failure and reduce potential environmental, life safety, and property damage effects of the rupture.

Construction of the proposed project would ensure the SFPUC's ability to meet the level of service goals for the regional water system and would constitute an improvement over existing conditions. Because the proposed BDPL No. 3X would be designed in accordance with accepted design criteria for fault displacement and the *General Seismic Design Requirements*, impacts related to fault rupture would be *less than significant*.

Impact GE-5: Seismically induced groundshaking.

Groundshaking is the most widespread effect of earthquakes. Depending on the level of groundshaking, an earthquake on the Hayward fault or one of the regional faults could damage the new BDPL No. 3X, the existing BDPL No. 4, and associated facilities, potentially resulting in a disruption of water service and/or endangering the health and welfare of people. Such damage could require short-term, temporary service interruptions for inspections and repairs, and long-term repairs could also be required.

As stated in Section 5.10.1, Setting, the project area could experience peak ground accelerations of 69 to 105 percent of gravity (0.69 g to 1.05 g). All of the peak ground accelerations are greater than 0.60 g, which would result in strong ground shaking that could cause widespread damage. However, the design of the new BDPL 3X, improvements to the existing BDPL No. 4, and associated features would meet current seismic standards as well as requirements presented in the *General Seismic Design Requirements*, thereby improving the ability of these facilities to withstand seismic damage due to groundshaking. All improvements would be designed to withstand groundshaking consistent with an earthquake with a 975-year return period (i.e., an earthquake with a 5 percent chance of occurring in 50 years), which meets or exceeds International Building Code, California Building Code, and Uniform Building Code requirements. Because all improvements are designed in compliance with current seismic standards and the SFPUC's *General Seismic Design Requirements*, impacts related to groundshaking would be *less than significant*.

Impact GE-6: Seismically induced ground failure, including liquefaction and settlement.

Liquefaction-related phenomena can include lateral spreading, ground oscillation, loss of bearing strength, subsidence, and buoyancy effects, all of which can cause damage to structures. As described above in Section 5.10.1, Setting, the USGS considers the alluvial sediments in the project area to have a moderate liquefaction potential; however, the 2008 site-specific geotechnical investigation (URS, 2008b) indicated that the potential for liquefaction and related phenomena in the project area is very low, because most sediments in the project area consist of cohesive soils that are not susceptible to liquefaction, and those sediments that are not cohesive contain sufficient fine-grained materials to resist liquefaction. Because the potential for liquefaction is low and the new BDPL No. 3X pipeline is designed in accordance with the *General Seismic Design Requirements*, impacts related to liquefaction would be *less than significant.*

Impact GE-7: Seismically induced landslides and other slope failures.

As discussed in Section 5.10.1, Setting, and in Impact GE-1, the CGS has mapped a narrow zone of potential earthquake-induced landslides on the south side of the southbound diamond on-ramp to I-680 where BDPL Nos. 3 and 4 cross Agua Fria Creek (CGS, 2004). The receiving pit for the trenchless crossing of Agua Fria Creek would be located near this zone. However, a boring installed within this zone as part of the site-specific geotechnical investigation encountered fill and alluvium, but no landslide deposits (URS, 2008b). Furthermore, the USGS has not mapped this area as landslide prone (Nilsen and Turner, 1975).

Although the slope could fail in the event of an earthquake, the pipeline would be installed beneath this zone and would be constructed to withstand slope movement in accordance with the *General Seismic Design Requirements.* Therefore, impacts related to seismically induced and other slope failures would be *less than significant*.

Impact GE-8: Expansive or corrosive soils.

Problematic soils, such as expansive and corrosive soils, can cause damage to structures and buried utilities and can also increase required maintenance. As described in Section 5.10.1, Setting, the plasticity index of soils at the project site ranges from 15 to 45, which correlates to soils with a moderate to high swelling potential. The site-specific geotechnical investigation (URS, 2008b) concludes that the effect of expansive soils on the temporary excavation shoring systems and bridge pier foundations would not be substantial. However, the proposed vaults, at-grade roadways, and other site improvements could be affected by expansive soil, and thus would be underlain by non-expansive fills in accordance with the recommendations of the 2008 site-specific geotechnical investigation (URS, 2008b). Therefore, impacts related to expansive soils would be *less than significant*.

The 2004 geotechnical investigation conducted for the proposed project indicated that the site soils are moderately corrosive to corrosive (WIP, 2004). However, as described in Chapter 3, Project Description, a combination of coating and passive cathodic protection would be used to protect the proposed BDPL No. 3X from corrosion. The pipeline coating would be made of materials that would halt the external corrosion process. In addition, a cathodic protection system would be placed along the length of the new pipeline to prevent corrosion of the pipeline. With incorporation of these design features, as described in Chapter 3, impacts related to corrosive soil would be *less than significant*.

5.10.4 Mitigation Measures

Mitigation Measure M-HY-1: Construction Water Quality Best Management Practices.

(See Section 5.11, Hydrology and Water Quality)

5.10.5 References

California Geological Survey (CGS), State of California Seismic Hazard Zones, Milpitas Quadrangle, Official Map, October 19, 2004.

Fenton, C.H. and C.S. Hitchcock, Recent geomorphic and paleoseismic investigations of thrust faults in Santa Clara Valley, California, in H. Ferriz and R. Anderson (eds.), *Engineering Geology Practice in Northern California: California Division of Mines and Geology Bulletin 210*, 2001.

Helley, E.J. and Graymer, R.W., Quaternary Geology of Alameda County, and Parts of Contra Costa, Santa Clara, San Mateo, San Francisco, Stanislaus, and San Joaquin Counties, California: A Digital Database, USGS Open File Report OF 97-97. 1997.

Natural Resources Conservation Service (NRCS), Web Soil Survey, accessed at http://websoilsurvey.nrcs.usda.gov, January 5, 2009.

Nilsen, T.H. and B.L. Turner, *Influence of Rainfall and Ancient Landslide Deposits on Recent Landslides (1950-71) in Urban Areas of Contra Costa County, California*, U.S. Geological Survey Bulletin 1388, 1975.

Norris, R.M. and R.W. Webb, *Geology of California*, 1st Edition, John Wiley & Sons, Inc., 1976.

San Francisco Public Utilities Commission (SFPUC), *General Seismic Requirements for Design of New Facilities and Upgrade of Existing Facilities*, August 15, 2006.

URS Corporation, *Final Conceptual Engineering Report, Seismic Upgrade of Bay Division Pipelines Nos. 3 and 4 at the Hayward Fault*, October 14, 2008a.

URS Corporation, *Bay Division Pipelines 3 & 4, Hayward Fault Crossing Geotechnical Report*, Fremont, CA, December 5, 2008b.

U.S. Geologic Survey (USGS), *Summary Distribution of Slides and Earth Flows in the San Francisco Bay Region, California,* GIS database for Open File Report 97-745 Part C, by C.M. Wentworth, S.E. Graham, R.J. Pike, G.S. Beukelman, D.W. Ramsey, and A.D. Barron, 1997.

U.S. Geologic Survey (USGS), Maps of Quaternary Deposits and Liquefaction Susceptibility in the Central San Francisco Bay Region, California. Liquefaction Susceptibility. Geology by Robert C. Witter, Keith L. Knudsen, Janet M. Sowers, Carl M. Wentworth, Richard D. Koehler, and Carolyn E. Randolph. Digital Database by Carl M. Wentworth, Suzanna K. Brooks, and Kathleen D. Gans, Open File Report 06-1037, 2006.

U.S. Geologic Survey (USGS), The Uniform California Earthquake Rupture Forecast, Version 2 (UCERF 2), by the Working Group on California Earthquake Probabilities, Open File Report 2007-1437, 2008.

Water Infrastructure Partners (WIP), *Geotechnical Investigation, Seismic Upgrade of BDPL Nos. 3 and 4 at the Hayward Fault Zone Crossing*, May 18, 2004.

William Lettis & Associates, Inc. (WLA), *Memo on Fault Displacement Values for BDPL No. 3 Design Criteria*, July 31, 2008.

Youd, T.L. and D.M. Perkins, "Mapping Liquefaction Induced Ground Failure Potential," *Proceedings of the American Society of Civil Engineers, Journal of the Geotechnical Engineering Division*, 1978.

5.11 Hydrology and Water Quality

5.11.1 Setting

This section evaluates the potential impacts on hydrology and water quality that could result from implementation of the proposed project. Mitigation measures to reduce significant impacts to a less-than-significant level are identified.

5.11.1.1 Surface Water Features

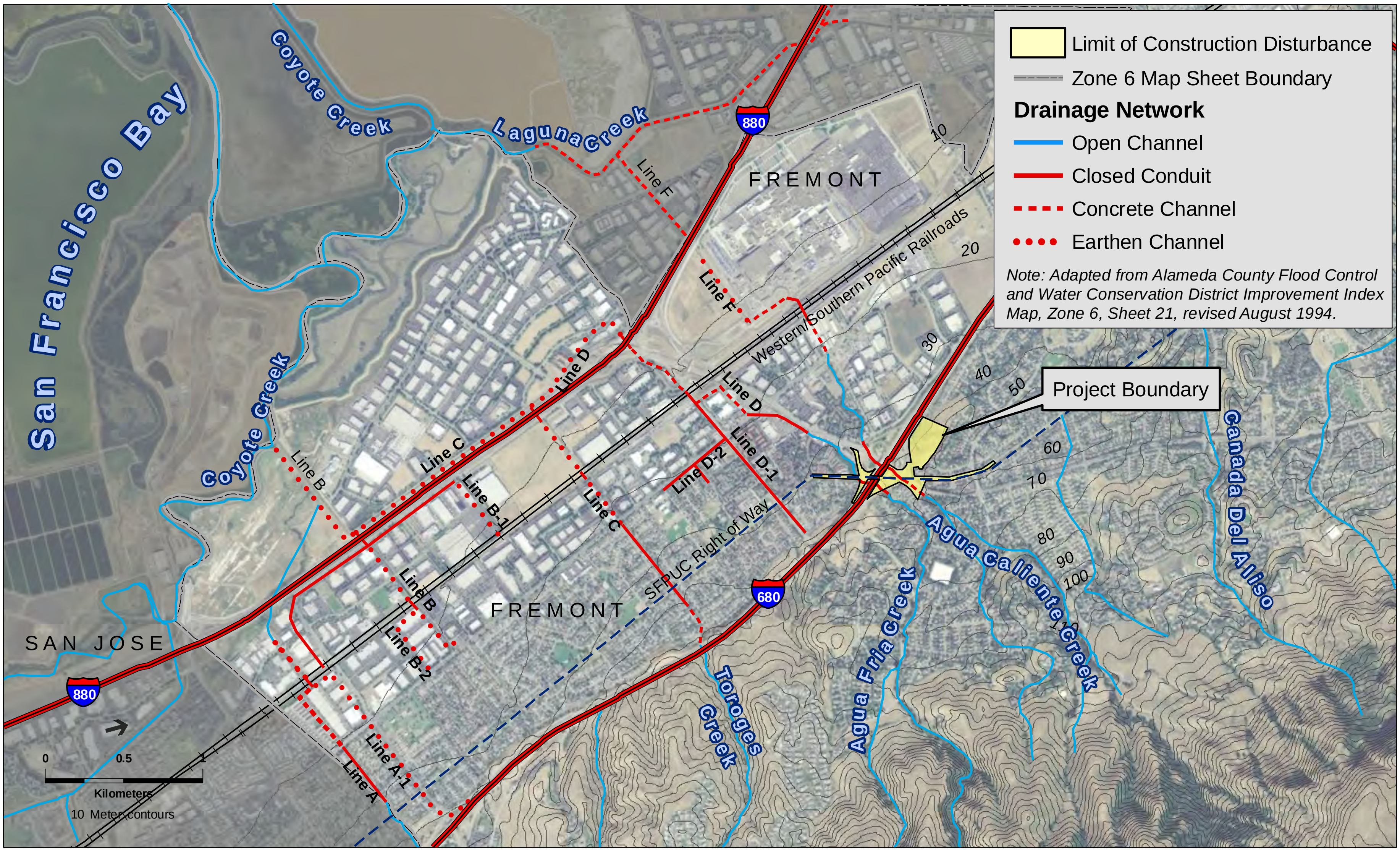
The proposed project area is located in Fremont, California in a region characterized by intermittent and perennial drainages that generally flow westward from the East Bay Hills toward the sloughs and tidal flats of South San Francisco Bay. The roughly 29-acre project area contains portions of two intermittent drainages—Agua Fria and Agua Caliente Creeks.

Agua Fria Creek

Agua Fria Creek originates on the western face between Mount Allison and Monument Peak in the hills above Fremont and drains a 1.79-square-mile area. Agua Fria Creek is an intermittent stream that flows primarily during the winter months, with very low flow, if any, during the remainder of the year. The creek flows generally westward and passes through the southern part of the project area, ultimately discharging into Coyote Creek at San Francisco Bay, as shown in **Figure 5.11-1** (DSE, 2009). The upper portion of the watershed is undeveloped and primarily composed of steep slopes with annual grassland. The hillsides are used for livestock grazing. In the upper portion of the watershed, Agua Fria Creek flows within its natural bed and supports riparian vegetation.

Further downstream, the middle portion of the watershed has been developed into residential neighborhoods. The creek is culverted under Interstate 680 (I-680), as shown in **Figure 5.11-2**. Upstream of the I-680 box culvert, the creek enters the project area; downstream of the I-680 culvert approximately 1,000 feet of creek—including the 80-foot section that crosses the BDPL Nos. 3 and 4 right-of-way (ROW)—flows as a natural drainage to the concrete culvert at the west end of the Extended Stay America Hotel parking lot. The remainder of the creek is contained in either a belowground storm drain or an engineered flood control channel that discharges to Coyote Creek, and ultimately flows to San Francisco Bay.

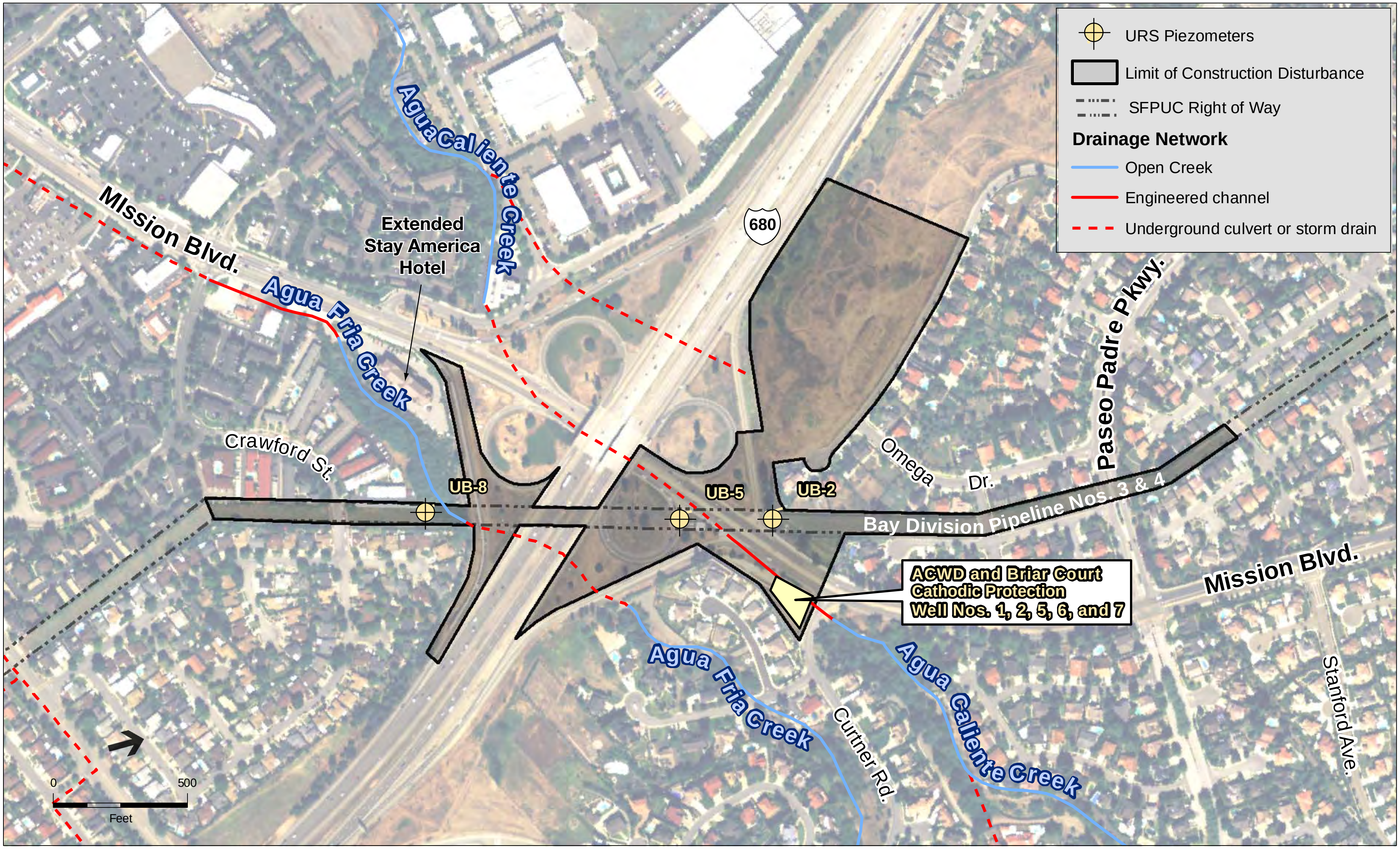
Where it crosses the BDPL Nos. 3 and 4 ROW, Agua Fria Creek is incised approximately 6 to 10 feet below the surrounding ground surface, and the densely vegetated banks include scrubby streamside thickets. Based on a hydrologic study of the creek conducted by Darnell Shaw Environmental in March and July of 2007 and January of 2008, the creek has experienced heavy winter streamflows, as evidenced by the flow debris observed on overhanging vegetation approximately 4 feet above the low water level (DSE, 2009). During a field visit in July 2007, it was noted that sandbags have been placed as a flood control protection measure on the south bank of a 50-foot shaded section of the creek within the project area.



SOURCE: NAIP, 2005; DSE, 2009

Seismic Upgrade of BDPL Nos. 3 and 4 at Hayward Fault . 206166.06

Figure 5.11-1
Area Creeks and Drainages



SOURCE: Sowers, 1999; URS, 2008b; ACWD, 2009

Seismic Upgrade of BDPL Nos. 3 and 4 at Hayward Fault

Figure 5.11-2
Creek and Well Locations

Limited streamflow data are available for Agua Fria Creek, with the exception of upstream measurements taken in winter 1998 by the Alameda County Public Works Agency (ACPWA) at Briar Place, as well as during the spring of 2003 at Warren Avenue (DSE, 2009). Based on the available data from these periods, the base flow, when present, typically ranges from as little 1 cubic foot per second (cfs) to about 5 cfs (ACPWA, 2008a, 2008b, 2008c). Flows during the measuring periods only sporadically exceeded this range, and the highest flow recorded during the measuring period was 472 cfs, which occurred in May 2003. A similar measurement of 436 cfs occurred in February 1998. The higher readings tend to occur during large storm events, and average flows would be much closer to the typical range 1 to 5 cfs (DSE, 2009).

As discussed in Section 5.11.2, Regulatory Framework, under the heading Beneficial Uses, the San Francisco Bay Regional Water Quality Control Board (RWQCB) has not designated beneficial uses for Agua Fria Creek; however, because this creek is tributary to Coyote Creek, the beneficial uses identified for Coyote Creek apply to Agua Fria Creek. The designated beneficial uses of Coyote Creek include groundwater recharge, coldwater habitat, fish migration, rare species, spawning, warmwater habitat, wildlife habitat, and noncontact water recreation. Water contact recreation is listed as a potential beneficial use. No recreational uses of the creek were observed in 2007 and 2008. Within the project area, Agua Fria Creek does provide suitable habitat for resident fish but not for migratory fish because the upstream area is too steep to support rearing of juveniles, and in the lower reaches the flow is too low for smolts (salmonids that are beginning their migration from a freshwater to a marine environment) to reach Coyote Creek (see Section 5.9.1.3, Fish Habitat, in Section 5.9, Biological Resources).

Agua Caliente Creek

Agua Caliente Creek is an intermittent stream that originates on the western flank of Mount Allison to the north of Agua Fria Creek (Figure 5.11-1). The watershed drains approximately 1.9 square miles. The upper portion of the watershed is primarily undeveloped steep slopes vegetated with annual grassland (DSE, 2009). The hillsides are used for livestock grazing. In the upper portion of the watershed, Agua Caliente Creek, like Agua Fria Creek, flows within its natural bed and supports riparian vegetation on both sides of the banks.

The middle portion of the watershed has been developed into residential neighborhoods. The remainder of the watershed, to the west of I-680, has been developed with industrial and commercial land uses. The creek is open in a “semi-improved” natural state until it enters a 375-foot-long open concrete channel near Mission Boulevard, and then flows through a culvert under I-680 and Mission Boulevard. This open concrete channel parallels Mission Boulevard and is located within the project area.

Downstream of I-680, a reach of this creek again flows within its natural bed for approximately 1,800 feet. The remaining section of creek to the west of Warm Springs Boulevard is contained in either a belowground storm drain or engineered flood control channels that discharge to Laguna Creek, which ultimately discharges to Coyote Creek, then San Francisco Bay.

In the easternmost portion of the project area, Agua Caliente Creek is contained within a concrete channel. The remainder of the creek within the project area traverses the project area as an underground, culverted stream (Figure 5.11-2). Its alignment was rerouted and its flow confined in an 8- by 10-foot underground concrete culvert during construction of I-680 in 1969. The underground culverted section of the creek passes underneath I-680, Mission Boulevard, and associated access ramps from east of Mission Boulevard to the west of the southbound diamond off-ramp (DSE, 2009).

Streamflow, sediment transport, and water quality monitoring data are not available for Agua Caliente Creek (DSE, 2009). As discussed below under the heading Beneficial Uses, the RWQCB has not designated beneficial uses for Agua Caliente and Laguna Creeks; however, because the creeks are tributary to Coyote Creek, the beneficial uses identified for Coyote Creek apply to these creeks. The designated beneficial uses of Coyote Creek include groundwater recharge, coldwater habitat, fish migration, rare species, spawning, warmwater habitat, wildlife habitat, and noncontact water recreation. Water contact recreation is listed as a potential beneficial use. None of these beneficial uses occur with the project area because the creek is primarily contained in an underground culvert.

5.11.1.2 Drainage

The ACPWA is responsible for design, construction, and maintenance of the storm drainage infrastructure of the area surrounding and including the proposed project area (see Figure 5.11-1). The ACPWA refers to the Agua Fria Creek flood control channel as Line D at the point where it enters the culvert at the west end of the Extended Stay Hotel parking lot. Downstream of its confluence with Toroges Creek (Lines B, B-1, and C), the Agua Fria Creek drainage is referred to as Line C, then as Line B before it discharges to Coyote Creek, about a half mile north of the west end of Dixon Landing Road.

The APWCA refers to the Agua Caliente Creek flood control channel as Line F. This line joins APWCA Line E, which drains to Laguna Creek before it discharges to Coyote Creek. Stormwater in the project area drains to Agua Fria or Agua Caliente Creek and ultimately to Coyote Creek and San Francisco Bay.

5.11.1.3 Flooding

Flooding in the region is primarily restricted to areas along the San Francisco Bay margins and along individual streams. An extensive network of flood control channels has been constructed throughout this region, and flood control improvements have been made to many of the streams to contain the 100-year and 500-year floods. In some areas, flood flows are contained by levees. Within the project boundaries, 100-year peak flows would be contained within existing creek channels and culverts; however, both Agua Fria and Agua Caliente Creeks have 100-year flood zones downstream of the project site, as discussed below.

Agua Fria Creek

The Federal Emergency Management Agency (FEMA) has identified a 100-year flood zone associated with Agua Fria Creek upstream of the crossing of Western Pacific and Southern Pacific Railroads, approximately 0.7 mile downstream of the project area, due to inadequate culvert capacity at these crossings (FEMA, 2009). At all other locations and crossings along the creek, the 100-year flood is contained within the existing channels and culverts. The peak discharge for a 100-year storm at I-680, near the project site, is estimated to be 600 cfs (FEMA, 2009). FEMA has identified areas of shallow flooding with a base flood elevation of 9 feet above mean sea level along Coyote Creek and the San Francisco Bay margin.

Agua Caliente Creek

FEMA has also mapped 100-year flood zones along much of Agua Caliente Creek upstream of road and railroad crossings that have inadequate culvert capacity. These crossings include Curtner Road, Warm Springs Boulevard, the Western Pacific Railroad, and Kato Road. Between the Nimitz Freeway and Kato Road, the 100-year flood zone occurs within a swale-type depression that parallels the Nimitz Freeway to the north. At all other locations and crossings along the creek, the 100-year flood is contained within the existing channels and culverts. The peak discharge for a 100-year storm at I-680, near the project site, is estimated to be 1,000 cfs (FEMA, 2009). FEMA has identified areas of shallow flooding with a base flood elevation of 9 feet above mean sea level along the bay margin.

5.11.1.4 Surface Water Quality

The Clean Water Act (discussed in Section 5.11.2, Regulatory Framework) requires state governments to identify a list of impaired water bodies, defined as those water bodies that do not meet water quality standards. Neither Agua Fria Creek nor Agua Caliente Creek is listed on the State Water Resources Control Board (SWRCB) 303(d) list of impaired water bodies (SWRCB, 2007). However, it is noted that Coyote Creek in Santa Clara County, downstream of the project area, is listed as an impaired water body due to the presence of diazinon, a pesticide that originates from urban runoff and storm sewers.

From 1999 to 2002, as part of a larger regional study, the U.S. Geologic Survey performed periodic streamflow and sediment monitoring on Agua Fria Creek at the Warm Springs Road culvert (DSE, 2009). The water quality parameters monitored for this study included temperature, instantaneous discharge, suspended sediment discharge, and suspended sediment concentration, as shown in **Table 5.11-1**.

Throughout this period, temperatures in Aqua Fria Creek ranged from 9 degrees Celsius (°C) (48 degrees Fahrenheit), recorded on January 26, 2001, to as high as 16.5 °C (62 degrees Fahrenheit), recorded on October 6, 2000. Maximum sediment concentrations and sediment loads occurred when flow rates (instantaneous discharge) were the highest. During the sampling period, the highest instantaneous discharge reading (6.9 cfs) occurred on March 9, 2000; the

TABLE 5.11-1
WATER QUALITY MONITORING DATA FOR AGUA FRIA CREEK AT WARM SPRINGS ROAD

Date	Temperature (°C)	Discharge (cfs)	Suspended Sediment Concentration (mg/L)	Suspended Sediment Discharge (tons/day)
1/25/2000	14.0	3.1	78	0.65
3/9/2000	10.0	6.9	124	2.3
10/6/2000	16.5	0.64	22	0.04
1/26/2001	9.0	0.36	no value	no value
3/6/2001	13.5	0.20	57	0.03
3/20/2001	15.5	0.3	12	0.01
10/3/2001	no value	0.35	28	0.03
12/20/2001	10.0	6.8	78	1.4
1/10/2002	12.0	0.41	13	0.01
3/4/2002	13.0	2.20	12	0.07
4/11/2002	16.0	0.34	no value	no value
4/30/2002	14.0	0.28	8	0.01

NOTES: cubic feet per second; mg/L = milligrams per liter; °C = degrees Celsius

SOURCE: USGS, 2002.

maximum suspended sediment load (2.3 tons/day) and maximum suspended sediment concentration (124 milligrams per liter [mg/L]) also occurred on this date. Likewise, the lowest readings for these parameters occurred when the instantaneous discharge rates were low. The minimum suspended sediment load was 0.01 ton per day on March 20, 2001, January 10, 2002, and April 30, 2002, when the instantaneous discharge flow rate was 0.41 cfs or less.

5.11.1.5 Groundwater

The project area is located within the Niles Cone Groundwater Basin, which is a subbasin of the Santa Clara Valley Groundwater Basin. The Niles Cone basin is bounded on the east by the Diablo Range and on the west by San Francisco Bay. Although there is not a physical boundary separating the groundwater basin from basins to the north and south, the California Department of Water Resources (DWR) defines the northern boundary as the northern boundary of the Alameda County Water District (ACWD) and the southern portions of the city of Hayward. The southern boundary is defined as the Alameda–Santa Clara County boundary. Alameda Creek, the principal surface water within the basin, flows near the eastern and northern margins of the basin. Coyote Creek flows along a portion of the southwestern margin of the basin (DWR, 2006).

Within Niles Cone basin, the Hayward fault acts as a barrier to groundwater flow and separates the basin into the Below Hayward Fault and Above Hayward Fault subbasins. The project area is close to the boundary of these two subbasins, but within the Below Hayward Fault subbasin. The sources of water that feed the basin are runoff and precipitation from the Alameda Creek watershed, and applied water obtained from the State Water Project and the SFPUC (ACWD,

2009) (which is introduced through percolation ponds). The shallowest aquifer[1] west of the Hayward fault is the Newark Aquifer, which consists primarily of thick gravel and sand layers. The aquifer is found between 40 and 140 feet below ground surface. Low-permeability silts and clays, referred to as the Newark Aquiclude, overlie most of the aquifer (with the exception of areas just west of the Hayward fault), allowing for direct recharge of the aquifer. The project area is located in this unconfined area. The unconfined area consists of very thick alluvial deposits that act to recharge the Newark Aquifer as well as the deeper aquifers—referred to as the Centerville, Fremont, and Deep Aquifers—that make up the Niles Cone Groundwater Basin.

Groundwater extraction in the Niles Cone Groundwater Basin includes pumping of the ACWD's production wells, privately owned wells, and wells managed under the ACWD's Aquifer Reclamation Program (ACWD, 2008). The beneficial uses of the basin, as identified in the *Water Quality Control Plan for the San Francisco Bay Basin* (RWQCB, 2007) (referred to as the Basin Plan, and discussed further below), are municipal supply, industrial process water supply, industrial service water supply, and agricultural supply. The nearest ACWD production well to the project is in the Mowry Wellfield, which is approximately 5.5 miles north of the project site.

The ACWD (2009) conducted a review of wells located within a five-mile radius of the project area and identified three 100-foot-deep groundwater piezometers[2] installed by the SFPUC to obtain information needed to design the proposed project. The piezometers (UB-2, UB-5, and UB-8) are located within the pipeline ROW (see Figure 5.11-2). The review also identified a cluster of three ACWD cathodic protection wells (No. 5, No. 6, and No. 7)[3] that are 12 feet deep and two Briar Court Association cathodic protection wells (No. 1 and No. 2) that are 150 feet deep near the intersection of Curtner Road and Mission Boulevard (see Figure 5.11-2). No other wells were identified within or in the vicinity of the project area, although the information available on a number of domestic and agricultural wells was insufficient to determine the well locations. The lack of information on these wells suggests that they were initially installed when the region was used for agricultural purposes (mainly orchards). The developed areas surrounding the project area are now primarily residential and lie within the ACWD water supply service area, where drinking water is not generally obtained from private wells.

1 A stratum of earth or porous rock that contains water.

2 Piezometers are groundwater monitoring wells used to monitor water levels; they do not involve the extraction of groundwater.

3 Cathodic protection wells are used to prevent the corrosion of metal in underground pipelines. These wells use a "sacrificial" metallic anode that is designed to corrode in place of the pipeline. These types of wells do not involve the extraction of groundwater.

5.11.2 Regulatory Framework

5.11.2.1 Water Quality Regulations

The federal Clean Water Act (1972) and subsequent amendments, under the enforcement authority of the U.S. Environmental Protection Agency (U.S. EPA), were enacted "to restore and maintain the chemical, physical, and biological integrity of the Nation's waters." The Clean Water Act gave the U.S. EPA the authority to implement pollution control programs such as setting wastewater standards for industry. It also set water quality standards for surface waters and established the National Pollutant Discharge Elimination System (NPDES) program to protect water quality. Under Section 402 of the Clean Water Act, discharge of pollutants to navigable waters is prohibited unless the discharge is in compliance with an NPDES permit. The U.S. EPA determined that California's water pollution control program has sufficient authority to manage the NPDES program under state law in a manner consistent with the Clean Water Act. Therefore, implementation and enforcement of the NPDES program is conducted through the California State Water Resources Control Board (SWRCB) and the nine RWQCBs. These agencies also implement the waste discharge requirements (WDR) program, which regulates discharges of waste to land under the California Water Code as well as discharges of waste into waters of the state that are outside federal jurisdiction, as defined under the Clean Water Act.

The RWQCB (Region No. 2) regulates water quality in the project area under the State of California's Porter-Cologne Water Quality Control Act (California Water Code, Division 7) through the regulatory standards and objectives set forth in the Basin Plan. The Basin Plan identifies existing and potential beneficial uses, and provides numerical and narrative water quality objectives to protect those uses. The current Basin Plan was adopted in January 2007 and is periodically updated and amended (RWQCB, 2007).

Beneficial Uses

Beneficial uses serve as a basis for establishing water quality objectives and discharge prohibitions to achieve the highest water quality that provides the maximum benefit to the people of the state. Beneficial uses are designated in Basin Plans for surface waters and groundwater basins, and, in the case of the San Francisco Bay Basin, for wetlands. Although the beneficial uses for Agua Fria and Agua Caliente Creeks are not specifically defined in the Basin Plan, they are listed for Coyote Creek, and the beneficial uses of any specifically identified water body generally apply to all of its tributaries. The existing beneficial uses of Coyote Creek include groundwater recharge, coldwater habitat, fish migration, rare species, spawning, warmwater habitat, wildlife habitat, and noncontact water recreation. Water contact recreation is listed as a potential beneficial use. Because coldwater habitat is a beneficial use for Coyote Creek, the Basin Plan specifies that the temperature of the creek may not be increased by more than 5 degrees Fahrenheit above its natural water temperature.

The beneficial uses of the Niles Cone Groundwater Basin are listed in the Basin Plan as municipal supply, industrial process water supply, industrial service water supply, and agricultural supply.

Construction in Waters of the State and of the United States

The RWQCB has regulatory authority over construction in waters of the United States and waters of the state, including activities in wetlands, under both the federal Clean Water Act and the Porter-Cologne Act. Under the Clean Water Act, the RWQCB has regulatory authority over actions in waters of the United States through water quality certifications under Section 401 of the Clean Water Act, which are issued in conjunction with permits issued by the Army Corps of Engineers (Corps) under Section 404 of the Clean Water Act. When the RWQCB issues a Section 401 certification for a project, the project is also regulated under SWRCB Order No. 2003-0017-DWQ, "General Waste Discharge Requirements for Dredge and Fill Discharges That Have Received State Water Quality Certification," which requires compliance with all conditions of the water quality certification. Activities in areas outside the jurisdiction of the Corps (e.g., isolated wetlands, vernal pools, stream banks above the ordinary high water mark) are regulated by the RWQCB under the authority of the Porter-Cologne Act. Activities that lie outside Corps jurisdiction may require the issuance of either individual or general waste discharge permits.

Section 401 of the Clean Water Act provides the SWRCB and RWQCBs with the regulatory authority to waive, certify, or deny any proposed federally permitted activity that could result in a discharge to surface waters of the state. To waive or certify an activity, these agencies must find that the proposed discharge will comply with state water quality standards, including protection of beneficial uses and water quality objectives. This water quality certification is generally required for projects involving the discharge of dredged or fill material to wetlands or other water bodies, as described in Section 5.9, Biological Resources.

Under the California Fish and Game Code, the California Department of Fish and Game (CDFG) has jurisdiction over any activity that could affect the bank or bed of any stream that has value to fish and wildlife. If any changes are proposed along a creek or waterway within its jurisdiction, a streambed alteration agreement would be required under California Fish and Game Code Section 1602. (Refer to Section 5.9, Biological Resources, for additional information.)

NPDES Waste Discharge Regulations

The NPDES program requires all facilities that discharge pollutants into waters of the United States to be permitted. The discharge permit provides two levels of control for the protection of water quality: technology-based limits and water-quality-based limits. Technology-based limits are based on the ability of dischargers in the same category to treat wastewater, while water-quality-based limits are required if technology-based limits are not sufficient to provide protection of the water body. Water-quality-based effluent limitations required to meet water quality criteria in the receiving water are based on criteria specified in the National Toxics Rule, the California Toxics Rule, and the Basin Plan. The NPDES regulations initially focused on municipal and industrial wastewater discharges, and then addressed stormwater discharge regulations, which became effective in November 1990. NPDES permits for wastewater and industrial discharges specify discharge prohibitions and effluent limitations, and include other provisions (such as monitoring and reporting programs) deemed necessary to protect water quality. In California, the SWRCB and RWQCBs implement and enforce the NPDES program.

Municipal Stormwater Permit

Stormwater in Alameda County is managed in accordance with the Municipal Regional Stormwater NPDES permit from the San Francisco Bay RWQCB (Permit No. R2-2009-0074).

Provision C.3 to the municipal stormwater permit, requires new development and redevelopment projects that create or replace 10,000 square feet or more of impervious surfaces to incorporate treatment measures, source control measures, and site design features to reduce the pollutant load in stormwater discharges and to manage runoff flows. The permit specifies that the threshold for compliance with these requirements will be reduced to 5,000 square feet on December 1, 2011. Provision C.6 of the municipal stormwater permit requires municipalities subject to the permit to adopt a construction site inspection and control program at all construction sites and to develop an Enforcement Response Plan to prevent construction site discharges of pollutants and impacts on beneficial uses of receiving waters from construction site discharges.

NPDES Permit for the SFPUC Drinking Water Transmission System

RWQCB Order No. R2-2008-0102 (the Order), dated December 12, 2008, regulates discharges of treated water from the SFPUC Drinking Water Transmission System. It regulates planned discharges resulting from routine operations and maintenance that can be scheduled in advance, as well as unplanned and emergency discharges resulting from system failures or natural disasters. Planned discharges include drainage of pipelines and tunnels to allow for inspection, repair, and/or replacement; and flushing of disinfection water from the pipelines and tunnels after bringing them back online. The Order has been issued by the RWQCB—pursuant to Section 402 of the Clean Water Act, and Chapter 5.5, Division 7 of the California Water Code (commencing with Section 13370)—to serve as an NPDES permit for point source discharges from the SFPUC regional water system to surface waters. The Order also serves as WDRs pursuant to Article 4, Chapter 4, Division 7 of the Water Code (commencing with Section 13260).

For planned discharges, the Order mandates effluent and receiving water discharge limitations. Specific effluent limitations, shown in **Table 5.11-2**, set numerical restrictions for chlorine, pH, nickel, and trihalomethanes, including the requirement for removal of all chlorine.[4] Receiving water limitations set forth in the Order require that the discharges do not cause any of the following conditions in the receiving water:

- Floating material, including solids, liquids, foams, and scum, in concentrations that cause nuisance or adversely affect beneficial uses
- Bottom deposits or aquatic growths to the extent that such deposits or growths cause nuisance or adversely affect beneficial uses
- Alteration of temperature from ambient levels unless it can be demonstrated to the satisfaction of the RWQCB that such alteration of temperature does not affect adversely beneficial uses

[4] The SWRCB is considering a statewide policy on chlorine residual, and the NDPES permit limitations on residual chlorine may be changed to reflect the statewide policy, when established.

TABLE 5.11-2
EFFLUENT LIMITATIONS FOR PLANNED DISCHARGES FROM THE SFPUC SYSTEM

		Effluent Limitations			
Parameter	**Units**	**Average Monthly**	**Maximum Daily**	**Instantaneous Minimum**	**Instantaneous Maximum**
Total residual chlorine	mg/L	–	–	–	0.0[a]
pH[b]	Standard Units	–	–	6.5	8.5
Nickel	μg/L	4.2	7.2	–	–
Total trihalomethanes	mg/L	0.10	–	–	–

NOTES: mg/L = milligrams per liter; μg/L = micrograms per liter

a This limit is defined as the analytical detection limit of 0.05 mg/L.
b Exceedance of the effluent limitation for pH would not constitute a violation of the permit if it does not cause the pH of the receiving water to be reduced below 6.5 or increased above 8.5, or if it does not cause more than a 0.5 standard unit change in the receiving water pH if the receiving water pH is outside this range.

SOURCE: RWQCB, 2008.

- Oils, greases, waxes, or other materials in concentrations that result in a visible film or coating on the surface of the water or on objects in the water, that cause nuisance, or that otherwise adversely affect beneficial uses
- Toxic or other deleterious substances in concentrations or quantities that will cause deleterious effects on aquatic biota, wildlife, or waterfowl; or that render any of these unfit for human consumption, either at levels created in the receiving waters or as a result of biological concentration
- Changes in turbidity that cause nuisance or adversely affect beneficial uses (in non-tidal receiving waters, where background turbidity is greater than 50 NTU (nephelometric turbidity units), the discharges also shall not cause an increase of more than 10 percent above upstream background turbidity)

In accordance with the Monitoring and Reporting Program of the Order, the SFPUC is required to conduct sampling to demonstrate compliance with permit requirements during all planned discharges. For discharges to creeks, monitoring is required at a minimum of the following four locations:

- In the discharge line immediately following treatment and before it joins or is diluted by any other waste stream, body of water, or substance
- In the receiving water located upstream of the discharge point where conditions are not expected to be influenced by the discharge
- Within 50 feet downstream from the point of discharge into the receiving water, or if access is limited, at the first accessible point downstream
- At least 10 times the channel width downstream from the point of discharge (referred to as the erosion monitoring location)

Effluent monitoring requirements are summarized in **Table 5.11-3**, and receiving water requirements are summarized in **Table 5.11-4**. In addition to demonstrating permit compliance, the monitoring information is used to facilitate self-policing by the waste discharger to prevent and abate pollution resulting from the discharge; develop or assist in the development of effluent or other limitations, discharge prohibitions, and water quality standards; and prepare water and wastewater quality inventories.

Compliance with the shear stress, soil texture, and channel geomorphology monitoring requirements for the receiving waters includes determination of sheer stress and soil texture of the stream banks at the erosion monitoring location as well as cross-sectional surveys and a longitudinal profile starting at the point of discharge and ending at the erosion control monitoring location. In addition, the SFPUC is required to photographically document conditions at the erosion monitoring location by collecting photographs of the stream alignment, channel banks, and any vegetation present on the banks both upstream and downstream of the erosion monitoring location before and after the discharge. In accordance with the Order, the SFPUC is required to monitor and report all discharges greater than 25 gallons per minute (gpm), and shall also report all discharges to creeks providing habitat for salmonids, regardless of flow rate. Neither Agua Fria nor Agua Caliente Creek provides habitat for salmonids (see Section 5.9, Biological Resources).

In addition, the Order requires the SFPUC to develop and implement standard operating procedures (SOPs) for dechlorination of discharges and an erosion control plan. These SOPs have been prepared for the SFPUC and are discussed below.

Construction Stormwater NPDES Permit

The federal Clean Water Act prohibits discharges of stormwater from construction projects unless the discharge is in compliance with an NPDES permit. The SWRCB, the permitting authority in California, adopted a Statewide General Permit for Stormwater Discharges Associated with Construction Activity (Order No. 99-08) that encompasses construction sites that include one or more acres of soil disturbance. Construction activity includes clearing, grading, grubbing, excavation, stockpiling, and reconstruction of existing facilities involving removal or replacement. On September 2, 2009, the SWRCB adopted the NPDES General Permit for Stormwater Discharges Associated with Construction and Land Disturbance Activities (construction general permit, Order No. 2009-0009). Order No. 2009-0009 becomes effective July 1, 2010, supersedes Order No. 99-08 and also applies to construction sites that include one or more acre of soil disturbance.

The construction general permit requires that the landowner and/or contractor file permit registration documents prior to commencing construction and pay an annual fee. These documents include a notice of intent, risk assessment, site map, stormwater pollution prevention plan (SWPPP), and signed certification statement. The permit specifies a risk-based permitting approach that includes requirements specific to three overall levels of risk, determined based on the potential for the project to cause sedimentation as well as the sensitivity of the receiving water to sedimentation. The three risk levels are used to determine specific numeric action levels and effluent limitations for pH and turbidity, as well as requirements for a rain event action plan, BMP implementation, monitoring, and reporting.

TABLE 5.11-3
EFFLUENT MONITORING REQUIREMENTS FOR DISCHARGES FROM THE SFPUC SYSTEM

Parameter	Units	Sample Type[a]	Minimum Sampling Frequency
Flow rate	MGD	Continuous	Hourly on each occurrence
Volume	MG	Continuous	Daily on each occurrence
pH	standard units	Grab	Hourly on each occurrence
Total residual chlorine	mg/L	Grab	Hourly on each occurrence
Copper	μg/L	Grab	One discharge per quarter
Nickel	μg/L	Grab	One discharge per quarter
Total trihalomethanes	mg/L	Grab	One discharge per quarter
All other priority pollutants not listed above	μg/L	Grab	Any one discharge per five years

NOTES: MG = million gallons; MGD = million gallons per day; mg/L = milligrams per liter; μg/L = micrograms per liter

[a] A continuous sample is one that is measured continuously and recorded and reported in accordance with the minimum sampling frequency. A grab sample is a discrete sample of effluent collected during periods of peak flow.

SOURCE: RWQCB, 2008.

TABLE 5.11-4
RECEIVING WATER MONITORING REQUIREMENTS
FOR DISCHARGES FROM THE SFPUC SYSTEM

Parameter	Units	Sample Type	Minimum Sampling Frequency
Turbidity	NTU	Grab	One discharge per quarter
pH	standard units	Grab	Hourly on one discharge per quarter
Hardness	mg/L as $CaCO_3$	Grab	One discharge per quarter
Nickel	μg/L	Grab	One discharge per quarter
Standard observation[a]	–	–	Once per occurrence
All other priority pollutants not listed above	μg/L	Grab	Any one discharge per 5 years
Shear stress	lb/ft	NA	One discharge per quarter
Soil texture	–	Grab	One discharge per quarter
Channel geomorphology	feet	NA	One discharge per quarter

NOTES: $CaCO_3$ = calcium carbonate; lb/ft^2 = pounds per square foot; mg/L = milligrams per liter; NTU = nephelometric turbidity units; μg/L = micrograms per liter

[a] Standard observations for receiving waters include: discoloration and turbidity, including the color, source, and size of affected area; depth of water column and sampling depth; weather conditions, including air temperatures, total precipitation during the past five days and on the day of observation; and location of meteorological station accessed to collect weather conditions and distance of this station from the discharge location.

SOURCE: RWQCB, 2008.

The SWPPP must include measures to ensure that all pollutants and their sources are controlled; non-stormwater discharges are identified and either eliminated, controlled, or treated; site BMPs are effective and result in the reduction or elimination of pollutants in stormwater discharges and authorized non-stormwater discharges; and BMPs installed to reduce or eliminate pollutants after construction are completed and maintained. The SWPPP must demonstrate that calculations and design details as well as BMP controls for site run-off are complete and correct. Non-stormwater discharges include those from improper dumping, accidental spills, and leakage from storage tanks or transfer areas. The general construction permit specifies minimum BMP requirements for stormwater control based on the risk level of the site. Post-construction stormwater performance standards must be included for sites not covered by a municipal stormwater permit. The standards address water quality, runoff reduction, drainage density, and channel protection requirements for the receiving water.

The permit requires effluent and receiving water monitoring to demonstrate compliance with permit requirements, and corrective action must be taken if these limitations are exceeded. The results of the monitoring and corrective actions must be reported annually to the SWRCB. The construction general permit specifies minimum qualifications for a qualified SWPPP developer and qualified SWPPP practitioner.

5.11.2.2 Groundwater Management

Groundwater Management Policy

The ACWD Groundwater Management Policy (ACWD,1973) specifies procedures to protect and improve ACWD's groundwater resources for the benefit of both ACWD's customers and private well owners by taking actions designed to meet the following objectives:

- Increase groundwater replenishment capability
- Increase the usable storage of the groundwater basin
- Operate the basin to provide: (1) a reliable water supply to meet baseload and peak distribution system demands; (2) an emergency source of supply; and (3) reserve storage to augment dry-year supplies
- Protect groundwater quality from degradation from any and all sources, including: saline water intrusion; wastewater discharges; recycled water use; urban and agricultural runoff; and chemical contamination
- Improve groundwater quality by: (1) removing salts and other contaminants from affected areas of the basin; and (2) improving the water quality of source water used for groundwater recharge

Drilling Permits

The ACWD requires the submittal of an application for a drilling permit for the completion of borings or wells within the district boundaries, including the installation of new wells and abandoning of existing wells. The proposed project, while located within the SFPUC's ROW, is located within the ACWD boundaries.

Because groundwater is utilized for a major portion of ACWD's drinking water supply, the ACWD administers the well ordinances for Fremont, Newark, and Union City. These city ordinances regulate all work on wells and boreholes associated with the following three categories of drilling activities: (1) water wells, cathodic protection wells, and dewatering wells; (2) geotechnical investigations; and (3) chemical investigations.

Destruction or abandonment of wells is required to adhere to the standards specified in the Water Well Standards that have been produced by the DWR (1981). These standards include:

- Wells must be inspected and all obstructions within the well must be cleared.
- The wells must be completely filled with appropriate materials (sealing materials shall comprise a minimum of the upper 20 feet). Sealing materials can include neat cement, sand-cement grout, concrete, and bentonite clay. Filling materials can include clay, silt, sand, gravel, crushed stone, native soils, or mixtures thereof.
- Neat cement must be placed in one continuous operation.
- For some wells, the removal of part or all of the well casing could be required.

5.11.2.3 Alameda County Public Works Agency

The ACPWA is responsible for maintaining the infrastructure of Alameda County—from its roads and bridges to flood channels and natural creeks. Within the ACPWA, the Alameda County Flood Control and Water Conservation District (ACFCWCD) works specifically to protect county citizens from flooding, and provides oversight on environmental protection through public outreach and enforcement of pollution control regulations governing local waterways. Channelized waterways within the project area and downstream fall under the jurisdiction of the ACFCWCD, and discharges or modifications to the channels within the ACFCWCD jurisdiction are required to be conducted under a flood encroachment permit issued by the district.

Alameda County Flood Control Ordinance

The ACFCWCD specifies requirements for discharges to and construction within the flood control facilities under its jurisdiction, including Agua Fria and Agua Caliente Creeks, in Chapter 6.36 of the General Ordinance of the County of Alameda, referred to as the County of Alameda Flood Control Ordinance. This ordinance specifies that any work within one of the agency's flood control or storm drainage facilities is subject to a flood encroachment permit. Coverage under the permit requires the permittee to provide a completed application, including a written scope of work. As part of permit approval, the ACFCWCD would require that its facilities are protected from the effects of erosion, contamination, and other damage and would specify inspection and testing points to demonstrate that these effects do not occur. In addition, the ACFCWCD would have the right to monitor and inspect any work conducted under the permit.

For groundwater dewatering discharges, the ACFCWCD would require implementation of a groundwater treatment plan. A district inspector must be present to observe activities that would breach any ACFCWCD-maintained facility. The district must approve plans to divert flows, and implementation of a formal diversion plan could be required. Discharges to district facilities must be made in accordance with a written discharge plan. All plans would be subject to district approval.

5.11.2.4 City of Fremont

The City of Fremont Storm Water Management and Discharge Control Ordinance (Chapter 11, Article 2 of the Fremont Municipal Code) prohibits non-stormwater discharges to the city storm sewer system. Exceptions to the discharge prohibition include any non-stormwater discharges that are regulated under a separate NPDES permit, as well as discharges from waterline flushing or other potable water sources and uncontaminated pumped groundwater.

5.11.2.5 SFPUC Standard Procedures

SFPUC Dechlorination Procedures

SFPUC procedures for dechlorinating all planned pipeline discharges in compliance with RWQCB Order No. R2-2008-0102 are established in the *Manual of Procedures – Disinfection/ Dechlorination and Related Tasks* (SFPUC, 2005). In accordance with these procedures, the SFPUC would generally be responsible for performing the initial gravity drain of the pipeline, and prior to discharge, would prepare a dewater and discharge plan, including the date, volume, and location of the discharge as well as a dechlorination plan showing a piping diagram for the dechlorination system. A construction contractor would be responsible for conducting the discharge following the initial gravity drain by the SFPUC. The contractor would be required to submit a draining, dechlorination, and monitoring plan to the SFPUC at least 30 days prior to the discharge. The plan would include an estimate of the water volume and time period for the discharge, and would describe how the discharge would comply with regulatory requirements. Information on personnel, equipment, instrumentation and calibration requirements, chemicals, sampling locations, monitoring, regulatory notifications, and record keeping would also be included. Methods for dechlorination of the discharge could include using a drip feed or metering pump to inject a 25 percent sodium bisulfite solution or other suitable method approved by the SFPUC.

SFPUC Erosion Control Standard Operating Procedures

In accordance with the requirements of RWQCB Order No. R2-2008-0102, described above, the SFPUC has prepared an SOP (RMC, 2008) that specifies erosion control practices for discharges to streams as well as SFPUC organizational responsibilities for implementing the SOP and coordination with the RWQCB, local agencies, and other users of the affected surface water. In accordance with this SOP, most discharges would occur using gravity flow, and the discharge rate would be controlled with valves and/or by restricting the size of the discharge pipe. Typical discharge rates would be 800 to 1,000 gpm (1.8 to 2.2 cfs), but in accordance with the requirements of the Order, could be as high as 3,500 gpm (7.8 cfs).

Discharge is typically accomplished through piping connected to the transmission system piping or to the tail end of the dechlorination piping, and extending to the riparian zone at the point of discharge. To reduce flow rates at the discharge point to 2 to 3 feet per second and diffuse the discharge, the piping would be connected by a tee to a larger diameter perforated pipe, and discharge would occur along the stream bed through the perforations. To facilitate discharge and protect riparian resources, the discharge pipeline could be placed on planks above the stream bed. The erosion control SOP specifies that, where possible, the discharge pipe should also be located above hardened sections of the stream to further reduce the potential for erosion.

Initially, the discharge rate would be restricted to 40 to 200 gpm (0.1 to 0.4 cfs) to soak unhardened sections of the channel and reduce the potential for scouring. Over the first 30 minutes of the discharge, the flow rate would be gradually increased until the permitted discharge flow rate is achieved, and the discharge would be monitored as described below. Within the last 30 to 60 minutes of discharge, the flow rates would be gradually reduced. When pumping is needed to complete the discharge, there is likely to be a short interval (generally less than one hour) between the gravity flow discharge and the pumped discharge, and the two events would be treated as two separate discharge events. For the pumped discharge, the pumping rate would be gradually increased within the first 30 to 60 minutes of pumping and gradually decreased during the final 30 to 60 minutes of pumping, as practicable.

Monitoring for erosion during discharges would include visual observation of the receiving water and turbidity monitoring in the receiving water. If visible signs of erosion are observed downstream of the discharge, the flow rate would be decreased until such effects are no longer visible. Allowable changes in turbidity depend on the ambient turbidity of the receiving water (summarized in **Table 5.11-5**). The SOP requires the collection of turbidity measurements twice during the first hour of the discharge event, and two additional times during the daylight hours. If turbidity measurements indicate that turbidity limitations specified in Table 5.11-5 are exceeded, the flow rate of the discharge would be adjusted to maintain appropriate turbidity levels.

TABLE 5.11-5
RECEIVING WATER TURBIDITY COMPLIANCE STANDARDS
FOR PLANNED SFPUC DISCHARGES

Ambient Stream Turbidity	Compliance Standard
≤ 50 NTU[a]	≤ ambient turbidity + 5 NTU
50 – 100 NTU	≤ ambient turbidity + 10 NTU
> 100 NTU	≤ 1.1 x ambient turbidity
No upstream flow	1,000 NTU

NOTE: NTU = nephelometric turbidity units

SOURCE: RMC, 2008.

5.11.3 Impacts

5.11.3.1 Significance Criteria

The City and County of San Francisco (CCSF) has not formally adopted significance standards for impacts related to hydrology and water quality, but generally considers that implementation of the proposed project would have a significant hydrologic or water quality impact if it were to:

- Violate any water quality standards or waste discharge requirements;
- Substantially deplete groundwater supplies or interfere substantially with groundwater recharge such that there would be a net deficit in aquifer volume or a lowering of the local groundwater table level (e.g., the production rate of preexisting nearby wells would drop to a level 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, in a manner that would result in substantial erosion or siltation on or off the site;
- 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 flooding on or off the site;
- 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;
- Otherwise substantially degrade water quality;
- Place housing within a 100-year flood hazard area as mapped on a federal Flood Hazard Boundary or Flood Insurance Rate Map or other authoritative flood hazard delineation map;
- Place within a 100-year flood hazard area structures that would impede or redirect flood flows;
- 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; or
- Expose people or structures to a significant risk of loss, injury, or death involving inundation by seiche, tsunami, or mudflow.

5.11.3.2 Approach to Analysis

Due to the nature of the proposed project, there would be no impacts related to the following criteria; therefore, no impact discussion is provided for these topics for the following reasons:

> *Alter drainage patterns in a manner that would result in substantial erosion or siltation or in flooding on or off the site*. After construction is complete, the proposed project would not result in a significant change to existing drainage patterns. The only proposed aboveground improvements are: modifications to the existing slip-joint vault that protrudes approximately 3 feet above grade in the vicinity of the northbound loop on-ramp

to I-680; and construction of six access manholes, approximately 6 feet in diameter, that would protrude about 2.5 feet above grade. Otherwise, all proposed permanent improvements would be constructed below ground and would not affect drainage patterns. Therefore, the proposed project would not result in a substantial increase in permanent impervious surfaces or changes in topography that would affect drainage, and would not result in substantial erosion or siltation or cause flooding on or off the site.

Contribute runoff water that would exceed the capacity of a stormwater drainage system or provide substantial sources of polluted runoff. The project does not propose the construction of substantial new permanent impervious surfaces or an increased use of hazardous materials, and therefore would not increase stormwater runoff or provide additional sources of polluted runoff during operation. Temporary changes in stormwater runoff are addressed in Impact HY-1, below, and the effects of discharges of groundwater and treated system water to Agua Fria Creek are addressed in Impacts HY-3 and HY-4, below.

As discussed above in Section 5.11.1.4, Coyote Creek in Santa Clara County is listed as an impaired water body due to the presence of diazinon, a pesticide that originates from urban runoff and storm sewers. However, the project would not contribute to urban runoff because no new impervious surfaces would be constructed, as described above.

Place housing or structures within a 100-year flood hazard area. The project area is not located within a 100-year flood zone. The proposed project does not include housing and would not entail the construction of any permanent aboveground improvements that might affect or be affected by a 100-year flood storm event. Therefore, there would be no impacts related to the placement of housing within a 100-year flood zone or obstruction of 100-year flood flows.

Cause a levee or dam to fail. None of the permanent aboveground structures would be susceptible to damage from the failure of a levee or dam. According to mapping compiled by the Association of Bay Area Governments, the proposed project area is located outside of any dam inundation area (ABAG, 2009). Although the ACWD maintains the 18-million-gallon Alameda Reservoir approximately one-third mile to the east, this reservoir is constructed completely belowground, and nearly all of the proposed project improvements would be constructed belowground. Therefore, the project improvements would not be affected by inundation as a result of failure of this reservoir, and no impacts related to failure of a levee or dam would occur.

Result in seiche, tsunami, or mudflow. The project area is not located near an enclosed body of water capable of producing seiche waves and is too far inland to be at risk for tsunami hazards. The relatively flat topography of the project area is also not susceptible to mudflows. Therefore, no impacts related to seiche, tsunami, or mudflow would occur.

This analysis of hydrologic and water quality impacts on surface water evaluates the potential for water quality degradation and increased erosion, sedimentation, and runoff attributable to the construction and operation of the proposed project, with consideration of legally mandated requirements for protecting water quality. The analysis evaluates the nature, magnitude, duration/frequency, and overall severity of the project effects relative to the significance criteria to determine whether the project would result in significant impacts and thus whether mitigation measures would be required.

The proposed project would not have a direct long-term effect on the hydrology or water quality of local surface waters, including Agua Fria Creek, Agua Caliente Creek, Coyote Creek, Laguna Creek, and San Francisco Bay, because the only substantial discharges to Agua Fria and Agua Caliente Creeks would occur during construction. Short-term construction impacts could result in erosion of the creek bed, sedimentation, or the discharge of construction-related pollutants to Agua Fria Creek or the Fremont storm drain system, potentially causing water quality effects and flooding, depending on the flow rate in Agua Fria Creek at the time of the proposed construction-related discharges. During operation, there would be only minimal discharges of water to Agua Caliente Creek from the slip-joint vault and new articulated vault, unless BDPL No. 4 ruptures due to an earthquake on the Hayward fault.

The analysis of impacts on groundwater resources considers the existing uses of the groundwater basin and the effects of planned construction dewatering on those resources. The potential to affect groundwater quality takes into account the potential construction of groundwater dewatering wells and abandonment of existing piezometers within the BDPL Nos. 3 and 4 ROW, with consideration of legally mandated requirements for well construction and abandonment.

Under the proposed project, BDPL No. 4 could rupture in the event of an earthquake on the Hayward fault; however, proposed improvements to BDPL No. 4 are intended to ensure that only BDPL No. 4 would break and that a ‘controlled’ breakage would occur at Trace B of the Hayward fault. Under existing conditions, a rupture of the Hayward fault could result in catastrophic failure of both BDPL Nos. 3 and 4, resulting in loss of water supply to downstream users. Extensive damage to the surrounding area, including I-680 and Mission Boulevard, could occur during the 30- to 60-minute period required to close the isolation shutoff valves, during which time the release rate from the pipelines would be approximately 300,000 gpm, resulting in a release of up to approximately 18 million gallons of water. If only BDPL No. 4 were to rupture, the volume of water that would be discharged before the shutoff valves could be closed would be reduced to approximately 10 million gallons.

In addition, the project includes drainage improvements to accommodate flows from a potential rupture of BDPL No. 4 and reduce damage from a release of water. These improvements, described in Chapter 3, Project Description (see Section 3.4.3.3, BDPL No. 4 Upgrades), include installing a 24-inch drain in the modified vault to direct some of the flow to the Agua Caliente Creek culvert, utilizing the abandoned BDPL No. 3 to direct some of the flow to Agua Fria Creek and the Aqua Caliente Creek culvert, installing panels on the slip-joint vault to direct flows, and improving the Mission Boulevard stormwater collection system. Reducing the volume of water that would be discharged as a result of an earthquake on the Hayward fault and constructing these drainage improvements would be an improvement over existing conditions. Therefore, the potential effects of a release of water from BDPL No. 4 as a result of an earthquake on the Hayward fault are not discussed further.

5.11.3.3 Impact Analysis

Summary of Impacts

Table 5.11-6 summarizes the potential hydrology and water quality impacts and the significance of project impacts before and after mitigation.

TABLE 5.11-6
SUMMARY OF IMPACTS – HYDROLOGY AND WATER QUALITY

Impact	Significance Determination Before Mitigation	Significance Determination After Mitigation
Impact HY-1: Degradation of water quality as a result of erosion and sedimentation or a hazardous materials release during construction.	S	LS
Impact HY-2: Depletion of groundwater resources.	LS	–
Impact HY-3: Degradation of water quality and flooding due to discharges during dewatering of trenches.	S	LS
Impact HY-4: Erosion, degradation of water quality, and flooding due to construction-related discharges of treated water (from pipelines).	PS	LS
Impact HY-5: Damage to existing piezometer and cathodic protection wells, creating a potential conduit for pollutants to enter the underlying groundwater aquifer.	LS	–

LS = Less than Significant impact
PS = Potentially Significant impact
S = Significant impact
SU = Significant and Unavoidable impact, even with mitigation incorporated
– = Mitigation not required

Construction Impacts

Impact HY-1: Degradation of water quality as a result of erosion and sedimentation or a hazardous materials release during construction.

The proposed project includes construction activities along the entire 2,360-foot segment of SFPUC ROW between the North and South Shutoff Stations as well as in the four staging areas, as indicated on in Chapter 3, Project Description, Figure 3.9. Construction activities would include excavation of subsurface soil, stockpiling of spoils, placement of imported fill materials, and placement of temporary pavement during traffic rerouting on the I-680 on-ramps and Mission Boulevard. Construction activities within the majority of the project area would occur within the Caltrans or SFPUC ROWs in areas that drain to the Fremont stormwater system, and ultimately to Agua Fria and Agua Caliente Creeks that are under the jurisdiction of the ACFCWCD.

In Zone 1, excavation could be required within Agua Fria Creek if the cut-and-cover construction method is used to cross the creek. This work would be subject to a Streambed Alteration

Agreement from the CDFG (described in Section 5.9, Biological Resources). If construction occurs when there is flow in the creek, Agua Fria Creek would be dewatered via a temporary dewatering system that would be built to create a dry work area during construction as described in Chapter 3, Project Description. This system would likely entail constructing a sandbag coffer dam around the worksite together with a flume pipe to sustain downstream flow at all times. Control measures would be implemented to prevent downstream pollution and sedimentation, and maintain the natural flow and temperature of the stream downstream of the construction area.

In the absence of proper controls, construction activities in all construction zones could result in substantial erosion of and sedimentation in Agua Fria and Agua Caliente Creeks, particularly if construction were to occur during the rainy season. Sedimentation in the creeks would degrade water quality and could increase channel siltation, reduce the flood-carrying capacity of the creeks, and affect aquatic species and habitats (see Section 5.9, Biological Resources, for a discussion of impacts on aquatic species and associated habitats). In addition, the temporary storage of diesel and chemicals in the staging areas and use of construction equipment throughout the project area could result in accidental releases to the local storm drain system or Agua Fria Creek and could degrade water quality. Substantial erosion, sedimentation or hazardous materials releases would result in a *significant* impact.

Project construction would affect approximately 29 acres of land; therefore, construction activities would be subject to the requirements of the SWRCB's NPDES general construction permit, which is required for construction sites disturbing one or more acres of soil. In accordance with this permit, the SFPUC or its contractor(s) would submit the required notices, develop a SWPPP, and implement site-specific BMPs in accordance with the approved SWPPP to control and reduce discharges of sediments and pollutants associated with construction stormwater runoff into storm drains and any receiving waters. Implementation of **Mitigation Measure M-HY-1, Construction Water Quality Best Management Practices,** would ensure the procedures used during construction are in compliance with federal and state regulations that protect water quality. Thus, implementation of this mitigation measure would reduce water quality impacts related to construction stormwater quality and a release of hazardous materials during construction to a less-than-significant level.

Mitigation Measure M-HY-1, Construction Water Quality Best Management Practices, specifies BMPs that address project scheduling, erosion control, tracking controls, non-stormwater controls to address releases of hazardous materials, and waste management and hazardous materials pollution control. These protection measures would be site specific and would prevent or minimize erosion as well as non-stormwater discharges to the storm sewers and receiving waters. The recommended BMPs would be subject to the review and approval of the RWQCB, and may be altered, supplemented or deleted during the RWQCB's review process, since the RWQCB has final authority over the terms of the SWPPP.

In addition to implementing Mitigation Measure M-HY-1, the SFPUC or its contractor(s) would be subject to the following permit requirements in Zone 1 where pipe installation would cross Agua

Fria Creek: Army Corps of Engineers (Section 404); RWQCB (Section 401 Water Quality Certification); and CDFG (Section 1602 Lake and Streambed Alteration Agreement). These permits are briefly described in Section 5.11.2, Regulatory Framework, and are discussed in Section 5.9, Biological Resources. Work within Agua Fria Creek would also be subject to the encroachment permitting requirements of the ACFCWCD, in accordance with the Alameda County Flood Control Ordinance described in Section 5.11.2.3.

Impact HY-2: Depletion of groundwater resources.

Temporary dewatering of excavated trenches during construction of the proposed project could be required in Zones 1, 3, 5, and 8 (see Chapter 3, Project Description, for a discussion of zones) in order to maintain a relatively dry excavation area during pipeline installation. In Zone 1, a 150-foot-long trench would be excavated to a depth of 30 feet. Stabilized groundwater levels within this zone are deeper than 41 feet below the ground surface (URS, 2009), but this analysis conservatively assumes that some dewatering could be required over the approximately three-month period that construction would take place in this zone. In Zone 5, a 75-foot-long trench would be excavated to a depth of 18 feet; and in Zone 8, a 970-foot-long trench would be excavated to a depth of 13 to 27 feet. The groundwater table in these zones is expected to be close to the bottom of the excavations at a depth of 13 to 26 feet (URS, 2008; URS, 2009), necessitating only limited dewatering over a period of approximately one month in Zone 5 and three months in Zone 8. In Zone 3, a 60-foot-long trench would be excavated to a depth of 35 feet, and the geotechnical report for the project concluded that groundwater would likely be encountered. Groundwater dewatering could be required over the approximately one-month period when construction would occur in this zone. Dewatering from the pipeline trenches during the construction period would temporarily affect groundwater levels in the shallow groundwater zone, but this effect would be limited to the immediate area of excavation.

The ACWD manages and protects groundwater resources in the project area, and groundwater is one of its major water supply sources. However, as discussed in Section 5.11.1, Setting, no groundwater-producing wells have been identified in the immediate vicinity of the project area. There are no ACWD production wells within five miles of the project site (and even if they did exist, such wells would not be affected by dewatering activities because they draw water from deeper aquifers).

Based on the limited extent of excavation requiring dewatering (approximately 1,300 linear feet of pipeline trench); the temporary nature of the dewatering activities (approximately eight months); and the absence of any identified groundwater production wells nearby, the proposed project would not substantially deplete groundwater supplies, interfere substantially with groundwater recharge, or cause other adverse effects such as subsidence; therefore, the potential impact on groundwater resources would be *less than significant*.

Impact HY-3: Degradation of water quality and flooding due to discharges during dewatering of trenches.

Water (predominantly groundwater) collected during the dewatering of excavated trenches in Zones 1, 3, 5, and 8 and rainwater collected within the pipeline trenches would be discharged directly via the local storm drain system to Agua Fria Creek and Agua Caliente Creek. Although the quantity of water that would be discharged is small, this water could contain sediments that, without proper controls, could degrade water quality in the receiving body of water, and the discharge could also result in erosion of the creek bed and/or cause downstream flooding (depending on the rate of discharge), resulting in a *significant* water quality impact. However, this impact would be reduced to a less-than-significant level through implementation of **Mitigation Measure M-HY-1, Construction Water Quality Best Management Practices,** and **Mitigation Measure M-HY-3, Coordination with Alameda County Flood Control and Water Conservation District and City of Fremont**. Mitigation Measure M-HY-1 would require the contractor to include BMPs for trench dewatering discharges in the project SWPPP and to prepare a trench dewatering plan. The plan would outline ways to impound the water, as necessary, to settle out solids before discharging it to local waterways. Mitigation Measure M-HY-3 would require the SFPUC to notify the ACFCWCD and City of Fremont of the planned discharge, verify that the discharge could be accommodated by existing storm drains and flood control channels, and manage the flow rate in coordination with these agencies to avoid flooding. The SFPUC would also be required to obtain an encroachment permit from the ACFCWCD for these discharges and implement the requirements of the permit, including preparation of a discharge plan subject to district approval.

Impact HY-4: Erosion, degradation of water quality, and flooding due to construction-related discharges of treated drinking water.

The proposed project would require emptying chloramine-treated drinking water from the existing BDPL No. 3 between the North and South Shutoff Stations prior to the installation of new wyes and valves, as well as emptying the chloramine-treated drinking water from the existing BDPL No. 4 for construction of the concrete encasement and sliplining. Approximately 606,000 gallons of water would be discharged from BDPL No. 3 over a period of approximately three days, and 917,000 gallons of water would be discharged from BDPL No. 4 over a period of four days. Both discharges would be made to Agua Fria Creek. In addition, both BDPL Nos. 3 and 4 would also require a one-time disinfection prior to being brought back online, and the new BDPL No. 3X would require disinfection prior to being put into service. Disinfection of the pipelines would involve flushing the pipelines with highly chlorinated water. Following disinfection, the pipelines would be flushed with clean SFPUC system water. The total amount of water discharged for this process would be approximately 2 million gallons for BDPL Nos. 3 and 3X over a period of three days, and about 2.6 million gallons from BDPL No. 4 over a period of four days. Both discharges would be made to Agua Fria Creek.

Erosion and Water Quality Impacts

The SFPUC drinking water is disinfected by means of chloramination—i.e., treatment with chloramine, a product of the reaction between chlorine and ammonia. After such treatment, the water typically contains 4 mg/L of residual chlorine and has a pH of up to 9.5. The chlorinated water used for disinfection would have a chlorine concentration of approximately 13 mg/L. Without the appropriate precautions, discharge of water containing chlorine and chloramines to Agua Fria Creek could degrade water quality and affect aquatic organisms. Depending on the method and rate of discharge, the discharge could also result in erosion in the receiving water (leading to water quality impacts).

Detrimental effects related to differences in temperature should not occur, because the system water has an average temperature of 12 °C (54 degrees Fahrenheit) (SFPUC, 2009), and historical temperatures in Agua Fria Creek range from 9 to 16.5 °C (48 to 62 degrees Fahrenheit), as discussed above in Section 5.11.1.4, Surface Water Quality.

RWQCB Order No. R2-2008-0102, described above in Section 5.11.2 contains specific effluent limitations for discharges of water from the SFPUC regional water system to creeks; requires erosion control BMPs and preparation of SOPs describing these BMPs; specifies receiving water limitations based on water quality objectives contained in the Basin Plan; and specifies compliance procedures that include a monitoring and reporting program and an annual compliance evaluation. These requirements mandate that water be treated onsite prior to discharge to remove chlorine and adjust the pH so that downstream water quality is protected. In addition, the Order specifies that the discharge shall not alter the temperature of the receiving water from ambient levels, unless it can be demonstrated that altering the temperature would not affect beneficial uses. Compliance with the requirements of the Order, as well as the SFPUC erosion control SOP (described in Section 5.11.2.5, SFPUC Standard Procedures) would ensure that impacts related to discharges of treated drinking water are less than significant.

Flooding Impacts

The above described Order No. R2-2008-0102 for discharges of water from the SFPUC regional water system allows discharge flow rates of up to 3,500 gpm (7.8 cfs). Although discharges rates under the proposed project would generally be lower—ranging from 500 to 1,000 gpm (1.1 to 2.2 cfs)—they could reach as high as 2,500 gpm (5.5 cfs). According to the limited data available, Agua Fria Creek flow rates have historically ranged from 1 to 5 cfs, with measurements as high as 472 cfs (DSE, 2009). Therefore, the proposed discharges would be on the same order of magnitude as existing average flows in Agua Fria Creek.

However, as noted in Section 5.11.1.3, Flooding, FEMA has identified a 100-year flood zone associated with Agua Fria Creek upstream of the Western Pacific and Southern Pacific Railroad crossing, approximately 0.7 mile downstream of the project area, due to inadequate culvert capacity at the crossing. Depending on the timing and nature of the discharge and other discharges to the creek at the time of implementation, these discharges could potentially contribute to flooding in Agua Fria Creek downstream of the project area if the creek flow rates were at or near flood stage at the time of the discharge, a *potentially significant* impact. This impact would be reduced to a less-than-significant level with implementation of **Mitigation Measure M-HY-3, Coordination with Alameda County Flood Control and Water Conservation District and City of Fremont,** which requires the SFPUC or its contractor to notify the ACFCWCD and City of Fremont of the planned discharge, verify that the discharge could be accommodated by existing storm drains and flood control channels, and manage the flow rate in coordination with these agencies to avoid flooding. The SFPUC would also be required to obtain an encroachment permit from the ACFCWCD and implement the requirements of the permit, including preparation of a discharge plan subject to district approval.

Impact HY-5: Damage to existing piezometer and cathodic protection wells, creating a potential conduit for pollutants to enter the underlying groundwater aquifer.

As described in Section 5.11.1, Setting, three project-related 100-foot-deep piezometers are located within the ROW and five 12-foot- and 150-foot-deep cathodic protection wells are located within the project area near Curtner Road. Because these wells are located in an area where the Newark Aquifer is present and in direct communication with the underlying production aquifer, damage to these wells during construction could create a potential conduit for contaminants, such as sediments, discharge water, and hazardous materials, to enter the underlying groundwater aquifer.

Prior to construction, the piezometers would be abandoned in accordance with the DWR well abandonment requirements, described in Section 5.11.2.2, Groundwater Management, which require the wells to be cleared, drilled out, and sealed with impermeable materials such as cement, and therefore the wells would not provide a conduit for groundwater contamination. The cathodic protection wells are located in a portion of the project area where excavation and construction staging would not occur. Therefore, it is unlikely that construction activities would damage these wells. If dewatering wells are used during construction, they would be constructed under a permit from the ACWD and would be constructed in accordance with DWR well construction requirements that specify installation of a surface seal to prevent wells from providing a conduit for groundwater contamination. Therefore, the potential impact on groundwater quality from damage to the existing piezometers and cathodic protection wells, and possible construction of new dewatering wells, would be *less than significant*.

Facility Siting, Operation, and Maintenance Impacts

Following completion of proposed improvements to BDPL Nos. 3 and 4, pipeline maintenance and operations procedures would be consistent with existing procedures. While project facilities would be monitored regularly in accordance with the SFPUC's standard inspection schedule (see Chapter 3, Project Description, Section 3.6, Operations and Maintenance), the frequency of monitoring or maintenance activities would not change substantially from current conditions. As described in Chapter 3 (see Section 3.5.1.7, Zone 7 – Cut-and-Cover Excavation, and Section 3.5.2.1, Zone 6 – Modifications to Slip-Joint Vault and Upgrades to BDPL No. 4), both the modified slip-joint vault for BDPL No. 4 and the proposed articulated vault for BDPL No. 3X would be equipped with drains connected to the Agua Caliente Creek culvert beneath I-680 and Mission Boulevard. These drains would collect groundwater accumulated in the vaults, as well as incidental leakage of system water from the slip joints and ball valves within the vaults. Under normal conditions, these discharges would be very small, on the order of 100 gpm. Therefore, the project would not result in any long-term effects on water quality or groundwater resources.

5.11.4 Mitigation Measures

Mitigation Measure M-HY-1: Construction Water Quality Best Management Practices.

Consistent with the requirements of the SWRCB General Permit for Storm Water Discharges Associated with Construction and Land Disturbance Activities, the proposed project would be undertaken in accordance with a project-specific SWPPP. The RWQCB, the primary agency responsible for protecting water quality within the project area, is responsible for reviewing and ensuring compliance with the SWPPP. This review is based on the general permit issued by the SWRCB.

The recommended Best Management Practices (BMPs), subject to the review and approval of the RWQCB, include the following measures. However, the measures themselves may be altered, supplemented or deleted during the RWQCB's review process, since the RWQCB has final authority over the terms of the SWPPP.

Scheduling

- Schedule construction to minimize ground disturbance during the rainy season
- Sequence construction activities to minimize the amount of time that soils remain disturbed
- Stabilize all disturbed soils as soon as possible following the completion of ground-disturbing work in any area of the project site
- Provide plans to stabilize soil with vegetation or physical means in the event rainfall is expected
- Install erosion and sediment control BMPs prior to the start of any ground-disturbing activities

Erosion and Sedimentation

- Preserve existing vegetation at areas where no construction activity is planned or where construction activity will occur at a later date
- Stabilize and revegetate disturbed areas as soon as possible after construction with planting, seeding, and/or mulch (e.g., straw or hay, erosion control blankets, hydromulch, or other similar material) except in actively cultivated areas

- Install silt fences, fiber rolls, and other suitable measures around the perimeter of the project site and staging areas and around riparian buffers, storm drains, temporary stockpiles, spoil areas, stream channels, swales, down-slope of all exposed soil areas, and in other locations determined necessary to prevent offsite sedimentation
- Install temporary slope breakers during the rainy season on slopes greater than 5 percent where the base of the slope is less than 50 feet from a water body, wetland, or road crossing at spacing intervals required by the RWQCB
- Use storm drain inlet protection, filter fabric, or other appropriate measures to prevent sediment from entering storm drain inlets
- Detain and treat stormwater and water produced by construction site dewatering using sedimentation basins, sediment traps, baker tanks, or other measures to ensure that discharges to receiving waters meet applicable water quality objectives

Groundwater/Dewatering

- Prepare a dewatering plan prior to trench dewatering activities specifying methods of water collection, transport, treatment, and discharge of all water produced by construction site dewatering to avoid degradation of water quality and downstream flooding
- Impound water produced by dewatering in sediment retention basins or other holding facilities to settle the solids and provide treatment as necessary prior to discharge to receiving waters to meet San Francisco Bay Basin Plan water quality objectives
- Control discharges of water collected by dewatering to prevent erosion
- Locate sedimentation basins and other retention and treatment facilities away from waterways to prevent silt-bearing water from reaching streams

Tracking Controls

- Grade and stabilize construction site entrances and exits to prevent runoff from the site and to prevent erosion
- Install a tire washing facility at the site access to allow for tire washing when vehicles exit the site, if necessary
- Remove any soil or sediment tracked off paved roads during construction by street sweeping

Non-stormwater Control

- Place drip pans under construction machinery and all parked equipment near Agua Fria Creek
- Check construction equipment for leaks regularly
- Refuel vehicles and equipment away from Agua Fria Creek and other waters to prevent run-on, runoff, and to contain spills
- Contain fueling areas to prevent run-on and runoff and to contain spills
- Cover all storm drain inlets when paving or applying seals or similar materials to prevent the offsite discharge of these materials

Waste Management and Hazardous Materials Pollution Control

- Clean-up trash, including food waste and wrappers, at the project area daily. Provide an adequate number of waste containers with watertight covers throughout the work site.
- Locate sanitary facilities a minimum of 300 feet from Agua Fria Creek and other surface waters (e.g., Seep in Staging area 4).
- Maintain sanitary facilities regularly
- Store all hazardous materials in a bermed area protected from rainfall and stormwater run-on and prevent the offsite discharge of leaks or spills
- Minimize the potential for contamination of Agua Fria Creek and other waters by maintaining spill containment and cleanup equipment onsite, and by properly labeling and disposing of hazardous wastes
- Locate waste collection areas close to construction entrances and away from roadways, storm drains, Agua Fria Creek, and other waters and prohibit dumping within the creek
- Inspect dumpsters and other waste and debris containers regularly for leaks and remove and properly dispose of any hazardous materials and liquid wastes placed in these containers
- Train construction personnel in proper material delivery, handling, storage, cleanup, and disposal procedures

BMP Inspection, Maintenance, and Repair

- Inspect all BMPs on a regular basis to confirm proper installation and function
- Inspect all stormwater BMPs daily during storms
- Inspect sediment basins, sediment traps, and other detention and treatment facilities regularly throughout the construction period
- Provide sufficient devices and materials (e.g., silt fence, fiber rolls, erosion blankets, etc.) throughout project construction to enable immediate repair or replacement of failed BMPs
- Inspect all seeded areas regularly for failures, and remediate or repair immediately

Monitoring and Reporting

- Provide the required documentation for SWPPP inspections, maintenance, and repair requirements
- Maintain written records of inspections, spills, BMP-related maintenance activities, corrective actions, and visual observations of offsite discharges of sediment or other pollutants, as required by the RWQCB
- Monitor water quality to assess the effectiveness of control measures

Post-construction BMPs

- Revegetate all temporarily disturbed areas as required after construction activities are completed

- Remove any remaining construction debris and trash from the project site and area upon project completion
- Phase the removal of temporary BMPs as necessary to ensure stabilization of the site
- Maintain post-construction site conditions to avoid any unintended drainage channels, erosion, or areas of sedimentation
- Correct post-construction site conditions as necessary to comply with the SWPPP and any other pertinent RWQCB requirements

Mitigation Measure M-HY-3: Coordination with Alameda County Flood Control and Water Conservation District and City of Fremont.

The SFPUC or its contractor will contact the ACFCWCD and the City of Fremont prior to beginning the discharge of water produced during trench dewatering or water drained from BDPL Nos. 3, 3X, or 4 to verify that the flow rate can be accommodated by the existing storm drain system. The flow rate will be managed in coordination with these agencies to avoid downstream flooding.

5.11.5 References

Association of Bay Area Governments (ABAG), *Bay Area Dam Inundation Hazards,* http://www.abag.ca.gov/bayarea/eqmaps/damfailure/damfail.html, accessed January 27, 2009.

Alameda County Public Works Agency (ACPWA), Streamflow Data from 1/11/98 through 1/20/98. Fremont, CA, December 2008a.

Alameda County Public Works Agency (ACPWA), Streamflow Data from 1/28/98 through 2/10/98. Fremont, CA, December 2008b.

Alameda County Public Works Agency (ACPWA), Streamflow Data from 3/28/03 through 5/02/03. Fremont, CA, December 2008c.

Alameda County Water District (ACWD), Replenishment Assessment Act of the Alameda County Water District, Chapter 1942 of the Statutes of 1961, as amended April 2, 1970 and April 26, 1973.

Alameda County Water District (ACWD), *Groundwater Monitoring Report 2008,* January 15, 2009.

Alameda County Water District (ACWD), *Nearby Wells Report – Wells within 0.50 miles of 5S/1W-13K and 5S/1W-24B*, January 9, 2009.

Darnell Shaw Environmental (DSE), *Hydrologic Conditions Report, Seismic Upgrade of the Bay Division Pipelines No. 3 and 4 at the Hayward Fault Project Area Fremont, California,* January 2009.

Department of Water Resources (DWR), *Water Well Standards: State of California*, Bulletin 74-81, December 1981.

Department of Water Resources (DWR), *California's Groundwater, Bulletin 118, Santa Clara Valley Groundwater Basin,* last updated January 20, 2006.

Federal Emergency Management Agency (FEMA), Flood Insurance Rate Map, City of Fremont, California, Alameda County. Community Panel Number 0650280046D, August 3, 2009.

Regional Water Quality Control Board (RWQCB), San Francisco Bay Region, *Water Quality Control Plan for the San Francisco Bay Basin* (Basin Plan), January 18, 2007.

Regional Water Quality Control Board (RWQCB), *San Francisco Bay Region, Waste Discharge Requirements for the San Francisco Public Utilities Commission, San Francisco Public Utilities Commission Drinking Water Transmission System*. Order No. R2-2008-0102, NPDES No. CA0038857. December 12, 2008

RMC Water and Environment, *Technical Memorandum, Water Transmission NPDES Technical Support Services, Erosion Control Standard Operating Procedure*, July 16, 2008.

San Francisco Public Utilities Commission (SFPUC), *Manual of Procedures – Disinfection/ Dechlorination and Related Tasks, Version 01/2005*, January 20, 2005.

Sowers, J.M., 1999 Creek and Watershed Map of Fremont & Vicinity: Oakland Museum of California, Oakland, Ca.

State Water Resources Control Board (SWRCB), Final 2006 Clean Water Act Section 303(d) List of Water Quality Limited Segments, U.S. EPA Approved 2007.

U.S. Geological Survey (USGS), *Water Resources Data, California, Water Year 2002*, Volume 2, Pacific Slope Basins from Arroyo Grande to Oregon State Line Except Central Valley, Water Data Report CA-02-2, 2002.

URS Corporation, *Bay Division Pipelines 3 & 4 Hayward Fault Crossing Geotechnical Report, Fremont, CA,* December 5, 2008.

URS Corporation, *Groundwater Data Tables,* March 6, 2009.

5.12 Hazards and Hazardous Materials

This section provides an assessment of potential impacts related to hazards and hazardous materials that could be present in the vicinity of the proposed project. Potential hazards addressed in this section include hazardous materials in soil and groundwater, potentially gassy conditions in tunnels, fires, releases of hazardous materials during construction, and interference with an adopted emergency response plan or emergency evacuation plan. Mitigation measures to reduce significant impacts to a less-than-significant level are identified.

5.12.1 Setting

A background technical report for the proposed project (AEW, 2009) includes an evaluation of the potential presence of hazardous materials in soil and groundwater within the project area. The evaluation was based on a review of: (1) historical aerial photographs and maps; (2) environmental databases (EDR, 2008); and (3) soil sampling conducted within the project area (WIP, 2004). The findings of the report are discussed below.

5.12.1.1 Potential Presence of Hazardous Materials in Soil and Groundwater

Historical Land Uses

Historically, the project area was used for agricultural purposes. Residential development in the project area began in the 1970s, and both the north and south ends of the San Francisco Public Utilities Commission (SFPUC) right-of-way (ROW), between the North and South Shutoff Stations, are now surrounded by primarily residential land uses (see Figure 5.2-1 in Section 5.2, Land Use and Land Use Planning). Based on the historical agricultural use of the project area, it is likely that pesticides, which commonly include metals, were applied to the soil. Other than the presumed history of pesticide usage for agricultural uses, there are no other presumed sources of hazardous materials in the soil; for example, there are no gas station sites or industrial sites present in aerial photography of the project area from the late 1930s until the area was converted to residential in the 1970s (AEW, 2009).

Environmental Database Review

The environmental database review conducted for the proposed project identified a total of 20 permitted hazardous materials uses,[1] environmental cases,[2] and spill sites[3] within 1/4 mile of the project area. However, permitted hazardous materials uses would not likely affect soil or groundwater quality in the project area because these permitted uses handle hazardous materials in accordance with applicable laws and have not had a documented release of hazardous materials unless they are identified as an environmental case.

[1] Permitted hazardous materials uses are facilities that use hazardous materials or handle hazardous wastes but comply with current hazardous materials and hazardous waste regulations.

[2] Environmental cases are sites where soil and/or groundwater contamination is known or suspected to have occurred, and that are identified on regulatory agency lists.

[3] Spill sites are locations of spills reported to state or federal regulatory agencies; such releases may or may not have involved hazardous materials.

None of the environmental cases are likely to affect soil or groundwater quality within the project area. Two active environmental cases are identified within 1/4 mile of the project area were identified: a 1988 gasoline release at a service station located at 46494 Mission Boulevard, and a tetrachloroethylene release at a dry cleaner located at 46670 Mohave Drive. Groundwater contamination has been identified at both sites, and both cases are open (indicating that at least groundwater monitoring is still being conducted). However, because these sites are located at least 1/8 mile southwest (downgradient) of the project area, they are not likely to affect project area soil or groundwater.

The environmental database review identified three spill sites within or adjacent to the project area: a 10-gallon gasoline spill at Tissiack Court (in 1993); an unidentified substance release as a result of an automobile accident at Paseo Padre Parkway and Mission Boulevard (in 1988); and an unidentified substance release at I-680 (in 1989). Based on the age and presumed small quantity of each release, these spills are not likely to have affected soil or groundwater quality in the project area.

Environmental Investigation

In 2003, Water Infrastructure Partners conducted an environmental investigation to evaluate soil quality within the BDPL Nos. 3 and 4 ROW (WIP, 2004). The investigation involved the collection of soil samples from six borings, at depths ranging from 1 foot to 15 feet below ground surface. Soil samples from these borings were analyzed for organochlorine pesticides and Resource Conservation and Recovery Act (RCRA) 8 metals.[4] **Table 5.12-1** shows the maximum concentration of each constituent identified in the soil samples. This section presents the results of the investigation and identifies data gaps. Potential impacts related to the presence of hazardous materials in the soil are discussed below in Section 5.12.3.3, Impact Analysis, along with mitigation measures to address pertinent data gaps.

Table 5.12-1 compares the maximum concentration of each constituent to the San Francisco Bay Regional Water Quality Control Board (RWQCB) Environmental Screening Levels (ESLs) for residential uses (RWQCB, 2008) and the U.S. Environmental Protection Agency (U.S. EPA) Preliminary Remediation Goals (PRGs) for residential uses (U.S. EPA, 2008), as well as to federal and state hazardous waste classification criteria, including the federal regulatory level and state total threshold limit concentration (TTLC) and soluble threshold limit concentration (STLC), discussed below in Section 5.12.2, Regulatory Framework.

As shown in Table 5.12-1, only low levels of the pesticides dichlorodiphenyltrichloroethane (4,4′ DDT), dichlorodiphenyldichloroethylene (4,4′ DDE), chlordane, alpha-chlordane, and gamma-chlordane were detected in the soil samples, all below the residential ESLs and hazardous waste criteria. While the soil samples contained detectable concentrations of arsenic, barium, cadmium, chromium, lead, mercury, and selenium, only the arsenic concentration (at a

4 RCRA 8 metals include arsenic, barium, cadmium, chromium, lead, mercury, selenium, and silver, and are the metals for which the U.S. EPA has established regulatory levels for waste classification.

TABLE 5.12-1
SOIL ANALYTICAL RESULTS, SCREENING LEVELS, AND HAZARDOUS WASTE CRITERIA

Parameter	Maximum Concentration Detected (mg/kg)	Residential Environmental Screening Level (mg/kg)	Residential Preliminary Remediation Goal (mg/kg)	Regulatory Level for Waste Classification		
				TCLP (mg/L)	TTLC (mg/kg)	STLC (mg/L)
Pesticides						
Chlordane	0.11	0.44	1.6	0.03	2.5	0.25
alpha Chlordane	0.0045	–	–	–	–	–
gamma Chlordane	0.0043	–	–	–	–	–
Dichlorodiphenyldichloroethylene (4,4'-DDE)	0.100	1.7	1.4	–	1	0.1
Dichlorodiphenyltrichloroethane (4,4' DDT)	0.051	1.7	1.7	–	1	0.1
Metals						
Antimony	N/A	6.3	31	–	500	15
Arsenic	3.3*	0.39	0.39	5.0	500	5.0
Barium	370	750	15,000	100.0	10,000	100
Beryllium	N/A	4.0	160	–	75	0.75
Cadmium	0.5	1.7	70	1.0	100	1.0
Chromium (trivalent)	60*	750	280	5.0	2,500	5
Chromium (hexavalent)	N/A	8.0	230	–	500	5
Cobalt	N/A	40	23	–	8,000	80
Copper	N/A	230	3,100	–	2,500	25
Fluoride salts	N/A	–	–	–	18,000	180
Lead	37	200	400	5.0	1,000	5
Mercury	0.16	1.3	4.3	0.2	20	0.2
Molybdenum	N/A	40	390	–	3,500	350
Nickel	N/A	150	1,500	–	2,000	20
Selenium	5.3	10	390	1.0	100	1.0
Silver	<1	20	390	5.0	500	5
Thallium	N/A	1.3	5.1	–	700	7.0
Vanadium	N/A	16	390	–	2,400	24
Zinc	N/A	600	23,000	–	5,000	250

NOTES:

TCLP = Toxicity Characteristic Leaching Procedure. Because the TCLP involves a 20-to-1 dilution of the sample, the total concentration of a substance in the soil would need to exceed 20 times the regulatory level for the soluble concentration to possibly be greater than the regulatory level in the extract.

TTLC = Total Threshold Limit Concentration

STLC = Soluble Threshold Limit Concentration. The California Waste Extraction Test, used to determine the soluble concentration of a substance under state regulations, involves a 10-to-1 dilution of the sample. Therefore, the total concentration of a substance would need to exceed 10 times the STLC for the soluble concentration to possibly exceed the STLC in the extract.

mg/kg = milligram per kilogram

mg/L = milligram per liter

N/A = samples not analyzed for this metal

– = criterion has not been established for this parameter

< = constituent was not detected in sample at the detection limit provided
* = concentration in excess of screening level, or potentially in excess of waste classification criteria

SOURCE: AEW, 2009.

maximum of 3.3 milligrams per kilogram [mg/kg]) exceeded the residential ESL and PRG of 0.39 mg/kg. All but one of the arsenic concentrations exceeded this criterion, and three of the arsenic concentrations equaled or exceeded the commercial/industrial ESL of 1.6 mg/kg. The maximum concentration of total chromium (potentially consisting of both trivalent and hexavalent chromium) exceeded the ESL of 8.0 mg/kg for hexavalent chromium. However, the amount of hexavalent chromium is not known, and it would be necessary to differentiate the concentrations of trivalent and hexavalent chromium to determine whether the criterion for hexavalent chromium would be exceeded.

Total chromium was detected at a maximum concentration of 60 mg/kg, which slightly exceeds 10 times the STLC of 5 milligrams per liter (mg/L) for both trivalent and hexavalent chromium. This result requires use of the California Waste Extraction Test (WET) to evaluate whether the excavated soil would be classified as a hazardous waste under state regulations.[5] However, because the maximum concentration of chromium only slightly exceeded the 10-times-STLC criterion, the WET results might not exceed the STLC; therefore, the soil would likely be considered nonhazardous. Of the other metals analyzed for, none of the concentrations exceeded hazardous waste criteria. However, the environmental investigation (WIP, 2004) addressed only the RCRA 8 metals, and California regulations specify hazardous waste criteria for the following additional nine metals, which were not analyzed for: antimony, beryllium, cobalt, copper, molybdenum, nickel, thallium, vanadium, and zinc.

5.12.2 Regulatory Framework

Hazardous materials and wastes can result in public health hazards if released to soil, groundwater, or air. Hazardous materials as defined in Section 25501(o) of the California Health and Safety Code are materials that, because of their “quantity, concentration, or physical or chemical characteristics, pose a significant present or potential hazard to human health and safety or to the environment if released to the workplace or environment.” Hazardous materials have been and are commonly used in commercial, agricultural, and industrial applications, as well as to a limited extent in residential areas.

A waste is any material that is relinquished, recycled, or inherently waste-like. Title 22 of the California Code of Regulations (CCR) (22 CCR 66261.1, et seq.) contains regulations for the classification of hazardous wastes. Article 3 criteria classify waste as hazardous if it is toxic (causes human health effects), ignitable (has the ability to burn), corrosive (causes severe burns or damage to materials), or reactive (causes explosions or generates toxic gases). Article 4 also lists specific hazardous wastes, while Article 5 identifies specific waste categories, including RCRA hazardous wastes, non-RCRA hazardous wastes, extremely hazardous wastes, and special wastes. If improperly handled and released to soil, groundwater, or air (in the form of vapors, fumes, or dust), hazardous materials and wastes can result in public health hazards.

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5 The WET, used to determine the soluble concentration of a substance under state regulations, involves a 10-to-1 dilution of the sample. Therefore, the total concentration of chromium would need to exceed 10 times the STLC of 5 milligrams per liter for chromium for the soluble concentration to possibly exceed the STLC in the extract.

Hazardous materials and hazardous wastes are subject to numerous federal, state, and local laws and regulations intended to protect health, safety, and the environment. The U.S. EPA, the California Department of Toxic Substances Control (DTSC), the RWQCB, and the Bay Area Air Quality Management District (BAAQMD) are the primary agencies enforcing these regulations.

The Alameda County Water District is the lead agency for the investigation and cleanup of leaking underground storage tank sites, and for some groundwater contamination cases in Fremont. The RWQCB is the lead agency for other groundwater cases. The DTSC can be the lead agency for cases with no groundwater issues.

5.12.2.1 Aboveground Storage of Petroleum Products

The State Water Resources Control Board requires registration of an aboveground fuel storage tank at a construction site only if the tank is 20,000 gallons or larger, or if the aggregate volume of aboveground petroleum storage is over 100,000 gallons. As described in Section 5.11, Hydrology and Water Quality, the construction stormwater pollution prevention plan (SWPPP) that would be prepared for the project would address smaller temporary tanks used during construction, methods for controlling releases, and measures to clean up accidental releases and prevent degradation of water quality.

5.12.2.2 Tunnel Classification and Safety

The California Department of Industrial Relations, Division of Industrial Safety defines all underground passageways that are 30 inches in diameter or greater and are excavated by workers below the ground surface (such as trenchless construction) as tunnels. The California Tunnel Safety Orders (8 CCR 8422, et seq.) require the Division of Industrial Safety to assign all tunnels or portions of tunnels into one of the following classifications before a public works project can be opened for bids:

- *Nongassy* – unlikely that gas would be encountered during construction of the tunnel
- *Potentially gassy* – flammable gas or hydrocarbons could be encountered during construction of the tunnel
- *Gassy* – gas would likely be encountered, or monitoring indicates the presence of hazardous gases at a concentration greater than 5 percent of the lower explosive limit
- *Extra hazardous* – the Division of Industrial Safety determines a serious danger to employee safety, flammable gas or petroleum vapors emanating from the strata have been ignited in the tunnel, or monitoring indicates the presence of hazardous gases at a concentration greater than 20 percent of the lower explosive limit

Prior to construction, the Division of Industrial Safety would assign one of the classifications described above to each trenchless crossing and the articulated vault to be constructed, based on geologic assessments and SFPUC recommendations in accordance with the Tunnel Safety Orders. The existing corrugated-metal pipe segments would not likely be considered tunnels unless construction activities were to damage the structural integrity of the pipe or encounter the surrounding soil (Division of Industrial Safety, 2009).

For all tunnel operations, the Tunnel Safety Orders require an emergency plan that includes maps, ventilation controls, firefighting equipment, rescue procedures, evacuation plans, and communication. The orders specify ventilation requirements for all tunnel classifications. For potentially gassy tunnels, the orders specify monitoring requirements during construction. If threshold levels of gases are exceeded, work must halt and may not resume until the Division of Industrial Safety has authorized reentry in writing. For gassy tunnels, the Tunnel Safety Orders specify monitoring requirements for explosive gases; actions to be taken in the event that explosive vapors are identified; additional requirements for ventilation; restrictions on the use of equipment with internal combustion engines and spark-producing work activities such as welding or cutting; restrictions on smoking and possession of personal sources of ignition such as lighters or matches; requirements for a "kill" button to cut off electrical equipment in the event that sufficient vapors accumulate; and provision of a refuge chamber or escape route for employee safety.

5.12.2.3 Environmental Screening Levels

The U.S. EPA PRGs (U.S. EPA, 2008) and the RWQCB ESLs (RWQCB, 2008) are guidelines used to evaluate the potential risk associated with chemicals found in soil or groundwater where a release of hazardous materials has occurred. PRGs and ESLs have been established for both residential and commercial/industrial land uses, but not specifically for construction workers. Residential screening levels are the most restrictive; soil with chemical concentrations below these levels generally would not require remediation and would be suitable for unrestricted uses if disposed of offsite. Commercial/industrial screening levels are generally higher than residential screening levels because they are based on potential worker exposure to hazardous materials in the soil (generally less than residential exposures). In addition, screening levels would generally be lower for industrial workers than for construction workers due to potential length of exposure (industrial workers are exposed over a working lifetime while construction workers are only exposed for the duration of a construction project). Therefore, safe levels of chemicals in soil and groundwater would generally be higher for construction workers than for industrial workers.

5.12.2.4 Waste Classification Criteria

In accordance with 22 CCR 66261.20, et seq., excavated soil would be classified as a hazardous waste if it exhibits the characteristics of ignitability, corrosivity, reactivity, or toxicity. A waste is considered toxic in accordance with 22 CCR 66261.24 if it contains:

- Total concentrations of certain substances at concentrations greater than the TTLC;
- Soluble concentrations greater than the STLC;
- Soluble concentrations of certain substances greater than federal toxicity regulatory levels using the Toxicity Characteristic Leaching Procedure (TCLP); or
- Specified carcinogenic substances at a single or combined concentration of 0.001 percent.

A waste is considered hazardous by state and federal regulations if the soluble concentration exceeds the federal regulatory level as determined by the TCLP. Because the TCLP involves a 20-to-1 dilution of the sample, the total concentration of a substance in the soil would need to exceed 20 times the regulatory level for the soluble concentration to exceed the regulatory level in the extract. A waste is also considered hazardous under state regulations if the soluble contaminant concentration exceeds the STLC as determined by the WET method. Because the WET is performed using a 10-to-1 dilution of the sample, the total concentration of a substance would need to exceed 10 times the STLC for the soluble concentration to possibly exceed the STLC in the extract. A waste may also be classified as toxic if testing indicates toxicity greater than the specified criteria.

5.12.2.5 Hazardous Materials Worker Safety Requirements

The federal Occupational Safety and Health Administration (OSHA) and the California Occupational Safety and Health Administration (Cal-OSHA) are responsible for ensuring worker safety. The federal regulations for worker safety are contained in Title 29 of the Code of Federal Regulations, as authorized in the Occupational Safety and Health Act of 1970; these regulations provide standards for safe workplaces and work practices, including those relating to hazardous materials handling. In California, Cal-OSHA assumes primary responsibility for developing and enforcing workplace safety regulations; Cal-OSHA standards are generally more stringent than federal OSHA regulations.

The state regulations concerning the use of hazardous materials in the workplace are included in Title 8 of the CCR, which contain requirements for safety training, availability of safety equipment, accident and illness prevention programs, hazardous substance exposure warnings, and emergency action and fire prevention plan preparation. Cal-OSHA also enforces hazard communication program regulations, which contain worker safety training and hazard information requirements, such as procedures for identifying and labeling hazardous substances, communicating hazard information relating to hazardous substances and their handling, and preparation of health and safety plans to protect workers.

5.12.2.6 Control of Asbestos During Construction

The California Air Resources Board (CARB) has adopted an asbestos Airborne Toxic Control Measure (ATCM) for construction, grading, quarrying, and surface mining operations). The ATCM requires the use of best available dust mitigation measures to prevent offsite migration of asbestos-containing dust from road construction and maintenance activities, construction and grading operations, and quarrying and surface mining operations in areas of ultramafic rock,[6] serpentine,[7] or asbestos.[8] The BAAQMD implements the regulation, which became effective on

6 Ultramafic rocks are formed in high-temperature environments well below the surface of the earth.

7 Serpentine is a naturally occurring group of minerals that can be formed when ultramafic rocks are metamorphosed during uplift to the earth's surface. Serpentinite is a rock consisting of one or more serpentine minerals. This rock type is commonly associated with ultramatic rock along earthquake faults. Small amounts of chrysotile asbestos, a fibrous form of serpentine minerals, are common in serpentinite.

8 Asbestos includes several types of naturally occurring fibrous materials found in many parts of California.

July 22, 2002. The ATCM would not apply to the proposed project because it is not expected that rocks containing naturally occurring asbestos would be encountered during construction.

5.12.2.7 Fire

Pipeline construction would involve cutting and welding pipe sections, appurtenances, vault covers, stainless-steel ladders, and supports using the electric shielded arc method. The main risk in welding is to the health and safety of the welder and nearby workers from an accidental fire or unforeseen contact with hazardous materials. Workers would be required to conform with governmental standards, including the federal "Standard for Fire Prevention in Use of Cutting and Welding Processes" (OSHA, 29 CFR 1910.252[a][1]) and Cal-OSHA regulations, which require that portable fire extinguishers be maintained within 10 feet of active welding and cutting. The public would be separated from active work areas by barricades.

Chapter 14 of the California Fire Code addresses fire safety during construction and demolition activities, including underground construction and demolition. It specifies requirements for construction site accessibility for fire fighting vehicles; storage of combustibles and flammable liquids; limitations on smoking and other potential sources of ignition; cutting, welding, and other hot work; accumulation of combustible materials including oily rags; provision of phone service at the construction site; and provision of appropriate fire protection devices. Standard SFPUC specifications for construction projects require compliance with these regulatory requirements.

5.12.3 Impacts

5.12.3.1 Significance Criteria

The City and County of San Francisco has not formally adopted significance standards for impacts related to hazards, but generally considers that implementation of the proposed project would have a significant impact on these systems if it were to:

- Create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials;
- Create a significant hazard to the public or the environment through reasonably foreseeable upset and accident conditions involving the release of hazardous materials into the environment;
- Emit hazardous emissions or handle hazardous or acutely hazardous materials, substances, or waste within 1/4 mile of an existing or proposed school;
- Be located on a site that is included on a list of hazardous materials sites compiled pursuant to Government Code Section 65962.5 and, as a result, create a significant hazard to the public or the environment;

- For a project located within an area covered by an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, result in a safety hazard for people residing or working in the project area;

- For a project within the vicinity of a private airstrip, result in a safety hazard for people residing or working in the project area;

- Impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan; or

- Expose people or structures to a significant risk of loss, injury, or death involving fires.

5.12.3.2 Approach to Analysis

Due to the nature of the proposed project, there would be no impacts related to the following criteria; therefore, no impact discussion is provided for these topics for the reasons described below:

> *Routine transport, use, or disposal of hazardous materials*. Operation of the proposed project would not result in the new use or disposal of any hazardous materials. Although a number of hazardous materials would be used during construction, these uses would be temporary and would not constitute routine transport, use, or disposal of hazardous materials. Therefore, impacts related to the routine transport, use, or disposal of hazardous materials are not applicable.

> *Safety hazards in the vicinity of an airport*. The nearest airport to the proposed project is the Santa Clara Airport, approximately seven miles to the southwest. Because the project is located more than two miles from an airport and would not involve construction of aboveground structures that could interfere with air traffic, impacts related to safety hazards in the vicinity of an airport are not applicable.

This analysis focuses on the potential to encounter hazardous substances in soil and groundwater and the resultant effects on the public or the environment, and is based on a regulatory database review to identify permitted hazardous materials uses and environmental cases within 1/4 mile that could affect project area soil and groundwater. This impact could occur during soil excavation and construction dewatering, but would not be a concern during post-construction operations because any required soil disturbance would occur in clean fill placed on top of the new pipeline. The analysis also addresses the potential for the project to create fire hazards and cause safety risks associated with potentially gassy conditions in tunnels if trenchless construction is used in Construction Zones 1, 2 and 4 and in the articulated vault, which may be classified as a tunnel. Each potential impact is assessed in terms of the applicable regulatory measures, and mitigation measures are identified for significant impacts.

5.12.3.3 Impact Analysis

Summary of Impacts

Table 5.12-2 summarizes the potential hazards and hazardous materials impacts and the significance of project impacts before and after mitigation.

TABLE 5.12-2
SUMMARY OF IMPACTS – HAZARDS AND HAZARDOUS MATERIALS

Impact	Significance Determination Before Mitigation	Significance Determination After Mitigation
Impact HZ-1: Potential to encounter hazardous materials in soil and groundwater and interference with groundwater remediations.	PS	LS
Impact HZ-2: Gassy conditions in tunnels.	LS	–
Impact HZ-3: Accidental hazardous materials release from construction equipment.	PS	LS
Impact HZ-4: Impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan.	S	LS
Impact HZ-5: Risk of fires during construction.	LS	–
Impact HZ-6: Emit hazardous emissions or handle hazardous or acutely hazardous materials, substances, or waste within 0.25 mile of an existing or proposed school.	LS	–

LS = Less than Significant impact
PS = Potentially Significant impact
S = Significant impact
SU = Significant and Unavoidable impact, even with mitigation incorporated
– = Mitigation not required

Construction Impacts

Impact HZ-1: Potential to encounter hazardous materials in soil and groundwater and interference with groundwater remediations.

If hazardous materials are present in excavated soil or groundwater, a release to the environment could occur, potentially exposing construction workers and the public to the hazardous materials in the soil and groundwater and to chemical vapors during construction activities that disturb soil or groundwater. Depending on the nature and extent of any contamination encountered, adverse health effects and nuisance vapors could result if proper precautions are not taken. Contaminated soil and groundwater could also require disposal as a restricted or hazardous waste. Areas in which releases of hazardous materials have occurred (including leaking fuel or chemical storage tanks) present the greatest potential for exposures to contaminated soil and groundwater during construction.

As discussed in Section 5.12.1, Setting, the project area's previous agricultural use could have involved the application of pesticides to the soil. However, none of the pesticide concentrations detected in soil samples from the project area exceeded residential ESLs or PRGs or hazardous waste classification criteria. Therefore, there would be low potential to encounter unsafe levels of pesticides in the excavated soil.

Based on existing sampling, all metal concentrations detected in soil samples from the project area were below residential ESLs and PRGs, with the exception of arsenic (which exceeds the residential ESL and PRG and commercial/industrial ESL) and hexavalent chromium (which could potentially exceed the residential ESL). Only the chromium concentration exceeded 10 times the STLC, and none of the other metals concentrations exceeded hazardous waste classification criteria. However, the environmental investigation did not include analysis of nine additional metals for which California has established hazardous waste classification criteria (antimony, beryllium, cobalt, copper, molybdenum, nickel, thallium, vanadium, and zinc). If metals are present at concentrations above the ESL or PRG, risks to workers and the public could occur during construction, and if present at concentrations above hazardous waste criteria, disposal as a hazardous waste could be required.

The environmental database review did not identify any permitted hazardous materials uses, environmental cases, or spill sites with a high potential to affect soil or groundwater within the project area; however, additional environmental cases that could affect soil and groundwater in the project area could be identified prior to construction as a result of tank closures or ground-disturbing activities that could encounter contaminated soil or groundwater, and an update of the environmental database review would be required prior to construction to determine whether additional environmental cases have been identified.

Potential Exposure to Hazardous Materials in Soil

There is a potential for workers and the public to be exposed to hazardous materials in the soil during soil excavation and other soil-handling operations because arsenic concentrations in the soil exceed both residential and commercial/industrial screening levels, and hexavalent chromium concentrations could exceed residential environmental screening levels. In addition, disposal as a hazardous waste could be required if soluble chromium concentrations were to exceed the STLC. Furthermore, testing of the additional metals referred to above and updating the environmental database review prior to construction would be needed to further inform and confirm health and safety requirements as well as requirements for soil disposal. Therefore, impacts related to potential exposure to hazardous materials in the soil would be *potentially significant.* Implementation of **Mitigation Measures M-HZ-1a, Update Environmental Database Review, M-HZ-1b, Perform Soil Sampling,** and **M-HZ-1c, Hazardous Spoils Disposal Plan**, requiring an update of the environmental database review, additional sampling within the project area, and preparation of plan for disposal of hazardous spoils and measures to be followed in the event that unanticipated contamination is identified during construction, as well as **Mitigation Measure M-HZ-1d, Health and Safety Plan**, requiring preparation of a health and safety plan to address project-specific health and safety requirements, would reduce this impact to a less-than-significant level.

Exposure to Hazardous Materials in Groundwater

Based on soil sampling conducted in the project area, coupled with the lack of identified environmental cases near the project area, there is a low potential to encounter groundwater contamination that could expose workers or the public to adverse effects during groundwater dewatering, and impacts related to exposure to hazardous materials in the groundwater would be *less than significant*.

Interference with Groundwater Remediations

Limited groundwater dewatering would be required (for up to three months) for trenchless or open-trench construction in Zone 1 at the southern end of the project area. Although there are two active environmental cases within 1/8 mile to the southwest (downgradient) of the project area where groundwater contamination has occurred (at 46494 Mission Boulevard and 46670 Mohave Drive, as described in Section 5.12.1.1, Potential Presence of Hazardous Materials in Soil and Groundwater), dewatering in this zone would not likely affect groundwater flow patterns at these sites based on their distance from the project area and the limited groundwater dewatering that would be required. Dewatering in Zones 3, 5, and 8 would be conducted farther away from these groundwater contamination sites and would also have a low potential to affect groundwater flow patterns at these sites. Therefore, impacts related to the potential to interfere with ongoing site remediations would be *less than significant.*

Impact HZ-2: Gassy conditions in tunnels.

If trenchless construction is used for the crossings of Agua Fria Creek (Zone 1), the I-680 southbound diamond on-ramp (Zone 2), and I-680 (Zone 4), these crossings would be considered tunnels in accordance with the Tunnel Safety Orders described in Section 5.12.2.2, Tunnel Classification and Safety. The articulated vault might also be considered a tunnel during construction, although this determination would be made by the Division of Industrial Safety based on the final design of the vault and activities required for construction of the vault. Accumulated natural gases in these tunnels could cause an explosion during construction. A classification has not yet been assigned to the proposed tunnels. However, the SFPUC would be required to file an application for gas classification with the Division of Industrial Safety before the project would be put out to bid. The application would be based on a detailed geotechnical characterization to be performed for final design of the tunnels. If the proposed tunnels are classified as "potentially gassy" or "gassy," construction would be required to comply with the Tunnel Safety Orders (discussed in Section 5.12.2, Regulatory Framework), which specify requirements for the monitoring of explosive vapors, ventilation, and the restriction of potential ignition sources in tunnels. The Division of Industrial Safety could require additional measures if conditions warrant, and could shut down the tunneling operation if unsafe conditions were identified. Tunneling operations would not resume until the Division of Industrial Safety inspected the tunnel conditions and cleared the tunnel for reentry. Compliance with the Tunnel Safety Orders and any additional requirements of the Department of Industrial Safety would ensure that potential impacts related to hazards from gassy conditions in the tunnels would be *less than significant.*

Impact HZ-3: Accidental hazardous materials release from construction equipment.

Hazardous materials expected to be used during construction activities include fuels, lubricants, paints, and solvents. Storage and use of hazardous materials at the construction site and staging areas could result in the accidental release of small quantities of hazardous materials, which could degrade soil and groundwater quality and/or surface water quality in Agua Fria or Agua Caliente Creek, either directly or via discharge to the storm sewer system. This would be a *potentially significant* impact. As discussed in Impact HY-1 in Section 5.11, Hydrology and Water Quality, impacts related to a potential release of hazardous materials would be reduced to a less-than-significant level with implementation of **Mitigation Measure M-HY-1, Construction Water Quality Best Management Practices**; this measure would require the implementation of construction best management practices (BMPs), as specified in the SWPPP required by the RWQCB in accordance with the National Pollutant Discharge Elimination System Construction General Permit. BMPs that address a release of hazardous materials include requirements for placing drip pans under construction machinery and all parked equipment; checking equipment for leakage; refueling equipment and locating waste collection areas away from Agua Fria Creek and other waterways; storing hazardous materials and wastes and dispensing fuels in a bermed area protected from rainfall and stormwater run-on and runoff; maintaining spill containment and cleanup equipment onsite; protecting storm drain inlets and waterways; and construction personnel training.

Impact HZ-4: Impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan.

Neither Alameda County nor the City of Fremont have an adopted emergency response plan or emergency evacuation plan that encompasses the project area. However, the proposed project could interfere with emergency response services or an emergency evacuation if construction activities involved the complete or partial closure of roadways, otherwise restricted access for emergency response vehicles, or restricted access to critical facilities such as hospitals or fire stations. As discussed in Section 5.5, Transportation and Circulation, the installation of temporary bridges on the northbound I-680 diamond and loop on-ramps would result in intermittent and temporary closure of these on-ramps, and the installation of temporary bridges on Mission Boulevard would temporarily disrupt traffic patterns on that street (which would include intermittent and temporary street closures).

Although a detour would be provided during closure of the I-680 on-ramps and Mission Boulevard, as described in Section 5.5, Transportation and Circulation, the project would result in a *significant* impact related to impairment or interference with emergency response services or an emergency evacuation because of the temporary on-ramp closures and disruption of traffic on Mission Boulevard. This impact would be reduced to a less-than-significant level with implementation of **Mitigation Measure M-TR-1, Traffic Control Plan**, which would require the construction contractor to prepare a traffic control plan (see Section 5.5, Transportation and

Circulation) specifying circulation and detour plans during construction and requiring the contractor to notify the police and emergency responders of the affected roadways and traffic control measures to be implemented. In addition, the SFPUC would obtain an encroachment permit from Caltrans to cross the I-680 on-ramps and Mission Boulevard (see Chapter 3, Section 3.7, Required Permits and Approvals).

Implementation of the encroachment permit and Mitigation Measure M-TR-1 would be coordinated with Caltrans and the City of Fremont, and would ensure that emergency access is maintained throughout construction and emergency responders are notified of any detour routes, thereby reducing impacts related to impairment or interference with implementation of an adopted emergency response plan or emergency evacuation plan to a less-than-significant level.

There are no police or fire stations, schools, or hospitals adjacent to the project area. Therefore, the project would not interfere with access to these facilities.

Impact HZ-5: Risk of fires during construction.

Although the project area is not located within an area of high fire risk, construction activities would be conducted within the BDPL Nos. 3 and 4 ROW, in the vicinity of residences on both the north and south ends of the project area. Vegetation within the ROW in the residential areas includes non-native annual grasslands and ruderal vegetation (see Section 5.9, Biological Resources). These vegetation types typically die by early summer, leaving dry vegetation that could become a fuel source for fires. Use of construction equipment (including welding equipment) in these areas could provide an ignition source, potentially leading to fires. However, the SFPUC would be required to and would comply with Chapter 14 of the California Fire Code, Fire Safety During Construction and Demolition, which includes requirements for construction site accessibility for fire fighting vehicles; storage of combustibles and flammable liquids; limitations on smoking and other potential sources of ignition; cutting, welding, and other hot work; accumulation of combustible materials including oily rags; provision of phone service at the construction site; and provision of appropriate fire protection devices, as described in Section 5.12.2, Regulatory Framework The SFPUC would also be required to comply with "Standard for Fire Prevention in Use of Cutting and Welding Processes" (OSHA, 29 CFR 1910.252[a][1]) and Cal-OSHA regulations, which require that portable fire extinguishers be maintained within 10 feet of active welding and cutting. Standard SFPUC specifications for construction projects require compliance with these regulatory requirements. With SFPUC and contractor compliance with these regulations, impacts related to risk of fires during construction would be *less than significant*.

Impact HZ-6: Emit hazardous emissions or handle hazardous or acutely hazardous materials, substances, or waste within 0.25 mile of an existing or proposed school.

Hazardous air emissions are toxic air contaminants identified by the CARB and the BAAQMD. Extremely hazardous materials are defined by the State of California in Section 25532 (2)(g) of the Health and Safety Code. During project construction, only common hazardous materials such as paints, solvents, cements, adhesives, and petroleum products (such as asphalt, oil, and fuel) would be used, none of which are considered extremely hazardous materials. The only toxic air contaminant that would be emitted during construction is diesel particulate matter (DPM) (see Section 5.7, Air Quality). There would be no use of extremely hazardous materials or emissions of toxic air contaminants during project operation.

Only one school is located within 1/4 mile of the project area: Kiddoland Learning Center, a privately owned daycare center licensed for 64 children (toddlers through 6th graders). The school is located in a private home approximately 600 feet to the east of the project area, across Mission Boulevard and the I-680 northbound diamond off-ramp and northbound loop on-ramp (see Section 5.2, Land Use and Land Use Planning). Project activities would be conducted within 1/4 mile of this school, and construction activities would result in the emission of DPM, a toxic air contaminant. However, based on a conservative screening-level analysis (as discussed in Section 5.7, Air Quality, Impact AQ-2, exposure to diesel particulate matter during construction), construction emissions of DPM would result in an increased individual cancer risk of 2 in a million as compared to existing conditions, which is less than the BAAQMD threshold of 10 in a million and would be considered a less-than-significant impact. Therefore, impacts related to hazardous air emissions and the use of extremely hazardous materials within 1/4 mile of a school are *less than significant*.

Facility Siting, Operation, and Maintenance Impacts

Following completion of proposed improvements to BDPL Nos. 3 and 4, pipeline operations would be consistent with existing operations, and pipeline maintenance would occur as needed. While project facilities would be monitored regularly in accordance with the standard inspection schedule, the frequency of monitoring or maintenance activities would not change substantially from current conditions and operation of the improved pipelines would not require an increase in the use of hazardous materials or result in any of the hazards discussed above.

5.12.4 Mitigation Measures

Mitigation Measure M-HZ-1a: Update Environmental Database Review.

The SFPUC will update the environmental database review to identify permitted hazardous materials uses and environmental cases within 1/4 mile of the project area no more than three months before commencement of construction. If the environmental database review identifies sites that could potentially affect soil or groundwater quality within areas where project excavation or dewatering would occur, the SFPUC will retain an environmental professional to review site-specific information for those sites and evaluate the potential these sites to affect soil or groundwater quality where excavation or dewatering would occur. The environmental professional will present the findings of the review in a report to the SFPUC with recommendations for additional sampling to assess soil and/or groundwater quality in the project area, if needed.

Mitigation Measure M-HZ-1b: Perform Soil Sampling.

Based on the outcome of Mitigation Measure M-HZ-1a, the SFPUC will retain a qualified environmental professional to conduct soil sampling to: (1) assess concentrations of metals for which California has established hazardous waste criteria (Title 22 metals) in soil and (2) evaluate soil and/or groundwater quality in the vicinity of any sites identified by the updated environmental database review required by Mitigation Measure M-HZ-1a as having the potential to affect soil or groundwater quality where excavation or dewatering would occur. The environmental professional will prepare a report documenting the sampling performed, summarizing the results, and making recommendations for appropriate handling and disposal of soil and groundwater during construction.

Mitigation Measure M-HZ-1c: Hazardous Spoils Disposal Plan.

The SFPUC will require the contractor to prepare and successfully implement a 'Hazardous Spoils Material Disposal Plan' using the results of the soil sampling performed under Mitigation Measure M-HZ-1b, above. The plan will specify the disposal method and approved disposal site for the soil, including written documentation that the disposal site will accept the waste, which will be submitted to the SFPUC for verification. The plan will also include requirements for sampling and analysis of potentially hazardous materials and coordination with the appropriate regulatory agencies in the event that previously unidentified hazardous materials are encountered during construction. Evidence of potential hazardous contamination includes soil discoloration, suspicious odors, presence of underground storage tanks, or buried building material.

Mitigation Measure M-HZ-1d: Health and Safety Plan.

The SFPUC will require the contractor to prepare a site-specific health and safety plan in accordance with federal OSHA regulations (29 CFR 1910.120) and Cal-OSHA regulations (8 CCR 5192), using the results of the soil sampling performed under Mitigation Measure M-HZ-1b, above. The health and safety plan will list and characterize the chemicals identified in the project area, discuss potential health and safety hazards associated with those chemicals, describe the monitoring to be performed during site activities, identify soil-handling methods to minimize the potential for exposure to contaminants, discuss the types and uses of appropriate personal protective equipment, outline emergency response procedures, and list emergency contact information.

Mitigation Measure M-HY-1: Construction Water Quality Best Management Practices.

(See Section 5.11, Hydrology and Water Quality)

Mitigation Measure M-TR-1: Traffic Control Plan.

(See Section 5.5, Transportation and Circulation)

5.12.5 References

AEW Engineers, Inc. (AEW), *Final Regulatory Agency Database, Aerial Photograph, and Historic Map Review Report, Seismic Upgrade of BDPL Nos. 3 and 4 at Hayward Fault Project Alameda County, CA*, February 2009.

Division of Industrial Safety, Telephone conversation between Doug Patterson and Mary McDonald of Orion Environmental Associates, July 16, 2009.

Environmental Data Resources, Inc. (EDR), EDR Radius Map, Fremont Alignment, Fremont, CA. Inquiry Number: 2160158.2s, March 2008.

San Francisco Bay Regional Water Quality Control Board (RWQCB), *Screening for Environmental Concerns at Sites with Contaminated Soil and Groundwater. Interim Final – November 2007*, Revised May 2008.

U.S. Environmental Protection Agency (U.S. EPA), *Regional Screening Levels (RSL) for Chemical Contaminants at Superfund Sites*, September 2008.

Water Infrastructure Partners (WIP), *Geotechnical Investigation Seismic Upgrade of BDPL Nos. 3 and 4 at the Hayward Fault Zone Crossing*, May 18, 2004.

5.13 Mineral and Energy Resources

This section addresses the potential mineral and energy-related impacts resulting from implementation of the proposed project. Specifically, this analysis evaluates impacts in terms of short-term energy use during construction and long-term use for operational purposes. There would be no change in energy requirements to operate the proposed project as compared to energy requirements under existing conditions, and operational energy requirements are therefore not discussed further in this section.

5.13.1 Setting

5.13.1.1 Current Energy Providers

SFPUC Power Enterprise

The SFPUC Power Enterprise (formerly part of Hetch Hetchy Water and Power Enterprise) provides a long-term annual average of 1.7 billion kilowatt-hours (kWh) of electrical power, which is generated by the SFPUC's hydroelectric facilities in the Hetch Hetchy system. The system includes 150 miles of high-voltage transmission lines that carry this power from the SFPUC power generation facilities on the Tuolumne River to Newark, where the Hetch Hetchy power system is linked to California's electricity grid. The SFPUC Power Enterprise provides electricity to all City and County of San Francisco (CCSF) facilities (including tenants), San Francisco International Airport and its tenants, Norris Industries (a federal facility), and the Modesto and Turlock Irrigation Districts (for municipal and agricultural pumping). While the quantity of power produced exceeds San Francisco's municipal power needs on an annual basis, the CCSF must supplement its power sources to meet municipal demand and its contractual obligations during the summer and fall months, when power generation in the Hetch Hetchy system is reduced so that water can be stored.

Pacific Gas and Electric Company

Pacific Gas and Electric Company (PG&E) provides natural gas and electricity to the city of Fremont. PG&E produces and purchases electricity from both renewable and nonrenewable resources, with power derived from fossil fuels, nuclear, and hydroelectric sources. PG&E has an electricity generation portfolio that totals 6,000 megawatts. In 2006, this power consisted of 44 percent hydroelectric, 54 percent nuclear from the Diablo Canyon plant, and 2 percent from fossil fuels. This portfolio supplied about 40 percent of the power provided by PG&E, with the remainder procured from outside sources or transmitted on behalf of the California Department of Water Resources. PG&E provides the SFPUC Power Enterprise with transmission and distribution services west of Newark, pursuant to an Interconnection Agreement regulated by the Federal Energy Regulatory Commission (PG&E, 2008).

5.13.1.2 California's Electricity Supply

California's electricity is supplied by a number of sources, including natural gas (45.2 percent), coal (16.6 percent), large hydroelectric plants (11.7 percent), and nuclear (14.8 percent) (CEC, 2008a). The remaining 11.7 percent is supplied from renewable resources such as wind, solar, geothermal, biomass, and small hydroelectric facilities. Despite California's policies aimed at diversifying the state's electrical supply, dependence on natural gas is continuing to grow, from 41.5 percent in 2006 to 45.2 percent in 2007 (CEC, 2008b). In 2002, California imposed a requirement that corporations providing electricity must increase their procurement of eligible renewable energy resources by at least 1 percent per year such that 20 percent of their retail sales are obtained from renewable resources by 2010 (Public Utilities Code, Section 399.15). In addition, the California Public Utilities Commission has asked publicly owned utilities to consider establishing a similar target.

5.13.1.3 Current Energy Use

Electricity is distributed in the city of Fremont via local lines that are owned and operated by PG&E. The most recent year for which annual consumption data are available is 2007. These data show that Alameda County, in which Fremont is located (Fremont is 1 of 14 incorporated jurisdictions), consumed 11.9 billion kWh, which represents about 4 percent of PG&E's total electrical demand of 284.5 billion kWh for California in 2007 (CEC, 2009).

5.13.1.4 Mineral Resources

Mineral resources in California include a mix of fuel and nonfuel resources. Fuel resources consist of oil and gas, which are found in central California. Nonfuel resources found in the Bay Area include gravel and sand, aggregate, clay, stone/rock, and salt. Sand, clay, gravel, and rock products are the most important mineral resources in California. The project area is mapped as Mineral Resources Zones MRZ-1 and MRZ-3 (California Department of Conservation, 1996). Lands designated as MRZ-1 include "areas where adequate information indicates that no significant mineral deposits are present, or where it is judged that little likelihood exists for their presence." Lands designated as MRZ-3 include "areas containing mineral deposits the significance of which cannot be evaluated from available data."

5.13.2 Regulatory Framework

There are no federal, state, or local regulations applicable to the proposed project that are relevant to the significance criteria for mineral and energy resources.

5.13.3 Impacts

5.13.3.1 Significance Criteria

The CCSF has not formally adopted significance standards for impacts related to mineral and energy resources, but generally considers that implementation of the proposed project would have a significant impact if it were to:

- Result in the loss of availability of a known mineral resource that would be of value to the region and the residents of the state;
- Result in the loss of availability of a locally important mineral resource recovery site delineated on a local general plan, specific plan, or other land use plan; or
- Encourage activities that resulted in the use of large amounts of fuel, water, or energy, or used these resources in a wasteful manner.

5.13.3.2 Approach to Analysis

Due to the nature of the proposed project, there would be no impacts related to the following criteria; therefore, no impact discussion is provided for these topics for the reasons described below:

> <u>*Loss of known mineral resources, including locally important mineral resources*</u>. The proposed project area has been graded and disturbed for construction of the existing BDPL Nos. 3 and 4, and the project would not alter the existing use of the right-of-way. Furthermore, the project is located in an area designated by the State of California as MRZ-1 and MRZ-3, which are areas not known to include regionally significant mineral resources (California Department of Conservation, 1996; City of Fremont, 1996). Therefore, the project would not result in the loss of mineral resources or make them inaccessible, and would have no impacts related to mineral resources.

This analysis evaluates the proposed project in terms of fuel, water, and energy demand. For use during construction, the analysis discusses how these resources would not be used in a wasteful manner. Because there would be no new use of fuel, water, or energy as part of project operations, the demand on these resources during operations is not discussed.

5.13.3.3 Impact Analysis

Summary of Impacts

Table 5.13-1 summarizes the potential energy-related impacts and the significance of project impacts before and after mitigation.

TABLE 5.13-1
SUMMARY OF IMPACTS – MINERAL AND ENERGY RESOURCES

Impact	Significance Determination Before Mitigation	Significance Determination After Mitigation
Impact ME-1: Construction-related fuel, water, and energy use.	LS	–

LS = Less than Significant impact
PS = Potentially Significant impact
S = Significant impact
SU = Significant and Unavoidable impact, even with mitigation incorporated
– = Mitigation not required

Construction Impacts

Impact ME-1: Construction-related fuel, water, and energy use.

Construction of the proposed project would require the use of fuels (primarily gas, diesel, and motor oil) for a variety of construction activities, including excavation, grading, demolition, and vehicle travel. During these activities, fuel for construction worker commute trips would likely be minor in comparison to the fuel used by construction equipment. In addition, energy would be used to operate mobile office facilities, nighttime lighting, and some equipment. Water would be consumed by construction personnel and sprayed on exposed soil to control dust; in addition, water would be discharged from the existing BDPL Nos. 3 and 4 to allow work on these pipelines, and from these pipelines and the new BDPL No. 3X to disinfect the pipelines prior to being brought online. Although limited and temporary dewatering of the trenches would be required to provide a dry work area, groundwater levels in the Newark Aquifer would only be affected locally and temporarily (see Impact HY-2, depletion of groundwater resources, in Section 5.11, Hydrology and Water Quality). Such construction-related uses of fuel, energy, and water are typical of construction practices for projects of a similar nature and scale, and these resources would not be used in a wasteful manner. Thus, impacts related to the wasteful use of fuel, water, and energy during construction would be *less than significant.*

Further, several plans, policies, regulations, and mitigation measures described in this EIR either encourage or require increased efficiencies in fuel and energy use. For example, measures intended to reduce greenhouse gases include the use of exhaust controls required by the Bay Area Air Quality Management District and the implementation of the State of California's Low Carbon Fuel Standard beginning in 2010. Exhaust controls include low-emissions tune-ups and limits on the idling of all diesel-fueled commercial vehicles (see Section 5.7, Air Quality). In addition, implementation of the Greenhouse Gas Measures described in Chapter 3, Project Description, and energy efficiency programs by the SFPUC, including those described in San Francisco's Sustainability, Electricity, Resource, and Climate Action Plans (i.e., greening vehicle fleets and increasing energy efficiency), would further reduce the potential for the wasteful use of fuels.

Facility Siting, Operation, and Maintenance Impacts

Following the completion of proposed improvements to BDPL Nos. 3 and 4, pipeline operations would be consistent with existing operations, and pipeline maintenance would occur as needed. Future operation of the pipelines would not involve an increase in fuel, water, or energy use.

5.13.4 Mitigation Measures

No mitigation measures are required.

5.13.5 References

California Department of Conservation, Division of Mines and Geology, *Update of Mineral Land Classification: Aggregate Materials in the South San Francisco Bay Production-Consumption Region*, DMG Open-File Report 96-03, 1996.

Pacific Gas and Electric (PG&E), Company Profile, available online at http://www.pgecorp.com/corp_responsibility/reports/2006/company_overview.html, 2008. Site accessed on February 4, 2009.

California Energy Commission (CEC), *California's Major Sources of Energy*, available online at http://energyalmanac.ca.gov/overview/energy_sources.html, updated November 13, 2008a. Site accessed February 4, 2009.

California Energy Commission (CEC), *2007 Net System Power Report*, available online at http://www.energy.ca.gov/2008publications/CEC-200-2008-002/CEC-200-2008-002-CMF.PDF, April 2008b. Site accessed February 18, 2009.

California Energy Commission (CEC), *California's Electricity and Natural Gas Consumption Data – Electricity Consumption by County*, available online at http://ecdms.energy.ca.gov/elecbycounty.asp. Site accessed February 4, 2009.

City of Fremont, *General Plan*, 1991, as amended through February 10, 1996.

CHAPTER 6
Other Topics Required by CEQA

This chapter addresses the growth-inducement potential, cumulative impacts, significant environmental effects that cannot be avoided if the project is implemented, and significant irreversible impacts of the San Francisco Public Utilities Commission's (SFPUC) proposed Seismic Upgrade of Bay Division Pipelines (BDPL) Nos. 3 and 4 at Hayward Fault Project ("project" or "proposed project").

6.1 Growth Inducement

This section analyzes the growth-inducement potential of the proposed project, as required by the California Environmental Quality Act (CEQA). CEQA Guidelines Section 15126.2(d) requires that an environmental impact report (EIR) evaluate the growth-inducing impacts of a proposed project. A growth-inducing impact is defined as follows:

> [T]he ways in which the proposed project could foster economic or population growth, or the construction of additional housing, either directly or indirectly, in the surrounding environment. Included in this are projects which would remove obstacles to population growth…. It must not be assumed that growth in any area is necessarily beneficial, detrimental, or of little significance to the environment.

The environmental effects of project-induced growth are secondary or indirect impacts of the project. Growth can result in a variety of indirect environmental impacts, including increased demand on community services and public service infrastructure; increased traffic and noise; and degradation of air and water quality.

6.1.1 Approach to Analysis

Based on the CEQA definition above, assessing the growth-inducement potential of the proposed project involves answering the questions:

1) Would the proposed project contribute to the growth-inducement potential of the SFPUC's Water System Improvement Program (WSIP)?

2) Would construction and/or operation of the proposed replacement pipeline for BDPL No. 3 (that is, BDPL No. 3X) and seismic upgrades to BDPL No. 4 remove an obstacle to growth and thus directly or indirectly support more economic or population growth or residential construction in the surrounding environment?

As described in Chapter 2, Introduction and Background, of this EIR, the proposed project is one component of the WSIP, and, as such, its growth-inducement potential is considered in the context of the WSIP, the overall regional water system, and the SFPUC service area. The proposed project would reduce the vulnerability of BDPL Nos. 3 and 4 to earthquake damage where these pipelines cross the Hayward fault, thereby increasing the overall delivery reliability of the SFPUC regional water system to customers downstream of the project location. The following discussion responds to the above two questions with regard to the project's potential for growth inducement in relation to the WSIP and the growth-inducement potential of the proposed project in and of itself.

6.1.2 Growth-Inducement Potential of the Project

The San Francisco Planning Department prepared a detailed analysis of the growth-inducement potential of the SFPUC's current water supply strategy as part of the Program Environmental Impact Report (PEIR) on the WSIP (San Francisco Planning Department, 2008). As described in the PEIR, the WSIP water supply strategy for 2018 would meet customer water supply needs and increase delivery reliability throughout the system, thus removing inadequacies and deficiencies in the water supply system as one potential obstacle to growth within the SFPUC service area. The WSIP would support planned growth in the SFPUC service area, and the PEIR concluded that the WSIP water supply strategy would have an indirect growth-inducing effect.

Although the proposed project is one of the facility improvement projects in the WSIP, and the project was included in the Draft PEIR for the WSIP, the San Francisco Planning Department determined prior to certification of the WSIP PEIR that this project has "independent utility" from the overall WSIP program. While projects with independent utility contribute to the overall improved system reliability provided by the WSIP, they have the primary purpose of rehabilitating existing facilities and providing flexibility for maintenance and emergency response. The projects with independent utility would not contribute to the growth-inducement effects of the WSIP for the following reasons:

- Projects with independent utility are necessary regardless of whether any other WSIP project is constructed.
- The construction of independent utility projects does not increase the normal operating capacity of the system, change the manner in which water is dispersed, increase the storage capacity of the system, or increase or alter the nature of any treatment capacity of the system.
- Each independent utility project does not commit the SFPUC to any other WSIP facility improvement project.
- Any potential cumulative impacts associated with independent utility projects can be and are adequately addressed by the cumulative impact analysis in the project-specific environmental review document.

In addition to the above reasons, which provide general explanations for why projects with independent utility do not contribute to the growth-inducement potential or growth-inducing effects of the WSIP, the following project-specific characteristics explain why the proposed project itself does not represent an increase in the hydraulic capacity of the regional water system:

- The purpose of the project is to reduce the risk of pipeline failure in a major seismic event, and the project would serve this function and is necessary regardless of whether any other WSIP project is constructed.
- The performance specifications and design parameters applicable to the proposed project are independent of the PEIR analysis and any outcomes of the PEIR.
- The construction of the project would not increase the normal operating capacity of the regional water system because the new BDPL No. 3X functionally replaces the existing segment of BDPL No. 3.

Therefore, for the reasons listed above, implementation of the project in and of itself would not remove an obstacle to growth (in the form of increased capacity to convey additional water supplies). The project would not directly or indirectly foster economic or population growth or the construction of housing. The proposed project would reduce the potential for catastrophic failure of BDPL Nos. 3 and 4 where they cross the Hayward fault in order to protect these two major regional transmission pipelines in the event of a major earthquake. The proposed BDPL No. 3X would be designed to contribute to the SFPUC's seismic reliability goal of being functional within 24 hours of a seismic event and delivering basic service to the East/South Bays, Peninsula, and San Francisco within 24 hours of a major earthquake. The proposed improvements would help ensure that the SFPUC would be capable of restoring facilities to meet average-day demand within 30 days of a major earthquake. However, as discussed above, the pipeline sizing and design capacity of the proposed improvements would be the same as or less than the existing pipelines and associated infrastructure; the project would not increase the overall operating capacity of the regional water system; and project implementation in and of itself would not facilitate an increase in water deliveries in the SFPUC's service area. Therefore, the project would not remove an obstacle to population or economic growth, and would not have a growth-inducing impact.

6.2 Cumulative Impacts

The purpose of this analysis is to disclose potentially significant or significant cumulative impacts that would result from implementation of the proposed project in combination with other related past, present, and probable future projects in and beyond the project area. A cumulative impact is a compounded impact resulting from the combination of the impacts caused by the proposed project and those of other past, present, and probable future projects in the project vicinity.

6.2.1 CEQA Analysis Requirements

CEQA Guidelines Section 15130 requires that an EIR discuss a proposed project's contribution to cumulative impacts. Cumulative impacts refer to "two or more individual effects which, when considered together, are considerable or which compound or increase other environmental impacts." The cumulative impact analysis may be less detailed than the analysis of the project's individual effects (CEQA Guidelines Section 15130[b]). The cumulative impact that results from several closely related projects is defined as:

> ….the change in the environment which results from the incremental impact of the project when added to other closely related past, present, and reasonably foreseeable probable future projects. Cumulative impacts can result from individually minor but collectively significant projects taking place over a period of time (CEQA Guidelines Section 15355[b]).

Section 15130[b] requires one of the following elements for an adequate discussion of significant cumulative impacts of a proposed project:

- A list of past, present, and probable future projects producing related or cumulative impacts, including, if necessary, those projects outside the control of the agency
- A summary of projections contained in an adopted general plan or related planning document or in an adopted or certified environmental document that described or evaluated regional or areawide conditions contributing to the cumulative impact

This EIR relies on a "list of projects" approach for the cumulative impact analysis.

6.2.2 Projects Considered in Cumulative Analysis

The list of projects, shown in **Table 6.1** and on **Figure 6.1,** includes other past, present, and probable future projects within and near the project area. With the exception of the construction of the North and South Shutoff Stations on BDPL Nos. 3 and 4, the list consists of projects that are planned or proposed by other jurisdictions or entities, as there are no other SFPUC projects proposed in the project area or its vicinity.

Table 6.1 identifies and describes the projects that are considered in the cumulative impact analysis. The table also lists the resource areas where the proposed project could contribute to cumulative impacts. Two factors limit the potential for the proposed project to contribute to cumulative impacts. The primary factor is that the proposed project activities are limited in geographic scope and would occur primarily in the vicinity of the Interstate 680 (I-680) and Mission Boulevard interchange in Fremont, and therefore the impacts related to project implementation would generally be limited to the immediate vicinity of the project area. In addition, the impacts of the project would primarily occur during construction, which would last for approximately 27 months, anticipated to occur between 2012 and 2014.

As indicated in Table 6.1, six projects planned or proposed by other entities have tentative construction schedules that could overlap with construction of the proposed project (these projects are shown in **bold** in Table 6.1):

- The I-880/Mission Boulevard/Warren Avenue Interchange Reconstruction planned for construction by the Alameda County Transportation Authority, California Department of Transportation (Caltrans), and City of Fremont between 2006 and 2012. This project is under construction and is expected to be completed by 2012.

TABLE 6.1
PROJECTS CONSIDERED IN THE CUMULATIVE IMPACT ANALYSIS

Cumulative Project No.	Jurisdiction	Project Name	Project Sponsor(s)	Project Description	Distance from Project Area and Potential Cumulative Impact	Estimated Construction Schedule / Status
1	City of Fremont	I-880 / Mission Boulevard (Route 262) / Warren Avenue Interchange Reconstruction	Alameda County Transportation Authority (ACTA), California Department of Transportation (Caltrans), City of Fremont	Reconstruction of the interchange to improve traffic conditions between I-880 and I-680 along Mission Boulevard. Ramps and lanes to improve traffic flow by separating local and regional traffic movements, providing compatibility with mainline widening, and completing high-occupancy vehicle (HOV) lanes to Santa Clara County (ACTA, 2009; Bellows, 2009; Caltrans, 2009a). Construction is planned at I-880/Mission Boulevard interchange.	Approximately 1 mile from project area Construction-related traffic and associated air impacts; cultural resources, air quality, waste generation, biological resources, water quality, flooding, energy resources	2006–2012 / In Progress
2	City of Fremont	BART Warm Springs Extension	San Francisco Bay Area Rapid Transit District (BART)	A 5.4-mile extension of the BART Fremont line to the Warm Springs district of Fremont, with an optional station in the Irvington district; the latter station would be constructed if funding is identified. The extension to Warm Springs is divided into two contracts: one for the construction of an embankment and subway tunnel beneath Central Park, and a second for construction of the track, line, and station at Warm Springs. Construction began in September 2009 (ACTIA, 2009a; BART, 2009a, 2009b; Kohlstrand, 2009).	Approximately 0.75 mile from project area Construction-related traffic and associated air and land use impacts; cultural resources, air quality, waste generation, biological resources, water quality, groundwater depletion, energy resources	2006–2014 / In Progress
3	Santa Clara County	BART to Silicon Valley	San Francisco Bay Area Rapid Transit District (BART)	Building on the Warm Springs Extension, BART would extend to San Jose, with stops in Milpitas, Berryessa, Alum Rock, downtown San Jose, Diridon Station in San Jose, and Santa Clara. The Final Supplemental EIR for the project was certified in June 2007. The federal Draft Environmental Impact Statement was released in March 2009, with final environmental documents expected in winter 2009/2010 (SCVTA, 2009a, 2009b).	Approximately 0.5 mile from project area Construction-related traffic and associated air impacts; cultural resources, air quality, waste generation, biological resources, water quality, flooding, groundwater depletion, energy resources	2010–2018 / Not Currently Under Construction
4	City of Fremont	Sabercat Neighborhood Center	Robert Lindley	Mixed-use development of 158 for-sale condominium units and 55,500 square feet of commercial/office space on a 12.2-acre site located on Cormack Road (City of Fremont, 2009a, 2009b; Pullen, 2009).	Approximately 1.75 miles from project area Construction-related traffic and associated air impacts; cultural resources, air quality, waste generation, biological resources, water quality, energy resources	2011+ / Not Currently Under Construction

TABLE 6.1 (Continued)
PROJECTS CONSIDERED IN THE CUMULATIVE IMPACT ANALYSIS

Cumulative Project No.	Jurisdiction	Project Name	Project Sponsor(s)	Project Description	Distance from Project Area and Potential Cumulative Impact Topics	Estimated Construction Schedule
5	**County of Alameda**	**I-680 Sunol Express Lanes Northbound**	**Alameda County Congestion Management Agency (ACCMA), Caltrans**	**Conversion of HOV lanes to high-occupancy toll (HOT) lanes along the northbound I-680 corridor in the area of the Sunol Grade. The conversion requires additional roadway width and installation of tolling equipment along the corridor, as well as construction of retaining walls and sound walls (ACTIA, 2009c; Caltrans, 2009b, 2009c; Carboni, 2008; Landin-Lowe, 2009).**	**This site crosses the project area** **Construction-related traffic and associated air and land use impacts; aesthetics, cultural resources, air quality, waste generation, biological resources, water quality, energy resources**	**2013–2015+ / Not Currently Under Construction**
6	**City of Fremont**	**Warm Springs Specific Plan**	**City of Fremont**	**The City has prepared an existing conditions analysis of the area around the future Warm Springs BART Station. Subsequent planning efforts will include preparation and evaluation of alternative development scenarios for the area and an implementation approach (City of Fremont, 2008).**	**Approximately 0.5 mile from project area** **Construction-related traffic and associated air impacts; cultural resources, air quality, waste generation, biological resources, water quality, energy resources**	**2011 (Plan Approval Date, but Construction Schedule Unknown)**
7	**Alameda County and Santa Clara County**	**I-680 / I-880 Cross Connector Studies**	**Caltrans, Santa Clara Valley Transportation Authority (SCVTA), and ACCMA**	**Studies related to an improved connection between I-680 and I-880 in southern Alameda County. Potential improvements include road modifications, intersection-specific improvements, and traffic system management options. The three corridors under study in Alameda County are Auto Mall Parkway, Fremont and Grimmer Boulevards, and Mission Boulevard. The ACCMA began preparing a project study report for the Mission Boulevard corridor. However, the project is on hold (Highway 262) (ACTIA, 2009b; Edwin, 2009).**	**A portion of this site is adjacent to the project area** **Construction-related traffic and associated air impacts; aesthetics, cultural resources, air quality, waste generation, biological resources, water quality, flooding, energy resources**	**Unknown**
8	City of Fremont	Lancar Project	Allen Odell	Demolition of a building and construction of four new condominium buildings, totaling 28 units, on East Warren Avenue (City of Fremont, 2009a, 2009b; Pullen, 2009).	Approximately 0.5 mile from project area Cultural resources, air quality, waste generation, biological resources, water quality, flooding, energy resources	2010–2011 / Not Currently Under Construction

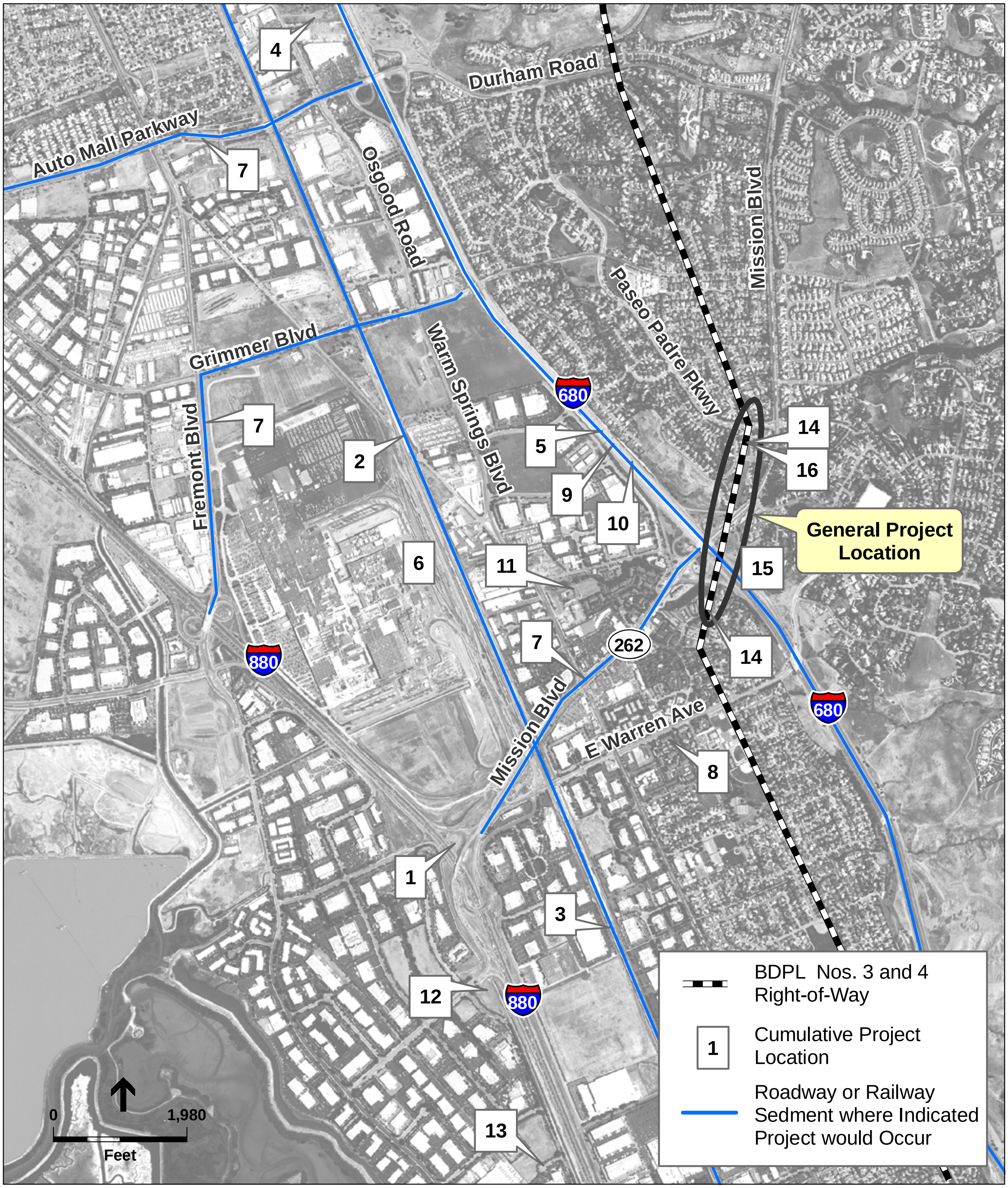
TABLE 6.1 (Continued)
PROJECTS CONSIDERED IN THE CUMULATIVE IMPACT ANALYSIS

Cumulative Project No.	Jurisdiction	Project Name	Project Sponsor(s)	Project Description	Distance from Project Area and Potential Cumulative Impact Topics	Estimated Construction Schedule
9	County of Alameda	I-680 Sunol Express Lanes Southbound	ACCMA, Caltrans	Conversion of HOV lanes to HOT lanes along the southbound I-680 corridor in the area of the Sunol Grade. The conversion requires additional roadway width and installation of tolling equipment along the corridor. Caltrans is doing the widening in three phases. The first phase, between Grimmer Boulevard and Mission–Highway 238, will be completed in November 2009. The phase from Grimmer Boulevard southbound into Santa Clara County will be under construction from 2009–2010 (ACTIA, 2009c; Caltrans, 2009b; Carboni, 2008; O'Brien, 2009; Landin-Lowe, 2009).	This site crosses the project area Construction-related traffic and associated air impacts; aesthetics, cultural resources, air quality, waste generation, biological resources, water quality, energy resources	2008–2011 / In Progress
10	Alameda County and Santa Clara County	I-680 Portland Cement Concrete and Asphalt Concrete Rehabilitation	Caltrans	Rehabilitation of concrete along I-680 from Santa Clara County to Pleasanton (Carboni, 2008).	This site crosses the project area Aesthetics, cultural resources, air quality, waste generation, biological resources, water quality, energy resources	2008–2011 / In Progress
11	City of Fremont	Fremont Times Square	Jeff Major	Development of 95,000-square-foot commercial building on a 7.67-acre lot on Warm Springs Boulevard (City of Fremont, 2009a, 2009b; Pullen, 2009).	Approximately 0.25 mile from the project area Cultural resources, air quality, waste generation, biological resources, water quality, energy resources	2009 / In Progress
12	City of Fremont	Fire Station 11	City of Fremont	Construction of a 10,300-square-foot fire station on a 1.47-acre site on Lakeview Boulevard. Project is under construction (City of Fremont, 2009a, 2009b; Pullen, 2009).	Approximately 1.25 miles from project area Cultural resources, air quality, waste generation, biological resources, water quality, flooding, energy resources	2010 / In Progress
13	City of Fremont	Fremont Technology Center Phase II	Jeff Lee	Approved Zone Administrator Permit, Tentative Parcel Map, and Environmental Impact Assessment for construction of a 76,500-square-foot, six-building technology park development on Lakeview Boulevard (City of Fremont, 2009a, 2009b; Pullen, 2009).	Approximately 1.5 miles from project area Cultural resources, air quality, waste generation, biological resources, water quality, flooding, energy resources	2010 / Not Currently Under Construction

TABLE 6.1 (Continued)
PROJECTS CONSIDERED IN THE CUMULATIVE IMPACT ANALYSIS

Cumulative Project No.	Jurisdiction	Project Name	Project Sponsor(s)	Project Description	Distance from Project Area and Potential Cumulative Impact Topics	Estimated Construction Schedule
14	City and County of San Francisco	North and South Shutoff Stations	San Francisco Public Utilities Commission	Construction of shutoff and crossover facilities on BDPL Nos. 3 and 4 on either side of the Hayward fault.	Located within the project area Cultural resources, air quality, loss of top soil, geologic and seismic impacts	2007 / Completed
15	City of Fremont	Zone 6, Agua Fria Creek (Line D) Improvements	Alameda County Flood Control and Water Conservation District	Improvements to Agua Fria Creek between I-680 and Briar Court including bank restoration and stabilization, removal of non-native vegetation, maintenance of flood protection, enhancement and improvement of natural habitat, and increasing flow carrying capacity (ACFCWCD, 2009).	Located immediately upstream of project area Cultural resources, air quality, biological resources, water quality, flooding	2010-2011 / Not Currently Under Construction
16	City of Fremont	Zone 6, Agua Caliente Creek (Line F) Improvements	Alameda County Flood Control and Water Conservation District	Improvements to Agua Caliente Creek between Paseo Padre and Tumbelweed Common including bank restoration and stabilization, removal of non-native vegetation, maintenance of flood protection, enhancement and improvement of natural habitat, and increasing flow carrying capacity (ACFCWCD, 2009).	Located approximately 2,000 feet upstream of project area Cultural resources, air quality, biological resources, water quality, flooding	2010-2011 / Not Currently Under Construction

NOTE: **Bold** indicates project with potentially overlapping construction schedules.



SOURCE: California Environmental Resources Evaluation System, 2005

Note: See Table 6.1 for corresponding project names and descriptions.

Seismic Upgrade of BDPL Nos. 3 and 4 at Hayward Fault . 206166.06

Figure 6.1
Projects in the Vicinity of the
Project Area with Potential for Cumulative Impacts

- The Bay Area Rapid Transit District (BART) Warm Springs Extension planned for construction between 2006 and 2014. This project is under construction to the north of the project area. Construction of the Warm Springs Station is expected to be complete by 2014.
- BART to Silicon Valley planned for construction between 2010 and 2018.
- The 12.2-acre Sabercat Neighborhood Center planned for construction beginning in 2011.
- Construction of I-680 Sunol Express Lanes on northbound I-680 by the Alameda County Congestion Management Agency, scheduled for construction beginning in 2013.
- Implementation of the Warm Springs Specific Plan, scheduled for approval in 2011. This plan will address development in the area of the proposed Warm Springs BART Station, but specific development projects and construction schedules are unknown.

The construction schedule has not been determined for the I-680/I-880 Cross Connector project. However, this project would be implemented in the vicinity of the proposed project, and construction schedules could overlap (this project is also shown in **bold** in Table 6.1). The other projects listed in Table 6.1 have been completed or would be completed by the time that construction of the proposed project begins in 2012.

6.2.3 Cumulative Impact Analysis

6.2.3.1 Significance Criteria for Cumulative Impact Analysis

The City and County of San Francisco has not formerly adopted significance standards for impacts related to cumulative effects, but generally considers that implementation of the project would have significant cumulative impacts if it were to:

- Have impacts that would be individually limited but cumulatively considerable ("cumulatively considerable" means that the incremental effects of a project are significant when viewed in connection with the effects of past, present, and probable future projects)

This EIR has determined that the proposed project would have no impacts related to wind and shadow, population and housing, public services, and agricultural resources (see Chapter 5, Environmental Setting and Impacts, Section 5.1.1, Scope of Analysis). Therefore, the project would not contribute to cumulative impacts related to these topics. The remaining topics addressed in Chapter 5 are described below.

6.2.3.2 Summary of Impacts

The potential cumulative impacts of the proposed project are described in this section by environmental resource topic, since the geographic scope of the impact can vary by topic. Each impact discussion below assesses the potential for a cumulative impact to occur and identifies projects that could contribute to the cumulative impact, then assesses the proposed project's contribution to significant cumulative impacts. The significant impacts to which the proposed project could contribute are summarized in **Table 6.2** and discussed by resource topic below.

TABLE 6.2
SUMMARY OF CUMULATIVE IMPACTS

Impact	Significance of Project's Contribution to Impact Before Mitigation	Significance Determination After Mitigation
Impact C-LU: Cumulative disruption or displacement of existing land uses, and effects on the existing character of the project vicinity.	LS	–
Impact C-AE: Cumulative impacts on scenic resources, visual character, and new sources of light and glare.	LS	–
Impact C-CP: Cumulative impacts on historical, archaeological, and paleontological resources.	LS	–
Impact C-TR: Cumulative impacts related to increases in traffic and traffic hazards, access, and parking.	PS	LS
Impact C-NO: Cumulative impacts related to increases in noise and vibration.	LS	–
Impact C-AQ: Cumulative impacts related to violations of air quality standards, increases in emissions of criteria air pollutants, exposure of sensitive receptors to pollutants, and greenhouse gas emissions.	LS / S*	– / SU*
Impact C-UT: Cumulative impacts related to disruption or relocation of utilities, landfill capacity, and compliance with solid waste statutes and regulations.	LS	–
Impact C-BI: Cumulative impacts related to wetlands, aquatic resources, riparian habitat, special status species, and compliance with local policies and ordinances protecting biological resources.	LS	–
Impact C-GE: Cumulative impacts related to seismic hazards, soil erosion, unstable geologic units, expansive soils, and changes to topography.	LS	–
Impact C-HY: Cumulative impacts related to degradation of water quality, depletion of groundwater resources, and flooding	LS	–
Impact C-HZ: Cumulative impacts related to a release of hazardous materials into the environment and impairment of or interference with implementation of an adopted emergency plan.	PS	LS
Impact C-ME: Cumulative impacts related to the use of large amounts of energy resources or wasteful use of these resources.	LS	–

B = Beneficial impact
LS = Less than Significant impact
PS = Potentially Significant impact
S = Significant impact
SU = Significant and Unavoidable impact, even with mitigation incorporated
– = Mitigation not required
* Significance determination under current BAAQMD CEQA Guidelines / significance determination under draft BAAQMD CEQA Guidelines

6.2.3.3 Cumulative Impact Analysis

Land Use and Land Use Planning

Impact C-LU: Cumulative disruption or displacement of existing land uses, and effects on the existing character of the project vicinity.

The geographic scope of potential cumulative land use impacts encompasses the project area and immediate vicinity, including proposed staging areas and detour routes.

Disruption of Existing Land Uses and Effects on the Existing Character of the Project Vicinity

Temporary cumulative impacts related to disruption of existing land uses and effects on the existing character of the vicinity, including physical impacts that could indirectly affect land use (e.g., aesthetics, traffic, air quality, and noise), would occur if the project areas and construction schedules of the proposed project and the potentially cumulative projects listed in Table 6.1 overlap. With the exception of Projects 2, 5, 7, 9, and 10 listed in Table 6.1, all of the cumulative projects that could have overlapping construction schedules with the proposed project are located to the west of I-680 or more than 0.5 mile to the north of the proposed project (see Figure 6.1) and would not contribute to potential cumulative impacts related to disruption of existing land uses.

However, Projects 5, 9, and 10 (I-680 Sunol Express Lanes Northbound and Southbound and I-680 Portland Cement Concrete and Asphalt Concrete Rehabilitation) as well as Project 7 (I-680 / I-880 Cross Connector Studies) involve improvements to I-680 or Mission Boulevard in the vicinity of the interchange of these roadways where construction of the proposed project would also occur. Project 5, which involves the construction of I-680 Sunol Express Lanes on northbound I-680, would overlap with construction of the proposed project, and this overlap would occur for over a year in 2013 and 2014. The project schedule for Project 7, which includes construction of improved connectors between I-680 and I-880, has not been determined, but this project could also overlap with that of the proposed project, depending on the implementation schedule. Project 2 (BART Warm Springs Extension) would involve construction to the west of Warm Springs Boulevard and would overlap with the construction of the proposed project during the entire construction period from 2012 to 2014. Because these projects would have overlapping schedules and cumulative project activities would occur near the proposed project, the potential for cumulative land use impacts from traffic, noise, and dust emissions are discussed below.

As discussed under the heading *Transportation and Circulation*, the project's contribution to temporary reductions in roadway capacity, temporary increases in traffic volumes and delays and safety hazards, and impaired access for emergency response vehicles would be cumulatively considerable (*potentially significant*). However, the project's contribution to these cumulative traffic impacts and related impacts on land uses would be reduced to a less than significant level with implementation of **Mitigation Measure M-C-TR, SFPUC Project Construction Traffic Coordinator**, which requires SFPUC construction coordination with Caltrans, the City of

Fremont, and county agencies responsible for reviewing and/or approving the construction of other identified private and public development projects to minimize traffic impacts on local access roads; particularly local streets where sensitive receptors (e.g., schools, residences, or hospitals) are located.

As discussed under the heading *Noise*, there would be no cumulative impact related to construction-related increases in noise and vibration as a result of the project, and the project's contribution to temporary increases in noise along the proposed detour routes and construction traffic-related noise on Mission Boulevard, I-680, and I-880 would not be cumulatively considerable. Therefore, the project's contribution to impacts related to disruption of land uses and effects on the existing character of the vicinity from noise increases would not be cumulatively considerable, and would be *less than significant*.

As discussed under the heading *Air Quality*, under existing Bay Area Air Quality Management District (BAAQMD) CEQA Guidelines, implementation of BAAQMD-recommended dust control measures (Mitigation Measures M-AQ-1a) would ensure that the project's contribution to the air quality impact would not be cumulatively considerable and would be less than significant. Therefore, cumulative land use impacts associated with dust emissions would not be cumulatively considerable, and would be *less than significant*.

Displacement of Existing Land Uses during Construction

Although the proposed project would use private property in Staging Areas 3 and 4, and Caltrans easements for Staging Areas 1, 2, and 3, these properties are currently undeveloped and the SFPUC would obtain temporary construction easements for their use. With acquisition of these easements, and because no existing land uses would be displaced, project impacts related to displacement of land uses would be less than significant and there would be no cumulative impact related to displacement of existing land uses as a result of implementation of the proposed project.

Aesthetics

Impact C-AE: Cumulative impacts on scenic resources, visual character, and new sources of light and glare.

The geographic scope of potential aesthetics impacts encompasses the project area and immediate vicinity, as well as the I-680, Mission Boulevard, and Fremont Hills viewsheds in which the proposed project is located.

Long-term cumulative aesthetics impacts could occur if the proposed project and the cumulative projects listed in Table 6.1 in the immediate vicinity involved the construction of new facilities, removal of trees, or other changes that would affect the same visual resources. For these projects, temporary cumulative aesthetics impacts could also occur if the project schedules overlapped.

With the exception of Projects 5, 7, 9, and 10 listed in Table 6.1, all of the cumulative projects are located to the west of I-680 or more than 0.5 mile to the north of the proposed project (see Figure 6.1) and would not cumulatively contribute to potential aesthetics impacts associated with the proposed project, which would affect scenic resources along I-680 and Mission Boulevard and in the viewshed of the Fremont Hills. However, Projects 5, 9, and 10 (I-680 Sunol Express Lanes Northbound and Southbound and I-680 Portland Cement Concrete and Asphalt Concrete Rehabilitation) as well as Project 7 (I-680/I-880 Cross Connector Studies) involve improvements to I-680 or Mission Boulevard in the vicinity of the interchange of these roadways, within the viewshed of the Fremont Hills, and could result in cumulative impacts related to visual resources in this viewshed.

Construction-Related Impacts on Scenic Vistas, Scenic Resources, and the Visual Character of the Surroundings

The proposed project would result in significant construction-related impacts on scenic vistas, scenic resources, and the visual character of the project vicinity, including the I-680, Mission Boulevard, and Fremont Hills viewsheds, associated with the presence and use of construction equipment, supplies, and vehicles as well as the removal of vegetation within the project area (see Impact AE-1). Project 5 (the I-680 Sunol Express Lanes Northbound project) is the only cumulative project with an overlapping construction schedule that would occur within the proposed project viewsheds. Construction of this project would overlap with construction of the proposed project for over a year in 2013 and 2014. The schedule for Project 7, which includes construction of improved connectors between I-680 and I-880, has not been determined, but this project could also overlap with the proposed project, depending on the implementation schedule. Construction of the express lanes (Project 5) and improvements to the roadway system (Project 7) could result in impacts on visual resources similar to those of the proposed project. Thus, construction-related cumulative impacts on visual resources could be *potentially significant*.

Without project-level mitigation, the project's contribution to this impact could be cumulatively considerable. However, cumulative impacts on visual resources would be temporary in nature (restricted to the approximately 27-month construction period). In addition, implementation of **Mitigation Measure M-HY-1, Construction Water Quality Best Management Practices**, requiring the SFPUC to preserve existing vegetation in areas where no construction activity is planned or where construction activity would occur at a later date, and to revegetate disturbed areas following construction, would ensure that the visual character of the construction area is restored following completion of each construction component and that permanent effect on scenic vistas, scenic resources, and the visual character of the area do not occur as a result of project implementation. Therefore, the proposed project's contribution to this cumulative impact would not be cumulatively considerable with project-level mitigation and would be *less than significant*.

Temporary Construction-Related Sources of Light and Glare

The proposed project would include construction-related sources of light and glare during intermittent nighttime construction (see Impact AE-2). Construction of Project 5 on northbound I-680 could be concurrent with construction of the proposed project for over a year in 2013 and

2014. The I-680/I-880 Cross Connector Studies project (Project 7) is still in the conceptual stage, and the construction details and schedule are currently unknown, but could also potentially overlap with the proposed project depending on the implementation schedule. Because these projects could both include nighttime lighting in the same general vicinity as the proposed project, cumulative impacts related to new sources of light and glare would be potentially significant.

However, the project would require nighttime lighting only approximately 17 times over 11 months, and prior to construction, the SFPUC or contractor would prepare a construction lighting plan that includes locations and methods to minimize light spillover to adjacent residential areas. Because of the temporary nature of nighttime lighting under the proposed project, and because light spillover to adjacent residential areas would be minimized, the proposed project's contribution to this cumulative impact would not be cumulatively considerable and would be *less than significant*.

Permanent Construction-Related Impacts on Scenic Vistas, Scenic Resources, and the Visual Character of the Surroundings

Project-related permanent impacts on scenic vistas, scenic resources, and the visual character of the area could result from the removal of trees and vegetation, construction of new structures, and alteration of existing structures within the I-680, Mission Boulevard, and Fremont Hills viewsheds, as well as from the removal of trees within the Agua Fria Creek riparian corridor (see Impact AE-3). None of the cumulative projects listed in Table 6.1 would affect trees or visual resources within the Agua Fria Creek corridor, and therefore no cumulative impact on visual resources would occur in this corridor.

Construction of Project 5 would be restricted to the I-680 corridor and should not require tree removal, but would involve the installation of tolling equipment, sound walls, and retaining walls. Although Project 7 (the I-680/I-880 Cross Connector Studies) could require tree removal or construction of new structures along Mission Boulevard, this project is still in the conceptual stage, and design requirements are not known. Because these projects include construction of new structures, and potentially tree removal, within the same viewsheds as the proposed project, permanent cumulative impacts on visual resources could be potentially significant.

However, removal of trees within the project area would have a negligible affect on the views in the project area. The only new structures constructed under the proposed project would be six new manholes, the modified slip joint vault, and access structures for the new articulated vault, and these structures would protrude a maximum of approximately 2.5 feet above ground. These structures would be only be briefly visible from passing vehicles and would not substantially affect views from nearby residences. Therefore, the proposed project's contribution to this cumulative impact would not be cumulatively considerable and would be *less than significant*.

Cultural and Paleontological Resources

Impact C-CP: Cumulative impacts on historical, archaeological, and paleontological resources.

The geographic scope of potential cumulative impacts on cultural resources encompasses the cultural resources study area for the proposed project (referred to as the CEQA Area of Potential Effects, or C-APE) and immediate vicinity. The proposed project would contribute to cumulative impacts on cultural resources, including historical, archaeological, and paleontological resources, if the proposed project and other projects in Table 6.1 were to adversely affect the same cultural resources or cultural resources within the project vicinity.

Impacts on the Historical Significance of an Individual Facility, Historic District, or Contributor to a Historic District

As discussed in Section 5.4, Cultural Resources, no historic architectural resources eligible for listing in the National Register of Historic Places or California Register of Historical Resources were identified within or immediately adjacent to the C-APE, either individually or as contributors to a historic district (see Impact CP-1). Therefore, no cumulative impact on historic resources would result from implementation of the proposed project.

Impacts on Unknown and Known Prehistoric and Historic Period Archaeological Resources

As discussed in Section 5.4, Cultural Resources, the proposed project is expected to result in significant impacts on known and previously undiscovered archaeological resources (see Impact CP-2), including a documented archaeological site. In addition, the project is located in an area of high sensitivity for archaeological resources, and project activities could encounter these resources in the project area. With the exception of Project 10 (I-680 Portland Cement Concrete and Asphalt Concrete Rehabilitation), all of the projects listed in Table 6.1 would likely involve earthwork and excavation activities within this highly sensitive region and could encounter previously undiscovered archaeological resources during construction. Thus, cumulative impacts on archaeological resources could be potentially significant.

Without project-level mitigation, the project's contribution to this impact could be cumulatively considerable. However, project-related impacts on archaeological resources would be site-specific and would be reduced to a less-than-significant level with implementation of **Mitigation Measure M-CP-2a, Archaeological Research Design and Treatment Plan and Archaeological Data Recovery Report for CA-ALA-576**, requiring implementation of a data recovery program and data recovery report for the known site, as well as **Mitigation Measures M-CP-2b, Extended Archaeological Survey for Areas Outside of CA-ALA-576; M-CP-2c, Archaeological Evaluation Plan and Archaeological Evaluation and Effects Report; M-CP-2d, Archaeological Monitoring Plan and Accidental Discovery Measures;** and **M-CP-4, Human Remains and Associated or Unassociated Funerary Objects**. These measures would require an extended survey to evaluate the presence of previously unidentified archaeological resources and human remains in the project area and follow-up measures for the treatment of any resources identified. Implementation of these measures would ensure that any archaeological resources encountered during construction would be recovered and appropriately managed. Thus, with implementation of these measures, the proposed project's contribution to cumulative impacts on archaeological resources would not be cumulatively considerable with project-level mitigation and would be *less than significant*.

Impacts on Paleontological Resources

The Irvington Gravels and undivided surficial deposits in the project vicinity are considered to have a high potential to yield fossil resources (see Impact CP-3). With the exception of Project 10 (I-680 Portland Cement Concrete and Asphalt Concrete Rehabilitation), all of the projects listed in Table 6.1 would likely involve earthwork and excavation activities within these highly sensitive geologic units and could encounter previously undiscovered paleontological resources during construction, a potentially significant cumulative impact. Without project-level mitigation, the project's contribution to this impact could be cumulatively considerable. However, project-related impacts on paleontological resources would be reduced to a less-than-significant level with implementation of **Mitigation Measures M-CP-3a, Worker Training, and M-CP-3b, Paleontological Resources Monitoring**, which require that workers are trained to recognize areas likely to yield fossils, that a trained paleontologist monitors excavation activities in formations most likely to yield fossils, and that accidentally discovered fossils be appropriately assessed for their significance and salvaged, if deemed necessary. Implementation of this measure would ensure that any paleontological resources encountered during construction would be recovered and appropriately managed. With implementation of this mitigation measure, the proposed project's contribution to this cumulative impact would not be cumulatively considerable and would be *less than significant*.

Transportation and Circulation

Impact C-TR: Cumulative impacts related to increases in traffic and traffic hazards, access, and parking.

The geographic scope of potential cumulative impacts related to transportation and circulation includes Mission Boulevard; the northbound on-ramps to I-680, which would be directly affected by construction of the proposed project; temporary detour routes used when the I-680 on-ramps or Mission Boulevard need to be closed during construction; and the regional roadway system, which could be affected by construction-related traffic. The potentially affected roadway system includes I-680 and I-880, and the detour routes include Warm Springs Boulevard – Osgood Road, Auto Mall Parkway – Durham Road, Paseo Padre Parkway, and South Grimmer Boulevard.

Traffic-related impacts resulting from the proposed project would be restricted to the construction phase. Therefore, if the proposed project and other projects listed in Table 6.1 were under construction at the same time and affected the same roadways, the proposed project would contribute to cumulative construction-related traffic impacts, including temporary reductions in roadway capacity, short-term increases in traffic volumes and delays, potential traffic safety hazards, temporary impaired access for emergency response vehicles, and short-term displacement of on-street parking. Of the projects listed in Table 6.1, Projects 1 through 5 could be under construction between 2012 and 2014, at the same time as the project. Although the project schedule is not known for Project 7, it could also overlap with the proposed project schedule.

Temporary Reductions in Roadway Capacity

Project construction across Mission Boulevard and the I-680 northbound on-ramps would include installing temporary bridges to avoid major traffic disruptions during construction of the new BDPL No. 3X, and the project would result in significant impacts related to reduced roadway capacities and increased traffic delays on the detour routes (Warm Springs Boulevard – Osgood Road, Auto Mall Parkway – Durham Road, Paseo Padre Parkway, and South Grimmer Boulevard) and adjacent roadways unless appropriate traffic management measures are implemented (see Impact TR-1). All of the cumulative projects with overlapping project schedules could contribute to traffic on Mission Boulevard, the I-680 on-ramps, or detour routes and could result in an increase in the volume of traffic on the proposed detour routes. In addition, the I-680/I-880 Cross Connector Project (see Table 6.1, Project 7) could also include construction on Mission Boulevard and Auto Mall Parkway, which could affect roadway capacities on these streets. Thus, cumulative impacts related to temporary reductions in roadway capacity would be potentially significant.

Without mitigation, the project's contribution to this impact could be cumulatively considerable. **Mitigation Measure M-TR-1, Traffic Control Plan**, would ensure implementation of a traffic control plan that would restrict the time periods when short-term lane closures could occur, thereby ensuring that the proposed project would not result in unacceptable increases in traffic or traffic delays. However, the project's contribution to cumulative impacts related to temporary reductions in roadway capacities would still be cumulatively considerable (*potentially significant*) because in combination with the cumulative projects with overlapping construction schedules, the proposed project would increase traffic on the detour routes. The project's contribution to this cumulative impact would be reduced to a less-than-significant level with implementation of the project-level mitigation measure **M-TR-1** (described above) and **Mitigation Measure M-C-TR, SFPUC Project Construction Traffic Coordinator**, which requires SFPUC construction coordination with Caltrans, the City of Fremont, and county agencies responsible for reviewing and/or approving the construction of other identified private and public development projects to minimize traffic impacts on local access roads; particularly local streets where sensitive receptors (e.g., schools, residences, or hospitals) are located.

Temporary Increased Traffic Volumes and Delays and Safety Hazards

Regional roadways used by project-related construction traffic (haul trucks and worker vehicles) could include I-680, I-880, Mission Boulevard, and Paseo Padre Parkway. The proposed project would not result in significant impacts from increased traffic volumes on these roadways because the project-related traffic would not adversely affect the level of service for any of the roadways relative to projected traffic volumes without the project (see Impact TR-2). However, all of the projects listed in Table 6.1 with overlapping construction schedules would increase traffic on at least one of the regional roadways. Construction of Project 5 (I-680 Sunol Express Lanes

Northbound) would also involve construction on northbound I-680, which could require temporary closure of some northbound traffic lanes, therefore reducing the roadway capacity. Although the exact timing and traffic volumes are not known for these projects, implementation of the proposed project and those projects with overlapping schedules could result in cumulative construction-related traffic impacts on I-680, I-880, Mission Boulevard, and Paseo Padre Parkway. The cumulative increase in traffic as a result of these multiple projects in combination with the proposed project could also result in increased traffic hazards for vehicles, bicyclists, and pedestrians (discussed in Impact TR-3). Therefore, cumulative impacts related to increased traffic volumes and delays and traffic safety hazards would be potentially significant.

Without mitigation, the project's contribution to this impact could be cumulatively considerable. Although **Mitigation Measure M-TR-1, Traffic Control Plan**, would ensure implementation of a traffic control plan that would reduce project-level traffic-related safety hazards, the project's contribution to cumulative impacts on traffic-related safety hazards would still be cumulatively considerable (*potentially significant*). The project's contribution to this cumulative impact would be reduced to a less-than-significant level with implementation of the project-level mitigation measure **M-TR-1** (described above), and **Mitigation Measure M-C-TR, SFPUC Project Construction Traffic Coordinator**, which requires SFPUC construction coordination with Caltrans, the City of Fremont, and county agencies responsible for reviewing and/or approving the construction of other identified private and public development projects to minimize traffic impacts on regional roadways and local access roads, particularly local streets where sensitive receptors (e.g., schools, residences, or hospitals) are located.

Impaired Access for Emergency Response Vehicles

Under the proposed project, temporary closure of the I-680 northbound on-ramps and traffic management on Mission Boulevard during construction would result in impacts related to impaired access for emergency response vehicles (see Impact TR-4). Construction of the I-680 Sunol Express Lanes Northbound (Project 5) could also require lane closures on northbound I-680, potentially disrupting traffic and affecting emergency access in 2013 and 2014 when the project construction schedules would overlap. Improvements under the I-680/I-880 Cross Connector Studies (Project 7) could also require construction within Mission Boulevard or Auto Mall Parkway. Although the scope and schedule for this project have not been determined, construction in these roadways could cumulatively contribute to impaired access for emergency vehicles if the construction activities overlapped with those of the proposed project. Therefore, cumulative impacts related to impaired access for emergency response vehicles would be potentially significant.

Without mitigation, the project's contribution to this impact could be cumulatively considerable. **Mitigation Measure M-TR-1, Traffic Control Plan**, would ensure implementation of a traffic control plan that would restrict the time periods when short-term lane closures could occur, thereby ensuring that the proposed project would not result in unacceptable increases in traffic or traffic delays. However, the project's contribution to this impact would still be cumulatively considerable (*potentially significant*) because in combination with the cumulative projects with overlapping project schedules, the proposed project construction could result in significant increases in traffic or traffic delays. The project's contribution to this cumulative impact would be reduced to a less-than-significant level with implementation of the project-level mitigation measure **M-TR-1** (described above), and **Mitigation Measure M-C-TR, SFPUC Project Construction Traffic Coordinator**, which requires SFPUC construction coordination with Caltrans, the City of Fremont, and county agencies responsible for reviewing and/or approving the construction of other identified private and public development projects to minimize traffic impacts on local access roads, particularly local streets where sensitive receptors (e.g., schools, residences, or hospitals) are located.

Short-Term Displacement of On-Street Parking

As discussed in Impact TR-5, construction parking would occur primarily within the BDPL Nos. 3 and 4 right-of-way, designated staging areas within the project area, or in an offsite designated parking area though some workers could potentially park on neighborhood streets at both the north end (Tissiack Way area) and south end (Mohave Drive area) of the ROW. However, none of the cumulative projects listed in Table 6.1 would include construction in the immediate vicinity of these streets. Therefore, no cumulative impact on displacement of on-street parking would result from implementation of the proposed project.

Noise

Impact C-NO: Cumulative impacts related to increases in noise and vibration.

For noise and vibration, the geographic scope of potential cumulative impacts is limited to the immediate project vicinity as well as areas adjacent to any routes designated for proposed construction-related access, hauling, and detours. Of the cumulative projects listed in Table 6.1, none would be constructed in the immediate project vicinity, but Projects 2 and 5 could be under construction between 2012 and 2014, at the same time as the project and could use the same routes for access, hauling, and detours. Although the project schedules are not known for Project 7, it could also overlap with the proposed project schedule and could potentially use the same roadways.

Temporary Construction-Related Noise Increases and Vibration

Although the project would result in significant and unavoidable impacts related to noise from construction equipment (see Impact NO-1), noise from haul and delivery trucks (see Impact NO-3) and annoyance from construction-related vibration at night (see Impact NO-4), these impacts would be restricted to construction noise increases at residences within 50 feet of project activities in Construction Zones 1 and 8, noise increases from haul and truck traffic near residences on Nugget Way, Omega Drive, and Crystalline Drive, and construction-related vibration at houses within 25 feet of these zones. None of the projects listed in Table 6.1 would include construction within 50 feet of these construction zones or include haul and delivery traffic along this route. Therefore, there would not be a cumulative impact related to temporary construction-related noise increases, noise from haul and delivery trucks, or vibration as a result of project implementation.

Temporary Noise Disturbance along Construction Haul Routes and Detour Routes

The proposed project would also result in significant and unavoidable impacts related to detour traffic noise at residences along Durham Road and Paseo Padre Parkway, the planned detour routes for Mission Boulevard (see Impact NO-3). However, none of the projects listed in Table 6.1 would likely involve detouring or increased traffic on these roadways. Although Projects 2, 5, and 7 could increase traffic on Mission Boulevard, Warm Springs Road, and Auto Mall Parkway, these routes are surrounded predominantly by industrial and some commercial land uses, and diversion of nighttime traffic to these routes would not be expected to affect sensitive receptors. Therefore, there would not be a cumulative noise impact related to increased traffic noise on detour routes as a result of project implementation.

As indicated in the cumulative traffic discussion, cumulative construction-related traffic increases could occur on I-680, I-880, and Mission Boulevard due to implementation of the proposed project in combination with other projects listed in Table 6.1. The project's construction-related traffic increases along these routes (discussed in Impact TR-2), in addition to Projects 2, 5, and 7, would contribute incrementally to cumulative traffic noise increases on these three roadways, which currently carry high traffic volumes and generate high noise levels. Sound walls have been constructed along the two freeways to protect sensitive receptors from freeway noise. Land uses along Mission Boulevard are not considered noise-sensitive, and noise attenuation features were incorporated into the design of hotels/motels located along Mission Boulevard to maintain acceptable interior noise levels. As a general rule, a doubling of traffic volumes results in a 3-dBA[1] noise increase, which is barely perceptible to most people. Since the project's contribution to traffic increases on these roadways would be small compared to the total traffic volumes currently on these roadways, cumulative traffic noise increases resulting from the project would be well below 3 dBA, and therefore the increase in noise levels along these roadways as a result of the project would not be perceptible. Thus, the project's contribution to this cumulative impact would not be cumulatively considerable and would be *less than significant*.

Air Quality

Impact C-AQ: Cumulative impacts related to violations of air quality standards, increases in emissions of criteria air pollutants, exposure of sensitive receptors to pollutants, and greenhouse gas emissions.

Potential impacts related to air quality are evaluated on a regional (air basin) basis, including impacts generated at the project site and along truck haul routes. Cumulative impacts could occur if implementation of the proposed project and other projects in Table 6.1 resulted in increased construction emissions that violated air quality standards, contributed substantially to the region's nonattainment status for ozone and particulate matter (PM_{10} and $PM_{2.5}$), or exposed sensitive receptors to pollutants. Greenhouse gas (GHG) emissions and their contribution to climate change is a global issue.

[1] A-weighted decibel (see Section 5.6 for description).

Construction Emissions of Criteria Pollutants

As described in Section 5.7, Air Quality, construction activities under the proposed project and other projects in the region, including those listed in Table 6.1 could result in temporary impacts from project-related criteria pollutant emissions, including suspended particulate matter (PM_{10} and $PM_{2.5}$) and ozone precursors (see Impact AQ-1), a significant cumulative impact. However, under existing Bay Area Air Quality Management District (BAAQMD) CEQA Guidelines, implementation of BAAQMD-recommended dust and exhaust control measures (Mitigation Measures M-AQ-1a and M-AQ-1b) would ensure that the project's contribution to this impact would not be cumulatively considerable and would be *less than significant*.

Under proposed BAAQMD CEQA Guidelines, the proposed project's incremental contribution to suspended particulate emissions would be reduced to a less-than-significant level with implementation of **Mitigation Measure M-AQ-1a, BAAQMD Dust Control Measures,** and the project's residual contribution would not be cumulatively considerable. However, proposed BAAQMD guidelines specify quantitative thresholds for construction-related combustion emissions. Even with implementation of **Mitigation Measures M-AQ-1b, BAAQMD Exhaust Control Measures**, and **M-AQ-1c, Additional Exhaust Controls,** construction combustion emissions would still exceed the BAAQMD's daily thresholds for nitrogen oxide (NO_X), an ozone precursor. None of the other criteria pollutants would be exceeded.

Although the project would implement standard control measures (as specified in **Mitigation Measures M-AQ-1b and M-AQ-1c**), there would still be a residual contribution from the proposed project and other projects in the region to the air basin's nonattainment status for ozone and there is no mitigation that would reduce the cumulative impacts further. Therefore, the proposed project's contribution to construction-related cumulative air quality impacts with respect to the region's nonattainment status for ozone would be cumulatively considerable, and thus would be *significant and unavoidable.*

Exposure to Diesel Particulate Matter during Construction

The project would also result in an increase in emissions of Diesel Particulate Matter (DPM), a toxic air contaminant (TAC) that contains substances that are known carcinogens, during construction from the use of diesel-operated construction equipment, and haul and delivery trucks (see Impact AQ-2).

Significance Determination under Existing (1999) BAAQMD Guidelines. The existing BAAQMD Guidelines specify a significance threshold of 10 in one million for a new source or receptor, but does not include a threshold for cumulative DPM emissions. When project-related DPM emissions of 4 in a million are compared to the existing BAAQMD significance threshold of 10 in one million, the project's contribution would not exceed the threshold and therefore, would not be cumulatively considerable *(less than significant)* under the existing BAAQMD guidelines.

Significance Determination under Draft BAAQMD Guidelines. Under the draft BAAQMD significance thresholds, the cumulative local community risk and hazard impacts on residential receptors would be significant if the cancer risk for all sources within a 1,000 zone of influence exceeds 100 in a million; the chronic non-cancer risk exceeds a Hazard Index (HI) of 1.0; or ambient annual average $PM_{2.5}$ concentrations exceed 0.8 micrograms per cubic meter ($\mu g/m^3$) (BAAQMD, 2009). The draft thresholds, unlike existing thresholds, consider all sources within the 1,000-foot zone of influence. The draft thresholds do not specify a threshold for determining the significance of a project-specific contribution when a cumulative threshold is exceeded. For the purposes of this analysis, *any* contribution of TAC emissions is conservatively assumed to be cumulatively considerable if a cumulative threshold would be exceeded when all TAC sources within 1,000 feet of where the project would emit construction emissions are considered (DPM in this case).

Within the 1,000-foot zone of influence the primary potential sources of DPM emissions include the I-680 freeway and Mission Boulevard. In 2007 (the last year of published data), there was an average of 13,140 trucks per day on I-680 north of Mission Boulevard, and 9,585 trucks per day south of this intersection (Caltrans, 2008). In addition, Mission Boulevard carried an average of 4,032 trucks per day on the approach to I-680.

A screening-level individual cancer analysis was conducted using the U.S. EPA SCREEN3 computer model to compare the added risk from the project-related construction activities to the baseline conditions of DPM exposure to local traffic sources. For this analysis, peak daily DPM emissions from project activities (included in Table 6.3) were conservatively[2] assumed to occur on 260 workdays over two years of construction. The SCREEN3 model results (included in Appendix D) were converted to an individual cancer risk, included in **Table 6.3**.

Using this conservative assessment, the proposed project would result in an estimated 11.6 pounds per day of DPM emissions during peak construction activity. With these extremely conservative assumptions, Table 6.3 shows that the screening-level individual cancer risk would be an additional 4 in a million from project construction and the chronic non-cancer HI would be an additional 0.13. As discussed in Section 5.6, Air Quality, there is a large degree of conservatism built into the screening level evaluation. Nevertheless, for the purpose of worst-case analysis, it is assumed that the project would result in an additional 4 in a million lifetime cancer risk from project construction activities.

There is currently an estimated 10 pounds per day of DPM emissions from diesel trucks released on I-680 and Mission Boulevard near the project area. As shown in Table 3, if this emission rate were to remain unchanged, the screening-level lifetime individual cancer risk associated with these emissions is currently 82 in a million, and the chronic non-cancer HI is 0.05.[3] While this estimated risk level is based on current traffic levels, and traffic may increase on I-680 and Mission Boulevard over the course of the project, this is a conservative estimate of risk associated

2 Receptors were conservatively assumed to remain at the same location outdoors during every hour of the construction duration and for every hour of the day for 70 years for the freeway exposure calculation.

3 The estimated cancer and non-cancer risks for DPM exposure from diesel trucks on I-680 and Mission Boulevard are overstated because the DPM emissions over the next 70 years are anticipated to decrease tenfold due to CARB regulatory measures. Therefore, a more realistic lifetime screening-level cancer risk estimate due to freeway proximity is closer to 10 to 15 in a million when averaged over the next 70 years (82 per million in 2007, well below 10 in a million by 2077).

TABLE 6.3
INDIVIDUAL CANCER RISK FROM DPM EXPOSURE

Parameter	DPM Exposure from Project Construction Activities	DPM Exposure from Other Major Sources [a]
1-Hour ($\mu g/m^3$)	6.58	2.74
Annual ($\mu g/m^3$)	0.658	0.274
70-Year Average ($\mu g/m^3$)	0.013[b]	0.274[c]
Cancer Risk ($x10^{-6}$)[d]	4.0	82.2
Non-cancer Risk (HI)	0.13	0.05

DPM = diesel particulate matter
$\mu g/m^3$ = microgram per cubic meter

[a] Other major sources of DPM within a 1,000-foot radius of the project site are limited to truck traffic on I-680 and Mission Boulevard.
[b] 260 workdays/365 days/year/70 years
[c] assume no fleet improvements and no truck volume increases for the next 70 years from the 2007 baseline (worst-case)
[d] 300 x 10^{-6} per $\mu g/m^3$ (70-year average)

SOURCE: U.S. EPA SCREEN3 Computer Model (see Appendix D for model output).

with DPM emissions from diesel trucks on these roadways because DPM emissions are expected to decrease in the future due to CARB regulations. [4] Over the last decade, DPM emissions from diesel trucks have been decreasing and will continue to decrease much faster than any year-to-year increases in local truck volumes. This trend is forecast to continue throughout the next decade. Localized background DPM emissions are thus steadily trending downward. Therefore, addition of project emissions to 2007 background DPM conditions in this cumulative analysis is considered very conservative (worst-case).

Sensitive receptors within this 1,000-foot radius are residences located on both sides of the project area. The cancer risk associated with the I-680 freeway and Mission Boulevard is estimated to be currently at 82 in a million and when the project is added, the total cancer risk is 86 in a million. This worst-case cumulative health risk impact, assuming no reduction in baseline risk levels, would be less than the proposed BAAQMD threshold of 100 in a million. The chronic non-cancer HI associated with the I-680 freeway and Mission Boulevard is estimated at 0.05 and when the project is added, the total HI is 0.18, less than the proposed BAAQMD threshold of 1.0. As indicated in Table 6.3, combined annual concentrations are estimated at 0.932 $\mu g/m^3$, which would exceed the BAAQMD's threshold for ambient annual average $PM_{2.5}$ concentration of 0.8 $\mu g/m^3$. However, implementation of project-level **Mitigation Measures M-AQ-1b, BAAQMD Exhaust Control Measures, M-AQ-1c, Additional Exhaust Control Measures,** and **Mitigation Measure M-AQ-2, Use of Soot Filters,** would reduce project emissions by approximately 80 percent, so that mitigated project emissions (approximately 0.142 $\mu g/m^3$) in combination with other major sources (0.274 $\mu g/m^3$) would not exceed the BAAAMD cumulative TAC threshold of

[4] California Air Resources Board (CARB) regulatory measures, including the Truck and Bus Regulation adopted in 2008, specifies measures to be implemented between 2011 and 2023 to reduce DPM and criteria pollutant emissions from on-road diesel trucks and buses (CARB, 2009).

0.8 $\mu g/m^3$. Therefore, the project's contribution to cumulative DPM emissions would not be cumulatively considerable and would be *less than significant.*

Greenhouse Gas Emissions and Conflicts with Applicable Plans, Policies, or Regulations Adopted for the Purpose of Reducing Greenhouse Gas Emissions

The accumulation of GHGs has been implicated as a driving force for global climate change, a term that is used interchangeably with "global warming" and the "greenhouse effect." Construction of the project in combination with other projects in the region, including those listed in Table 6.1, would contribute to regionwide cumulative increases in emissions of GHGs, a significant cumulative impact. However, the project's GHG emissions associated with construction-related traffic and construction equipment would represent approximately 5.5×10^{-4} (0.00055) percent of the statewide total of GHG emissions and approximately 2.7×10^{-3} (0.0027) percent of the Bay Area inventory. Current and proposed BAAQMD guidelines do not specify a quantitative threshold for construction GHG emissions. Given the small amount of GHG emissions associated with project construction; implementation of CARB regulations (specified in Title 13 of the California Code of Regulations, Sections 2480 and 2485, which limit idling of diesel-fueled commercial motor vehicles); implementation of greenhouse gas reduction actions described in Chapter 3, Project Description (see Section 3.5.14, Greenhouse Gas Reduction Actions); implementation of **Mitigation Measures M-AQ-1b, BAAQMD Exhaust Control Measures, and M-AQ-1c, Additional Exhaust Control Measures**; and continuing implementation of GHG reduction actions by the City and County of San Francisco, including those described in the San Francisco Sustainability Plan (See Chapter 4, Plans and Policies), the project's contribution to cumulative GHG emissions would not be cumulatively considerable since project implementation would not conflict with the state's goal of reducing GHG emissions to 1990 levels by 2020, as set forth in the timetable established by Assembly Bill 32, the Global Warming Solutions Act of 2006, nor would it conflict with San Francisco's *Climate Action Plan's* goal of reducing GHG emissions established by the 2008 *Greenhouse Gas Reduction Ordinance*. Thus, the project's contribution to cumulative GHG emissions would not be cumulatively considerable and would be *less than significant*.

Utilities and Service Systems

Impact C-UT: Cumulative impacts related to disruption or relocation of utilities, landfill capacity, and compliance with solid waste statutes and regulations.

The geographic scope of potential cumulative impacts on utilities and service systems is limited to the immediate project vicinity, where services could be disrupted and utilities could require relocation. For landfill capacity, the geographic scope includes the service areas of Alameda and Santa Clara Counties, where disposal of construction-related waste could occur. For compliance with solid waste statutes and regulations, the geographic area encompasses Alameda County.

Relocation or Temporary Damage to or Disruption of Existing Utilities

The proposed project area would not overlap with any of the projects listed in Table 6.1, and none of these projects would be immediately adjacent to the proposed project area. Therefore, there would be no cumulative impact related to relocation or temporary damage to or disruption of existing utilities as a result of project implementation.

Reduction in Landfill Capacity

The proposed project and all of the cumulative projects listed in Table 6.1 would generate construction-related waste requiring offsite disposal and could contribute to a significant cumulative impact on landfill capacity. However, the project's demand on landfill capacity represents an immeasurably small fraction of the total remaining landfill capacity in Alameda and Santa Clara Counties (see Impact UT-2). Therefore, the project's contribution to cumulative demand on regional landfill capacity would not be cumulatively considerable and would be *less than significant*.

Compliance with Solid Waste Statutes and Regulations

The proposed project and all of the projects listed in Table 6.1 would generate waste that requires offsite disposal and could contribute to a significant cumulative impact related to compliance with solid waste statutes and regulations if they did not include waste diversion measures in accordance with Assembly Bill 939 or the City of Fremont's (or other jurisdiction, as applicable) waste management ordinance. However, each of these projects would implement source reduction, recycling, and composting measures, as mandated by Assembly Bill 939 and implemented by the City of Fremont (or other jurisdictions, as applicable) waste management ordinance, to divert wastes from landfills. Project-specific compliance would be ensured through **Mitigation Measure M-UT-3, Waste Management Plan**, which requires the implementation of measures to reduce the amount of waste disposed in landfills (see Impact UT-3). Implementation of this measure would ensure that the project's contribution to cumulative impacts related to compliance with federal, state, and local solid waste statutes and regulations is not cumulatively considerable and would be *less than significant*, regardless of the compliance status of other projects.

Biological Resources

Impact C-BI: Cumulative impacts related to wetlands, aquatic resources, riparian habitat, special status species, and compliance with local policies and ordinances protecting biological resources.

The geographic scope of potential cumulative impacts on biological resources encompasses the jurisdictional waters and riparian habitat in the project area as well as other areas in the region that are biologically linked. This regional approach is appropriate because the habitats and wildlife species that could be affected by the proposed project and projects identified in Table 6.1 are part of a broader ecosystem, and the potential disturbance of individual areas has repercussions for a wider region than the immediate project vicinity. Two of the proposed projects (15 and 16) include improvements to Agua Fria Creek and Agua Caliente Creek that would enhance and improve the natural habitat of these creeks. Although only limited information is available for the remaining projects listed in Table 6.1, it is assumed that other projects in the vicinity could adversely affect the same biological resources as the proposed project (including wetlands and riparian habitat).

Impacts on Aquatic Resources and Riparian Habitats

As described in Section 5.9, Biological Resources, project construction activities along the Agua Fria Creek corridor could adversely affect 0.07 acre of "other waters of the United States" that were delineated within the project area. In addition, the project could affect up to 0.4 acre of Central Coast riparian scrub (see Impact BI-1). All of the projects listed in Table 6.1 would also have the potential to affect these resources, a potentially significant cumulative impact. Without project-level mitigation and implementation of regulatory requirements, the project's contribution to this impact could be cumulatively considerable. However, the loss of waters of the United States and Central Coast riparian scrub would be temporary, and these resources would be restored at the completion of construction, in compliance with requirements of the Section 404 permit from the Army Corps of Engineers and the Streambed Alteration Agreement from the CDFG. The SFPUC would also be required to implement compensation measures for the loss of jurisdictional waters and riparian resources in accordance with **Mitigation Measure M-BI-1, Protection and Compensation for Loss of Jurisdictional Waters and Riparian Habitat**, which would ensure "no net loss" of habitat extent or function of jurisdictional waters. Therefore, because project-specific mitigation would ensure no net loss of jurisdictional waters and riparian resources, the project's contribution to this impact would not be cumulatively considerable and would be *less than significant*.

Water Discharge Effects on Riparian Habitat

The proposed project could adversely affect riparian resources in Agua Fria Creek due to discharges of groundwater produced during trench dewatering and discharges of chloraminated water from the BDPL Nos. 3, 4, and 3X during project construction (see Impact BI-4). Based on their location, none of the projects listed in Table 6.1 would include discharges to the same stretch of Agua Fria Creek. Although Projects 16 and 17 would include construction within Agua Fria and Agua Caliente Creeks upstream of the project area and could affect the same resources, these projects are intended to provide habitat improvements within the creeks and would not result in adverse effects on riparian habitat of the creek. Therefore, there would be no cumulative impact related to the effects of water discharges on riparian habitat as a result of project implementation.

Impacts on Special-Status Species

Project implementation also has the potential to adversely affect special-status species and species of concern, including California red-legged frog, white-tailed kite, Cooper's hawk, tricolored blackbird, other migratory birds, burrowing owl, and San Francisco dusky-footed woodrat (see Impact BI-2). All of the cumulative projects listed in Table 6.1 could affect at least some of the same sensitive species, a potentially significant cumulative impact. Without mitigation, the project's contribution to this impact could be cumulatively considerable. However, project-specific impacts on special-status species would occur during construction only, and implementation of the following mitigation measures would ensure that construction activities do not result in the loss of habitat or direct mortality for any of the special-status species present: **M-BI-2a, Protection Measures for Key Special-Status Species and Other Species of Concern; M-BI-2b, Avoidance and Minimization Measures for California Red-Legged Frog; M-BI-2c, Avoidance and Minimization Measures for Nesting Raptors and other Migratory Birds; M-BI-2d, Avoidance and Minimization Measures for Western Burrowing Owl; and M-BI-2e, Mitigation for San Francisco Dusky-Footed Woodrat Middens**. Therefore, with project-level mitigation, the project's contribution to this impact would not be cumulatively considerable and would be *less than significant*.

Conflicts with Local Policies and Ordinances

The proposed project could conflict with local policies or ordinances protecting biological resources because project construction would require the removal of up to 44 trees that meet the City of Fremont size and species criteria for protection (see Impact BI-4). Although it is likely that several projects listed in Table 6.1 would also remove protected trees, the majority of these projects would be required to adhere to the City of Fremont's (or other jurisdiction, as appropriate) criteria for tree removal permits, which stipulate that protected trees be replaced with trees of similar type and size, and there would be no cumulative impact related to conflicts with local plans and ordinances. Further, the proposed project's impacts related to tree removal would be less than significant with replacement or compensation for the protected trees, as prescribed in **Mitigation Measure M-BI-4a, Tree Replacement/Compensation**. Therefore, with project-level mitigation, the project's contribution to this impact would not be cumulatively considerable and would be *less than significant*.

Geology and Soils

Impact C-GE: Cumulative impacts related to seismic hazards, soil erosion, unstable geologic units, expansive soils, and changes to topography.

The geographic scope of potential cumulative impacts related to geology, seismicity, and soils encompasses the project site and immediate vicinity. Although many of the cumulative projects listed in Table 6.1 could have similar geologic impacts to the proposed project, geologic, and soils impacts are generally site-specific and depend on local geologic and soil conditions.

Loss of Topsoil

Many of the projects listed in Table 6.1 would also have the potential to result in a loss of topsoil, a potentially significant cumulative impact. However, as described in Section 5.10, Geology and Soils, all of the excavation and grading under the proposed project would occur in an urban area where the soil has already been disturbed by highway or pipeline construction. Large amounts of fill are present, and there would not be a strongly developed topsoil horizon. Therefore, the project's impacts related to loss of top soil are less than significant; the project's contribution to cumulative loss of top soil would not be cumulatively considerable and would be *less than significant*.

Other Geologic and Seismic Impacts

With the exception of Project 14 none of the other projects listed in Table 6.1 are located within or immediately adjacent to the project area and would not contribute to cumulative geologic and seismic impacts in connection with implementation of the project.

With respect to other cumulative geologic and soils impacts that could result from the overlapping construction zones for the proposed project and Project 14, both the proposed project and Project 14 are SFPUC projects designed in accordance with the *SFPUC General Seismic Design Requirements*, which specifies appropriate construction methods to address site-specific seismic hazards (including groundshaking, seismically induced slope failures, and seismically induced ground failure such as liquefaction and settlement). In addition, Project 14 was constructed in 2007 and would not contribute to cumulative impacts during construction of the proposed project (such as slope instability). Neither project would alter the topography, and both projects are designed to withstand expansive and corrosive soils. Therefore, the cumulative impact associated with geologic and soils impacts would be *less than significant*.

The proposed project would reduce the vulnerability of BDPL Nos. 3 and 4 to surface fault rupture and seismically induced groundshaking where these pipelines cross the Hayward fault. Because the proposed project would improve the seismic safety of the water system facilities and reduce the potential for flooding and damage to adjacent structures in the event of pipeline rupture, the project would result in beneficial effects related to the seismic safety of the regional water system and project vicinity. Implementation of Project 15 also increased the seismic safety of the regional water system, and thus also contributes to this beneficial effect. With respect to seismic safety, the project's contribution to cumulative seismic effects would be *beneficial*.

Hydrology and Water Quality

Impact C-HY: Cumulative impacts related to degradation of water quality, depletion of groundwater resources, and flooding.

The geographic scope of potential cumulative surface water hydrology and water quality impacts encompasses receiving surface water bodies, including Agua Fria and Agua Caliente Creeks as well as Laguna Creek and Coyote Creek (which these creeks drain to) and ultimately San Francisco Bay. The geographic scope of potential cumulative groundwater impacts encompasses local groundwater resources in the vicinity of the proposed project (the Niles Cone Groundwater Basin).

Degradation of Water Quality

The proposed project and the cumulative projects in Table 6.1 have the potential to degrade water quality as a result of construction-related soil erosion and accidental discharges of hazardous materials into downstream water bodies as well as construction-related discharges of water, a potentially significant cumulative impact. As described in Section 5.11, Hydrology and Water Quality, construction and excavation activities of the proposed project could also increase soil erosion and sediment loads in downstream water bodies and result in the discharge of hazardous construction chemicals into site runoff, thereby adversely affecting water quality (see Impact HY-1). In addition, discharges of treated water from the existing BDPL No. 3 between the North and South Shutoff Stations during project construction as well as discharges of groundwater produced during dewatering activities also have the potential to affect water quality in Agua Fria Creek (see Impacts HY-3 and HY-4).

Without project-level mitigation, the project's contribution to this impact could be cumulatively considerable. However, the proposed project's impacts on water quality would be less than significant with implementation of **Mitigation Measure M-HY-1, Construction Water Quality Best Management Practices** and implementation of the requirements listed in RWQCB Order No R2-2008-0102 and SFPUC Erosion Control Standard Operating Procedures. Mitigation Measure M-HY-1 requires preparation of a site-specific stormwater pollution prevention plan that includes best management practices to be implemented during construction activities in accordance with the National Pollutant Discharge Elimination System (NPDES) General Construction Permit. Similarly, the cumulative projects in Table 6.1 would also be subject to NPDES General Construction Permit requirements. RWQCB Order No R2-2008-0102 regulates discharges of altered water from the SFPUC Drinking Water Transmission System and sets numerical restrictions on water quality constituents, including the requirement that all chlorine be removed from treated water supplies. Because both NPDES permits were developed based on a consideration of regional water quality, implementation of Mitigation Measures M-HY-1 and compliance with RWQCB Order No R2-2008-0102 would ensure the project's residual impacts on surface water quality would not be cumulatively considerable and would be *less than significant*.

Depletion of Groundwater Resources

The proposed project and the cumulative projects in Table 6.1 have the potential to deplete groundwater resources if the projects were to involve significant long-term or permanent groundwater dewatering. Although details regarding the projects in Table 6.1 are somewhat limited, it is possible that certain projects (such as Projects 2 and 3, which are assumed to involve extensive belowground construction for new BART facilities) would involve long-term groundwater dewatering. Therefore, the proposed project and the cumulative projects could result in significant cumulative impacts on depletion of groundwater resources. However, the proposed project's impacts on groundwater resources would be minimal and less than significant because only temporary groundwater dewatering from the shallow aquifer would be required during construction (see Impact HY-2), and adverse effects on the shallow aquifer are predominantly determined by rainfall and recharge conditions rather than by temporary construction dewatering. Based on the limited and temporary nature of groundwater dewatering under the proposed project, the project's contribution to this cumulative impact would not be cumulatively considerable and would be *less than significant*.

Flooding

Discharges of groundwater from trench dewatering and treated water to Agua Fria Creek during construction of the proposed project could lead to flooding, as described in Impacts HY-3 and

HY-4, depending on the flow rate in the creek and downstream water bodies at the time of the discharges. Although construction details for the cumulative projects are not known, those projects located to the south of Mission Boulevard, including Projects 1, 3, 7, 8, 12, and 13, could involve discharges to Agua Fria Creek or related downstream water bodies. Cumulative flooding impacts could occur if the other projects resulted in discharges or increased runoff at the same time as the discharges to Agua Fria Creek under the proposed project. Therefore, the proposed project and the cumulative projects could result in significant cumulative impacts related to flooding. Without project-level mitigation, the project's contribution to this impact could be cumulatively considerable. However, in accordance with **Mitigation Measure M-HY-3, Coordination with Alameda County Flood Control and Water Conservation District and City of Fremont**, the SFPUC would coordinate with the Alameda County Flood Control and Water Conservation District and the City of Fremont prior to beginning the discharge to verify that the storm drains and flood control channels are adequately sized to manage the flows at the time of the discharge, and would control the flow rate of the discharges to avoid flooding. Because the allowable flow rate would be restricted by the existing flows in Agua Fria Creek as required by the project-level mitigation, the project's contribution to potential flooding in the creek would not be cumulatively considerable and would be *less than significant*, regardless of the amount of water discharged to Agua Fria Creek and downstream water bodies from the other projects.

Hazards and Hazardous Materials

Impact C-HZ: Cumulative impacts related to a release of hazardous materials and impairment of or interference with implementation of an adopted emergency plan.

The geographic scope of potential cumulative impacts associated with hazards and hazardous materials encompasses the project area and immediate vicinity. With respect to hazardous materials in the environment, effects are generally limited to site-specific conditions. For cumulative effects on emergency response plans, the effects can extend to regional roadways that could be affected by construction-related traffic.

Release of Hazardous Materials

Cumulative impacts related to the presence of hazardous materials in the soil or groundwater could occur where projects with overlapping construction schedules would be implemented in the same area. However, with the exception of Project 14, the projects listed in Table 6.1 would not be constructed in the same location as the proposed project. Although Project 14 was constructed in the same area as the proposed project, it was constructed in 2007, and the construction schedule would not overlap with that of the proposed project. Therefore, there would be no cumulative impact related to exposure to hazardous materials in the soil or groundwater as a result of project implementation.

Impairment of or Interference with Implementation of an Adopted Emergency Plan

The proposed project could interfere with implementation of an adopted emergency response plan or emergency evacuation plan as a result of temporary closure of the I-680 on-ramps, construction activities on Mission Boulevard, and temporary closure of Mission Boulevard. Projects 2, 5, and 8 listed in Table 6.1 have construction schedules that overlap with the proposed project and could also interfere with implementation of an adopted emergency response plan or emergency evacuation plan as a result of road closures, increased traffic and traffic delays. Therefore, the proposed project and the cumulative projects could result in potentially significant cumulative impacts related to implementation of an emergency response plan or emergency evacuation plan.

Although this impact would be reduced to less than significant at the project level with implementation of **Mitigation Measure M-TR-1, Traffic Control Plan**, which requires measures to reduce traffic impacts in the project vicinity, including notifying local police and emergency providers of potential ramp closure, the project's contribution to cumulative impacts related to this topic could still be cumulatively considerable (*potentially significant*). The project's contribution to this cumulative impact would be reduced to a less-than-significant level and would not be cumulatively considerable with implementation of the project-level mitigation measure **M-TR-1** (described above) and **Mitigation Measure M-C-TR, SFPUC Construction Traffic Coordinator**, which requires assignment of an SFPUC Project Construction Traffic Coordinator.

Mineral and Energy Resources

Impact C-ME: Cumulative impacts related to the use of large amounts of energy resources or wasteful use of these resources.

As discussed in Section 5.13, Mineral and Energy Resources, the proposed project would not affect mineral resources. Therefore, cumulative effects on mineral resources are not evaluated. Potential impacts related to energy resources are evaluated on a regional basis.

Energy Resources

Construction of the project in combination with other projects in the region, including those listed in Table 6.1, would require the operation of construction machinery during excavation, grading, and materials hauling and would contribute to the regional use of fuels (primarily gas, diesel, and motor oil), water, and energy. Thus, construction of the project in combination with other regional projects would contribute to regionwide cumulative increases in use of fuel, water and energy, a significant cumulative impact. However, as discussed in Impact ME-1 (see Section 5.13, Mineral and Energy Resources), such construction-related uses of fuel, energy, and water are typical of construction practices for projects of a similar nature and scale, and these resources would not be used in a wasteful manner under the proposed project. Further, several plans, policies, regulations, and mitigation measures described elsewhere in this EIR either encourage or require increased efficiencies in fuel and energy use. For example, measures intended to reduce greenhouse gases include the use of exhaust controls required by the BAAQMD and the implementation of the State of California's Low Carbon Fuel Standard beginning in 2010. Exhaust controls include low-emissions tune-ups and limits on the idling of all diesel-fueled commercial vehicles (see Section 5.7, Air Quality). In addition, implementation of the Greenhouse Gas Measures described in Chapter 3, Project Description, and energy efficiency programs by the SFPUC, including those described in San Francisco's Sustainability, Electricity, Resource, and Climate Action Plans (i.e., greening vehicle fleets and increasing energy efficiency), would further reduce the potential for the wasteful use of fuels. Thus, the project's contribution to cumulative use of fuels, water, and energy would not be cumulatively considerable and would be *less than significant*.

6.2.4 Cumulative Mitigation Measures

Mitigation Measure M-C-TR: SFPUC Project Construction Traffic Coordinator

As required in **Mitigation Measure TR-1, Traffic Control Plan**, the construction contractor will be required to submit a traffic control plan to the SFPUC. Under this measure, the SFPUC construction coordinator will coordinate development of this traffic control plan with Caltrans, the City of Fremont, and county agencies responsible for reviewing and/or approving the construction of other identified private and public development projects (as listed in Table 6.1) so as to minimize traffic impacts on regional roadways and local access roads, particularly local streets where sensitive receptors (e.g., schools, residences, or hospitals) are located.

6.3 Significant Environmental Effects that Cannot be Avoided if the Proposed Project is Implemented

In accordance with Section 21067 of CEQA, and with Sections 15126(b) and 15126.2(b) of the CEQA Guidelines, the purpose of this section is to identify project-related environmental impacts that could not be eliminated or reduced to a less-than-significant level with implementation of all identified mitigation measures. The findings in this chapter are subject to final determination by the San Francisco Planning Commission as part of its certification of this EIR.

6.3.1 Unavoidable Construction Effects of the Proposed Project

This section identifies project-related impacts that would remain potentially significant or significant, even with the implementation of all identified mitigation measures. Chapter 5, Environmental Setting and Impacts, describes the potential environmental impacts of the proposed project and identifies mitigation measures to reduce those impacts. The impacts associated with the project would occur primarily during the construction phase as opposed to the operations phase. Although construction impacts would be temporary, some of these impacts could be significant, as described in Chapter 5. With the exception of the significant and unavoidable impacts described below, all other significant construction impacts would be eliminated or reduced to less-than-significant levels by the identified mitigations measures.

The eight significant and unavoidable impacts associated with construction of the project include:

- Land use disruptions and changes in the character of the project vicinity due to construction noise associated with heavy equipment and haul and delivery truck traffic as well as noise associated with increased traffic on detour routes and temporary nighttime construction noise and vibration (Impact LU-1)
- Construction noise associated with heavy equipment (Impact NO-1)
- Noncompliance with Fremont Municipal Code time limits due to nighttime construction activities (Impact NO-2)
- Temporary noise disturbance due to haul and delivery truck traffic during the day as well as nighttime deliveries, and along detour routes at night due to road closures (Impact NO-3)
- Disturbance due to temporary construction-related vibration during the nighttime (Impact NO-4)
- Construction-related combustion emissions of criteria air pollutants (Impact AQ-1)
- Construction-related emissions of diesel particulate matter (Impact AQ-2)
- Cumulative construction-related emissions of criteria air pollutants (Impact C-AQ)

Mitigation measures would reduce construction noise adjacent to receptors, but noise levels would exceed the speech interference criterion at houses within 50 feet of construction activities even after implementation of mitigation measures, resulting in a significant and unavoidable impact related to noise and land use disruption (Impacts LU-1 and NO-1). Further, nighttime noise levels could exceed the sleep interference criterion at nearby residences. Impacts related to compliance with the Fremont Municipal Code are significant because some construction activities would take place at night (approximately 17 times over 11 months during installation and removal of the temporary bridges on Mission Boulevard and the I-680 on-ramps), and construction would occasionally occur on Sundays, a significant and unavoidable impact (Impact NO-2). Noise from haul and truck traffic would increase noise levels above ambient noise at nearby receptors, and noise from nighttime deliveries and increased traffic along detour routes during the nighttime hours in residential neighborhoods would exceed the sleep interference criterion. However, the feasibility of mitigation measures to reduce haul and delivery truck noise is uncertain and there is no feasible alternative detour route that would avoid residential neighborhoods, resulting in significant and unavoidable impacts related to noise and land use disruption (Impacts LU-1 and NO-3). Mitigation measures would require the SFPUC and its contractor to restrict vibrations effects from construction machinery at nearby residences, but these measures do not guarantee that nighttime vibration levels would remain below the annoyance threshold at night (Impact NO-4), resulting in a significant and unavoidable impact. Implementation of mitigation measures would reduce emissions from construction equipment exhaust. However, mitigated nitrogen oxide (NO_X) levels would still remain above the BAAQMD's proposed significance threshold for NO_X, resulting in a significant and unavoidable impact (Impacts AQ-1 and C-AQ). Depending on the final BAAQMD guidelines, construction-related emissions of diesel particulate matter may also result in significant and unavoidable impacts (Impact AQ-2).

6.4 Significant Irreversible Environmental Changes

In accordance with CEQA Section 21100(b)(2)(B) and CEQA Guidelines Sections 15126(c) and 15126.2(c), the purpose of this section is to identify significant irreversible environmental changes that would be caused by the proposed project. Construction activities associated with the proposed improvements to BDPL Nos. 3 and 4 would result in an irretrievable and irreversible commitment of natural resources through the use of power supply and construction materials.

The proposed improvements to BDPL Nos. 3 and 4 would require the commitment of energy resources to fuel and maintain construction equipment (such as gasoline, diesel, and oil) during the construction period. Project construction would commit resources, such as concrete and steel, to be used for the proposed BDPL No. 3X and the improvements to the existing slip-joint vault for BDPL No. 4, as well as new piping and other related improvements. The proposed project would also commit asphalt materials for the repaving of roadways and other paved surfaces disturbed during project construction. However, as described in Chapter 3, Project Description, some of the corrugated-metal pipe segments, asphalt and road construction materials, and other general construction debris generated during project construction activities could be reused or recovered.

The proposed project would not result in an increased demand for energy during project operation; thus, no significant irreversible changes associated with long-term energy use would result.

6.5 References

Alameda County Flood Control and Water Conservation District (ACFCWCD), *Engineering Design Services for Select Creek Restoration Projects*, PowerPoint presentation for pre-proposal meeting. March 5, 2009.

Alameda County Transportation Authority (ACTA), "I-880/Mission Boulevard (Route 262) Interchange Reconstruction." *Monthly Report: January 2009.* http://www.acta2002.com/projects.html. Accessed February 4, 2009.

Alameda County Transportation Improvement Authority (ACTIA), "BART Warm Springs Extension." *Monthly Report: January 2009.* http://www.acta2002.com/projects.html. Accessed February 4, 2009a.

Alameda County Transportation Improvement Authority (ACTIA), "I-680 / I-880 Cross Connector Studies." *Monthly Report: January 2009.* http://www.acta2002.com/projects.html. Accessed February 4, 2009b.

Alameda County Transportation Improvement Authority (ACTIA), "I-680 Sunol Express Lanes." *Monthly Report: January 2009.* http://www.acta2002.com/projects.html. Accessed February 4, 2009c.

Bay Area Air Quality Management District (BAAQMD), *California Environmental Quality Act Guidelines Update, Proposed Thresholds of Significance*, available online at http://www.baaqmd.gov/~/media/Files/Planning%20and%20Research/CEQA/Proposed%20BAAQMD%20CEQA%20Air%20Quality%20Thresholds-Nov%202009.ashx, November 2, 2009.

Bay Area Rapid Transit District (BART), "Warm Springs Extension Project." Web page: http://www.bart.gov/about/projects/wsx/index.aspx. Accessed February 12, 2009a.

Bay Area Rapid Transit (BART), Warm Springs Extension News. Available online at www.bart.gov/about/projects/wsx/news.aspx. Accessed November 24, 2009b.

Bellows, Michele, Alameda County Transportation Authority (ACTA) Project Manager, I-880/Mission Boulevard (Route 262) Interchange Reconstruction. Phone Conversation. February 11, 2009.

California Air Resources Board (CARB), Truck and Bus Regulation, On-Road Heavy-Duty Diesel Vehicle (In-Use) Regulation, available online at http://www.arb.ca.gov/msprog/onrdiesel/onrdiesel.htm. Accessed July 2009.

California Department of Transportation (Caltrans), 2007 Annual Average Daily Truck Traffic on the California Highway System, compiled by Traffic Data Branch, Division of Traffic Operations, State of California Business, Transportation, and Housing Agency, Department of Transportation. Prepared in cooperation with the U.S. Department of Transportation, Federal Highway Administration. September 2008.

California Department of Transportation (Caltrans), District 4, "I-880 Mission Home Page." http://www.dot.ca.gov/dist4/880_mission/. Accessed February 10, 2009a.

California Department of Transportation (Caltrans), District 4, "I-680 Southbound Express Lanes Project." http://www.dot.ca.gov/dist4/680hov/. Accessed February 10, 2009b.

California Department of Transportation (Caltrans), District 4, *Interstate 680 High Occupancy Vehicle and Auxiliary Lanes, Sunol Grade Northbound. Negative Declaration with Initial Study and Environmental Assessment.* http://www.dot.ca.gov/dist4/documents/sunol_web_version.pdf. Accessed February 12, 2009c.

California Environmental Resources Evaluation System (CERES), Cal-Atlas GeoSpatial Clearinghouse, Alameda County Imagery, NAIP 2005, Available Online: http://atlas.ca.gov/download.html. Uploaded August 17, 2005. Accessed December 1, 2009.

Carboni, Lisa, California Department of Transportation (Caltrans). Letter RE: "Seismic Upgrade of Bay Division Pipelines Numbers 3 and 4 – Notice of Preparation." April 25, 2008.

City of Fremont, *City of Fremont General Plan Update 2030: Land Use Background Report*. February 2008.

City of Fremont, "Development Activity Amended Through February 2009 and FSUD Attendance Areas." City of Fremont. Community Development Department—Planning Division. January 29, 2009a.

City of Fremont, "City of Fremont Development Activity Map and Chart: Amended Through September 21, 2009." City of Fremont Community Development Department - Planning Division. September 21, 2009b.

Edwin, Arul, Alameda County Congestion Management Agency. Phone Conversation RE: I-880 / I-680 Cross-Connector Study. February 12, 2009.

Landin-Lowe, Emily, Caltrans Project Manager for the I-680 HOV/HOT widening project. Phone Conversation: February 13, 2009.

Kohlstrand, Rebecca, Alameda County Transportation Authority (ACTIA) Project Manager, (1) Altamount Commuter Express Rail, (2) BART Warm Springs Extension, (3) BART Santa Clara County Extension. February 11, 2009.

O'Brien, James, ACTIA Project Manager for the I-680 HOT lanes southbound project. Phone Conversation RE: Project. February 13, 2009.

Pullen, Joel, City of Fremont. Community Development Department—Planning Division. Phone Conversation RE: Development Activity. February 11, 2009.

San Francisco Planning Department, *Program Environmental Impact Report for the San Francisco Public Utilities Commission's Water System Improvement Program*, October 2008.

Santa Clara County Transportation Authority (SCVTA), BART to Silicon Valley. Website: http://www.vta.org/bart/. Accessed February 12, 2009a.

Santa Clara County Transportation Authority (SCVTA), *Silicon Valley Rapid Transit Corridor: Volume 1 Draft Environmental Impact Statement and Draft Section 4(f) Evaluation*. March 2009b.

CHAPTER 7
Alternatives

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7.1 Introduction

7.1.1 CEQA Requirements for Alternatives Analysis

This chapter discusses alternatives to the proposed project. The California Environmental Quality Act (CEQA) Guidelines, Section 15126.6(a), state that an environmental impact report (EIR) must describe and evaluate a reasonable range of alternatives to the proposed project that would feasibly attain most of the project's basic objectives and would avoid or substantially lessen any significant adverse environmental effects of the project. An EIR need not consider every conceivable alternative to the proposed project. Rather, it must consider a reasonable range of potentially feasible alternatives that will foster informed decision-making and public participation. The EIR must evaluate the comparative merits of the alternatives and include sufficient information about each alternative to allow meaningful evaluation, analysis, and comparison with the proposed project. Specifically, the CEQA Guidelines set forth the following criteria for selecting alternatives:

- The discussion of alternatives shall focus on alternatives to the project or its location that are capable of avoiding or substantially lessening any significant effects of the project, even if these alternatives would impede to some degree the attainment of the project objectives or would be more costly (Section 15126.6[b]).

- The range of potential alternatives shall include those that could feasibly accomplish most of the basic objectives of the project and could avoid or substantially lessen one or more of the significant effects (Section 15126.6[c]).

- The specific alternative of "No Project" (referred to as the No Project Alternative) shall also be evaluated along with its impacts (Section 15126.6[e][1]).

- The alternatives should be limited to ones that would avoid or substantially lessen any of the significant effects of the project. Of those alternatives, the EIR need examine in detail only the ones that the lead agency determines could feasibly attain most of the basic objectives of the project. The range of feasible alternatives shall be selected and discussed so as to foster meaningful public participation and informed decision-making (Section 15126.6[f]).

- An EIR is not required to consider alternatives that are infeasible (Section 15126.6[a]).

This chapter discusses the alternatives to the proposed project. Section 7.2 presents the objectives of the project and a summary of its significant environmental impacts, along with an analysis of the three alternatives evaluated, including the No Project Alternative. Section 7.3 compares the three alternatives to the proposed project and identifies the environmentally superior alternative, and Section 7.4 describes the process used to identify and screen the alternatives. Alternatives considered but rejected from further consideration are discussed in Section 7.5.

7.2 Alternatives Analysis

This section describes the project-specific alternatives that were selected and analyzed according to CEQA Guidelines Section 51526.6(a). These alternatives, along with the No Project Alternative, represent a reasonable range of alternatives to the proposed project that would feasibly attain most of the project's basic objectives and would avoid or substantially lessen significant adverse environmental effects of the project. The selected alternatives were based on engineering options previously considered by the SFPUC, as well as an assessment of ways to reduce significant impacts of the proposed project. The three alternatives selected for detailed analysis in this EIR include the No Project Alternative, one alternate location alternative, and one engineering alternative:

- Alternative 1: No Project Alternative
- Alternative 2: Alternate Location – South Alignment
- Alternative 3: Alternate Design – New 48-inch BDPL No. 3X and Improvements to BDPL Nos. 3 and 4

Table 7.1 provides a brief description of these alternatives, highlights how they differ from the proposed project, and lists the impact areas the alternative is intended to address. **Figure 7.1** shows the alignments of Alternatives 2 and 3. Section 7.5 discusses alternatives considered but rejected from further analysis.

TABLE 7.1
SELECTED ALTERNATIVES FOR CEQA ANALYSIS

Alternative / Description	How Does the Alternative Differ from the Proposed Project?	What Project Impacts is the Alternative Intended to Avoid or Minimize?
Alternative 1: No Project – No improvements would be constructed. No action would be taken to protect BDPL Nos. 3 and 4 from rupture during an earthquake on the Hayward fault. Emergency repairs to the pipeline(s) would be conducted as needed to restore operations following an earthquake.	• The new BDPL No. 3X would not be constructed. • There would be no upgrades to BDPL No. 4. • Emergency repairs, if needed, would restore the pipeline, but the alternative would not upgrade existing facilities.	• Included as required by CEQA.
Alternative 2: Alternate Location – South Alignment – The SFPUC would reroute BDPL Nos. 3 and 4 south of and around the intersection of I-680 and Mission Boulevard.	• Both BDPL Nos. 3 and 4 would be replaced. • Pipeline improvements would be constructed south of the SFPUC ROW for BDPL Nos. 3 and 4. • There would be no construction across I-680 on-ramps. • Construction across Mission Boulevard could be accomplished via trenchless construction. • No construction would occur within the riparian corridor of the Agua Fria Creek channel.	• Disruption of a documented archaeological site in the project vicinity • Adverse effects on riparian habitat along Agua Fria Creek. • Traffic conflicts on I-680 on-ramps and Mission Boulevard during construction. • Noise impacts from nighttime construction.
Alternative 3: Alternate Design – New 48-inch BDPL No. 3X and Improvements to BDPL Nos. 3 and 4 – The SFPUC would install a new BDPL No. 3X and make improvements to BDPL Nos. 3 and 4.	• The new BDPL No. 3X would have a smaller diameter. • BDPL No. 3 would remain in service in conjunction with BDPL Nos. 4 and 3X. • A new ball joint and slip joint would be installed in both BDPL No. 3 and No. 4. • The new vault would be shorter and would not be designed to break up in the event of an earthquake, but includes other design features to accommodate fault movement at Trace B of the Hayward fault.	• Noise impacts from nighttime construction.

SOURCE: California Environmental Resources Evaluation System, 2005

Seismic Upgrade of BDPL Nos. 3 and 4 at Hayward Fault

Figure 7.1
Alignments of Alternatives 2 and 3

This section evaluates the comparative merits of the selected alternatives relative to those of the proposed project. Since the alternatives are conceptual, the evaluation is based on the available information and reasonable assumptions about how each alternative would be implemented. For each alternative, this section presents the following:

- A description of the alternative, including associated facility improvements and auxiliary components. Each description includes assumptions regarding the construction methods that would be used and a review of potential feasibility issues.
- Analysis of the environmental impacts of each alternative compared to those of the proposed project.
- Evaluation of the alternative's ability to meet project goals and objectives.

The project objectives and significant environmental impacts of the proposed project are provided below, followed by an analysis of impacts associated with each alternative compared to those of the proposed project.

7.2.1 Project Objectives

As discussed in Section 3.3 of Chapter 3, Project Description, the overall objectives of the proposed project are to reduce the vulnerability of the Bay Division Pipelines (BDPL) Nos. 3 and 4 to earthquake damage and to increase water delivery reliability where these pipelines cross the Hayward fault. Specific objectives are to:

- Reduce the potential effects of a catastrophic failure of BDPL Nos. 3 and 4 where they cross the Hayward fault in order to protect these vital lifelines (Mission Boulevard, I-680, and the new BDPL No. 3X).
- Design the proposed BDPL No. 3X to be functional within 24 hours of a seismic event.
- Deliver basic service to the East/South Bays, Peninsula, and San Francisco within 24 hours of a major earthquake. Basic service is defined as average winter-month usage, and the performance objective for the Bay Division regional system is 229 million gallons per day (mgd). The performance objective is to provide delivery to at least 70 percent of the turnouts (i.e., water-diversion connecting points from the regional system to customers) in each region, with 104, 44, and 81 mgd delivered to the East/South Bays, Peninsula, and San Francisco regions, respectively.
- Design and upgrade facilities to meet average-day demand for the Bay Division regional system of up to 300 mgd within 30 days of a major earthquake.

7.2.2 Overview of the Project's Potentially Significant and Significant Impacts

As described in detail in Chapter 5, Environmental Setting and Impacts, of this EIR, implementation of the project would result in potentially significant or significant impacts on the following resources (before mitigation):

- **Land Use and Land Use Planning:** Significant and unavoidable impacts on the existing land use character of the project vicinity related to noise from increased traffic on detour routes, daytime construction and haul and delivery truck noise during the 27-month construction period, and nighttime noise and vibration from construction on approximately 17 nights over 11 months.

- **Aesthetics:** Impacts to scenic vistas, scenic resources, or the visual character of the surroundings as a result of visibility of construction sites and disturbance of construction areas.

- **Cultural Resources:** Permanent impacts on documented archaeological site in the project vicinity likely to contain archaeological resources. Impacts on archaeological and paleontological resources caused by earthmoving activities in an area of high archaeological sensitivity and in geological formations characterized as having a high potential to yield paleontological resources.

- **Transportation and Circulation:** Temporary increases in traffic volumes along detour routes (if the Mission Boulevard and I-680 on-ramp closures were to remain in place past prescribed times). Temporary hazards for bicyclists and pedestrians, and impaired emergency access during construction.

- **Noise:** Significant and unavoidable impacts due to construction and haul and delivery truck noise; traffic noise along detour routes at night; nighttime and Sunday construction outside the local ordinance time limits; and disturbance due to temporary construction-related vibration at night. Significant impacts related to construction-related vibration during the daytime.

- **Air Quality:** Violation of air quality standards and emissions of fugitive dust. Significant and unavoidable impacts related to combustion emissions during construction and construction-related emissions of diesel particulate matter under the draft 2009 Bay Area Air Quality Management District (BAAQMD) Guidelines (see Section 5.7, Air Quality, for a discussion of these guidelines).

- **Utilities and Service Systems:** Temporary damage to or disruption of utilities during relocation or protection of conflicting utilities during construction. Adverse effects associated with compliance with the solid waste diversion goals established by the California Integrated Waste Management Act and City of Fremont, unless waste diversion measures such as source reduction, recycling, and composting are implemented.

- **Biological Resources:** Impacts on jurisdictional waters of the United States and Central Coast riparian scrub along Agua Fria Creek. Potential impacts related to mortality or habitat loss for special-status animal species that could occur within the project area, and potential impacts on riparian and/or aquatic resources from treated water discharges. Removal of up to 44 trees protected under the City of Fremont Tree Protection Ordinance.

- **Geology and Soils:** Potential impacts related to long-term soil erosion.

- **Hydrology and Water Quality:** Potential water quality impacts related to erosion or a release of hazardous materials during construction, water quality effects from discharges of groundwater produced during dewatering, and potential flooding effects from discharges of groundwater and approximately 6.2 million gallons of treated water during construction.

- **Hazards and Hazardous Materials:** Potential exposure of workers, the public, and the environment to contaminated soil during project construction and the potential to interfere with an adopted emergency response plan or emergency evacuation plan. Potential release of hazardous materials from construction equipment.

Mitigation measures identified in Chapter 5 of this EIR would reduce all but eight of the potentially significant or significant impacts listed above to a less-than-significant level. Of the significant impacts listed in this EIR, eight impacts are identified as *significant and unavoidable* for the project as proposed:

- Land use disruptions and changes in the character of the existing vicinity due to construction noise associated with heavy equipment and haul and delivery truck traffic as well as noise associated with increased traffic on detour routes and temporary nighttime construction noise and vibration (Impact LU-1)
- Construction noise associated with heavy equipment (Impact NO-1)
- Noncompliance with Fremont Municipal Code time limits due to nighttime and occasional Sunday construction activities (Impact NO-2)
- Temporary noise disturbance due to haul and delivery traffic during the day as well as nighttime deliveries, and along detour routes due to nighttime road closures (Impact NO-3)
- Disturbance due to temporary construction-related vibration during the nighttime (Impact NO-4)
- Construction-related combustion emissions of criteria pollutants (Impact AQ-1)
- Construction-related emissions of diesel particulate matter (Impact AQ-2)

Mitigation measures would reduce construction noise adjacent to receptors, but noise levels would exceed the speech interference criterion at houses within 50 feet of construction activities even after implementation of mitigation measures, resulting in a significant and unavoidable impact related to noise and land use disruption (Impacts LU-1 and NO-1). Further, nighttime noise levels could exceed the sleep interference criterion at nearby residences. Impacts related to compliance with the Fremont Municipal Code are significant because some construction activities would take place at night (approximately 17 times over 11 months during installation and removal of the temporary bridges on Mission Boulevard and the I-680 on-ramps), and construction would occasionally occur on Sundays, a significant and unavoidable impact (Impact NO-2). Noise from haul and truck traffic would increase noise levels above ambient noise at nearby receptors, and noise from nighttime deliveries and increased traffic along detour routes during the nighttime hours in residential neighborhoods would exceed the sleep interference criterion. However, the feasibility of mitigation measures to reduce haul and delivery truck noise impacts is uncertain and there is no feasible alternative detour route that would avoid residential neighborhoods, resulting in significant and unavoidable impacts related to noise and land use disruption (Impacts LU-1 and NO-3). Mitigation measures would require the SFPUC and its contractor to restrict vibrations at nearby residences, but these measures do not guarantee that nighttime vibration levels would remain below the annoyance threshold at night (Impact NO-4), resulting in a significant and unavoidable impact. Implementation of mitigation measures would reduce emissions from construction equipment exhaust. However, mitigated nitrogen oxide (NO_X) levels would still remain above the Bay Area Air Quality Management District's (BAAQMD's) draft significance threshold for NO_X, resulting in a significant and unavoidable impact (Impact AQ-1). Depending on the final BAAQMD guidelines, construction-related emissions of diesel particulate matter may also result in significant and unavoidable impacts (Impact AQ-2).

As discussed below, the selected alternatives would reduce or avoid at least one of the potentially significant or significant environmental impacts associated with the project as proposed.

7.2.3 Alternative 1: No Project

7.2.3.1 Description

CEQA Guidelines Section 15126.6(e)(3)(B) describes the "No Project" Alternative as the circumstance under which the proposed project does not proceed. Consideration of the No Project Alternative is required under Section 15126(f) of the CEQA Guidelines. The purpose of describing and analyzing a No Project Alternative is to allow decision-makers to compare the impacts of approving the proposed project with the impacts of not approving the proposed project (CEQA Guidelines Section 15126.6[e][1]).

The No Project Alternative includes those activities that would reasonably be expected to occur in the foreseeable future if the proposed project were not approved. These activities include the following:

- Continued operation and maintenance of BDPL Nos. 3 and 4 as they are currently operated and maintained, including storage of emergency pipelines in the project vicinity
- Emergency repairs to BDPL No. 3 and/or No. 4 in the event of a pipeline failure resulting from a major earthquake or other unforeseeable event

The No Project Alternative would not include seismic upgrades to minimize the vulnerability of the existing BDPL Nos. 3 and 4 from the threat of a major earthquake. The U.S. Geological Survey estimates that there is a 63 percent probability of a strong earthquake (magnitude 6.7 or higher) occurring in the San Francisco Bay Area in the 30-year period between 2003 and 2032, with a 31 percent chance of such an earthquake within the Rodgers Creek–Hayward fault system (WGCEP, 2008). In their current condition, for a magnitude 6.9 earthquake on the Hayward fault, BDPL No. 3 has a 94 percent chance of rupture, and BDPL No. 4 has a 91 percent chance of rupture (G&E Engineering, 2006b).

Construction in 2007 of the North and South Shutoff Stations on either side of the Hayward fault allows the SFPUC to shut down both BDPL Nos. 3 and 4 should they fail, which would substantially reduce the physical damage from pipeline breakage. However, without additional improvements, a rupture of one or both of these pipelines is expected to release about 18 million gallons of water for about 30 to 60 minutes at a maximum release rate of about 300,000 gallons per minute (gpm). This release of water could cause localized flooding, damage to adjacent infrastructure and residences, and public safety hazards, and breakage of the pipelines would also disrupt water deliveries to downstream SFPUC customers in the East and South Bays, the Peninsula, and San Francisco (G&E Engineering, 2006a).

Emergency pipeline repairs would require approximately 60 days for construction of a temporary pipe over Mission Boulevard, and an additional four to six months for construction activities associated with permanent repairs to one of the existing pipelines. In the absence of a major earthquake along the Hayward fault, future operations and maintenance under the No Project Alternative would be the same as under existing conditions. Normal maintenance activities include resetting the existing slip joints at Trace B every few years. There are no feasibility issues or constraints associated with this alternative, other than the increasing risks associated with potential pipeline failure. The No Project Alternative would not achieve any of the project objectives.

7.2.3.2 Impact Analysis

The potential impacts of the No Project Alternative are discussed below and summarized in **Table 7.2**.

Land Use and Land Use Planning

Absent a pipeline rupture, the No Project Alternative would not result in any land use changes or land use impacts, as there would be no construction or change of use along the BDPL Nos. 3 and 4 pipeline alignments.

However, in the probable event of a major earthquake resulting in pipeline failure in the next 30 years, temporary impacts on the existing character of the vicinity and disruption of existing land uses would occur during construction of emergency repairs to the BDPL Nos. 3 and 4 and surrounding infrastructure due to traffic, air quality, and noise effects. These effects would likely occur only in the immediate vicinity of the pipeline rupture. Although the extent of the construction corridor is unknown, repairs are estimated to include construction over a 0.5-mile segment of the right-of-way (ROW), and over a shorter construction period (8 months vs. 27 months). However, the effects would likely be more intense because emergency repairs would require 24-hour construction, including traffic and noise effects during the nighttime over the entire 6- to 8-month construction period, as opposed to the approximately 17 times that nighttime construction would be required over 11 months under the project as proposed. Overall, impacts on disruption of land use would be greater than under the proposed project if the pipelines ruptured because of the traffic and noise effects related to 24 hour construction over the 6 to 8-month construction period.

TABLE 7.2
COMPARISON OF THE ENVIRONMENTAL IMPACTS OF THE CEQA ALTERNATIVES

Parameter	Proposed Project	Alternative 1: No Project Alternative	Alternative 2: Alternate Location – South Alignment	Alternative 3: Alternate Design – New 48-inch BDPL No. 3X and Improvements to BDPL Nos. 3 and 4
Construction Character				
Length of construction corridor	0.5 mile	**Similar** Unknown (depends on severity of break)	**Increased** 1.5 miles	**Same** 0.5 mile
Construction duration	27 months	**Decreased** 6 to 8 months	**Increased** 36 months	**Similar** 27 months
Land Use and Land Use Planning				
Disruption of residential land uses	0.5 mile	**Increased** Unknown, but in the event of an emergency, would result in greater impacts due to nighttime construction	**Decreased** Less nighttime construction and detours **Increased** 1.2 miles of residential land uses	**Decreased** Same construction area, but less nighttime construction and detours
Aesthetics				
Effects on visual character	Temporary effects on visual character during construction	**Increased** Rupture would cause flooding, erosion, and damage to scenic roadways, which would have adverse effects on the visual character of the vicinity 24-hour construction could require lighting within the ROW over the entire 8-month construction period	**Similar** Temporary effects on visual character during construction	**Similar** Construction would be similar in nature to the proposed project and would utilize the same project area
Cultural Resources				
Effects on cultural resources	Disruption of one documented archaeological site likely containing archaeological resources in addition to potential disruption of previously unidentified archaeological and paleontological resources	**Increased** Rupture of both pipelines and construction of emergency repairs could adversely affect documented archaeological site, potentially destroying archaeological and paleontological resources that would otherwise be recovered	**Decreased** Could avoid documented archaeological site, but within area of high archeological and paleontological sensitivity	**Similar** Construction would occur within the same area, with similar impacts to the documented archaeological site and would also have the potential to disrupt previously unidentified archaeological and paleontological resources

TABLE 7.2 (Continued)
COMPARISON OF THE ENVIRONMENTAL IMPACTS OF THE CEQA ALTERNATIVES

Parameter	Proposed Project	Alternative 1: No Project Alternative	Alternative 2: Alternate Location – South Alignment	Alternative 3: Alternate Design – New 48-inch BDPL No. 3X and Improvements to BDPL Nos. 3 and 4
Transportation and Circulation				
Roadway conflicts	Temporary and intermittent disruption/closure of Mission Boulevard and I-680 on-ramps on approximately 17 nights over approximately 11-months	**Increased** Disruption of Mission Boulevard due to construction of emergency pipeline over roadway Potential damage to I-680 and Mission Boulevard as a result of pipeline rupture Increased use of local streets over a longer period of time if Mission Boulevard is impassible	**Decreased** Avoids conflicts with I-680 and Mission Boulevard **Increased** Use of both lanes of traffic by construction vehicles in one direction on Paseo Padre Parkway and East Warren Avenue along the segment undergoing construction	**Decreased** Fewer nighttime detours required **Increased** Traffic would be disrupted on Mission Boulevard daily for 12 weeks Traffic would utilize alternative access to northbound I-680 for up to 15 weeks
Noise				
Noise conflicts	Disruption to sensitive receptors along 0.5-mile residential corridor; noise levels in excess of speech interference criterion at residences for more than two weeks Intermittent and short-term nighttime construction activities conflict with local noise ordinance	**Increased** Higher noise levels in the absence of noise controls In the event of emergency repairs, 24-hour construction likely required over 6- to 8-month construction period, including weekends Increased traffic on local streets over a longer period of time if Mission Boulevard is impassible in the event of emergency repairs	**Decreased** Reduced nighttime construction No nighttime detours **Increased** Disruption to sensitive receptors along longer (1.2 miles) residential corridor	**Decreased** Reduced nighttime construction Fewer nighttime detours **Similar** Disruption to sensitive receptors along 0.5-mile residential corridor
Air Quality				
Air pollutant emissions	Emissions along 0.5-mile corridor over a 27-month construction period	**Decreased** Emissions along less than 0.5-mile corridor, over a 6- to 8-month construction period	**Increased** Emissions along 1.5-mile corridor over a 36-month construction period	**Similar** Emissions along 0.5-mile corridor over a 27-month construction period

TABLE 7.2 (Continued)
COMPARISON OF THE ENVIRONMENTAL IMPACTS OF THE CEQA ALTERNATIVES

Parameter	Proposed Project	Alternative 1: No Project Alternative	Alternative 2: Alternate Location – South Alignment	Alternative 3: Alternate Design – New 48-inch BDPL No. 3X and Improvements to BDPL Nos. 3 and 4
Utilities and Service Systems				
Disruption of utilities	Potential disruption along 0.5-mile corridor	**Increased** Increased potential for accidental damage to utilities due to pipeline rupture and therefore, increased potential for disruption of utility service	**Similar** Potential disruption along 1.5-mile corridor	**Similar** Potential disruption along the same 0.5-mile corridor
Generation of construction-related waste	Approximately 28,500 cubic yards of soil would require offsite reuse or disposal	**Increased** Unknown, but potentially greater if both pipelines were to rupture and because damage would occur to larger area	**Increased** More than 3 times greater volume than project. Would include asphalt from location along a street alignment	**Decreased** This alternative would generate less spoils because a smaller vault would be constructed, and construction of the new pipeline would utilize all three corrugated-metal pipe segments rather than just two
Biological Resources				
Creek crossings and riparian habitat disruption	One creek crossing where the creek is contained in its natural bed Construction in riparian habitat along Agua Fria Creek	**Decreased** Rupture of the pipelines would not likely affect riparian habitat along Agua Fria Creek in the project area. **Unknown** Pipeline rupture could impact riparian habitat along Agua Fria Creek and Agua Caliente Creek from flooding downstream of the project area.	**Decreased** Two creek crossings where the creeks are contained in culverts beneath the street	**Similar** As for the proposed project, the new pipeline could cross Agua Fria Creek, using either trenchless or open-cut excavation methods
Impacts on riparian habitat and aquatic resources from discharges of chloraminated water	Discharge of approximately 6.2 million gallons of dechlorinated water to Agua Fria Creek where it is contained in its natural channel	**Similar** Approximate volume unknown, but would likely be similar to the proposed project. Discharge location would be the same	**Decreased** Approximately 3 times greater volume than project, but discharge could be made to a culverted section of creek. One time discharge from abandoned pipelines would also be needed	**Similar** Approximately the same length of pipelines would require discharges for pipeline draining and disinfection and the discharge location would be the same

TABLE 7.2 (Continued)
COMPARISON OF THE ENVIRONMENTAL IMPACTS OF THE CEQA ALTERNATIVES

Parameter	Proposed Project	Alternative 1: No Project Alternative	Alternative 2: Alternate Location – South Alignment	Alternative 3: Alternate Design – New 48-inch BDPL No. 3X and Improvements to BDPL Nos. 3 and 4
Biological Resources (cont.)				
Special status species	Special status species affected in the riparian corridor of Agua Fria Creek, as well as in other portions of the project area	**Decreased** If pipeline rupture avoids Agua Fria Creek, special status species in the riparian corridor would be avoided	**Decreased** Special status species in the riparian corridor would be avoided	**Similar** Construction would be similar in nature to the proposed project and would utilize the same project area
Tree removal	Up to 44 trees subject to the Fremont Tree Ordinance removed	**Similar** Unknown, but likely fewer trees would be removed	**Similar** Unknown, but impacts would be similar and trees would be replaced in accordance with City of Fremont requirements	**Similar** Construction would utilize the same project area and would likely include removal and replacement of a similar number of trees
Geology and Soils				
Soil erosion and loss of topsoil	Soil disturbance throughout the 29-acre project area	**Similar** In the event of emergency repairs, soil disturbance would occur throughout the project area,	**Similar** Although soil disturbance would occur in a larger area, the pipeline corridor would be in the street (paved)	**Similar** Soil disturbance throughout the project area and the size of the project area would be the same
Hydrology and Water Quality				
Construction-related erosion and release of hazardous materials	Excavation along a 0.5-mile unpaved corridor. Soil disturbance throughout the project area and soil stockpiling could result in erosion-related water quality impacts	**Increased** Unknown, but erosion would occur during the emergency repair period and as a result of pipeline rupture	**Increased** Excavation along a 1.5-mile street corridor and soil stockpiling could result in erosion-related water quality impacts	**Similar** Construction would be similar in nature to the proposed project and would utilize the same project area
Discharge of chloraminated water due to pipeline breakage	Discharge of up to 10 million gallons	**Increased** Potential for discharge of up to 18 million gallons	**Unknown** Amount of discharge is unknown although project design would try to minimize impact using design features to withstand rupture at the fault traces	**Unknown** Amount of discharge is unknown although project design would try to minimize impact using design features to withstand rupture at the fault traces

TABLE 7.2 (Continued)
COMPARISON OF THE ENVIRONMENTAL IMPACTS OF THE CEQA ALTERNATIVES

Parameter	Proposed Project	Alternative 1: No Project Alternative	Alternative 2: Alternate Location – South Alignment	Alternative 3: Alternate Design – New 48-inch BDPL No. 3X and Improvements to BDPL Nos. 3 and 4
Hydrology and Water Quality (cont.)				
One-time discharges of treated chloraminated water for draining and disinfection of pipelines	Discharge of approximately 6.2 million gallons of dechlorinated water to receiving water	**Unknown** Approximate volume unknown, but would likely be less than proposed project	**Increased** Approximately 3 times greater volume than project. Abandoned pipelines would also need draining	**Similar** Approximately the same length of pipelines would require discharges for pipeline draining and disinfection
Hazards and Hazardous Materials				
Potential to encounter hazardous materials in soil or groundwater	Low potential to encounter hazardous materials because pipeline route is adjacent to residential areas	**Similar** Emergency repairs would be constructed in similar area as proposed project	**Similar** Pipeline route would be adjacent to residential uses only and follow a street corridor	**Similar** Construction would be similar in nature to the proposed project and would utilize the same project area
Potential to disrupt emergency response	Emergency response could be disrupted during intermittent and temporary closure of Mission Boulevard and I-680 on-ramps for approximately 17 nights over approximately 11-months	**Increased** Emergency response would be disrupted longer if rupture of the pipeline(s) damaged Mission Boulevard or I-680. Damage to these roadways could also interfere with delivery of emergency response services needed as a result of the earthquake that caused the damage	**Similar** Emergency response partially disrupted by use of both traffic lanes in one direction at the segment undergoing construction on Paseo Padre Parkway and East Warren Avenue. Although traffic flow would be maintained on other side of medium, disruption would occur for longer than under the proposed project (daily for 36 months vs 17 evenings over 11 months).	**Increased** Emergency response could be disrupted on Mission Boulevard daily for 12 weeks Emergency response vehicles would utilize the alternative left-turn access to northbound I-680 provided under this alternative for up to 15 weeks

Aesthetics

This alternative would not directly result in any changes to the existing visual environment because no new facilities would be constructed, nor would any improvements to the existing facilities be implemented. However, in the event of a pipeline rupture as well as during emergency repairs, impacts on the visual character of the surroundings could result from localized flooding, erosion, possible damage to Mission Boulevard and I-680 (designated scenic routes), and damage to trees and vegetation that would not occur under the proposed project. In addition, 24-hour construction could require the use of lighting within the ROW over the entire 8-month construction period as opposed to the 17 times that nighttime construction would be required over 11 months under the project as proposed. Overall, impacts on visual resources would be more severe relative to those of the proposed project because of the extent of damage that could occur in the event of a pipeline rupture and because nighttime lighting throughout the construction period could create a new source of light and glare adjacent to residences.

Cultural Resources

In the absence of a pipeline failure, this alternative would avoid construction of new facilities within the area of the documented archaeological site. However, in the probable event of a major earthquake in the next 30 years, damage to the existing BDPL Nos. 3 and 4 could result in damage or destruction to documented or previously unidentified archaeological and paleontological resources in this highly sensitive area. Emergency repairs and construction of replacement facilities could result in further destruction of these resources, particularly if emergency construction activities were performed within the limits of the known archaeological site. Depending on the extent of erosion due to a pipeline rupture, the archaeological resources would be permanently lost, unlike the proposed project, which would include recovery and recording of archaeological resources within the documented site as well as of any previously unidentified archaeological and paleontological resources. Thus, this alternative could result in more severe impacts relative to those of the proposed project after a severe seismic event.

Transportation and Circulation

In the absence of a pipeline failure, this alternative would not result in any increases in traffic in the project area compared to existing conditions. However, if the existing BDPL Nos. 3 and 4 were damaged during a seismic event, they would likely rupture at Trace B of the Hayward fault in the vicinity of Mission Boulevard, requiring placement of an aboveground pipeline over Mission Boulevard for up to eight months and potentially disrupting traffic on this busy roadway. Increased traffic congestion and hazards could also result from localized flooding in the vicinity of Mission Boulevard and I-680 and possible damage to these roadways. The complete extent of damage that would occur if the pipelines ruptured is not certain. However, such damage would occur suddenly upon rupture of the pipelines, and could completely close one or both roadways or on-ramps for an indefinite period, resulting in long-term detours to neighborhood streets for 24-hours per day. The sudden nature of the damage would not allow for the orderly management of traffic on Mission Boulevard and the I-680 northbound on-ramps that would occur under the proposed project approximately 17 times over 11 months when the temporary bridges are being installed and removed. These potential effects would represent an overall increase in traffic and circulation impacts under the No Project Alternative relative to those of the proposed project.

Noise

In the absence of a pipeline failure, this alternative would not result in any changes in the existing noise environment. However, emergency repairs in the event of a pipeline failure could require up to eight months. Although the construction period for emergency repairs is shorter than that for the proposed project (6 to 8 months vs. 27 months), emergency repairs would likely require 24-hour construction throughout the duration of construction activities to restore water service, resulting in impacts related to conflicts with local ordinance time limits. Further, nighttime and weekend construction could occur for longer periods than under the proposed project, representing greater impacts than those of the proposed project. Due to the immediate need for the repairs, emergency repairs would not include the same noise controls specified for the proposed project and could result in greater noise impacts to sensitive receptors.

If damage resulting from the rupture completely closed I-680, Mission Boulevard, or the on-ramps, traffic would need to use local streets for an indefinite period, resulting in long-term detours and increases in noise on neighborhood streets for 24-hours per day, rather than the nine times that would occur during the evening over the 11 months when the temporary bridges are installed and removed on Mission Boulevard under the proposed project. Overall, impacts related to noise and vibration would be more severe than those of the proposed project.

Air Quality

In the absence of a pipeline failure, this alternative would not result in increases in criteria pollutants, diesel particulate matter, or greenhouse gas (GHG) emissions over current levels. In the event that emergency repairs are required, they would be conducted over a shorter period than improvements under the proposed project (6 to 8 months vs. 27 months). Although the intensity of construction would be greater under the No Project Alternative because of the 24-hour construction, overall there would be fewer emissions of these pollutants. Potential impacts related to air quality and GHG emissions would be less relative to those of the proposed project, although impacts related to construction-related combustion emissions and diesel particulate matter could remain significant and unavoidable if the construction-related emissions are above BAAQMD thresholds when adopted (see Section 5.7, Air Quality, for a discussion of proposed BAAQMD thresholds).

Utilities and Service Systems

In the absence of a pipeline rupture, the No Project Alternative would not result in the construction of new facilities or facility upgrades and would not affect public utilities or service systems. However, in the event of a pipeline rupture, discharges from the ruptured pipeline(s) could damage adjacent utilities, necessitating emergency repair of those facilities in addition to BDPL Nos. 3 and 4. Adjacent utilities could also be damaged or require relocation during emergency repairs to BDPL Nos. 3 and 4 and the construction of replacement facilities. This damage would not occur under the proposed project because conflicting utilities would either be relocated or protected prior to construction in accordance with agreements with the utility owners, and improvements would be made to BDPL No. 4 to control where breakage would occur and ensure flow is diverted to the storm sewer system in such a way as to avoid damage to the new BDPL No. 3X and surrounding utilities. Further, the proposed project includes mitigation measures to avoid service disruptions during relocation or replacement of utilities. Because a pipeline rupture could result in severe damage to public utilities under the No Project Alternative, substantial interruption of service could occur before emergency repairs are constructed, and impacts related to utilities and service systems would be more severe than those of the proposed project.

Emergency repairs under this alternative could produce a greater amount of excavated soil for offsite disposal if both pipelines require replacement between the shutoff stations, and could also produce more construction debris and materials (such as asphalt and concrete) than the proposed project because a rupture of the pipelines could damage a greater area. Under the proposed project, a waste management plan would be required, with 100 percent of asphalt and concrete and 50 percent of other debris diverted from landfills for reuse or recycling. The No Project Alternative would have unknown impacts associated with compliance with the solid waste diversion goals established by the California Integrated Waste Management Act and City of Fremont because a larger amount of construction-related waste could be produced than under the proposed project, and the amount of waste that would be reused or otherwise diverted from landfills is uncertain. Depending on the amount of waste diverted from landfills, this alternative could result in impacts associated with the compliance with the solid waste diversion goals established by the California Integrated Waste Management Act; therefore, impacts related to compliance with waste statutes could be greater than those of the proposed project.

Biological Resources

In the absence of a pipeline break, this alternative would not result in any impacts on biological resources. However, rupture of BDPL Nos. 3 and 4 could result in adverse impacts on special-status species and/or their habitat as a result of localized flooding or the discharge of up to 18 million gallons of chloraminated water to Agua Fria and Agua Caliente Creeks either directly or via the stormwater collection system, as discussed below under the heading Hydrology and Water Quality.

Central Coast riparian scrub habitat along the Agua Fria Creek corridor and associated special-status species would not likely be affected, because this creek is not located near any of the three fault traces. Although the volume of treated water discharged to Agua Fria Creek for pipeline disinfection is unknown, impacts to riparian habitat and aquatic resources in Agua Fria Creek would be similar because the water would be discharged at the same location as the proposed project. In addition, the No Project Alternative would likely require the removal of fewer trees than the proposed project.

Overall, the No Project Alternative would have fewer impacts on biological resources than the proposed project because it could avoid impacts on Central Coast riparian scrub habitat and associated special-status species, and because this alternative would likely require the removal of fewer trees.

Geology and Soils

In the absence of a pipeline rupture, the No Project Alternative would not result in the construction of new facilities or facility upgrades and would not have any impacts related to geology and soils.

However, if the proposed project is not implemented, BDPL No. 3 and/or No. 4 could rupture due to surface fault rupture. If emergency repairs included replacement of the pipeline(s) between the North and South Shutoff Stations, the 0.5-mile segment of ROW that would be disturbed during construction of the proposed project would also be disturbed. Further, construction of repairs would not likely involve the construction of new slopes that would experience long-term erosion. Overall, impacts related to erosion would be similar to those of the proposed project.

Hydrology and Water Quality

In the absence of a pipeline rupture, the No Project Alternative would not result in the construction of new facilities or facility upgrades and would not have any construction-related impacts on hydrology or water quality.

A large magnitude earthquake resulting in the rupture of BDPL Nos. 3 and 4 is expected to release up to 300,000 gpm of chloraminated water for 30 to 60 minutes (up to 18 million gallons) until SFPUC operators are able to close the north and south shutoff valves to stop the flow.[1] This alternative would result in the discharge of a larger volume of chloraminated water to Agua Fria and Agua Caliente Creeks, either directly or via the stormwater collection system, compared to the proposed project (18 vs. 10 million gallons of a controlled release), causing localized flooding and erosion. This discharge could also include debris and hazardous substances, adversely affecting water quality.

Erosion due to the lack of adequate best management practices (BMPs) could also degrade water quality during the emergency repairs. If emergency repairs included replacement of the pipeline(s) between the North and South Shutoff Stations, the 0.5-mile segment of ROW that would be disturbed during construction of the proposed project would also be disturbed. Although the project areas could be similar, the No Project Alternative could result in greater impacts related to the degradation of water quality because substantial erosion and flooding could occur in the event of a pipeline break.

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[1] Under the proposed project, BDPL No. 3 would be designed to withstand the maximum fault offset that is reasonably expected to occur at the Hayward fault. Only BDPL No. 4 is expected to rupture under the proposed project. Without the proposed improvements, both pipelines would be expected to rupture, resulting in greater flows and associated flooding and physical damage.

In addition, the emergency pipeline constructed across Mission Boulevard and the repaired pipeline(s) would require disinfection (prior to being brought back on line) and an associated discharge of treated water to Agua Fria or Agua Caliente Creek. The volume of this discharge is not known and would depend on whether one or both pipelines required repair, but would likely be less than that of the proposed project, which would require disinfection of BDPL Nos. 3 and 4 after the wyes and valves are installed at the points of connection, and BDPL No. 3X prior to putting this pipeline into service.

Hazards and Hazardous Materials

In the absence of a pipeline rupture, the No Project Alternative would not require any changes in the use of hazardous materials and would not have any impacts related to hazards and hazardous materials.

If a pipeline rupture were to occur, the environment, construction workers, and the general public could be exposed to hazardous materials in the soil, if present, during repairs to the pipelines. This impact would be similar for both the proposed project and the No Project Alternative.

Both I-680 and Mission Boulevard could be damaged from a pipeline rupture, resulting in interference with an adopted emergency response plan or emergency evacuation plan. The complete extent of damage that would occur if the pipelines ruptured is not certain. However, such damage would occur suddenly upon rupture of the pipelines, and could completely close one or both roadways or on-ramps for an indefinite period, resulting in long-term detours to neighborhood streets for 24 hours per day. The sudden nature of the damage would not allow for the orderly management of traffic on Mission Boulevard and the I-680 northbound on-ramps that would occur under the proposed project approximately 17 times during the 11 months that the temporary bridges are installed and removed on Mission Boulevard and the I-680 on-ramps. Because emergency services, and potentially emergency evacuation, could be necessary in the event of a major earthquake on the Hayward fault, and the No Project Alternative could result in indefinite closure of I-680 and/or Mission Boulevard, this impact would be much greater than that of the proposed project.

7.2.3.3 Conclusions

In the absence of a major earthquake along the Hayward fault, No Project Alternative would avoid both the potentially significant and significant but mitigable impacts that would occur with the proposed project. These impacts are related to: land use and land use planning; aesthetics; cultural resources; transportation and circulation; noise; air quality; utilities and service systems; biological resources; geology and soils, hydrology and water quality; and hazards and hazardous materials. Under normal circumstances, the No Project Alternative would also avoid the significant and unavoidable impacts related to daytime noise from heavy equipment use and haul and delivery truck traffic, noise from nighttime construction and deliveries, nighttime and Sunday construction outside the local ordinance time limits, increased noise on the detour routes, and disturbance due to temporary construction-related vibration at night. However, the No Project Alternative would fail to meet any of the project objectives.

In the probable event that BDPL Nos. 3 and 4 do rupture during a seismic event, the No Project Alternative would likely result in greater impacts than the proposed project and the pipeline repairs would be conducted on an emergency basis. Flooding could result in greater impacts related to land use disruption, visual resources, erosion, and damage to utilities (including service disruption). Such flooding could also damage I-680 and Mission Boulevard, potentially resulting in long-term disruption of traffic, use of local streets, and interference with emergency response activities while repairs to these roadways are under construction. If both pipelines ruptured, there would also be a greater volume of chloraminated water discharged to Agua Fria and Agua Caliente Creeks and a larger volume of construction-related waste. Rupture of the pipeline(s) could also irreversibly destroy known archaeological resources and previously unidentified archaeological and paleontological resources that would otherwise be recovered under the proposed project. Although the construction period would be shorter under the No Project Alternative, repairs would likely require 24-hour and weekend construction, resulting in greater noise-related impacts on nearby residences than under the proposed project. Potential impacts related to tree removal, air quality, biological resources, discharges of treated water, soil erosion and loss of top soil, and exposure to hazardous materials in soil would be less than or similar to those of the proposed project.

The No Project Alternative would not meet any of the project objectives, and would not be consistent with the Wholesale Regional Water System Security and Reliability Act (also known as Assembly Bill 1823), which includes the proposed project as one of the specific projects to be included in the WSIP (see Chapter 2, Introduction and Background). Overall, the No Project Alternative would likely result in greater environmental impacts than would the proposed project due to the high probability of pipeline failure caused by an earthquake on the Hayward fault.

7.2.4 Alternative 2: Alternate Location – South Alignment

7.2.4.1 Description

The Alternate Location – South Alignment alternative differs from the proposed project in that both BDPL No. 3 and No. 4 would be rerouted south of and around the intersection of I-680 and Mission Boulevard to the east. This alternative includes the abandonment of the existing BDPL Nos. 3 and 4 between the North and South Shutoff Stations once the new BDPL Nos. 3 and 4 become operational.

The Alternate Location – South Alignment alternative would reroute BDPL Nos. 3 and 4 within existing roadways south of the intersection of I-680 and Mission Boulevard in an attempt to avoid impacts on a documented archaeological site and reduce traffic impacts on the I-680 on-ramps and Mission Boulevard. Starting at a new north shutoff station, which would be built in the ROW north of Paseo Padre Parkway, the new BDPL Nos. 3 and 4 would be routed south along Paseo Padre Parkway to East Warren Avenue and then west along East Warren Avenue and below the I-680 overpass to the existing SFPUC ROW of BDPL Nos. 3 and 4 at East Warren Avenue, immediately west of Bradley Street (see Figure 7.1). A new south shutoff station would be constructed near East Warren Avenue and Bradley Street to connect the new pipeline to existing facilities. The new BDPL Nos. 3 and 4 would each have a total length of approximately 1.5 miles. The pipelines would be constructed using open-trench excavation along most of the pipeline route, except where trenchless construction could be used to cross roadways or the culverts where Agua Fria and Agua Caliente Creeks would cross the alignment. To facilitate construction of both pipelines, the trench could be as wide as 30 feet, which would occupy both lanes of traffic in one direction on Paseo Padre Parkway and East Warren Avenue.

As with the proposed project, the new BDPL Nos. 3 and 4 would be designed to withstand fault movement at the Hayward fault trace crossings. Additional vaults and/or improvements would be made at the fault traces along East Warren Avenue/Paseo Padre Parkway, in the vicinity of I-680. Although this alternate alignment would cross Mission Boulevard at Paseo Padre Parkway, it would not cross a fault trace at this location, and the pipeline would likely be constructed using trenchless methods, thus avoiding traffic disruptions on Mission Boulevard.

Potential feasibility and constraints associated with the Alternate Location – South Alignment alternative are related to the need to perform work outside of the existing SFPUC ROW. The SFPUC would need to acquire additional easements and ROWs for the BDPL Nos. 3 and 4 alignments and encroachment permits from the City of Fremont for construction within local roadways. In addition, due to the length of the new pipelines and the associated construction corridor under this alternative (approximately 1.5 miles) compared to the length of the construction corridor under the proposed project (0.5 mile), this alternative would involve considerably more construction within local roadways, thereby increasing the likelihood for conflicts with local traffic and circulation patterns and impacts on sensitive receptors during construction. Because the pipeline would be longer under this alternative, the overall duration of construction activities would be greater, possibly up to three years. Nighttime construction could be required for construction of the new shutoff stations and improvements to the pipelines at the fault crossings, but would likely occur less frequently than under the proposed project (approximately 10 nights compared to approximately 17 nights).

7.2.4.2 Impact Analysis

Land Use and Land Use Planning

Potential impacts on land use under the Alternate Location – South Alignment alternative would be longer in duration than that of the proposed project, and approximately 1.2 miles of the construction corridor would be within roadways bordered by residential land uses compared to 0.5 mile under the proposed project. Although this alternative would reduce the significant and unavoidable land use impacts that would occur under the proposed project related to construction equipment noise and noise from haul and delivery trucks, noise from nighttime construction and deliveries (approximately 17 times over 11 months), noise from increased nighttime traffic on detour routes in residential areas (nine times over 11 months), and annoyance from temporary nighttime vibration (approximately 17 times over 11 months), impacts associated with the temporary disruption of land uses and changes to the character of the project vicinity would be greater under this alternative than those of the proposed project because of the greater number of residences that would be affected during construction. Thus, land use impacts during construction would be greater than those of the proposed project and remain significant and unavoidable.

Aesthetics

This alternative would avoid construction within Mission Boulevard and the scenic viewshed of the Fremont Hills and would be less visible from I-680 and Mission Boulevard, but would involve construction along the entire portion of Paseo Padre Parkway between Mission Boulevard and I-680 (south of Mission Boulevard), a county-designated scenic route. Thus, temporary visual impacts during construction would be similar to those of the proposed project and could be mitigated to a less-than-significant level.

Cultural Resources

The South Alignment alternative would avoid impacts on the documented archaeological site, but would be constructed in an area of high archaeological and paleontological sensitivity and could potentially encounter previously unidentified archaeological resources, resulting in impacts on these resources. Impacts on cultural and paleontological resources would be less than those of the proposed project because the documented site could be avoided, but previously unidentified archaeological and paleontological resources could still potentially be encountered.

Transportation and Circulation

The Alternate Location – South Alignment alternative would avoid conflicts with use of the I-680 on-ramps and Mission Boulevard and the associated detours that would occur approximately 17 times over 11 months when temporary bridges would be installed and removed on these roadways. Construction activities would require temporary lane closures of both lanes of traffic in one direction along the sections under construction on Paseo Padre Parkway and East Warren Avenue for a three-year construction period, which would result in a greater traffic impact than under the proposed project since under the proposed project, lane closures along Mission Boulevard and full closures of this roadway and the I-680 on-ramps would occur infrequently over 11 months when the temporary bridges are installed or removed on this roadway. As with the proposed project, implementation of this alternative would result in an increase in construction-related vehicle trips; however, the increase in traffic volumes would not likely be significant.

Overall, the potential impacts on traffic and circulation would be similar to those of the proposed project because although temporary lane closures (possibly two lanes at a time) would be required along sections of 1.5 miles of local roadways for a three-year period under this alternative, the affected roadways carry less traffic than Mission Boulevard and the I-680 on-ramps which would be affected approximately 17 times during 11 months for construction and removal of temporary bridges, the proposed project would not cause a reduction of roadway capacity.

Noise

The significant and unavoidable noise impacts of the proposed project resulting from nighttime construction activities and deliveries (approximately 17 times over 11 months), and temporary disturbances from construction-related vibration at night (approximately 17 times over 11 months) could be reduced (approximately 10 nights compared to approximately 17 nights under the proposed project) and no nighttime detours would be required. However, significant and unavoidable noise impacts associated with the use of heavy equipment and haul and delivery truck traffic during the day could also occur under this alternative due to the proximity of residences to the construction area and concentrated construction activities at the fault crossings or the new vaults located within the BDPL Nos. 3 and 4 ROW at East Warren Avenue and Paseo Padre Parkway. Further, a greater number of residences would be affected by noise increases and construction-related vibration because there are residences located adjacent to 1.2 miles of this 1.5-mile long pipeline alignment. Overall, noise impacts associated with this alternative would be greater than the proposed project because more residences would be affected by construction-related noise and vibration.

Air Quality

As with the proposed project, the Alternate Location – South Alignment alternative would not result in permanent impacts on air quality because it would not create permanent sources of emissions. Construction-related increases in criteria pollutants, diesel particulate matter, and GHG emissions would be expected to affect a greater number of residences and sensitive receptors when compared to the proposed project. Because the construction corridor for the new BDPL Nos. 3 and 4 would be approximately two to three times longer than the construction corridor for the BDPL No. 3X under the proposed project and a wider trench would be excavated to accommodate the two pipelines, a proportional increase in excavation volumes and emissions would result. It is noted that under this alternative, emissions would not be concentrated in one general area (as would occur under the proposed project), but rather would move along the alignment with construction. However, overall construction-related air quality impacts would be greater than those of the proposed project because of the longer duration of the construction period, increased excavation area, and related increase in combustion and diesel particulate matter emissions from construction-related equipment and trucks. Impacts related to emissions would remain significant and unavoidable.

Utilities and Service Systems

Due to the longer construction corridor and wider pipeline installation trench, construction of this alternative could encounter more underground utilities. However, it is assumed that, like the proposed project, this alternative would implement strategies for utility protection and relocation. Thus, potential impacts related to relocating or damaging public utilities would be similar to those of the proposed project.

Due to the longer construction corridor and wider pipeline installation trench, this alternative would likely generate over three times more spoils and construction debris (asphalt) than the proposed project. Although the SFPUC would implement waste diversion measures to ensure compliance with the solid waste diversion goal established by the California Integrated Waste Management Act and City of Fremont, potential impacts related to the generation of construction wastes (asphalt specifically) would be greater than under the proposed project.

Biological Resources

The Alternate Location – South Alignment alternative would cross both Agua Fria and Agua Caliente Creeks at reaches where the creeks are culverted under Paseo Padre Parkway and would therefore avoid riparian habitat and associated special status species. One-time discharges to the City of Fremont storm drain system (via concrete storm drains) would be necessary for disinfection of the new pipelines prior to bringing them on line. The volume of these discharges would be approximately three times greater than under the proposed project because of the longer length of pipeline being disinfected. In addition, the existing BDPL Nos. 3 and 4 would need to be drained between the new shutoff stations when they are abandoned. However, there would be no impacts on aquatic resources or riparian habitat from erosion related to these discharges, since the water would be discharged into concrete channels. Therefore, this impact would be less than would occur under the proposed project. Although this alternative would be constructed within the street, tree removal could be required under this alternative, depending on the construction details. However, similar to the project, the SFPUC would be required to replace these trees in accordance with the City of Fremont Tree Protection Ordinance. Therefore, impacts related to tree removal would be similar to those of the proposed project.

Geology and Soils

Construction activities associated with the Alternate Location – South Alignment alternative would not likely result in the construction of new slopes that would experience long-term erosion, and the new pipeline alignment would be repaved at the completion of construction. The new pipelines would be constructed to withstand surface fault rupture, seismically induced groundshaking, and other seismic hazards in accordance with the SFPUC's *General Seismic Design Requirements*, as would the proposed project. Overall, this alternative represents similar impacts on geology and soils relative to those of the proposed project because both project site locations have a low potential for impacts related to erosion and loss of top soil.

Hydrology and Water Quality

Like the proposed project, no significant changes to existing drainage patterns would result from construction of this alignment. The new BDPL Nos. 3 and 4 would be designed to withstand fault movement. If the pipelines did rupture at the fault traces during a seismic event, neither BDPL No. 3 nor No. 4 would rupture in the vicinity of the natural reaches of Agua Fria or Agua Caliente Creeks, and therefore no untreated chloraminated water would be discharged directly to these water bodies.

During construction, due to the longer length of the construction corridor and expected increase in excavated spoils and construction debris (asphalt), implementation of the Alternate Location –

South Alignment alternative could adversely affect surface water quality in Agua Fria or Agua Caliente Creeks, either directly or via the local storm drain system, due to sedimentation, accidental releases of hazardous materials used in construction, and stormwater runoff. Groundwater collected during construction dewatering of the trenches could contain sediment and contaminants. Compared to the project, this alternative (because of the length of construction) would have a greater risk to water quality. However, water quality impacts related to construction activities would remain less than significant with mitigation measures requiring implementation of a SWPPP and implementation of related stormwater BMPs.

One-time discharges would be necessary when the existing BDPL Nos. 3 and 4 are drained after being taken out of service and when the new pipelines are disinfected prior to bringing them on line. The volume of these discharges would be approximately two to three times greater than those under the proposed project because of the longer length of pipeline being disinfected, and therefore the impact on water quality would be slightly greater. Although treated water from the pipelines would be discharged in compliance with the Waste Discharge Requirements for the SFPUC Drinking Water Transmission System (San Francisco Bay Regional Water Quality Control Board Order No. R2-2008-0102), thereby avoiding adverse effects on water quality, water quality impacts related to these discharges would be slightly greater than those of the proposed project because of the larger volume of water discharged.

Hazards and Hazardous Materials

The Alternate Location – South Alignment alternative would traverse approximately 1.2 miles of residential neighborhoods and would entirely avoid industrial and commercial neighborhoods; therefore, the potential to encounter hazardous materials in the soil and groundwater would be low, similar to the proposed project. Project construction activities would require closure of at least two lanes in one direction on Paseo Padre Parkway and East Warren Avenue at the segment undergoing construction, restricting traffic flow and interfering with emergency response. However, potential impacts related to emergency response are assumed to be similar to the proposed project because these roadways carry less traffic than Mission Boulevard and the I-680 on-ramps, and are not major arterials providing access to I-680. In addition, the mitigation measures identified for the proposed project for similar impacts would also apply to this alternative, and implementation of these measures would reduce impacts to a less-than-significant level.

7.2.4.3 Conclusions

Under the Alternate Location – South Alignment alternative, the documented archaeological site could be avoided, but there would still be the potential to encounter previously unidentified archaeological and paleontological resources because of the high sensitivity of the area. Although temporary lane closures required along the pipeline route would result in greater traffic impacts in relation to the proposed project, this alternative would also avoid disruption of traffic and emergency services along Mission Boulevard and the I-680 on-ramps, resulting in a similar degree of impacts related to roadway conflicts. The construction period would be nine months longer than under the project, but this alternative would include less nighttime construction which would minimize noise impacts related to nighttime construction and trucks and temporary disturbance from construction-related vibration as compared to the significant and unavoidable noise impact under the proposed project. Also, this alternative would not involve the detours through residential neighborhoods that would occur under the proposed project. However, significant and unavoidable impacts associated with the use of heavy equipment and haul and delivery truck noise during the day could occur.

Impacts related to land use disruption during construction would be greater because this alternative would traverse approximately 1.2 miles of residential land uses compared to 0.5 mile under the proposed project, temporary closures of both lanes in one direction would be required on both Paseo Padre Parkway and East Warren Avenue, and the construction period would be longer; however, significant and unavoidable land use impacts related to noise from nighttime construction and trucks, increased nighttime traffic on detour routes in residential areas, and temporary disturbance from construction-related vibration at night would be reduced. Impacts on riparian resources and associated special-status species would be less than under the proposed project because the pipelines would cross both Agua Fria and Agua Caliente Creeks under culverted creek sections beneath the roadway and discharges would not be made directly to the riparian corridor of Agua Fria Creek. The number of trees that would be removed under this alternative is unknown, but impacts related to tree removal would be similar to the proposed project because of compliance with the City of Fremont Tree Protection Ordinance. Because of the greater amount of excavation required for this alternative, there would be a proportional increase in air pollutant emissions and construction-related wastes (mainly asphalt).

There would be no discharges of untreated chloraminated water to Agua Fria or Agua Caliente Creek as a result of pipeline rupture at the fault traces. However, there would be a one time discharge of untreated chloraminated water directly to Agua Fria Creek when the existing pipelines are abandoned between the new shutoff stations. This alternative would also require the discharge of larger volumes of treated water to the storm drain system (ultimately discharging to San Francisco Bay), because the pipelines would be approximately three times longer than under the proposed project. All discharges to the City of Fremont storm drain system and Agua Fria Creek would be subject to compliance with the Waste Discharge Requirements for the SFPUC Drinking Water Transmission System (San Francisco Bay Regional Water Quality Control Board Order No. R2-2008-0102), thereby avoiding adverse effects on water quality, and water quality impacts. Impacts related to these discharges would be slightly greater than those of the proposed project because of the larger volume of water discharged.

Impacts related to the potential to disrupt emergency access would be similar to the proposed project because although this alternative would involve temporary closure of both lanes of traffic in one direction at the segment undergoing construction on Paseo Padre Parkway and East Warren Avenue throughout the entire construction period, disruption of Mission Boulevard and the I-680 on-ramps would be avoided. Strategies for protecting and relocating utilities would be similar to those of the proposed project, and thus potential impacts related to relocating existing utilities in the project vicinity would also be similar. Although the project area for this alternative is larger than the proposed project, the potential for soil erosion and loss of top soil is similar to the proposed project because construction activities would occur primarily within a paved street. The potential to encounter hazardous materials in the soil and groundwater would be similar to the proposed project because the pipeline alignment would not traverse any commercial or industrial areas. Aesthetics impacts related to construction would also be similar to those of the proposed project.

The Alternate Location – South Alignment alternative would meet all project objectives. Some impacts of the Alternate Location – South Alignment alternative would be less intense than those under the proposed project (such as impacts to Cultural Resources), while others would be similar to or could be slightly greater (such as Land Use, Air Quality, and Transportation and Circulation). While this alternative could avoid the documented archaeological site, there would still be the potential to encounter previously unidentified archaeological and paleontological resources because of the high sensitivity of the area. This alternative would likely result in similar or greater environmental impacts compared to those of the proposed project, due largely to the longer construction period and the longer construction corridor (one mile longer) which would increase both the extent and duration of disruption when compared to the proposed project.

7.2.5 Alternative 3: Alternate Design – New 48-inch BDPL No. 3X and Improvements to BDPL Nos. 3 and 4

The potential impacts of the Alternate Design – New 48-inch BDPL No. 3X and Improvements to BDPL Nos. 3 and 4 alternative are discussed below and summarized in Table 7.2.

7.2.5.1 Description

The Alternate Design – New 48-inch BDPL No. 3X and Improvements to BDPL Nos. 3 and 4 alternative includes installation of a new 48-inch BDPL No. 3X between the North and South Shutoff Stations, similar to the proposed project, and improvements to BDPL Nos. 3 and 4 where they cross the Hayward fault. Therefore, Alternative 3 would reduce the potential effects of fault movement at the Hayward Fault. However, the SFPUC has determined that this design is less reliable than the proposed project for accommodating fault movement at Trace B of the Hayward Fault, and preventing rupture of the pipeline at this location, and improvements proposed under the proposed project would provide better reliability in ensuring that the proposed BDPL No. 3X would be functional within 24 hours of a seismic event.

The new 48-inch BDPL No. 3X would have a smaller diameter than BDPL No. 3 because, unlike the project, the existing pipeline BDPL No. 3 would not be taken out of service. Rather, the new pipe would be installed through the existing corrugated-metal pipeline segments (CMP1, CMP2, and CMP3), and installed using conventional cut-and-cover methods in the remainder of the pipeline alignment. Similar to the proposed project, trenchless construction could be used to install the new pipeline beneath Agua Fria Creek. This pipeline design would accommodate fault movement at Traces A and B of the Hayward fault by allowing pipeline compression and movement within the existing corrugated-metal pipeline segments CMP1 and CMP2. The design accommodates fault offset at Trace C by allowing for bending and shortening within the backfilled trench. Fault offset at CMP3 and the remainder of the pipeline alignment would be accommodated by using controlled-density fill that would allow movement of the pipeline if an earthquake occurred.

Improvements to the existing BDPL Nos. 3 and 4 would strengthen these pipelines where they cross the Hayward fault, reducing their vulnerability to damage in the event of an earthquake on the Hayward fault. These improvements include installing liners within BDPL No. 3 at Trace A and Trace C of the Hayward fault; installing a liner within BDPL No. 4 at Trace C of the Hayward fault; and replacing both BDPL Nos. 3 and 4 at the existing slip-joint vault location (Trace B of the Hayward fault, where the greatest displacement would occur if the Hayward fault were to rupture). At this location, BDPL Nos. 3 and 4 would be replaced with two new steel pipelines with 54-inch-diameter ball joints and a slip joint within a new 100- to 120-foot-long vault. The new vault would have only one end wall, and the opposite end wall would be open to allow for movement of BDPL Nos. 3 and 4 during an earthquake. Utility relocation and vault construction would require traffic diversions for all lanes of Mission Boulevard for approximately 12 weeks, during which time at least two lanes of traffic would be open at all times. The northbound I-680 loop on-ramp could also be closed for up to 15 weeks, during which time a temporary on-ramp with a signalized left turn from Mission Boulevard would be provided for I-680 access.

Future operations and maintenance under the Alternate Design – New 48-inch BDPL No. 3X and Improvements to BDPL Nos. 3 and 4 alternative would be the similar to existing conditions. Normal maintenance activities include resetting the slip joints at Trace B every few years.

This alternative would involve less nighttime construction activities and road closures. However, traffic would be disrupted on Mission Boulevard for the entire 12 weeks of construction within this roadway, and on the I-680 northbound loop on-ramp for the entire 15 weeks of construction within this roadway.

7.2.5.2 Impact Analysis

Land Use and Land Use Planning

As with the proposed project, the Alternate Design – New 48-inch BDPL No. 3X and Improvements to BDPL Nos. 3 and 4 alternative would not result in permanent land use changes, disruption of land uses, or changes to the character of the project vicinity. In addition, this alternative is similar in nature to the proposed project, and the construction duration would be approximately the same. Therefore, construction activities could temporarily disrupt existing land uses and land uses activities due to traffic, noise, and air quality impacts. The significant and unavoidable land use impacts related to noise from heavy equipment use and haul and delivery traffic adjacent to residences would likely be similar to those of the proposed project. Nighttime construction would be reduced, and impacts associated with nighttime construction would be less than under the proposed project, but could still be significant and unavoidable. Overall, impacts related to disruption of existing land uses and land uses activities would be less than the proposed project.

Aesthetics

With the exception of manholes, all new facilities under this alternative would be constructed below grade and would not permanently affect the visual character of the surrounding area. Similar to the proposed project, construction under this alternative would occur within Mission Boulevard and the scenic viewshed of the Fremont Hills; would be visible from I-680, Mission Boulevard, and Paseo Padre Parkway, all designated scenic routes; and would likely require removal of a similar number of trees. Temporary and permanent visual impacts during construction activities would be similar to those of the proposed project and could be mitigated to a less-than-significant level. Overall, aesthetics impacts associated with this alternative would be similar to those of the proposed project.

Cultural Resources

This alternative would involve construction in the same project area, in the vicinity of the same documented archaeological site as the proposed project and would also include construction in an area of high archaeological and paleontological sensitivity. Impacts on cultural and paleontological resources would be similar to those of the proposed project, and previously unidentified archaeological and paleontological resources could potentially be encountered.

Transportation and Circulation

The Alternate Design – New 48-inch BDPL No. 3X and Improvements to BDPL Nos. 3 and 4 alternative would avoid conflicts with use of the I-680 on-ramps during construction of the new BDPL No. 3X because this pipeline would be installed within the existing corrugated metal pipe segment CMP-1 beneath these on-ramps. However, improvements to BDPL Nos. 3 and 4 at Trace B of the Hayward fault would require construction within both the I-680 northbound loop on-ramp and Mission Boulevard. During construction within the on-ramp, a temporary on-ramp with a signalized left turn from Mission Boulevard would be used to provide alternate access to I-680 for the 15 weeks of construction activities. Construction within Mission Boulevard would require traffic diversions for all four lanes of Mission Boulevard for 12 weeks. Although at least two lanes of Mission Boulevard would be open at all times, this reduction in lanes would reduce the capacity of Mission Boulevard by about 50 percent and would increase traffic delays, impair pedestrian and bicycle traffic and increase traffic hazards for the full 12 weeks that construction would occur within this roadway. Further, some full closures of Mission Boulevard could be required. However, similar to the proposed project, these closures would be scheduled for low traffic periods and similar to the proposed project, traffic impacts associated with these closures would be reduced to a less-than-significant level with implementation of mitigation measures imposing restrictions on the timing of full road closures.

Like the proposed project, implementation of this alternative would result in an increase in construction-related vehicle trips; however, the increase in traffic volumes would not likely be significant. Aside from traffic detours that would only occur approximately 17 times during 11 months for construction and removal of temporary bridges on the I-680 on-ramps and Mission Boulevard, the proposed project would not result in a reduction of roadway capacity. Overall, the potential impacts of this alternative on traffic and circulation would be greater than those of the proposed project because traffic diversions and lane closures on Mission Boulevard would be required for 12 weeks, and traffic diversions on the northbound I-680 loop on-ramp would be required for 15 weeks.

Noise

As with the proposed project, this alternative would not introduce permanent sources of noise or vibration to the project vicinity. Nighttime construction activities and the associated significant and unavoidable impacts related to nighttime construction and deliveries, increased nighttime traffic on detour routes in residential areas, and temporary disturbances from construction-related vibration at night would be reduced, but not avoided. Because this alternative is similar in nature to the proposed project and the construction duration would be approximately the same, impacts related to daytime construction would be similar to those of the proposed project and would likely be significant and unavoidable. Overall, even though the duration of nighttime construction would be reduced, significant and unavoidable noise impacts associated with nighttime construction would not be avoided completely, and the impacts would be similar to the proposed project.

Air Quality

As with the proposed project, this alternative would not result in permanent impacts on air quality because there would be no permanent sources of emissions. Construction-related increases in criteria pollutants, diesel particulate matter, and GHG emissions are expected to be similar to those of the proposed project because this alternative is similar in nature to the proposed project and the construction duration would be approximately the same. Overall, construction-related air quality impacts would be similar to those of the proposed project.

Utilities and Service Systems

The Alternate Design – New 48-inch BDPL No. 3X and Improvements to BDPL Nos. 3 and 4 alternative would require relocation and protection of the same utility lines as the proposed project because this alternative is similar in nature to the proposed project, and the project footprint would likely be the same. Thus, potential impacts related to the relocation of utilities in the project vicinity would be similar to those of the proposed project.

This alternative could generate a smaller volume of spoils and construction debris compared to the proposed project because this alternative would include construction of a shorter vault (120 feet long, compared to up to 400 feet under the proposed project) and the new BPDL No. 3X would be constructed through three existing corrugated metal pipe segments. As with the proposed project, the SFPUC would implement waste diversion measures to ensure compliance with the solid waste diversion goal established by the California Integrated Waste Management Act and City of Fremont. Thus, potential impacts related to the generation of construction-related wastes would be less than under the proposed project.

Biological Resources

The Alternate Design – New 48-inch BDPL No. 3X and Improvements to BDPL Nos. 3 and 4 alternative is similar in nature to the proposed project, and the project footprint would likely be the same. Thus, this alternative would have similar impacts on biological resources as the proposed project, including potential impacts on the riparian corridor along Agua Fria Creek, and associated special status species.

Geology and Soils

This alternative is similar in nature to the proposed project, and the project footprint would likely be the same. Thus, this alternative would have similar geology and soils impacts as the proposed project.

Hydrology and Water Quality

The Alternate Design – New 48-inch BDPL No. 3X and Improvements to BDPL Nos. 3 and 4 alternative is similar in nature to the proposed project, and the project footprint would likely be the same. Thus, this alternative would affect the same surface water features as the proposed project due to construction-related erosion, release of hazardous materials, discharges of groundwater produced during trench dewatering, and discharges of treated water for pipeline draining and disinfection. The amount of chloraminated water that would be released in the event of pipeline rupture in response to an earthquake on the Hayward fault is uncertain because the design of this alternative is considered less reliable than the proposed project. Overall, water quality impacts related to implementation of this alternative would be similar to those of the proposed project.

Hazards and Hazardous Materials

This alternative is similar in nature to the proposed project, and the project footprint would likely be the same. Thus, this alternative would have similar impacts related to the potential to encounter hazardous materials in the soil and groundwater.

Construction activities would require diversion of traffic on the I-680 northbound loop on-ramp for approximately 15 weeks, and traffic diversions for all four lanes of Mission Boulevard for 12 weeks. Although at least two lanes of Mission Boulevard would be open at all times, this reduction in lanes would decrease the capacity of Mission Boulevard by about 50 percent and could interfere with emergency response. Compared to the proposed project, which would include traffic detours approximately 17 times during 11 months for construction and removal of temporary bridges on the I-680 on-ramps and Mission Boulevard, this alternative would have a potentially greater impact related to interference with emergency response.

7.2.5.3 Conclusions

The Alternate Design – New 48-inch BDPL No. 3X and Improvements to BDPL Nos. 3 and 4 alternative would have similar impacts as the proposed project. Impacts that would be similar to those of the proposed project include aesthetics, cultural resources, air quality, biological resources, geology and soils, and hydrology and water quality. While this alternative would affect the same utilities as the proposed project, the volume of construction debris produced would be less. The potential to encounter hazardous materials in the soil and groundwater would be similar to the proposed project.

Land use and noise impacts from nighttime construction would be reduced due to the need for fewer instances of nighttime construction. However, under this alternative, traffic would be disrupted on Mission Boulevard for the entire 12 weeks of construction within this roadway and on the I-680 northbound loop on-ramp for the entire 15 weeks of construction within this roadway, which could result in greater impacts related to traffic delays, impaired pedestrian and bicycle traffic, increased traffic hazards, and impeded emergency access.

The Alternate Design – New 48-inch BDPL No. 3X and Improvements to BDPL Nos. 3 and 4 alternative would be less reliable than the proposed project for accommodating fault movement at Trace B of the Hayward fault and improvements proposed under the proposed project would provide better reliability in ensuring that the proposed BDPL No. 3X would be functional within 24 hours of a seismic event. On the whole, this alternative would likely result in greater environmental impacts compared to those of the proposed project and would not fully meet the project objectives.

7.3 Comparison of Alternatives

7.3.1 Comparison of Environmental Impacts and Environmentally Superior Alternative

The CEQA Guidelines require the identification of an environmentally superior alternative to the proposed project. If it is determined that the No Project Alternative would be the environmentally superior alternative, then the EIR should also identify an environmentally superior alternative from among the other project alternatives (Section 15126.6[e]).

Table 7.2 presents a comparison of the environmental impacts of each alternative with those of the proposed project. With the exception of noise and land use impacts related to daytime use of heavy equipment, haul and delivery truck traffic, nighttime construction and deliveries (approximately 17 times over 11 months), increased nighttime traffic on detour streets in residential neighborhoods (approximately nine times over 11 months), temporary disturbance due to construction-related vibration at night (approximately 17 times over 11 months), and noncompliance with local ordinance time limits associated with nighttime and Sunday construction, as well as air quality impacts associated with construction-related combustion emissions, all other identified significant and potentially significant impacts associated with the proposed project could be mitigated to a less-than-significant level with the mitigation measures included in this EIR.

As discussed in Section 7.2.3, the No Project Alternative would require emergency repairs in the probable event that the pipeline(s) break during an earthquake on the Hayward fault. Although most of the impacts identified for the alternate location alternative (Alternative 2) could likely be mitigated to a less-than-significant level with mitigation measures similar to those required for the proposed project, the degree of impacts often varies between this alternative and the proposed project. While some impacts would be reduced under this alternative, others would be similar to or could be slightly greater than the proposed project. The alternate design alternative (Alternative 3) would have similar impacts to the proposed project, however traffic would be disrupted on the I-680 northbound loop on-ramp and Mission Boulevard for a longer period.

7.3.1.1 No Project Alternative

In the absence of a major earthquake along the Hayward fault, the No Project Alternative would avoid the potentially significant and significant but mitigable impacts resulting from construction of the proposed project. However, in the probable event that BDPL Nos. 3 and 4 do rupture during an earthquake, irreversible damage could occur to archaeological and paleontological resources that would otherwise be recovered under the proposed project. As discussed above, the No Project Alternative could also result in more severe impacts related to land uses, visual character, light and glare, roadway conflicts, construction-related noise (including 24-hour construction and noise associated with increased traffic on local roadways if I-680 and/or Mission Boulevard become impassible due to a rupture of BDPL Nos. 3 and 4), utilities, construction-related erosion and releases of hazardous materials, discharges of chloraminated water due to pipeline rupture, and emergency response. Also, emergency repairs would not likely include waste diversion measures, resulting in greater amounts of construction-related wastes being disposed of at permitted waste disposal facilities. Relative to the proposed project (depending on the severity of the repair needed after an earthquake), the No Project Alternative would likely result in less severe or similar impacts related to tree removal, air pollutant emissions, disruption of riparian habitat and associated special-status species, discharges of treated chloraminated water, soil erosion and loss of top soil, and the potential to encounter hazardous materials in soil and groundwater. Overall, the No Project Alternative would likely result in greater or more severe environmental impacts than the proposed project, and therefore it would not be the environmentally superior alternative.

7.3.1.2 Alternative 2: Alternate Location – South Alignment

Under the alternate location alternative, the documented archaeological site could be avoided, but there would still be the potential to encounter previously unidentified archaeological and paleontological resources because of the high sensitivity of the project area. The significant and unavoidable impact related to noise from increased nighttime traffic on detour routes in residential neighborhoods would be avoided because detours would not be required. The significant and unavoidable impacts related to noise from nighttime construction and deliveries and temporary disturbances from construction-related vibration at night that would occur under the proposed project would be reduced, but not entirely avoided. This alternative would result in greater impacts related to the disruption of residential land uses, emissions of air pollutants, generation of construction-related wastes, and construction-related erosion and releases of hazardous materials.

The alternate location alternative would likely reduce discharges of chloraminated water to Agua Fria or Agua Caliente Creeks from a pipeline rupture at the fault traces, but potential impacts on water quality would be greater than under the proposed project because of the larger construction area increased quantity of water that would be produced to disinfect the longer pipelines. The alternative location alternative would avoid traffic conflicts on Mission Boulevard and the I-680 on-ramps and associated detours compared to the proposed project, but instead could require temporary partial closure of roadways or use of at least two lanes of traffic in one direction on local roadways at those segments undergoing construction, which would result in a similar degree of impacts related to the potential for traffic delays, traffic hazards, and impeded emergency access and response. Effects related to tree removal, the visual character of the vicinity, and disruption of utilities would be similar to or less than those of the proposed project for the alternate location alternative.

Impacts on riparian resources and associated special-status species would be avoided because the pipelines would cross both Agua Fria and Agua Caliente Creeks where they are culverted and this alternative would not include discharges to riparian habitat. The potential to encounter hazardous materials in the soil and groundwater would be similar to the proposed project because an area with only residential land uses would be traversed and impacts related to erosion and loss of top soil would also be similar.

The Alternate Location – South Alignment alternative would meet all project objectives. Some impacts of the Alternate Location – South Alignment alternative would be less intense than those under the proposed project (such as impacts to Cultural Resources), while others would be similar to or could be slightly greater (such as Land Use, Air Quality, and Transportation and Circulation). While this alternative could avoid the documented archaeological site, there would still be the potential to encounter previously unidentified archaeological and paleontological resources because of the high sensitivity of the area. This alternative would likely result in similar or greater environmental impacts compared to those of the proposed project, due largely to the longer construction period and the longer construction corridor (one mile longer) which would increase both the extent and duration of disruption when compared to the proposed project.

7.3.1.3 Alternative 3: Alternate Design – New 48-inch BDPL No. 3X and Improvements to BDPL Nos. 3 and 4

This alternative would have similar impacts to those of the proposed project. Fewer nighttime closures of Mission Boulevard and the I-680 on-ramps and the associated nighttime construction activities would be required. However, traffic would be disrupted on the I-680 northbound loop on-ramp and Mission Boulevard for longer. Impacts that would be similar to those of the proposed project include aesthetics, cultural resources, air quality, biological resources, geology and soils, and hydrology and water quality. While this alternative would affect the same utilities as the proposed project, the volume of wastes produced would likely be less. The potential to encounter hazardous materials in the soil and groundwater would be similar to the proposed project.

Significant and unavoidable land use and noise impacts associated with nighttime construction and trucks, increased nighttime traffic on detour streets in residential neighborhoods, and temporary disturbance from construction-related vibration at night would be reduced, but not avoided entirely. However, under the proposed project, nighttime construction would occur only approximately 17 times over 11 months, and detours on residential streets would occur only 9 times over 11 months. Under this alternative, traffic would be disrupted on Mission Boulevard for the entire 12 weeks of construction within this roadway, and on the I-680 northbound loop on-ramp for the entire 15 weeks of construction within this roadway, potentially resulting in greater impacts related to traffic delays, impaired pedestrian and bicycle traffic, increased traffic hazards, and impeded emergency access and response. Overall, the impacts related to traffic disruption and impeded emergency access are considered greater than the significant and unavoidable impacts of the proposed project because they would be much longer in duration.

7.3.1.4 Environmentally Superior Alternative

Based on the evaluation presented above, the proposed project is considered the environmentally superior alternative. Although there would be significant and unavoidable impacts related to noise and disruption of land uses due to daytime use of heavy equipment, haul and delivery truck noise, nighttime construction and deliveries, increased nighttime traffic on detour streets in residential neighborhoods, temporary disturbance from construction-related vibration at night, and compliance with noise ordinance time limits, as well as air quality impacts associated with construction-related combustion emissions of criteria air pollutants and diesel particulate matter, the proposed project would involve construction in a substantially smaller area than the alternate location alternative and would have a substantially shorter duration, resulting in fewer impacts related to residential land use disruption, traffic disruption, air quality, generation of construction-related waste, discharges of treated water, and construction-related erosion and releases of hazardous materials. While there would be a tradeoff between the longer, wider-ranging effects that would occur with the alternate location alternative and the shorter, more intense construction effects that would occur with the proposed project, the proposed project would have less overall environmental effects when taken as a whole.

The proposed project would disrupt a documented archaeological site, whereas the alternate location alternative could avoid this particular site. However, the proposed project includes mitigation that requires recovery and recordation of archaeological resources uncovered within the known site, which would help preserve these resources. Further, there would still be the potential to encounter previously unidentified archaeological and paleontological resources under the alternate location alternative because of the high sensitivity of the area.

The longer duration of traffic impacts related to the Alternate Design – New 48-inch BDPL No. 3X and Improvements to BDPL Nos. 3 and 4 alternative means a longer period of disruption and noise impacts, which overall, could result in greater impacts when compared to the more temporary and less frequent noise impacts related to nighttime construction under the proposed project.

7.4 Alternatives Identification and Screening

As part of the background studies for the proposed project, the SFPUC prepared three alternatives assessment and analysis reports to aid in selecting the preferred project. The Needs and Alternatives Identification Report (G&E Engineering, 2006a) assessed the risk of rupture or failure of BDPL Nos. 3 and 4 in the event of a large earthquake on the Hayward fault in Fremont, and the damages and water outages that could result. These risk assessments were used to develop eight design options to upgrade and protect BDPL Nos. 3 and 4 from catastrophic failure at three traces of the Hayward fault. The Alternatives Analysis Report (G&E Engineering, 2006b) evaluated the eight design options based on several factors, including the ability to meet all or most of the project objectives, seismic reliability, construction costs, and adverse effects on the local community. An addendum to the Alternatives Analysis Report (SFPUC, 2008) provided further analysis of the two, top-ranked design options evaluated in the Alternatives Analysis Report. From this analysis, the SFPUC selected and developed the proposed project described in Chapter 3 in this EIR.

As summarized in Section 7.5, Alternatives Considered but Rejected from Further Analysis, most of the design options developed by the SFPUC would not meet the seismic reliability goals of the proposed project or would result in constructability issues and greater environmental impacts than the proposed project, and therefore were not evaluated in detail in Section 7.2 as CEQA alternatives to the proposed project. Thus, these alternatives were rejected from further consideration. The alternate location and design alternatives selected for further analysis represent the range that would meet the project objectives and would have the least environmental impacts. During the scoping period for this EIR, the San Francisco Planning Department did not receive any comments or suggestions regarding alternatives to the project.

7.5 Alternatives Considered but Rejected from Further Analysis

Table 7.3 summarizes the design options that were considered in the Alternatives Analysis Report and indicates their ability to meet the project goals. As shown in this table, only Options 2 and 4 would meet all of the project objectives. However, both options would require a vault that is wider than the ROW and would extend into Construction Zone 8, necessitating acquisition of additional land and demolition of private residences on one or both sides of the ROW, presenting constructability issues. Further, because of the longer construction period and longer and wider vault, construction of these options would result in greater environmental impacts related to land use disruption, aesthetics, traffic, noise, air quality, and generation of construction related waste relative to the proposed project, and neither of these options would avoid the documented archaeological site. With the exception of Alternative 3, described and evaluated above, all engineering options presented in the Alternatives Analysis Report were considered but rejected, either because they would not meet the seismic reliability goals of the project or would not be feasible to implement because of the constraints of the ROW and would result in greater environmental impacts than the proposed project.

TABLE 7.3
ALTERNATIVES CONSIDERED BUT REJECTED FROM FURTHER CONSIDERATION

Potential Alternative Identified	Description	Ability to Meet Project Objectives and Constraints on Implementation
Option 1. New 48-inch-diameter BDPL No. 3A in Existing Corrugated-Metal Pipeline Segment	Install approximately 2,615 feet of a new 48-inch-diameter steel pipe (BDPL No. 3A) between the two isolation valves. The new pipe would be inserted through the existing CMP sections.	▪ Partially fails to meet project objectives - Flow limited to 120 mgd for 20 to 30 days after major earthquake - Both BDPL Nos. 3 and 4 could fail in the event of more than 60 inches of fault offset, leading to major erosion, inundation, and traffic impacts ▪ Reason for rejection: - Would not meet the goal of delivering basic service within 24 hours - Would not meet the goal of reducing the effects of a catastrophic failure of BDPL Nos. 3 and 4 if more than 60 inches of fault offset occurred
Option 2. New 84-inch-diameter BDPL Nos. 3 and 4, Zigzag in Long Vault	Replace 1,600 feet of the existing BDPL Nos. 3 and 4 with two new 84-inch-diameter pipes. The new pipes would be installed in a zigzag configuration ("S" shape) within a new vault.	▪ Meets all project objectives - Full flow immediately after earthquake - Very high reliability ▪ Constraints: - Requires tunneling under I-680 - Requires temporary lane reductions/lane closure of Mission Boulevard during construction. - Requires relocation/accommodation of other utilities/drainage in ROW - Further analysis indicates the vault would need to be wider than the ROW, necessitating acquisition of additional land and demolition of private residences on one or both sides of the ROW ▪ Reason for rejection: - Would require acquisition of additional land and demolition of houses on both sides of the ROW - Would result in greater environmental impacts than the proposed project due to longer construction period and longer and wider vault that would be constructed adjacent to residences in Construction Zone 8.
Option 3. New 84-inch-diameter BDPL Nos. 3 and 4, Zigzag in Medium Vault, plus 48-inch-diameter BDPL No. 3A	Replace 1,085 feet of the existing BDPL Nos. 3 and 4 with two new 84-inch-diameter pipes. The new pipes would be installed in a zigzag configuration ("S" shape) within a new vault. A new 48-inch-diameter BDPL No. 3A would also be constructed. The BDPL No. 3A would be constructed partially within the new vault and partially within the existing CMPs.	▪ Partially fails to meet project objectives - Full flow immediately after earthquake - Good reliability, but still some chance of failure and associated erosion and damage to I-680 should BDPL Nos. 3 and 4 fail at Trace A ▪ Constraints: - Requires temporary lane reductions/lane closure of Mission Boulevard during construction - Requires relocation/accommodation of other utilities/drainage in ROW

TABLE 7.3 (Continued)
ALTERNATIVES CONSIDERED BUT REJECTED FROM FURTHER CONSIDERATION

Potential Alternative Identified	Description	Ability to Meet Project Objectives and Constraints on Implementation
Option 3 (cont.)		- Further analysis indicates the vault would need to be wider than the ROW, necessitating acquisition of additional land and demolition of private residences on one or both sides of the ROW ▪ Reason for rejection: - Would not meet the goal of reducing the effects of a catastrophic failure of BDPL Nos. 3 and 4 should BDPL No. 3 fail at Trace A of the Hayward fault - Would require acquisition of additional land and demolition of houses on both sides of the ROW
Option 4. New 84-inch-diameter BDPL Nos. 3 and 4, Zigzag in Medium Vault, plus One Liner in BDPL No. 3	Replace 1,085 feet of the existing BDPL Nos. 3 and 4 with two new 84-inch-diameter pipes. The new pipes would be installed in a zigzag configuration (“S” shape) within a new vault. BDPL No. 3 would also be lined with a steel liner under I-680 (Trace A).	▪ Meets all project objectives - Full flow immediately after earthquake - Good reliability ▪ Constraints: - Requires temporary lane reductions/lane closure of Mission Boulevard during construction - Requires relocation/accommodation of other utilities/drainage in ROW - Requires construction of a larger vault than the proposed project, potentially resulting in greater impacts - Further analysis indicates the vault would need to be wider than the ROW, necessitating acquisition of additional land and demolition of private residences on one or both sides of the ROW - Requires installation of a bypass pipeline during construction - Large vault presents greater risk of collapse due to traffic loads ▪ Reason for rejection: - Would require acquisition of additional land and demolition of houses on both sides of the ROW, and larger vault would present greater risk of failure - Would result in greater environmental impacts than the proposed project due to longer construction period and longer and wider vault that would be constructed adjacent to more residences in Construction Zone 8.

TABLE 7.3 (Continued)
ALTERNATIVES CONSIDERED BUT REJECTED FROM FURTHER CONSIDERATION

Potential Alternative Identified	Description	Ability to Meet Project Objectives and Constraints on Implementation
Option 5. Emergency Bypass Pipe System	Install an emergency bypass pipe system consisting of a series of pipes that would be pre-installed and left disconnected from BDPL Nos. 3 and 4. The bypass pipe system would be designed to accommodate minor offset movements. In the event of a major earthquake that results in rupture of BDPL Nos. 3 and 4, a post-earthquake emergency	▪ Partially fails to meet project objectives - No flow for 48 hours - Flow limited to 60 mgd for 20 to 30 days after major earthquake - Both BDPL Nos. 3 and 4 would fail in the event of a major earthquake, leading to major erosion, inundation, and traffic impacts
Option 5 (cont.)	crew would install aboveground portable pipe or connect to the pre-installed pipes to allow water flow to be established within 8 hours (but no more than 24 hours) of a major earthquake.	▪ Reason for rejection: - Would not meet the goal that the pipeline is functional within 24 hours of a seismic event - Would not meet the goal of delivering basic service within 24 hours - Would not meet the goal of reducing the effects of a catastrophic failure of BDPL Nos. 3 and 4 because both pipelines could fail
Option 6. New 48-inch-diameter BDPL No. 3A plus Emergency Bypass Pipe	Install approximately 2,615 feet of a new 48-inch-diameter steel pipe (BDPL No. 3A) through the existing CMP sections between the two isolation valves. This alternative also includes an emergency bypass pipe system to ensure some backup capability to provide some flow following a large-magnitude earthquake.	▪ Partially fails to meet project objectives - Flow limited to 120 mgd for 20 to 30 days after most earthquakes - Flow limited to 60 mgd for 20 to 30 days after major earthquakes - Both BDPL Nos. 3 and 4 would fail in the event of a major earthquake, leading to major erosion, inundation, and traffic impacts ▪ Reason for rejection: - Would not meet the goal of delivering basic service within 24 hours - Would not meet the goal of reducing the effects of a catastrophic failure of BDPL Nos. 3 and 4 because both pipelines could fail

SOURCE: G&E Engineering, 2006a; SFPUC, 2008.

7.6 References

G&E Engineering Systems, Inc., *Seismic Upgrade of BDPLs No. 3 and 4 at the Hayward Fault – Needs & Alternatives Identification Report*. Prepared for the SFPUC under subcontract to URS Americas, Inc., August 28, 2006a.

G&E Engineering Systems, Inc., *Seismic Upgrade of BDPLs No. 3 and 4 at the Hayward Fault Alternatives Analysis Report*. Prepared for the SFPUC under subcontract to URS Americas, Inc., September 5, 2006b.

San Francisco Public Utilities Commission (SFPUC), Engineering Management Bureau, *Seismic Upgrade of Bay Division Pipelines Nos. 3 and 4 at Hayward Fault, Addendum to the Alternatives Analysis Report*, March 17, 2008.

Working Group for California Earthquake Probabilities (WGCEP), *The Uniform California Earthquake Rupture Forecast, Version 2 (UCERF 2).* U.S. Geological Survey Open File Report 2007-1437, California Geological Survey Special Report 203, SCEC Contribution #1138, 2008.

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