Summary

SUMMARY

S.1 Introduction and Purpose of the PEIR (Chapter 1)

The San Francisco Public Utilities Commission (SFPUC) proposes to adopt and implement the Water System Improvement Program (WSIP or proposed program) to increase the reliability of the regional water system that serves 2.4 million people in San Francisco and the San Francisco Bay Area. The WSIP would improve the regional system with respect to water quality, seismic response, water delivery, and water supply to meet water delivery needs in the service area through the year 2030 and would establish level of service goals and system performance objectives. The WSIP would implement a proposed water supply option, modify system operations, and construct a series of facility improvement projects. The proposed program area

spans seven counties—Tuolumne, Stanislaus, San Joaquin, Alameda, Santa Clara, San Mateo, and San Francisco.

The San Francisco Planning Department, Major Environmental Analysis (MEA) Division, determined that implementation of the WSIP could have a significant effect on the environment and therefore required preparation of a Program Environmental Impact Report (PEIR) in compliance with the California Environmental Quality Act (CEQA). This PEIR is intended to provide the public and responsible and trustee agencies with information about the potentially significant environmental effects of the proposed program, to identify possible ways to minimize the potentially significant effects, and to describe and evaluate feasible alternatives to the proposed program.

S.2 Program Description (Chapter 3)

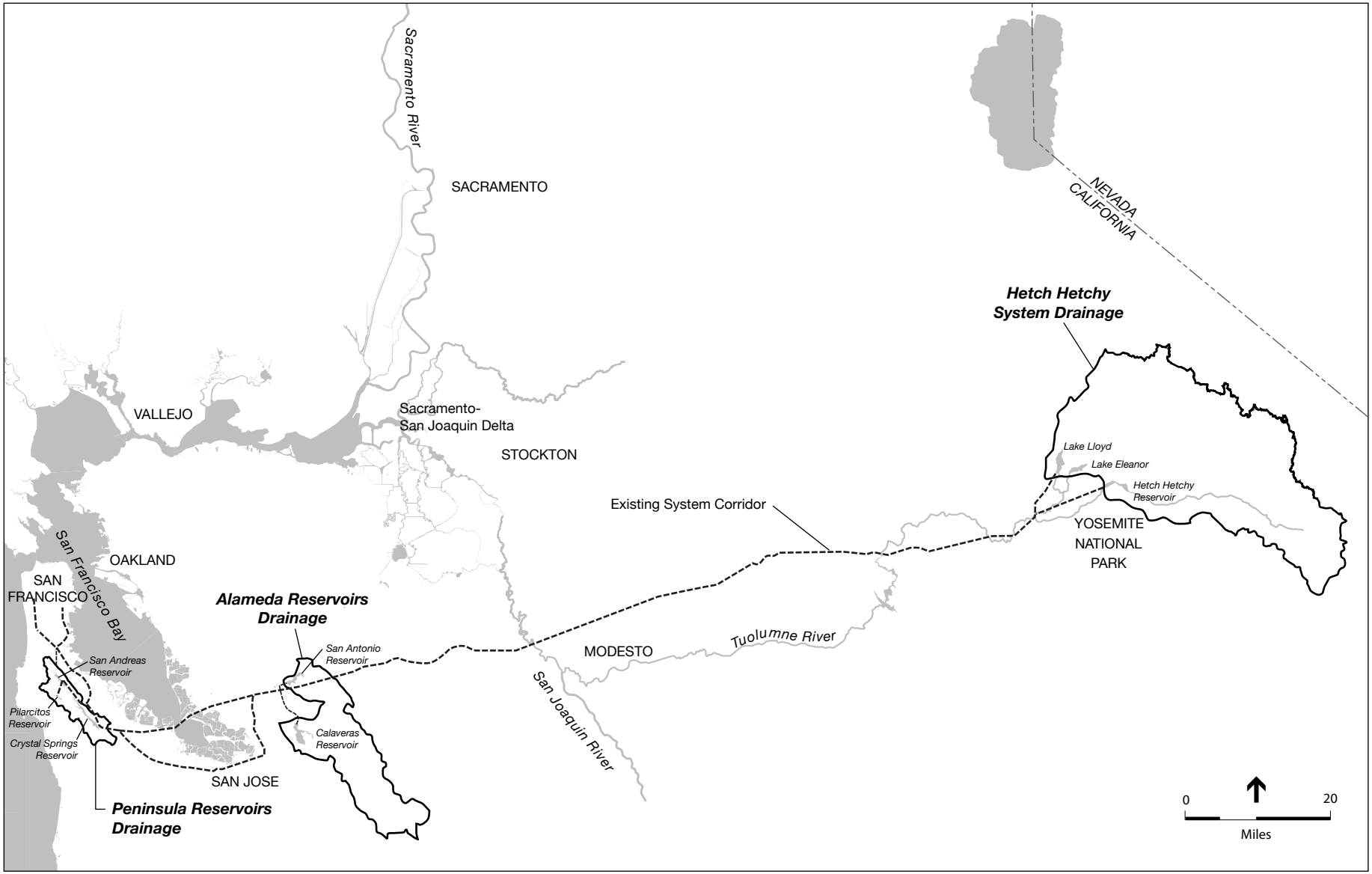
Need for and Objectives of the Program

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 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 and Pilarcitos Creeks watersheds (referred to together as the Peninsula watersheds), 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 S.1** shows 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 Conservation Agency (BAWSCA), which consists of 27 total customers, shown in **Figure S.2**. Some of these wholesale customers have other sources of water in addition to what they receive from the SFPUC regional system, while others rely completely on the SFPUC for supply.

While the SFPUC has historically met and is currently serving its customers' water demands, there are numerous factors contributing to the need for a comprehensive, systemwide program such as the WSIP. In order to continue to provide reliable water service to its customers, the SFPUC must plan for the future as well as address existing, known deficiencies, including the following:

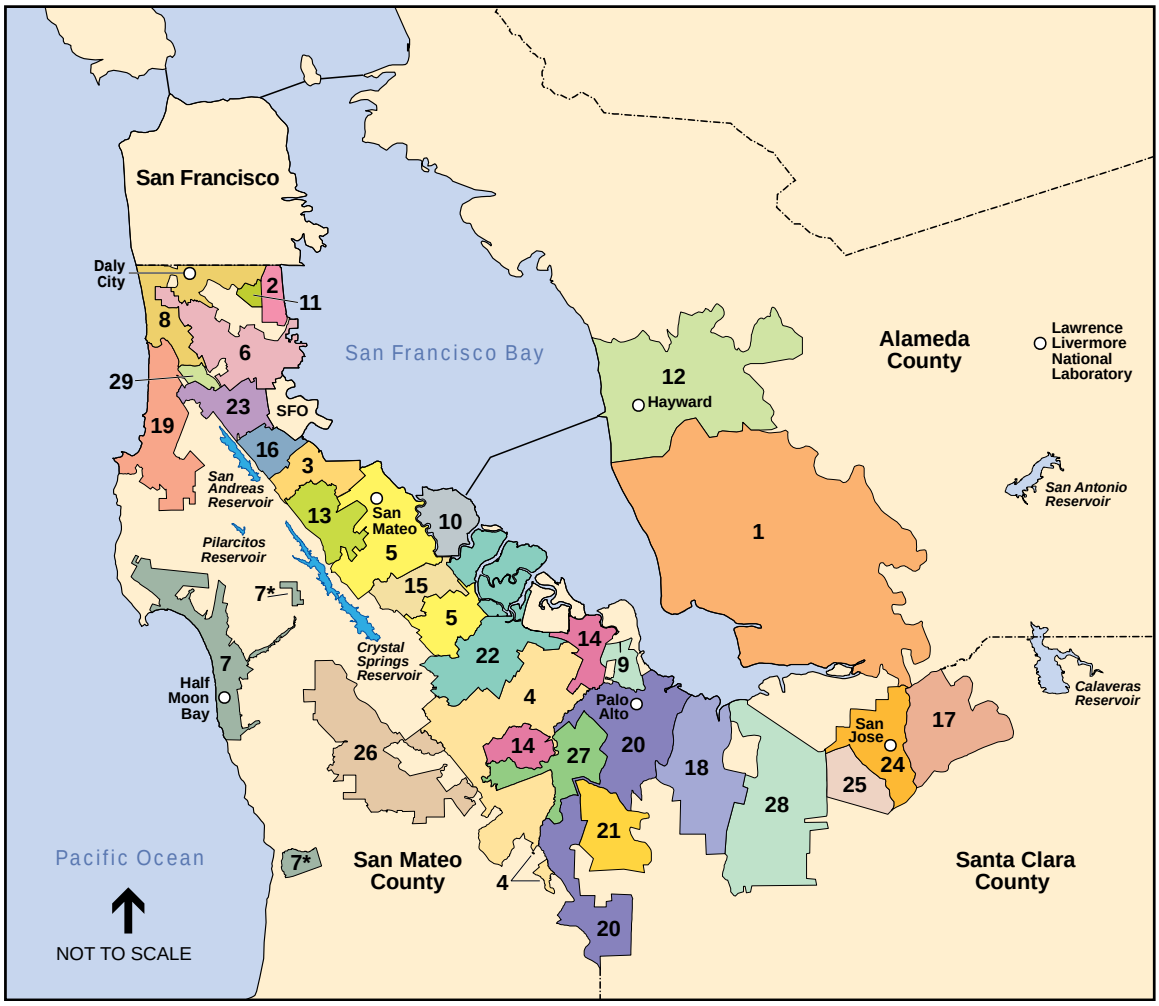
- *Aging Infrastructure*. Many of the components of the SFPUC regional water system were built in the 1800s and early 1900s. As the system ages, its reliability decreases and the risk of failure increases.



SOURCE: ESA + Orion

SFPUC Water System Improvement Program . 203287

Figure S.1
Overview of SFPUC Regional Water System
and Water Supply Watersheds



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

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

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

SOURCE: BAWSCA, 2006a

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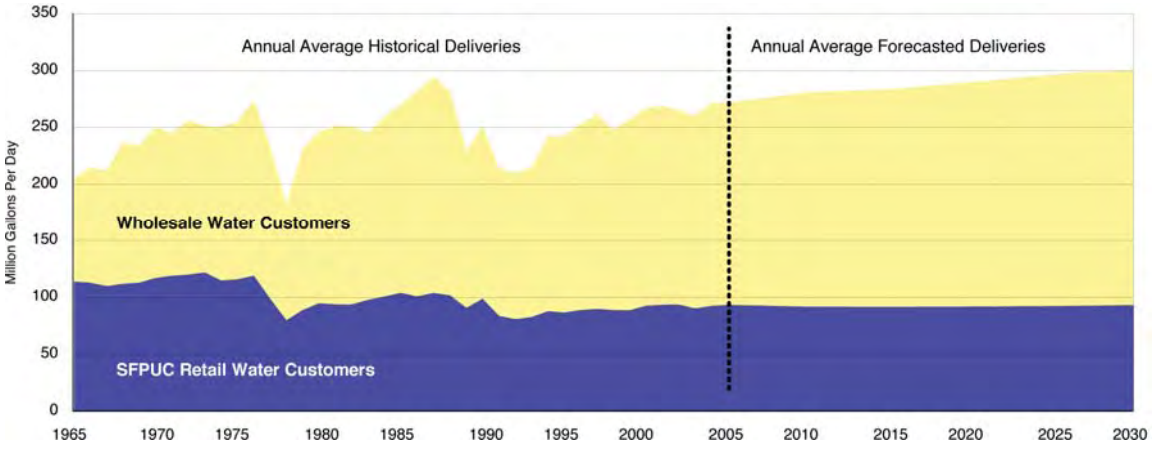
Figure S.2 (Revised)
SFPUC Water Service Area -
San Francisco and SFPUC Wholesale Customers

- *Exposure to Seismic and Other Hazards*. The system crosses five active earthquake faults, and many of the existing facilities do not meet modern seismic standards. The California Division of Safety of Dams (DSOD) imposed operating restrictions on two of the system's reservoirs, Calaveras and Lower Crystal Springs Reservoirs, due to seismic and flood control safety hazards, respectively. The restricted operations at these reservoirs reduce local storage capacity and impair normal system operations.

- *Water Quality*. The regional system currently meets or exceeds existing water quality standards. However, system upgrades are needed to improve the SFPUC's ability to maintain compliance with current water quality standards and to meet anticipated future water quality standards.

- *Delivery Reliability*. The system requires additional redundancy (i.e., backup) of some critical facilities to ensure sufficient operational flexibility to carry out adequate system inspection and maintenance and to be adequately prepared in the event of an earthquake, system failure, or other emergency. These critical facilities are necessary to meeting day-to-day customer water supply needs, and increased operational flexibility is needed in order to maintain service to all customers during a full range of operating conditions.

- *Customer Water Demand*. The regional system currently has insufficient water supply to meet customer demand during a prolonged drought, and this situation will worsen in the future without the WSIP. Additional supplies are needed to satisfy current demand in drought years as well as to meet future demand. Water demand among SFPUC retail and wholesale customers is projected to increase over the next 25 years, from an average annual demand of about 366 mgd to 417 mgd in 2030. Of this total projected demand in the SFPUC service area, retail and wholesale customers would purchase an annual average of about 300 mgd from the SFPUC system in 2030, compared to 265 mgd in 2005, as shown in **Figure S.3**. Thus, the SFPUC would need to provide additional water supplies to serve a projected average annual increase in purchase requests of 35 mgd by 2030.



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SOURCE: SFPUC, 2007b

Figure S.3 (Revised)
Annual Average Historical and
Projected Future Customer Purchase Requests

To address these challenges, the SFPUC must replace or upgrade numerous system facilities, add some new facilities, and expand its water supply portfolio—thus the need for the WSIP. In 2005, the SFPUC developed goals and objectives for the WSIP based on a planning horizon through 2030. The goals and objectives are founded on two fundamental principles pertaining to the existing regional water system: (1) maintaining a clean, unfiltered water source from the Hetch Hetchy system, and (2) maintaining a gravity-driven system. The overall goals of the WSIP are to:

- Maintain high-quality water
- Reduce vulnerability to earthquakes
- Increase delivery reliability and improve the ability to maintain the system
- Meet customer water supply purchase requests in nondrought and drought periods
- Enhance sustainability in all system activities
- Achieve a cost-effective, fully operational system

To further these program goals, the WSIP includes objectives that address system performance in the areas of water quality, seismic reliability, delivery reliability, and water supply through the year 2030. **Table S.1** presents the WSIP goals and objectives. The WSIP also includes proposed levels of service for the regional water system, which are intended to further define the system performance objectives through 2030 and provide design guidelines for the facility improvement projects. The levels of service (shown in Table 3.5, in Chapter 3, Program Description) address water quality, seismic response after a major earthquake, delivery during system maintenance, average annual water supply, regional system firm yield, and drought-year rationing.

Key program elements are summarized below and described in more detail in Chapter 3 (also see the SFPUC's 2006 *Water System Improvement Program* and 2007 *Water Supply Options* reports).

- *Water Supply*. Proposed water supply option to meet customer purchase requests during both nondrought and drought years.

- *System Operations*. Proposed system operations strategy to achieve water quality, seismic response, and delivery reliability performance objectives under a range of operating conditions, including the following scenarios: day-to-day, maintenance, unplanned outage, earthquake or other emergencies, and drought.

- *Facilities*. Proposed facility improvement projects to repair, upgrade, and, in some cases, expand the regional system facilities to reliably meet level of service goals and system performance objectives and to provide a cost-effective, fully operational water system.

Proposed Water Supply

Under the WSIP, the SFPUC proposes to meet the increased 35 mgd in purchase requests by continuing to maximize use of local watershed supplies, increasing diversions from the Tuolumne River under its existing water rights, and developing new local resources consisting of a combination of additional conservation, water recycling, and groundwater supply programs in

TABLE S.1
WSIP GOALS AND OBJECTIVES

Program Goal	System Performance Objective
Water Quality – *maintain high water quality*	• Design improvements to meet current and foreseeable future federal and state water quality requirements. • Provide clean, unfiltered water originating from Hetch Hetchy Reservoir and filter all other surface water sources. • Continue to implement watershed protection measures.
Seismic Reliability – *reduce vulnerability to earthquakes*	• Design improvements to meet current seismic standards. • Deliver basic service to the three regions in the service area (East/South Bay, Peninsula, and San Francisco) within 24 hours after a major earthquake. Basic service is defined as average winter-month usage, and the performance objective for the 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 Bay, Peninsula, and San Francisco regions, respectively. • Restore facilities to meet average-day demand of 300 mgd within 30 days after a major earthquake.
Delivery Reliability – *increase delivery reliability and improve the ability to maintain the system*	• Provide operational flexibility to allow planned maintenance shutdown of individual facilities without interrupting customer service. • Provide operational flexibility to minimize the risk of service interruption due to unplanned facility upsets or outages. • Provide operational flexibility and system capacity to replenish local reservoirs as needed. • Meet the estimated average annual demand of 300 mgd for 2030 under the conditions of one planned shutdown of a major facility for maintenance concurrent with one unplanned facility outage.
Water Supply – *meet customer water needs in nondrought and drought periods*	• Meet average annual water purchase requests of 300 mgd from retail and wholesale customers during nondrought years for system demands through 2030. • Meet dry-year delivery needs through 2030 while limiting rationing to a maximum 20 percent systemwide reduction in water service during extended droughts. • Diversify water supply options during nondrought and drought periods. • Improve use of new water sources and drought management, including use of groundwater, recycled water, conservation, and transfers.
Sustainability – *enhance sustainability in all system activities*	• Manage natural resources and physical systems to protect watershed ecosystems. • Meet, at a minimum, all current and anticipated legal requirements for protection of fish and other wildlife habitat. • Manage natural resources and physical systems to protect public health and safety.
Cost-effectiveness – *achieve a cost-effective, fully operational system*	• Ensure cost-effective use of funds. • Maintain gravity-driven system. • Implement regular inspection and` maintenance program for all facilities.

SOURCE: SFPUC, 2005.

San Francisco, as shown in **Figure S.4**. The water recycling and groundwater supply programs would be developed as part of the proposed facility improvement projects. This combination of water supply sources is expected to fully meet customer purchase requests during nondrought years through 2030. However, based on recent experience, these water supply sources would not be adequate during drought periods. The WSIP level of service goals include a policy to limit customer rationing to a maximum of 20 percent systemwide in any one year of a drought.

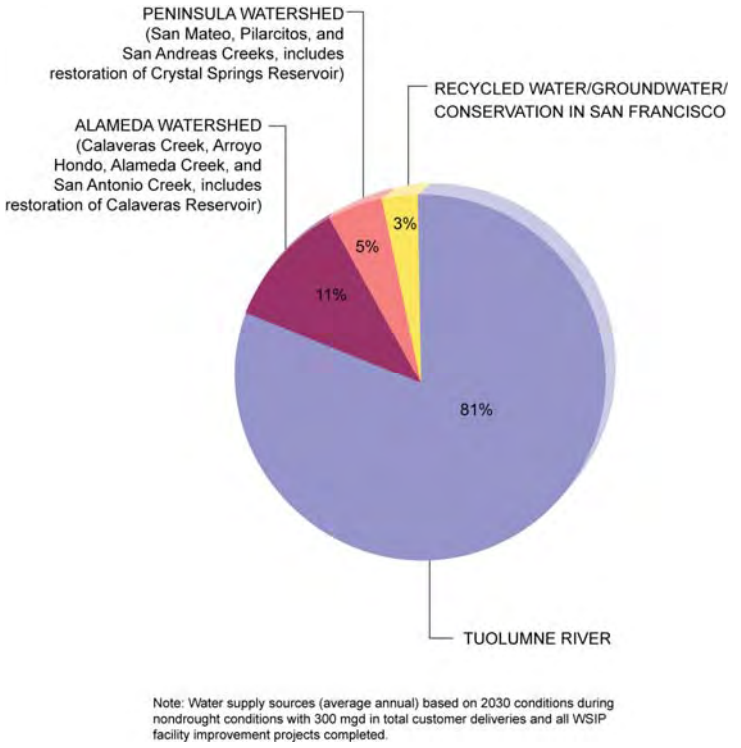

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Figure S.4
WSIP Water Supply Sources, Nondrought Years

To provide adequate water supply to customers during a prolonged drought, the WSIP includes supplemental sources to augment the nondrought-year water supplies described above. The SFPUC proposes to secure a water transfer with the Turlock Irrigation District (TID) and/or Modesto Irrigation District (MID) to provide supplemental dry-year water from the Tuolumne River. Further, the SFPUC proposes to implement a groundwater banking program in the Westside Groundwater Basin in San Mateo County. Under this program, SFPUC wholesale customers that utilize the Westside Groundwater Basin would use supplemental surface water supplies in nondrought years to reduce their groundwater pumping and allow for in-lieu groundwater banking; these wholesale customers could then increase their groundwater pumping in drought years and reduce their demand for surface water supply in those years. In addition, two of the WSIP facility improvement projects involve the restoration of historical operating

capacities at two of the system reservoirs, Calaveras and Lower Crystal Springs Reservoirs, which would further augment drought supplies for the regional system. As shown in **Figure S.5**, during drought years under the WSIP, the SFPUC would also include up to 20 percent systemwide rationing.

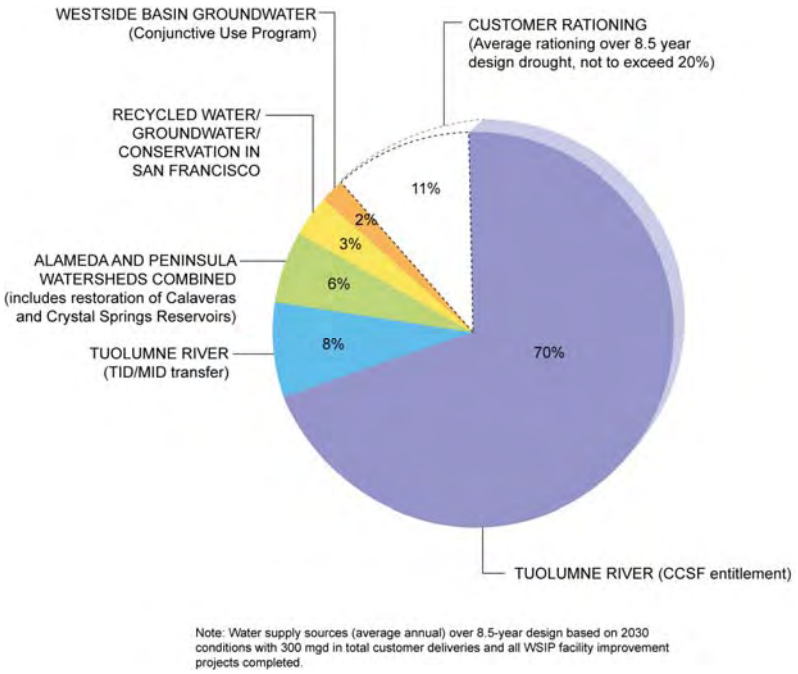


Figure S.5
WSIP Water Supply Sources, Drought Years

Proposed System Operation Strategy

Operation of the regional water system is affected by numerous factors, including fluctuations in customer demand; meteorological and hydrologic conditions; physical facilities and infrastructure capacity and maintenance requirements; and multiple institutional parameters. The WSIP addresses the condition of the physical facilities and infrastructure while planning for and taking into account these various factors. The operating strategy addresses four components of system operation: water supply and storage, water quality, water delivery, and asset management.

Under the WSIP, general day-to-day operation of the regional water system would be similar to existing operations but would provide for additional facility maintenance activities and improved emergency preparedness. Implementation of the program would allow for a refinement of the operations strategy to meet the WSIP goals and objectives and would thereby increase system reliability and provide additional flexibility for scheduling repairs and maintenance. The proposed operations strategy would also include a multistage drought response program during an extended

drought. Under the WSIP, regional system operations would continue to comply with all applicable institutional and planning requirements, including:

- Complying with all water quality, environmental, and public safety regulations
- Maximizing the use of water from local watersheds
- Assigning a higher priority to water delivery over hydropower generation
- Meeting all downstream flow requirements

Proposed Facility Improvement Projects

The WSIP includes 22 facility improvement projects along the regional system, from Oakdale Portal in Tuolumne County on the east end to San Francisco on the west. The projects, described in **Table S.2**, have been identified as necessary to achieve the level of service goals and system performance objectives of the WSIP. **Figure S.6** indicates the location of each facility improvement project.

Standard Construction Measures

The SFPUC has established standard construction measures that would be implemented as part of all WSIP projects. The main objective of these measures is to minimize potential disruption of surrounding neighborhoods during construction and to reduce impacts on environmental resources to the extent feasible. The construction measures would be implemented individually for the facility improvement projects; some measures might not be applicable to some projects, while some projects would require the development of more detailed construction measures and implementation steps as the individual projects are designed. The standard construction measures to be included in WSIP construction contracts address the following topics: neighborhood notice, seismic and geotechnical studies, onsite air and water quality measures during construction, groundwater, traffic, noise, hazardous materials, biological resources, cultural resources, and project site (i.e., the use of non-CCSF-owned land during construction).

Proposed Construction Schedule

Figure S.7 presents a preliminary master schedule of the construction phases for the facility improvement projects. The SFPUC developed the preliminary schedule to assure that water delivery service is maintained throughout construction of the numerous projects, but is preparing schedule refinements and adjustments as the projects are further developed and more information is known about construction requirements. All WSIP projects are scheduled to be completed by the end of 2014. The acquisition of supplemental water supplies during droughts would be implemented as needed to match the water supply needs of the retail and wholesale customers (see Chapter 5, Section 5.1) and is not included on the construction schedule.

TABLE S.2
WSIP FACILITY IMPROVEMENT PROJECTS

No.[a]	Project Title	Principal Type of Facility/ Objectives[b]	Location of Preferred Project[c]	Project Description
San Joaquin Region				
SJ-1	Advanced Disinfection	Treatment / Water Quality	Tesla Portal	This project would provide for the planning, design, and construction of a new advanced disinfection facility for the Hetch Hetchy water supply to comply with the new federal drinking water regulatory requirements contained in the Long Term 2 Enhanced Surface Water Treatment Rule. This regulation is designed to provide treatment for the parasite *Cryptosporidium*. The project is in the planning phase and the SFPUC is evaluating applicable technologies and possible locations to identify the most technologically sound and cost-effective alternative. In addition, the project includes planning and conceptual engineering for providing advanced disinfection facilities at the Sunol Valley and Harry Tracy Water Treatment Plants (WTPs). This project may be combined with the Tesla Portal Disinfection Station project along with portal modifications, and the need for the Lawrence Livermore Supply Improvements project may be affected by the location and technology selected for this project.
SJ-2	Lawrence Livermore Supply Improvements	Treatment / Water Quality	Thomas Shaft	This project includes design and construction of treatment upgrades for the water supplied to the Lawrence Livermore Laboratory. The project would construct water treatment facilities from the Thomas Shaft of the Coast Range Tunnel. An advanced disinfection facility planned at an upstream location under the Advanced Disinfection project could affect project design.
SJ-3	San Joaquin Pipeline System	Pipeline / Water Supply, Delivery Reliability	Isolated locations along the existing San Joaquin Pipeline corridor	The preferred project would generally be located within the existing San Joaquin Pipeline (SJPL) right-of-way and would include: • Construction of a new 6.4-mile-long, up to 86-inch-diameter fourth San Joaquin Pipeline parallel to the existing three pipelines at the east end of the pipelines, starting at Oakdale Portal, and associated portal modifications. • Construction of two additional crossover facilities between the San Joaquin Pipelines within the existing right-of-way, both located in Stanislaus County, with one about 20 miles east of Modesto and the other about 15 miles west of Modesto, and improvements at the existing Roselle Crossover. • Construction of a new 10-mile-long, up to 86-inch-diameter fourth San Joaquin Pipeline parallel to the existing three pipelines at the west end of the pipelines ending at Tesla Portal. This project would provide additional facilities to upgrade the hydraulic capacity of the San Joaquin Pipeline system to 314 mgd (and a 271-mgd average during system maintenance when a pipeline segment must be taken out of service) and to provide redundancy for prestressed concrete cylinder pipe for reliability. Note: While the current preferred alternative would construct 16 miles of pipeline, as much as 22 miles of pipeline could be constructed depending on the results of a conditions assessment of the existing pipelines.
SJ-4	Rehabilitation of Existing San Joaquin Pipelines	Pipeline / Water Supply, Delivery Reliability	Rehabilitation could occur anywhere along the pipeline corridor, which extends from Oakdale Portal to Tesla Portal	Reconditioning/rehabilitation of the existing San Joaquin Pipelines. There are three existing pipelines, each 47.7 miles long, extending from Oakdale Portal to Tesla Portal: • SJPL-1, riveted steel pipe, 56- to 72-inch internal diameter • SJPL-2, reinforced concrete pipe and welded steel pipe, 61- to 62-inch internal diameter • SJPL-3, prestressed concrete cylinder pipe and welded steel pipe, 78-inch internal diameter

TABLE S.2 (Continued)
WSIP FACILITY IMPROVEMENT PROJECTS

No.[a]	Project Title	Principal Type of Facility/ Objectives[b]	Location of Preferred Project[c]	Project Description
San Joaquin Region (cont.)				
SJ-5	Tesla Portal Disinfection Station	Treatment / Water Quality, Seismic Reliability	Tesla Portal	This project includes the planning, design, and construction of new disinfection facilities for the Hetch Hetchy water supply. The project would replace and upgrade the existing disinfection facilities at the Tesla Portal Disinfection Facility to meet current seismic, safety/fire, and building code standards. The preferred project would include construction of: • New control building and storage room • Pump houses • Chemical storage tanks and feed equipment and sampling systems • Emergency generator, including primary and standby power supplies • Access road It should be noted that the design and location of the Advanced Disinfection project would affect the design and location of this project.
Sunol Valley Region				
SV-1	Alameda Creek Fishery Enhancement	Other / Water Supply, Sustainability	Structural Alternatives: Alameda Creek in Sunol Valley, downstream of Calaveras Dam	This project would recapture the water released as part of the Calaveras Dam project and return it back to the regional system for use. A number of structural and non-structural recovery alternatives are under consideration for this project, including: a water recapture facility downstream of the Sunol Valley WTP, conjunctive groundwater use, horizontal collector wells, or other groundwater recovery systems yet to be defined. Other alternative designs for this project could be developed. If a structural alternative involving construction of a recapture facility is selected, the recapture facility would be located at the downstream end of the reach of Alameda Creek between the lower Sunol Valley and the confluence with Arroyo de la Laguna. As an alternative to the recapture facility, the SFPUC may coordinate with other water agencies to develop and implement other means of recapturing fishery enhancement flows consistent with the 1997 CDFG MOU.
SV-2	Calaveras Dam Replacement	Storage / Water Supply, Delivery and Seismic Reliability	Sunol Valley, immediately downstream of existing dam and at the Alameda Creek Diversion Dam	This project would provide for the planning, design, and construction of a replacement dam at Calaveras Reservoir to meet seismic safety requirements. The new dam would provide for a reservoir with the same storage capacity as the original reservoir (96,800 acre-feet), but the replacement dam would be designed to accommodate enlargement of the dam in the future. The preferred project would include construction of: • New earthfill dam • New intake tower and new outlet valve for water releases for instream flow requirements • New or rehabilitated outlet works for seismic safety and improved operations and maintenance • New bypass structure at the Alameda Creek Diversion Dam As part of this project, Calaveras Reservoir and the proposed bypass structure at the diversion dam would be operated to release up to 6,300 acre-feet per year (5.5 mgd) of water to Alameda Creek in support of fisheries in compliance with the 1997 CDFG MOU. When flow is available in Alameda Creek, releases would be made through the proposed bypass structure at the Alameda Creek Diversion Dam and would be supplemented as necessary with releases from Calaveras Dam.

TABLE S.2 (Continued)
WSIP FACILITY IMPROVEMENT PROJECTS

No.[a]	Project Title	Principal Type of Facility/ Objectives[b]	Location of Preferred Project[c]	Project Description
SV-3	Additional 40-mgd Treated Water Supply	Treatment / Water Quality, Delivery Reliability	Sunol Valley WTP and pipeline to connect to the Alameda Siphons or Irvington Tunnel	This project would provide for the planning, design, and construction of an additional 40 mgd of treatment capacity at the Sunol Valley WTP. The project would increase the sustainable capacity of the Sunol Valley WTP to 160 mgd. The planning-level study would evaluate treatment operations protocol and an alternative treatment process. The project would include either retrofitting the existing facilities with a membrane treatment process or expanding the existing facilities with: • New flocculation and sedimentation system • Upgrade of existing filters or addition of three new filters and a new flow distribution chamber

TABLE S.2 (Continued)
WSIP FACILITY IMPROVEMENT PROJECTS

No.[a]	Project Title	Principal Type of Facility/ Objectives[b]	Location of Preferred Project[c]	Project Description
Sunol Valley Region (cont.)				
SV-3 (cont.)				• New filtered water and backwash piping Additionally, the project would include: • New chemical feed and piping system • Upgrade of the electrical supply system • Miscellaneous piping, valves, and mechanical and electrical work • Approximately two miles of 78-inch-diameter pipe to connect to the Alameda Siphons or Irvington Tunnel
SV-4	New Irvington Tunnel	Tunnel / Delivery and Seismic Reliability	Sunol Valley to Fremont, parallel to and just south of the existing Irvington Tunnel	This project would construct a new tunnel parallel to and just south of the existing Irvington Tunnel to convey water from the Hetch Hetchy system and the Sunol Valley WTP to the Bay Area. The new tunnel would be a redundant water transmission facility to the existing Irvington Tunnel. The preferred project would include construction of: • New 18,200-foot-long, 10-foot-diameter tunnel • New portal at the east end adjacent to the existing Alameda West Portal in the Sunol Valley with connections to the existing Alameda Siphons and proposed new siphon • New portal at the west end adjacent to the existing Irvington Portal in Fremont with connections to the existing Bay Division Pipelines and proposed new pipeline (Bay Division Pipeline Reliability Upgrade) • Valves and equipment to control and monitor flows • Modifications to the existing Alameda West and Irvington Portals
SV-5	SVWTP – Treated Water Reservoirs	Storage and Treatment / Delivery Reliability	North of the Sunol Valley WTP	This project would provide for the planning, design, and construction of new treated water storage reservoirs at the Sunol Valley WTP to comply with requirements of the California Department of Health Services. The preferred project would include construction of: • One 5-million-gallon chlorine contact basin • Two 8.75-million-gallon storage basins • New inlet and outlet piping and reservoir drainage system • Pipe bridge over Alameda Creek • Chemical (ammonia and chlorine) storage and feed system • Backup filter washwater supply and filter washwater supply system • Instrumentation and controls and miscellaneous pumping appurtenances to integrate the reservoirs into the existing treatment plant • Expansion of the existing Sunol Valley WTP electrical substation • Two 750-kilowatt diesel-powered emergency generators

TABLE S.2 (Continued)
WSIP FACILITY IMPROVEMENT PROJECTS

No.[a]	Project Title	Principal Type of Facility/ Objectives[b]	Location of Preferred Project[c]	Project Description
Sunol Valley Region (cont.)				
SV-6	San Antonio Backup Pipeline	Pipeline / Delivery and Seismic Reliability	Sunol Valley between San Antonio Reservoir and San Antonio Pump Station	This project would consist of three proposed facilities: (1) San Antonio Backup Pipeline, a new pipeline (size undetermined) from San Antonio Reservoir to San Antonio Pump Station, about two miles long; (2) San Antonio Creek discharge facilities (improvements allowing for the discharge of Hetch Hetchy water and associated road improvements); and (3) Alameda East Portal vent overflow pipeline and portal modifications.
Bay Division Region				
BD-1	Bay Division Pipeline Reliability Upgrade	Pipeline and Tunnel / Water Supply, Delivery and Seismic Reliability	Along existing Bay Division Pipelines Nos. 1 and 2 easement from Fremont to Redwood City	This project would construct a new Bay Division Pipeline No. 5 (BDPL No. 5) from Irvington Tunnel Portal in Fremont to Pulgas Tunnel Portal near Redwood City, consisting of 16 miles of new pipeline and 5 miles of tunnel under San Francisco Bay. Portions of the section of BDPL No. 1 between Edgewood Valve Lot and Pulgas Valve Lot would be removed (approximately 1.4 miles), and existing aboveground and submarine sections of BDPL Nos. 1 and 2 over the five-mile-long section from Newark Valve House to Ravenswood Valve House would be decommissioned (decommissioning is not part of this project). The redundancy provided by the project would increase the overall transmission capacity of the Bay Division Pipeline system. The preferred project would include construction of: • New welded-steel pipeline, approximately 72 inches in diameter, extending along the seven-mile reach from Irvington Portal to Newark Valve Lot, located within the existing SFPUC right-of-way of BDPL Nos. 1 and 2 • New “Bay Tunnel” segment of BDPL No. 5, approximately 120 inches in diameter, extending five miles from Newark Valve Lot to Ravenswood Valve Lot, crossing under San Francisco Bay and adjacent marshlands; BDPL Nos. 1 and 2 would tie into the tunnel at both ends and would be decommissioned between Newark and Ravenswood Valve Lots • New welded-steel pipeline, approximately 60 inches in diameter extending along the nine-mile reach from Ravenswood Valve Lot to Pulgas Portal, located within the existing SFPUC right-of-way of BDPL Nos. 1 and 2 • New facilities at eight valve vault lots along the alignment, containing new concrete vaults and control structures that house electrical control panels, isolation valves, mechanical equipment, and cross-connections between BDPL No. 5 and the existing Bay Division Pipelines • Two flow metering vaults at or near Mission Boulevard (in Fremont) and Pulgas Portal areas • New Isolation valves and piping for connecting BDPL No. 5 to Irvington and Pulgas Portals

TABLE S.2 (Continued)
WSIP FACILITY IMPROVEMENT PROJECTS

No.[a]	Project Title	Principal Type of Facility/ Objectives[b]	Location of Preferred Project[c]	Project Description
Bay Division Region (cont.)				
BD-2	BDPL Nos. 3 and 4 Crossovers	Valve House / Delivery and Seismic Reliability	Three locations adjacent to where BDPL Nos. 3 and 4 traverse Guadalupe River, Barron Creek, Bear Gulch Reservoir	This project would construct three additional crossover facilities along BDPL Nos. 3 and 4 to provide operational flexibility for maintenance or during emergencies. The new crossover facilities would reduce the length of pipe to be removed from service, either for maintenance or for emergencies, and would reduce the duration of outages. Each crossover facility would include construction of: • Four mainline valves and one cross-connect valve • Automatic controlled actuators • Discharge facilities to enable release of water that meets water quality discharge requirements within discrete pipeline segments to surface waters, either for maintenance or emergencies
BD-3	Seismic Upgrade of BDPL Nos. 3 and 4 at Hayward Fault	Pipeline / Seismic Reliability	Along existing BDPL Nos. 3 and 4 in Fremont	This project would provide for the planning, design, and construction of upgraded, seismically resistant sections of the BDPL Nos. 3 and 4 where they cross the Hayward fault. The replacement pipelines would be located between the two new crossover/isolation valves that would be built as part of BDPL Nos. 3 and 4 Crossover/Isolation Valve at Hayward Fault project (a WSIP project determined to be independent of the PEIR). In addition to the replacement pipelines, a new bypass pipeline between the two new crossover/isolation valve vaults could also be built as part of one of the several alternatives being considered for this project.
Peninsula Region				
PN-1	Baden and San Pedro Valve Lots Improvements	Valve House / Delivery and Seismic Reliability	Baden Valve Lot, South San Francisco, San Pedro Valve Lot, Daly City	This project would upgrade valve vaults, valves, and piping at the existing Baden and San Pedro Valve Lots to meet current seismic standards. Work could also be performed at the Pulgas Pump Station and Pulgas Valve Lot as part of transmission reliability. The project would include a new pressure-reducing valve at one of the locations to allow transfer of water between high and low pressure zones from the Harry Tracy WTP to the Peninsula under an emergency scenario.
PN-2	Crystal Springs/ San Andreas Transmission Upgrade	Pipeline / Delivery and Seismic Reliability	Lower Crystal Springs Reservoir to San Andreas Reservoir, including Crystal Springs Pump Station	This project would consist of seismic improvements of facilities that convey water from Crystal Springs Reservoir to the Harry Tracy WTP. This project would increase the transmission capacity of the existing raw water pipeline from Crystal Springs Reservoir to San Andreas Reservoir in order to reliably supply 140 mgd of raw water for treatment at the Harry Tracy WTP. The project would include: • Repair of Upper Crystal Springs Dam discharge culverts • Upgrade and repair of Lower Crystal Springs Dam outlet structures and tunnels conveying water to Crystal Springs Pump Station • Replacement or refurbishment of Crystal Springs Pump Station • Upgrade and repair of the chemical system and Crystal Springs chlorine emergency feed • Improvements to the Crystal Springs/San Andreas Pipeline, including replacement of approximately 1,350 feet of 66-inch-diameter pipeline, general renewal of the remaining pipeline, and addition of new manholes, blowoff valves, and isolation valves; or construction of a new redundant pipeline along a new alignment.

TABLE S.2 (Continued)
WSIP FACILITY IMPROVEMENT PROJECTS

No.[a]	Project Title	Principal Type of Facility/ Objectives[b]	Location of Preferred Project[c]	Project Description
Peninsula Region (cont.)				
PN-2 (cont.)				• Seismic and hydraulic upgrade and repair of San Andreas outlet facilities • Addition of fish screens on the outlet structures for both Crystal Springs and San Andreas Reservoirs • Repair of two pipelines that convey raw water from San Andreas Reservoir to the Harry Tracy WTP raw water pump station
PN-3	HTWTP Long-Term Improvements	Treatment / Water Quality, Delivery and Seismic Reliability	Harry Tracy WTP	This project would be a seismic retrofit and rehabilitation of the existing building and facility to provide long-term reliability and process improvements. The project would increase the sustained treatment capacity of the plant from 120 to 140 mgd for 60 days. The proposed improvements would include: • Replacement and upgrade of the ozone generation system for primary disinfection • Replacement or upgrade of the existing sedimentation basins at the same location • Improvements to sludge handling facilities • New, redundant pipeline from the treatment works to the finished water storage reservoir • Raw water pump station improvements • Upgrade and replacement of electrical and instrumentation components, including improvements to process and plant security facilities
PN-4	Lower Crystal Springs Dam Improvements	Storage / Water Supply and Delivery Reliability	Lower Crystal Springs Dam	This project would consist of major repairs and improvements to Lower Crystal Springs Dam to provide adequate protection of the dam and downstream areas from the probable maximum flood, as defined by the DSOD. DSOD has placed operational restrictions on the dam, and the capacity of the reservoir is limited to 56,800 acre-feet. The project would restore the historical reservoir capacity of 68,000 acre-feet. The project would be coordinated with San Mateo County, which is concurrently planning the replacement of the existing county bridge built above the crest of the dam. Project elements would include: • Lowering the existing parapet wall on either side of the existing spillway to lengthen the overflow weir (central spillway) from the reservoir • Raising the remaining parapet walls and adding two new spillway bays, one on each side of the existing central spillway • Enlarging the spillway stilling basin to accommodated the probable maximum flood • Installing four gates (with control building) or installing a fixed weir within the spillway to restore the historical storage capacity

TABLE S.2 (Continued)
WSIP FACILITY IMPROVEMENT PROJECTS

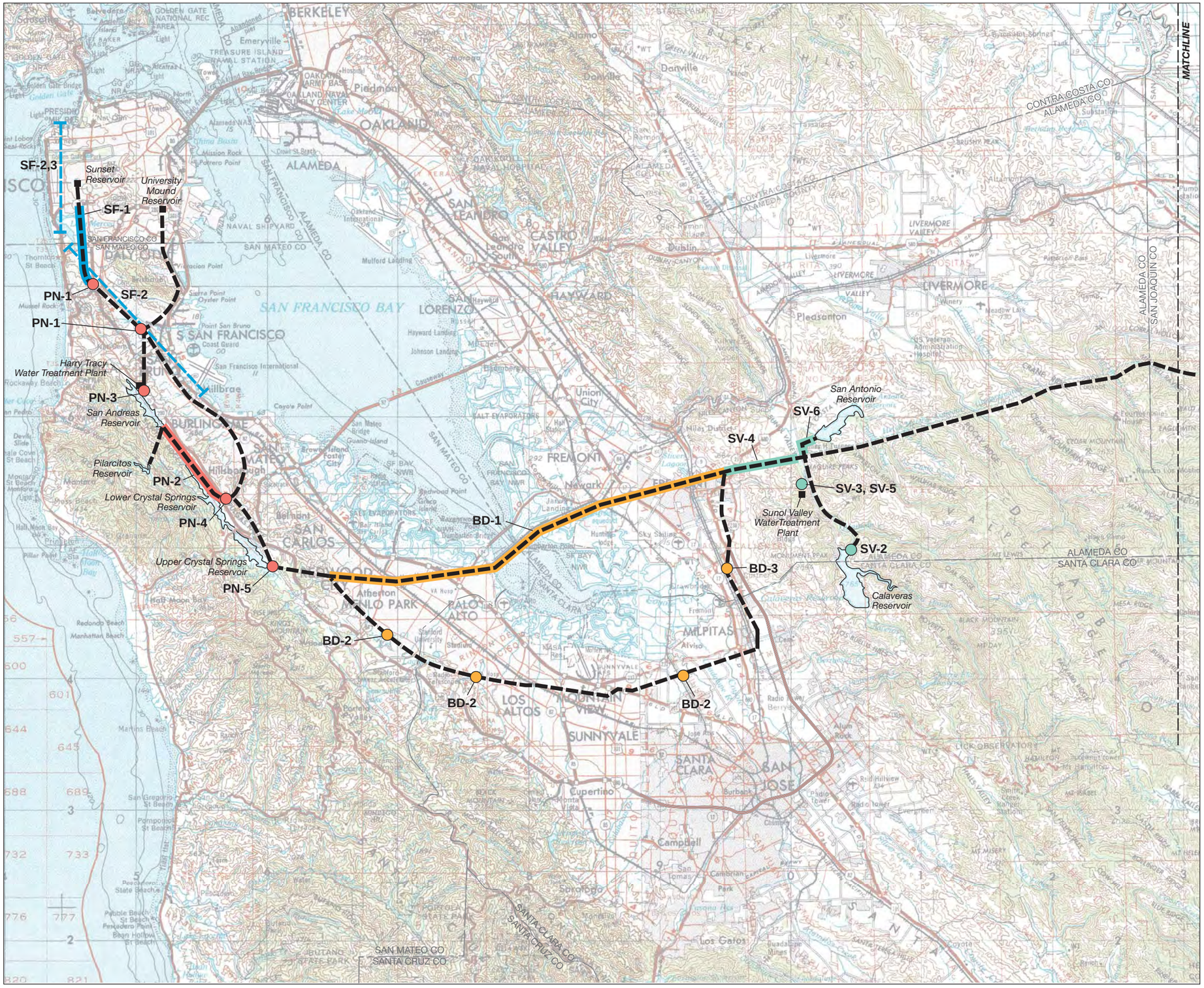
No.[a]	Project Title	Principal Type of Facility/ Objectives[b]	Location of Preferred Project[c]	Project Description
Peninsula Region (cont.)				
PN-5	Pulgas Balancing Reservoir Rehabilitation	Storage / Water Quality, Delivery and Seismic Reliability	Pulgas Balancing Reservoir and mouth of Laguna Creek at south end of Upper Crystal Springs Reservoir	This project would provide for the planning, design, and construction of improvements to the existing Pulgas Balancing Reservoir and associated facilities. The project would include: • Modifications to the inlet/outlet piping (Phase 1, currently under construction) • Design and construction to rehabilitate and/or expand the discharge channel to Crystal Springs Reservoir (or to install a parallel channel) (Phase 2) • Geotechnical investigations, design, and construction of recommended seismic improvements, including repair/replacement of the reservoir walls, floor, and roof (Phase 3) • Restoration of a six- to eight-acre sediment catchment basin in Laguna Creek to also serve as sustainable habitat for San Francisco garter snake and California red-legged frog, including culvert replacement, sediment removal, revegetation, and protective measures to avoid impacts on sensitive species (Phase 4) • Modification of the existing dechlorination process, including modifications to the chemical feed system to enable pH adjustment and dechlorination system to operate reliably (Phase 5)
San Francisco Region				
SF-1	San Andreas Pipeline No. 3 Installation	Pipeline / Delivery and Seismic Reliability	Daly City to San Francisco	This project would replace the out-of-service Baden-Merced Pipeline, which is beyond repair, and would construct a new pipeline extension of the existing San Andreas Pipeline No. 3 from San Pedro Valve Lot in Daly City to Merced Manor Reservoir in San Francisco. It would also connect the existing San Andreas Pipeline No. 2 at Sloat Boulevard in San Francisco and install an additional pipeline to serve the water turnouts along San Andreas Pipeline No. 2. The project would provide seismic reliability and system redundancy for Peninsula and San Francisco customers. The project would include: • New 3.8-mile-long, 36-inch-diameter pipeline • Approximately 0.27 mile of 36-inchdiameter pipeline for three connections between San Andreas Pipelines Nos. 2 and 3 • Removal of the Baden-Merced Pipeline where the new San Andreas Pipeline No. 3 alignment matches the Baden-Merced alignment • Less than 0.1 mile of 12- to 16-inch-diameter new pipeline for five branch connections to user turnouts (three turnouts to Daly City, two turnouts to San Francisco distribution lines) • Installation of line valves and vaults, manholes, cathodic protection and monitoring stations, sample taps, air valves, blowoffs, and other pipeline appurtenances
SF-2	Groundwater Projects	Other / Water Supply	West side of San Francisco and northern San Mateo County	This project includes three groundwater projects: Lake Merced, Local Groundwater, and Regional Groundwater. • The Lake Merced project would address raising the level of Lake Merced in San Francisco using a supplemental source of water, such as treated stormwater, recycled water, groundwater, or SFPUC system water.

TABLE S.2 (Continued)
WSIP FACILITY IMPROVEMENT PROJECTS

No.[a]	Project Title	Principal Type of Facility/ Objectives[b]	Location of Preferred Project[c]	Project Description
San Francisco Region (cont.)				
SF-2 (cont.)				• The Local Groundwater Projects would include development of 2 mgd of new local groundwater for blending with water in the potable water system in San Francisco. An estimated four wells and well stations would be constructed to develop this new local groundwater. This project would also include the use of an additional 2 mgd of groundwater through replacement of existing irrigation wells at the San Francisco Zoo, Golden Gate Park, and/or other locations, once recycled water were available for irrigation (to be developed under the Recycled Water Projects). Two existing wells would be modified to enable emergency supply to local residents in the event of a major earthquake or other disaster. This project would include the pipelines, water treatment equipment, and controls needed to add the groundwater to the municipal supply. The additional water supply developed under this project would be used during both nondrought and drought years. • As part of a regional conjunctive-use project, the SFPUC would construct about 10 new groundwater production wells in San Mateo County to develop about 6 mgd of potable groundwater for use as a supplemental drought-year supply. In nondrought years under this project, the SFPUC would provide potable water from the regional system to customers in Daly City, San Bruno, and South San Francisco to substitute for groundwater currently used for municipal purposes, thereby reducing groundwater pumping and allowing the groundwater basin to recharge naturally. In drought years, the groundwater would be available for local use to supplement the regional system water. This project would require agreements with the affected agencies see (Section 3.13).
SF-3	Recycled Water Projects	Other / Water Supply, Sustainability	Various locations on west side of San Francisco	This project includes recycled water projects in San Francisco and other locations. Projects include Westside Baseline and Harding Park/Lake Merced. This project would provide treatment, storage, and distribution facilities for about 4 mgd of recycled water to users on the west side of San Francisco. Primary users would include Golden Gate Park, Lincoln Park, Lincoln Park Golf Course, Harding Park Golf Course, San Francisco Zoo, Sunset Boulevard medians, and San Francisco State University. As described under Groundwater Projects, the SFPUC is also investigating appropriate sources of supply for increasing and maintaining Lake Merced lake levels, including recycled water that has undergone advanced treatment.

[a] The numbering system is consistent, to the extent possible, with that presented in the Notice of Preparation (NOP) regarding preparation of an environmental impact report on the WSIP issued in September 2005. However, due to a regrouping of the projects after publication of the NOP, some projects have been renumbered.
[b] General types of facilities. Objectives refer to the WSIP objectives met by each project; see Table S.1 for a complete description of WSIP goals and objectives.
[c] See Figure S.6 for the approximate locations of preferred projects; many of the projects are still in development, and the SFPUC may ultimately consider other design options.

SOURCE: SFPUC, 2006.



SFPUC WATER SYSTEM IMPROVEMENT PROGRAM, FACILITY IMPROVEMENT PROJECTS

SUNOL VALLEY REGION

- **SV-1** Alameda Creek Fishery Enhancement (not shown)
- **SV-2** Calaveras Dam Replacement
- **SV-3** Additional 40-mgd Treated Water Supply
- **SV-4** New Irvington Tunnel
- **SV-5** SVWTP – Treated Water Reservoirs
- **SV-6** San Antonio Backup Pipeline

BAY DIVISION REGION

- **BD-1** Bay Division Pipeline Reliability Upgrade
- **BD-2** BDPL Nos. 3 and 4 Crossovers (3 locations)
- **BD-3** Seismic Upgrade of BDPL Nos. 3 and 4 at Hayward Fault

PENINSULA REGION

- **PN-1** Baden and San Pedro Valve Lots Improvements (2 locations)
- **PN-2** Crystal Springs / San Andreas Transmission Upgrade
- **PN-3** HTWTP Long-Term Improvements
- **PN-4** Lower Crystal Springs Dam Improvements
- **PN-5** Pulgas Balancing Reservoir Rehabilitation

SAN FRANCISCO REGION

- **SF-1** San Andreas Pipeline No. 3 Installation
- **SF-2** Groundwater Projects (general geographic area indicated)
- **SF-3** Recycled Water Projects (general geographic area indicated)

- Existing System Corridor
- Existing System Facility
- Proposed Facility Corridor
- Proposed Facility Site
- Proposed Facility, General Location

0 5 Miles

SOURCE: ESA + Orion; SFPUC, 2006; USGS 1978

SFPUC Water System Improvement Program . 203287

Figure S.6a
Location of WSIP Facility Improvement Projects-
Sunol Valley, Bay Division, Peninsula,
and San Francisco Regions

SFPUC WATER SYSTEM IMPROVEMENT PROGRAM, FACILITY IMPROVEMENT PROJECTS

SAN JOAQUIN REGION

SJ-1 Advanced Disinfection
SJ-2 Lawrence Livermore Supply Improvements
SJ-3 San Joaquin Pipeline System
SJ-4 Rehabilitation of Existing San Joaquin Pipelines
SJ-5 Tesla Portal Disinfection Station

- Existing System Corridor
- Existing System Facility
- Proposed Facility Corridor
- Proposed Facility Site
- Proposed Facility, General Location

0 5
Miles

SOURCE: ESA + Orion; SFPUC, 2006; USGS 1969

SFPUC Water System Improvement Program . 203287

Figure S.6b
Location of WSIP Facility Improvement Projects-
San Joaquin Region

SFPUC WATER SYSTEM IMPROVEMENT PROGRAM, FACILITY IMPROVEMENT PROJECTS

- Existing System Corridor
- Existing System Facility
- Proposed Facility Corridor
- Proposed Facility Site
- Proposed Facility, General Location

NOTE: No WSIP facilities are proposed in this region.

0 5 Miles

SOURCE: ESA + Orion; SFPUC, 2006; USGS 1970

SFPUC Water System Improvement Program . 203287

Figure S.6c
Location of WSIP Facility Improvement Projects-
Hetch Hetchy Region

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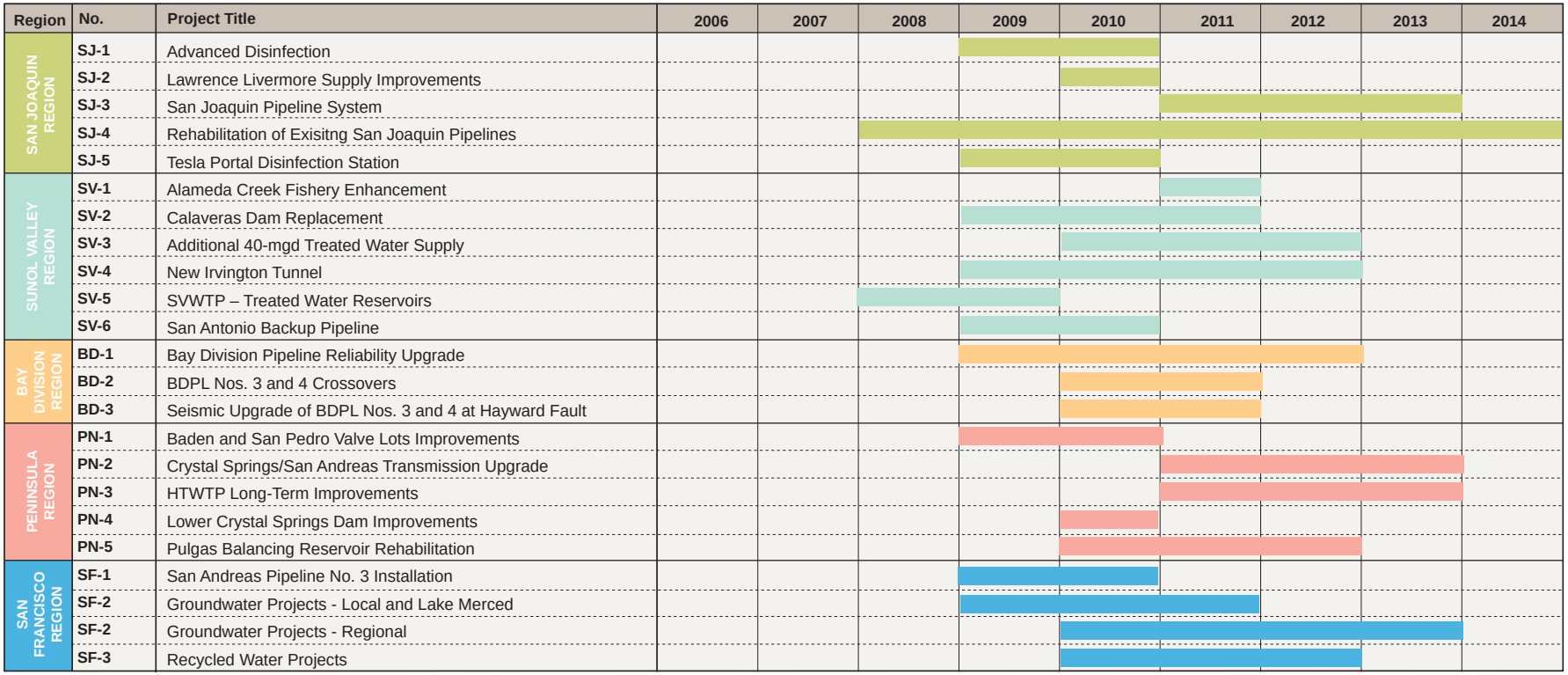

SOURCE: SFPUC, 2006

Figure S.7
Preliminary WSIP Construction Schedule

S.3 Environmental Effects (Chapters 4, 5, and 7)

Approach to Analyzing WSIP Facility Projects and Water Supply System Operations

The PEIR analysis of the environmental impacts of the WSIP is divided into three parts:

- Impacts Associated with Facility Improvement Projects (Chapter 4)
- Impacts Associated with Water Supply and System Operations (Chapter 5)
- Growth-Inducement Potential and Indirect Effects of Growth (Chapter 7)

Chapter 4 of this PEIR evaluates the major environmental effects of implementing proposed facility improvement projects from a broad perspective; this evaluation is a *program-level* analysis. While the SFPUC is aggressively developing the design, construction, and operation details of the projects included in the WSIP, these project details are not the focus of this PEIR. Instead, the PEIR frames the nature and magnitude of the expected environmental impacts associated with the proposed WSIP projects and identifies program mitigation measures to reduce the impacts of the projects as proposed. More detailed *project-level* analysis of individual facility improvement projects will be conducted separately, as required by CEQA.

In addition, Chapter 5 of this PEIR provides a *project-level* impact analysis of implementing the proposed water supply option through 2030. The chief environmental issues evaluated in the PEIR at a *project level* include:

- The effects of providing additional water to serve increasing customer purchase requests within the SFPUC service area (specifically, the effect of increasing the average annual water supply to serve customer purchase requests through 2030)

- The effects of using the proposed sources of water to serve the increased purchase requests through 2030 during both nondrought and drought periods

- The effects of proposed changes in system operations associated with implementing the proposed facility improvement projects and achieving the WSIP system performance objectives

The PEIR also evaluates the growth-inducement potential of the proposed WSIP—specifically, the proposal to serve increased customer purchase requests through 2030. The PEIR provides a comprehensive analysis of growth inducement for the WSIP as a whole and the secondary effects of growth; therefore, these issues do not need to be reevaluated during the environmental review of each individual WSIP facility improvement project.

Impact Significance Determinations

The level of significance of each impact was determined using significance criteria (thresholds) developed for each category of impacts. The following categories are used to describe impact significance:

Not Applicable (N/A). An impact is considered not applicable to a WSIP project if there is no potential for impacts or the environmental resource does not occur within the project area or the area of potential effect.

Beneficial (B). This determination applies to impacts that are beneficial for one or more environmental resource.

Less than Significant (LS). This determination applies if there is a potential for some limited impact, but not a substantial adverse effect that qualifies under the significance criteria as a significant impact.

Less than Significant with Program-Level Mitigation (LSM). This determination applies to the "collective" impact analysis only. The collective impact analysis is found in Chapter 4, Section 4.16, which presents the combined and overlapping effects of multiple WSIP facility projects.

Potentially Significant, Mitigatable (PSM). This determination applies if there is the potential for a substantial adverse effect that meets the significance criteria, but mitigation is available to reduce the impact to a less-than-significant level.

Potentially Significant, Unavoidable (PSU). This determination applies to impacts that are significant but for which there appears to be no feasible mitigation available to reduce the impacts to a less-than-significant level.

Significant Unavoidable (SU). This determination applies to impacts that are significant but for which there appears to be no feasible mitigation available to reduce the impact to a less-than-significant level.

Effects of the Facility Improvement Projects (Chapter 4)

Chapter 4 of this PEIR presents a program-level evaluation of the potential environmental impacts of constructing and operating each of the 22 regional WSIP facility improvement projects. It also evaluates the impacts associated with the combined and overlapping effects of multiple WSIP facility projects, referred to as "collective" impacts. In addition, Chapter 4 identifies the cumulative effects of implementing the WSIP facility improvement projects in combination with other past, present, and reasonably foreseeable future projects with similar impacts within the same regions. **Table S.3** lists the results of the impact assessment for each facility improvement project, by resource topic area. **Table S.4** summarizes the mitigation measures that will be implemented to avoid, minimize, or otherwise reduce significant impacts to a less-than-significant level for one or more of the facility improvement projects. The key impacts associated with implementation of the WSIP facility improvement projects are summarized below.

Facility Construction Effects

The major impacts associated with the facility improvement projects would occur primarily during the construction phase rather than during the operations phase. Although most construction impacts would be short term, they could pose significant effects. The construction of facility improvement projects could result in potential land use disruption, slope instability, water quality and flooding effects, disruption of sensitive habitats and impacts on special-status species, impacts on cultural resources, short-term traffic delays and impaired access along project roadways, local and regional degradation of air quality, short-term noise and vibration impacts, disruption of public utilities, effects on solid waste landfill capacity, temporary conflicts with recreational and agricultural uses, exposure to hazardous materials, and use of energy. These impacts would be mitigated to a less-than-significant level through implementation of the mitigation measures described in Chapter 6 of the PEIR, with the exception of the effects listed below. This PEIR makes a conservative determination that the effects listed below would be potentially significant and unavoidable. When more facility siting and construction information is available and MEA completes more detailed project-level CEQA review on the WSIP projects, it may be determined that these effects can be avoided or mitigated to a less-than-significant level.

- A ranch property in the Sunol Valley would be subject to 24-hour construction effects for the full duration of construction of the New Irvington Tunnel project, and such land use disruption is considered to be potentially significant and unavoidable even with implementation of traffic, noise, and air quality mitigation measures (Chapter 4, Section 4.3).

- Existing land uses could be displaced to accommodate proposed facilities at some locations under the following projects: San Joaquin Pipeline System, Additional 40-mgd Treated Water Supply, San Antonio Backup Pipeline, Bay Division Pipeline Reliability Upgrade, Crystal Springs/San Andreas Transmission Upgrade, Groundwater Projects, and Recycled Water Projects. Since final facility locations are undetermined, any possible permanent displacement of existing land uses is conservatively considered to be potentially significant and unavoidable in this PEIR (Chapter 4, Section 4.3).

- Removal of a large area of existing oak woodland cover as part of the Calaveras Dam Replacement project would permanently alter a scenic vista, a potentially significant and unavoidable impact (Chapter 4, Section 4.3).

- Alteration or demolition of existing facilities under the following projects could result in potentially significant and unavoidable impacts on the historical significance of individual facilities: Calaveras Dam Replacement, New Irvington Tunnel, Crystal Springs/ San Andreas Transmission Upgrade, and Lower Crystal Springs Dam Improvements (Chapter 4, Section 4.7).

- The Calaveras Dam Replacement and Crystal Springs/San Andreas Transmission Upgrade projects would result in potentially significant and unavoidable impacts on historic districts, if historic districts are determined to be present (Chapter 4, Section 4.7).

- Temporary construction-related noise impacts could occur under all facility improvement projects analyzed in the PEIR and would be potentially significant and unavoidable if excessive construction noise occurred in close proximity to sensitive receptors or audible construction noise occurred during the more noise-sensitive nighttime hours (Chapter 4, Section 4.10).

TABLE S.3
SUMMARY OF WSIP FACILITY CONSTRUCTION AND OPERATION IMPACTS

Impact	Advanced Disinfection SJ-1	Lawrence Livermore Supply Improvements SJ-2	San Joaquin Pipeline System SJ-3	Rehabilitation of Existing San Joaquin Pipelines SJ-4	Tesla Portal Disinfection Station SJ-5	Alameda Creek Fishery Enhancement SV-1	Calaveras Dam Replacement SV-2	Additional 40-mgd Treated Water Supply SV-3	New Irvington Tunnel SV-4	SVWTP – Treated Water Reservoirs SV-5	San Antonio Backup Pipeline SV-6	Bay Division Pipeline Reliability Upgrade BD-1	BDPL Nos. 3 and 4 Crossovers BD-2	Seismic Upgrade of BDPL Nos. 3 and 4 at Hayward Fault BD-3	Baden and San Pedro Valve Lots Improvements PN-1	Crystal Springs/San Andreas Transmission Upgrade PN-2	HTWTP Long-Term Improvements PN-3	Lower Crystal Springs Dam Improvements PN-4	Pulgas Balancing Reservoir Rehabilitation PN-5	San Andreas Pipeline No. 3 Installation SF-1	Groundwater Projects SF-2	Recycled Water Projects SF-3
Land Use and Visual Quality																						
Impact 4.3-1: Temporary disruption or displacement of existing land uses during construction.	LS	LS	PSM	PSM	LS	LS	LS	LS	PSU	LS	LS	PSM	PSM	LS	LS	LS	LS	LS	LS	PSM	PSM	PSM
Impact 4.3-2: Permanent displacement or long-term disruption of existing land uses.	LS	N/A	PSU	N/A	LS	N/A	N/A	PSU	LS	N/A	PSU	PSU	LS	N/A	N/A	PSU	N/A	N/A	N/A	N/A	PSU	PSU
Impact 4.3-3: Temporary construction impacts on scenic vistas or visual character.	LS	LS	LS	LS	LS	LS	LS	LS	LS	LS	LS	LS	LS	LS	LS	LS	LS	LS	LS	LS	LS	LS
Impact 4.3-4: Permanent adverse impacts on scenic vistas or visual character.	PSM	LS	LS	N/A	PSM	PSM	PSU	LS	PSM	LS	PSM	PSM	PSM	N/A	LS	PSM	PSM	PSM	PSM	PSM	PSM	PSM
Impact 4.3-5: New permanent sources of light glare.	PSM	PSM	PSM	PSM	PSM	PSM	PSM	PSM	PSM	PSM	PSM	PSM	PSM	PSM	PSM	PSM	PSM	PSM	PSM	PSM	PSM	PSM
Geology, Soils, and Seismicity																						
Impact 4.4-1: Slope instability during construction.	LS	PSM	N/A	N/A	LS	PSM	PSM	PSM	PSM	PSM	PSM	LS	N/A	N/A	LS	LS	PSM	LS	PSM	LS	PSM	PSM
Impact 4.4-2: Erosion during construction.	LS	LS	LS	LS	LS	LS	LS	LS	LS	LS	LS	LS	LS	LS	LS	LS	LS	LS	LS	LS	LS	LS
Impact 4.4-3: Substantial alteration of topography.	LS	LS	LS	LS	LS	LS	LS	LS	LS	LS	LS	LS	LS	LS	LS	LS	LS	LS	LS	LS	LS	LS
Impact 4.4-4: Squeezing ground and subsidence during tunneling.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	PSM	N/A	N/A	PSM	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Impact 4.4-5: Surface fault rupture.	LS	LS	LS	LS	LS	LS	LS	LS	LS	LS	LS	LS	LS	LS	LS	LS	LS	LS	LS	LS	LS	LS
Impact 4.4-6: Seismically induced groundshaking.	LS	LS	LS	LS	LS	LS	LS	LS	LS	LS	LS	LS	LS	LS	LS	LS	LS	LS	LS	LS	LS	LS
Impact 4.4-7: Seismically induced ground failure, including liquefaction and settlement.	LS	LS	LS	LS	LS	LS	LS	LS	LS	LS	LS	LS	LS	LS	LS	LS	LS	LS	LS	LS	LS	LS
Impact 4.4-8: Seismically induced landslides or other slope failures.	LS	LS	N/A	N/A	LS	LS	LS	LS	LS	LS	LS	LS	N/A	N/A	LS	LS	LS	LS	LS	LS	LS	LS
Impact 4.4-9: Expansive or corrosive soils.	PSM	PSM	PSM	PSM	PSM	PSM	PSM	PSM	PSM	PSM	PSM	PSM	PSM	PSM	PSM	PSM	PSM	PSM	PSM	PSM	PSM	PSM
Hydrology and Water Quality																						
Impact 4.5-1: Degradation of water bodies as a result of erosion and sedimentation or a hazardous materials release during construction.	LS	LS	LS	LS	LS	LS	LS	LS	LS	LS	LS	LS	LS	LS	LS	LS	LS	LS	LS	LS	LS	LS
Impact 4.5-2: Depletion of groundwater resources.	LS	N/A	LS	LS	LS	LS	LS	N/A	PSM	N/A	LS	LS	LS	LS	LS	LS	LS	LS	LS	LS	N/A	LS
Impact 4.5-3a: Degradation of water quality due to construction dewatering discharges.	LS	N/A	LS	LS	LS	LS	LS	N/A	LS	N/A	LS	LS	LS	LS	LS	LS	LS	LS	LS	LS	N/A	LS
Impact 4.5-3b: Degradation of water quality due to construction-related discharges of treated water.	LS	LS	LS	LS	LS	N/A	N/A	LS	LS	LS	LS	LS	LS	LS	N/A	N/A	LS	N/A	LS	LS	N/A	N/A
Impact 4.5-4: Flooding and water quality impacts associated with impeding or redirecting flood flows.	N/A	N/A	PSM	PSM	N/A	PSM	N/A	N/A	PSM	N/A	PSM	PSM	PSM	N/A	N/A	N/A	N/A	N/A	N/A	N/A	PSM	N/A
Impact 4.5-5: Degradation of water quality and increased flows due to discharges to surface water during operation.	N/A	N/A	LS	N/A	N/A	N/A	N/A	LS	N/A	LS	LS	LS	LS	N/A	N/A	LS	LS	N/A	LS	N/A	PSM	LS
Impact 4.5-6: Degradation of water quality as a result of alteration of drainage patterns or an increase in impervious surfaces.	LS	PSM	LS	LS	LS	LS	LS	LS	LS	LS	LS	LS	LS	LS	LS	LS	LS	LS	LS	LS	LS	LS

TABLE S.3 (Continued)
SUMMARY OF WSIP FACILITY CONSTRUCTION AND OPERATION IMPACTS

Impact	Advanced Disinfection SJ-1	Lawrence Livermore Supply Improvements SJ-2	San Joaquin Pipeline System SJ-3	Rehabilitation of Existing San Joaquin Pipelines SJ-4	Tesla Portal Disinfection Station SJ-5	Alameda Creek Fishery Enhancement SV-1	Calaveras Dam Replacement SV-2	Additional 40-mgd Treated Water Supply SV-3	New Irvington Tunnel SV-4	SVWTP – Treated Water Reservoirs SV-5	San Antonio Backup Pipeline SV-6	Bay Division Pipeline Reliability Upgrade BD-1	BDPL Nos. 3 and 4 Crossovers BD-2	Seismic Upgrade of BDPL Nos. 3 and 4 at Hayward Fault BD-3	Baden and San Pedro Valve Lots Improvements PN-1	Crystal Springs/San Andreas Transmission Upgrade PN-2	HTWTP Long-Term Improvements PN-3	Lower Crystal Springs Dam Improvements PN-4	Pulgas Balancing Reservoir Rehabilitation PN-5	San Andreas Pipeline No. 3 Installation SF-1	Groundwater Projects SF-2	Recycled Water Projects SF-3
Biological Resources																						
Impact 4.6-1: Impacts on wetlands and aquatic resources.	PSM	PSM	PSM	PSM	PSM	PSM	PSM	PSM	PSM	PSM	PSM	PSM	PSM	PSM	LS	PSM	LS	PSM	PSM	PSM	PSM	PSM
Impact 4.6-2: Impacts on sensitive habitats, common habitats, and heritage trees.	PSM	PSM	PSM	PSM	PSM	PSM	PSM	PSM	PSM	PSM	PSM	PSM	PSM	PSM	PSM	PSM	LS	PSM	PSM	PSM	PSM	PSM
Impact 4.6-3: Impacts on key special-status species – direct mortality and/or habitat effects.	PSM	PSM	PSM	PSM	PSM	PSM	PSM	PSM	PSM	PSM	PSM	PSM	PSM	PSM	PSM	PSM	LS	PSM	PSM	LS	LS	LS
Impact 4.6-4: Water discharge effects on riparian and/or aquatic resources.	LS	LS	PSM	PSM	LS	LS	LS	LS	PSM	LS	LS	PSM	PSM	LS	LS	LS	LS	LS	LS	N/A	N/A	N/A
Impact 4.6-5: Conflicts with adopted conservation plans or other approved biological resources plans.	N/A	N/A	PSM	PSM	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Cultural Resources																						
Impact 4.7-1: Impacts on paleontological resources.	PSM	LS	PSM	PSM	PSM	PSM	PSM	PSM	PSM	PSM	PSM	LS	LS	PSM	PSM	LS	PSM	LS	PSM	PSM	PSM	PSM
Impact 4.7-2: Impacts on archaeological resources.	PSM	PSM	PSM	PSM	PSM	PSM	PSM	PSM	PSM	PSM	PSM	PSM	PSM	PSM	PSM	PSM	PSM	PSM	PSM	PSM	PSM	PSM
Impact 4.7-3: Impacts on historical significance of a historic district or a contributor to a historic district.	PSM	N/A	PSM	PSM	N/A	N/A	PSU	N/A	PSM	N/A	PSM	PSM	PSM	PSM	N/A	PSU	N/A	PSM	N/A	PSM	N/A	N/A
Impact 4.7-4: Impacts on the historical significance of individual facilities resulting from demolition or alteration.	PSM	N/A	PSM	PSM	N/A	N/A	PSU	N/A	PSU	N/A	PSM	PSM	PSM	PSM	N/A	PSU	N/A	PSU	N/A	PSM	N/A	LS
Impact 4.7-5: Impacts on adjacent historic architectural resources.	LS	LS	PSM	PSM	PSM	LS	PSM	LS	PSM	LS	PSM	PSM	PSM	PSM	LS	PSM	LS	PSM	PSM	PSM	LS	PSM
Traffic, Transportation, and Circulation																						
Impact 4.8-1: Temporary reduction in roadway capacity and increased traffic delays.	LS	LS	PSM	PSM	LS	LS	PSM	LS	LS	LS	PSM	PSM	LS	PSM	LS	PSM	LS	PSM	PSM	PSM	PSM	PSM
Impact 4.8-2: Short-term traffic increases on roadways.	PSM	PSM	PSM	PSM	PSM	PSM	PSM	PSM	PSM	PSM	PSM	PSM	PSM	PSM	LS	PSM	PSM	PSM	PSM	PSM	LS	PSM
Impact 4.8-3: Impaired access to adjacent roadways and land uses.	LS	LS	PSM	PSM	LS	LS	PSM	LS	LS	LS	LS	PSM	PSM	PSM	LS	LS	LS	PSM	LS	PSM	PSM	PSM
Impact 4.8-4: Temporary displacement of on-street parking.	LS	LS	LS	PSM	LS	LS	LS	LS	LS	LS	LS	PSM	LS	PSM	LS	LS	LS	PSM	PSM	PSM	PSM	PSM
Impact 4.8-5: Increased traffic safety hazards during construction.	PSM	PSM	PSM	PSM	PSM	PSM	PSM	PSM	PSM	PSM	PSM	PSM	PSM	PSM	PSM	PSM	PSM	PSM	PSM	PSM	PSM	PSM
Impact 4.8-6: Long-term traffic increases during facility operation.	LS	LS	LS	LS	LS	N/A	N/A	LS	N/A	LS	N/A	LS	LS	LS	LS	LS	LS	LS	LS	N/A	LS	LS
Air Quality																						
Impact 4.9-1: Construction emissions of criteria pollutants.	PSM	PSM	PSM	PSM	PSM	PSM	PSM	PSM	PSM	PSM	PSM	PSM	PSM	PSM	LS	LS	LS	LS	LS	LS	LS	LS
Impact 4.9-2: Exposure to diesel particulate matter during construction.	LS	N/A	LS	LS	LS	LS	PSM	LS	LS	PSM	LS	PSM	LS	LS	LS	LS	LS	LS	LS	LS	LS	LS
Impact 4.9-3: Exposure to emissions (possibly including asbestos) from tunneling.	N/A	N/A	PSM	PSM	N/A	LS	N/A	LS	PSM	N/A	LS	PSM	N/A	PSM	N/A	PSM	N/A	N/A	N/A	PSM	PSM	PSM
Impact 4.9-4: Air pollutant emissions during project operation.	LS	LS	LS	LS	LS	LS	LS	LS	LS	LS	N/A	LS	LS	N/A	LS	LS	LS	LS	LS	LS	LS	LS
Impact 4.9-5: Odors generated during project operation.	LS	LS	N/A	N/A	LS	N/A	N/A	LS	N/A	LS	N/A	N/A	N/A	N/A	N/A	N/A	LS	N/A	N/A	LS	LS	LS
Impact 4.9-6: Secondary emissions at power plants.	LS	LS	LS	LS	LS	LS	LS	LS	LS	LS	LS	LS	LS	LS	LS	LS	LS	LS	LS	LS	LS	LS
Impact 4.9-7: Conflict with implementation of applicable regional air quality plans addressing criteria air pollutants and state goals for reducing greenhouse gas emissions.	LS	LS	LS	LS	LS	LS	LS	LS	LS	LS	LS	LS	LS	LS	LS	LS	LS	LS	LS	LS	LS	LS

TABLE S.3 (Continued)
SUMMARY OF WSIP FACILITY CONSTRUCTION AND OPERATION IMPACTS

Impact	Advanced Disinfection SJ-1	Lawrence Livermore Supply Improvements SJ-2	San Joaquin Pipeline System SJ-3	Rehabilitation of Existing San Joaquin Pipelines SJ-4	Tesla Portal Disinfection Station SJ-5	Alameda Creek Fishery Enhancement SV-1	Calaveras Dam Replacement SV-2	Additional 40-mgd Treated Water Supply SV-3	New Irvington Tunnel SV-4	SVWTP – Treated Water Reservoirs SV-5	San Antonio Backup Pipeline SV-6	Bay Division Pipeline Reliability Upgrade BD-1	BDPL Nos. 3 and 4 Crossovers BD-2	Seismic Upgrade of BDPL Nos. 3 and 4 at Hayward Fault BD-3	Baden and San Pedro Valve Lots Improvements PN-1	Crystal Springs/San Andreas Transmission Upgrade PN-2	HTWTP Long-Term Improvements PN-3	Lower Crystal Springs Dam Improvements PN-4	Pulgas Balancing Reservoir Rehabilitation PN-5	San Andreas Pipeline No. 3 Installation SF-1	Groundwater Projects SF-2	Recycled Water Projects SF-3
Noise and Vibration																						
Impact 4.10-1: Disturbance from temporary construction-related noise increases.	PSU	PSU	PSU	PSU	PSU	PSU	PSU	PSU	PSU	PSU	PSU	PSU	PSU	PSU	PSU	PSU	PSU	PSU	PSU	PSU	PSU	PSU
Impact 4.10-2: Temporary noise disturbance along construction haul routes.	PSU	N/A	PSU	PSU	PSU	LS	LS	LS	PSM	LS	LS	PSU	PSU	PSU	PSU	LS	PSU	LS	LS	PSU	PSU	PSU
Impact 4.10-3: Disturbance due to construction-related vibration.	LS	LS	PSU	PSU	LS	LS	LS	PSU	PSM	LS	LS	PSU	PSU	PSU	PSU	LS	LS	LS	LS	PSU	PSU	PSU
Impact 4.10-4: Disturbance due to long-term noise increases.	LS	LS	LS	N/A	LS	LS	N/A	LS	LS	LS	N/A	LS	N/A	N/A	LS	LS	LS	N/A	LS	N/A	LS	LS
Public Services and Utilities																						
Impact 4.11-1: Potential temporary damage to or disruption of existing regional or local public utilities.	LS	LS	PSM	LS	LS	PSM	PSM	PSM	PSM	LS	PSM	PSM	PSM	PSM	LS	PSM	LS	PSM	LS	PSM	PSM	PSM
Impact 4.11-2: Temporary adverse effects on solid waste landfill capacity.	PSM	PSM	PSM	PSM	PSM	PSM	PSM	PSM	PSM	PSM	PSM	PSM	PSM	PSM	PSM	PSM	PSM	PSM	PSM	PSM	PSM	PSM
Impact 4.11-3: Impacts related to compliance with statutes and regulations related to solid waste.	PSM	PSM	PSM	PSM	PSM	PSM	PSM	PSM	PSM	PSM	PSM	PSM	PSM	PSM	PSM	PSM	PSM	PSM	PSM	PSM	PSM	PSM
Impact 4.11-4: Impacts related to the relocation of utilities.	PSM	PSM	PSM	PSM	PSM	PSM	PSM	PSM	PSM	PSM	PSM	PSM	PSM	PSM	PSM	PSM	PSM	PSM	PSM	PSM	PSM	PSM
Recreational Resources																						
Impact 4.12-1: Temporary conflicts with established recreational uses during construction.	N/A	N/A	PSM	PSM	N/A	LS	LS	N/A	PSM	N/A	N/A	PSM	PSM	N/A	N/A	PSM	N/A	LS	LS	PSM	PSM	PSM
Impact 4.12-2: Conflicts with established recreational uses due to facility siting and project operation.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	PSM	PSM	PSM
Agricultural Resources																						
Impact 4.13-1: Temporary conflicts with established agricultural resources.	N/A	N/A	PSM	PSM	N/A	PSM	PSM	PSM	PSM	N/A	PSM	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Impact 4.13-2: Conversion of farmlands to nonagricultural uses.	N/A	N/A	PSM	N/A	N/A	N/A	LS	PSM	N/A	PSM	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Hazards																						
Impact 4.14-1: Potential to encounter hazardous materials in soil or and groundwater.	LS	LS	LS	PSM	LS	LS	LS	LS	LS	LS	LS	PSM	PSM	PSM	PSM	LS	LS	LS	LS	PSM	PSM	PSM
Impact 4.14-2: Exposure to naturally occurring asbestos.	N/A	N/A	N/A	N/A	N/A	N/A	LS	N/A	N/A	N/A	N/A	PSM	N/A	N/A	N/A	LS	N/A	LS	N/A	LS	LS	LS
Impact 4.14-3: Risk of fires during construction.	LS	LS	LS	LS	LS	LS	LS	LS	LS	LS	LS	LS	N/A	N/A	LS	LS	N/A	LS	LS	N/A	LS	LS
Impact 4.14-4: Gassy conditions in tunnels.	N/A	N/A	LS	LS	N/A	LS	N/A	LS	LS	N/A	LS	LS	N/A	LS	N/A	LS	N/A	N/A	N/A	LS	LS	LS
Impact 4.14-5: Exposure to hazardous building materials.	N/A	N/A	PSM	PSM	PSM	N/A	PSM	N/A	PSM	N/A	N/A	PSM	N/A	N/A	PSM	PSM	PSM	PSM	PSM	PSM	PSM	PSM
Impact 4.14-6: Accidental hazardous materials release from construction equipment.	LS	LS	LS	LS	LS	LS	LS	LS	LS	LS	LS	LS	LS	LS	LS	LS	LS	LS	LS	LS	LS	LS
Impact 4.14-7: Increased use of hazardous materials during operation.	LS	LS	LS	N/A	LS	N/A	N/A	LS	N/A	LS	N/A	LS	LS	N/A	LS	N/A	LS	LS	N/A	N/A	LS	LS
Impact 4.14-8: Emission or use of hazardous materials within 1/4 mile of a school.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	LS	LS	N/A	LS	N/A	LS	N/A	N/A	N/A	LS	LS

TABLE S.3 (Continued)
SUMMARY OF WSIP FACILITY CONSTRUCTION AND OPERATION IMPACTS

Impact	Advanced Disinfection SJ-1	Lawrence Livermore Supply Improvements SJ-2	San Joaquin Pipeline System SJ-3	Rehabilitation of Existing San Joaquin Pipelines SJ-4	Tesla Portal Disinfection Station SJ-5	Alameda Creek Fishery Enhancement SV-1	Calaveras Dam Replacement SV-2	Additional 40-mgd Treated Water Supply SV-3	New Irvington Tunnel SV-4	SVWTP – Treated Water Reservoirs SV-5	San Antonio Backup Pipeline SV-6	Bay Division Pipeline Reliability Upgrade BD-1	BDPL Nos. 3 and 4 Crossovers BD-2	Seismic Upgrade of BDPL Nos. 3 and 4 at Hayward Fault BD-3	Baden and San Pedro Valve Lots Improvements PN-1	Crystal Springs/San Andreas Transmission Upgrade PN-2	HTWTP Long-Term Improvements PN-3	Lower Crystal Springs Dam Improvements PN-4	Pulgas Balancing Reservoir Rehabilitation PN-5	San Andreas Pipeline No. 3 Installation SF-1	Groundwater Projects SF-2	Recycled Water Projects SF-3
Energy Resources																					
Impact 4.15-1: Construction-related energy use.	PSM	PSM	PSM	PSM	PSM	PSM	PSM	PSM	PSM	PSM	PSM	PSM	PSM	PSM	PSM	PSM	PSM	PSM	PSM	PSM	PSM
Impact 4.15-2: Long-term energy use during operation.	PSM	PSM	PSM	LS	PSM	PSM	N/A	PSM	N/A	PSM	N/A	PSM	PSM	PSM	N/A	PSM	PSM	N/A	N/A	PSM	PSM	PSM
Collective Facilities Impacts																					
Impact 4.16-1a: Collective temporary and permanent impacts on existing land uses in the vicinity of proposed facility sites.	N/A					N/A						PSU			LSM					N/A	
Impact 4.16-1b: Collective temporary and permanent impacts on the visual character of the surrounding area.	LSM					LS						LSM			LSM					LSM	
Impact 4.16-2: Collective exposure of people or structures to geologic and seismic hazards.	N/A					N/A						N/A			N/A					N/A	
Impact 4.16-3: Collective WSIP impacts related to the degradation of surface waters and flooding hazards.	LSM					LSM						LSM			LSM					LSM	
Impact 4.16-4: Collective loss of sensitive biological resources.	PSM					PSU						PSM			PSU					N/A	
Impact 4.16-5: Collective increase in impacts related to archaeological, paleontological, and historical resources.	LSM					PSU						LSM			PSU					N/A	
Impact 4.16-6: Collective traffic increases on local and regional roads.	PSM					PSM						PSM			PSM					PSM	
Impact 4.16-7: Collective increases in construction and/or operational emissions in the region.	PSM					PSM						LSM			LS					LS	
Impact 4.16-8: Collective increases in construction-related and operational noise.	PSU					PSM						PSU			PSU					PSU	
Impact 4.16-9: Collective impacts on utilities and landfill capacity.	N/A					N/A						N/A			N/A					N/A	
Impact 4.16-10: Collective effects on recreational resources during construction.	LSM					LSM						LSM			LSM					LSM	
Impact 4.16-11: Collective conversion of farmland to nonagricultural uses.	N/A					N/A						N/A			N/A					N/A	
Impact 4.16-12: Collective effects related to hazardous conditions and exposure to or release of hazardous materials.	LSM					LSM						LSM			LSM					LSM	
Impact 4.16-13: Collective increases in the use of nonrenewable energy resources.	LSM					LSM						LSM			LSM					LSM	
Cumulative Facilities Impacts																					
Impact 4.17-1: Cumulative disruption of established communities, changes in existing land use patterns, and impacts on the existing visual character.	LS																				
Impact 4.17-2: Cumulative exposure of people or structures to geologic and seismic hazards.	B/LS																				
Impact 4.17-3: Cumulative impacts related to the degradation of water quality, alteration of drainage patterns, increased surface runoff, and flooding hazards.	LS																				
Impact 4.17-4: Cumulative loss of sensitive biological resources	LS																				

TABLE S.3 (Continued)
SUMMARY OF WSIP FACILITY CONSTRUCTION AND OPERATION IMPACTS

Impact	Advanced Disinfection SJ-1	Lawrence Livermore Supply Improvements SJ-2	San Joaquin Pipeline System SJ-3	Rehabilitation of Existing San Joaquin Pipelines SJ-4	Tesla Portal Disinfection Station SJ-5	Alameda Creek Fishery Enhancement SV-1	Calaveras Dam Replacement SV-2	Additional 40-mgd Treated Water Supply SV-3	New Irvington Tunnel SV-4	SVWTP – Treated Water Reservoirs SV-5	San Antonio Backup Pipeline SV-6	Bay Division Pipeline Reliability Upgrade BD-1	BDPL Nos. 3 and 4 Crossovers BD-2	Seismic Upgrade of BDPL Nos. 3 and 4 at Hayward Fault BD-3	Baden and San Pedro Valve Lots Improvements PN-1	Crystal Springs/San Andreas Transmission Upgrade PN-2	HTWTP Long-Term Improvements PN-3	Lower Crystal Springs Dam Improvements PN-4	Pulgas Balancing Reservoir Rehabilitation PN-5	San Andreas Pipeline No. 3 Installation SF-1	Groundwater Projects SF-2	Recycled Water Projects SF-3
Cumulative Facilities Impacts (cont.)																						
Impact 4.17-5: Cumulative increase in impacts on archaeological, paleontological, and historical resources.	PSU																					
Impact 4.17-6: Cumulative traffic increases on local and regional roads.	PSU																					
Impact 4.17-7: Cumulative increases in construction and/or operational emissions in the region.	PSU																					
Impact 4.17-8: Cumulative increases in construction-related and operational noise.	PSU																					
Impact 4.17-9: Cumulative impacts related to disruption of utility service or relocation of utilities.	LS																					
Impact 4.17-10: Cumulative effects on recreational resources during construction.	LS																					
Impact 4.17-11: Cumulative conversion of farmland to nonagricultural uses.	LS																					
Impact 4.17-12: Cumulative effects related to hazardous conditions and exposure to or release of hazardous materials.	LS																					
Impact 4.17-13: Cumulative increases in the use of nonrenewable energy resources.	LS																					

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TABLE S.4
SUMMARY OF FACILITY MITIGATION MEASURES BY IMPACT

Impact	Mitigation Measure(s)
Impact 4.3-1: Temporary disruption or displacement of existing land uses during construction.	Traffic, Transportation, and Circulation Measures (4.8-1a and 4.8-1b); Air Quality Measures (4.9-1a thru 4.9-1d, 4.9-2a and 4.9-2b); Noise Measures (4.10-1a, 4.10-1b, 4.10-2a thru 4.10-2c, 4.10-3a thru 4.10-3c); and Recreational Resources Measure (4.12-1), described below.
Impact 4.3-2: Permanent displacement or long-term disruption of existing land uses.	**Measure 4.3-2, Facility Siting Studies:** Conduct project-specific facility siting studies for non-SFPUC land and implement these studies' recommendations to avoid or minimize impacts on existing land uses.
Impact 4.3-3: Temporary construction impacts on scenic vistas or visual character.	None required.
Impact 4.3-4: Permanent adverse impacts on scenic vistas or visual character.	**Measure 4.3-4a, Architectural Design:** Design permanent new, aboveground facilities to be compatible with existing visual character of the site and surrounding area. **Measure 4.3-4b, Landscaping Plans:** Prepare and implement landscaping plans to restore (recontour, revegetate, landscape) sites to preconstruction conditions. Monitor landscape plantings. **Measure 4.3-4c, Landscape Screens:** Include new plantings and landscape berms to screen views of new structures and equipment from scenic roads. **Measure 4.3-4d, Minimize Tree Removal:** Minimize or avoid the removal of trees that screen existing and proposed WSIP facility sites; implement tree replacement plan.
Impact 4.3-5: New permanent sources of light and glare.	**Measure 4.3-5, Reduce Lighting Effects:** Use cut-off shields and nonglare fixture design, direct lighting onsite and downward, prevent use of highly reflective building materials or finishes.
Impact 4.4-1: Slope instability during construction.	**Measure 4.4-1, Quantified Landslide Analysis:** Avoid sites with landslide hazards; where they cannot be avoided, conduct site-specific slope stability analyses and implement recommendations.
Impact 4.4-2: Erosion during construction.	None required.
Impact 4.4-3: Substantial alteration of topography.	None required.
Impact 4.4-4: Squeezing ground and subsidence during tunneling.	**Measure 4.4-4, Subsidence Monitoring Program:** Monitor subsidence and implement corrective actions as warranted.
Impact 4.4-5: Surface fault rupture.	None required.
Impact 4.4-6: Seismically induced groundshaking.	None required.
Impact 4.4-7: Seismically induced ground failure, including liquefaction and settlement.	None required.
Impact 4.4-8: Seismically induced landslides or other slope failures.	None required.
Impact 4.4-9: Expansive or corrosive soils.	**Measure 4.4-9, Characterize Extent of Expansive and Corrosive Soil:** Characterize presence of expansive/corrosive soils; implement recommendations.

[a] Mitigation measure text is summarized; please see Chapter 6 for details.
[b] The City and County of San Francisco (including the SFPUC, the Planning Department, and other City agencies and departments) would be responsible for implementing all mitigation measures; please see Chapter 6 for details.

TABLE S.4 (Continued)
SUMMARY OF FACILITY MITIGATION MEASURES BY IMPACT

Impact	Mitigation Measure(s)
Impact 4.5-1: Degradation of water bodies as a result of erosion and sedimentation or a hazardous materials release during construction.	None required.
Impact 4.5-2: Depletion of groundwater resources.	**Measure 4.5-2, Site-Specific Groundwater Analysis and Identified Measures:** Conduct project-specific analysis of dewatering and implement measures to ensure that groundwater resources beneficial uses of groundwater not adversely affected.
Impact 4.5-3a: Degradation of water quality due to construction dewatering discharges.	None required.
Impact 4.5-3b: Degradation of water quality due to construction-related discharges of treated water.	None required.
Impact 4.5-4: Flooding and water quality impacts associated with impeding or redirecting flood flows.	**Measure 4.5-4a, Flood Flow Protection Measures:** Preclude exposure of stockpiled soils, hazardous materials, and construction materials to flood flows. **Measure 4.5-4b, Site-Specific Flooding Analysis and Identified Measures:** Implement design measures to preclude projects from causing flooding or damage from redirected flood flows.
Impact 4.5-5: Degradation of water quality and increased flows due to discharges to surface water during operation.	**Measure 4.5-5**, **Stormwater Treatment and Groundwater Monitoring:** If treated stormwater is used to maintain Lake Merced water levels, monitor surface water and groundwater quality in the vicinity of Lake Merced. Identify and implement corrective actions (e.g., treatment).
Impact 4.5-6: Degradation of water quality as a result of alteration of drainage patterns or an increase in impervious surfaces.	**Measure 4.5-6, Appropriate Source Controls and Site Design Measures:** If a WSIP project will affect jurisdictional wetlands, implement source control and site design measures to ensure compliance with applicable water quality criteria and goals and protect the beneficial uses of the receiving water.
Impact 4.6-1: Impacts on wetlands and aquatic resources.	**Measure 4.6-1a, Wetlands Assessment:** Wetland scientist will determine whether wetlands could be affected by the project, and if so, perform a wetland delineation and develop mitigation. **Measure 4.6-1b, Compensation for Wetlands and Other Biological Resources:** If a WSIP project will affect jurisdictional wetlands, implement avoidance measures, restoration procedures, and compensatory creation or enhancement to ensure no net loss of wetland extent or function. Compensate for sensitive riparian and upland habitats supporting key special-status species. Obtain permits for each project and comply with applicable regulations addressing sensitive habitats and species. The Habitat Reserve Program is an alternative for implementing offsite habitat compensation.
Impact 4.6-2: Impacts on sensitive habitats, common habitats, and heritage trees.	Biological Resources Measure 4.6-1b, described above. **Measure 4.6-2, Habitat Restoration/Tree Replacement:** Restore temporarily affected sensitive habitats. Replace trees designated as heritage trees (or similar local designation) consistent with requirements of local ordinances. Minimize loss of sensitive habitats by coordinating WSIP projects.

[a] Mitigation measure text is summarized; please see Chapter 6 for details.
[b] The City and County of San Francisco (including the SFPUC, the Planning Department, and other City agencies and departments) would be responsible for implementing all mitigation measures; please see Chapter 6 for details.

TABLE S.4 (Continued)
SUMMARY OF FACILITY MITIGATION MEASURES BY IMPACT

Impact	Mitigation Measure(s)
Impact 4.6-3: Impacts on key special-status species – direct mortality and/or habitat effects.	Biological Resources Measure 4.6-1b, described above. **Measure 4.6-3a, Protection Measures During Construction for Key Special-Status Species and Other Species of Concern:** Where key special-status species and other species of concern are potentially present, implement general practice measures (preconstruction surveys, worker awareness program, environmental inspector, minimization of habitat loss). **Measure 4.6-3b, Standard Mitigation Measures for Key Special-Status Plants and Animals:** Implement measures to reduce impacts on key special-status species.
Impact 4.6-4: Water discharge effects on riparian and/or aquatic resources.	**Measure 4.6-4, Pipeline and Water Treatment Plant Treated Water Discharge Restrictions:** Design planned discharges from the WSIP pipelines and water treatment plants to natural water bodies to minimize impacts on riparian and aquatic resources and to avoid or minimize temperature effects on aquatic resources.
Impact 4.6-5: Conflicts with adopted conservation plans or other approved biological resources plans.	Biological Resources Measures 4.6-1a, 4.6-1b, 4.6-2, 4.6-3a, and 4.6-3b, described above.
Impact 4.7-1: Impacts on paleontological resources.	**Measure 4.7-1, Suspend Construction Work if Paleontological Resource is Identified:** Suspend work and notify a qualified paleontologist when a paleontological resource is discovered at any of the project sites. The paleontologist will document the discovery as needed, evaluate the potential resource, and assess the significance of the find under CEQA criteria. Temporarily halt or divert excavation within 50 feet of a fossil find until the discovery is examined by a paleontologist. If avoidance is not feasible, the paleontologist will prepare an excavation plan.
Impact 4.7-2: Impacts on archaeological resources.	**Measure 4.7-2a, Archaeological Testing, Monitoring, and Treatment of Human Remains:** Determine if implementation of an archeological testing or archaeological monitoring program or both is the appropriate strategy for avoidance of potential adverse effects on significant archaeological resources. Review any requirements approved by the State Historic Preservation Officer. Prepare an archeological testing plan, an archeological monitoring plan, final archeological resources report and, if applicable, a archeological data recovery plan. The treatment of human remains and of associated or unassociated funerary objects discovered during any soil-disturbing activity will comply with applicable state laws. **Measure 4.7-2b, Accidental Discovery Measures:** Distribute archaeological resource "ALERT" to contractors. If an archeological resource may be present within the project site, an archeological consultant will evaluate it and make a recommendation as to what action (e.g., preservation in situ) is warranted. The project sponsor will implement appropriate measures.

[a] Mitigation measure text is summarized; please see Chapter 6 for details.
[b] The City and County of San Francisco (including the SFPUC, the Planning Department, and other City agencies and departments) would be responsible for implementing all mitigation measures; please see Chapter 6 for details.

TABLE S.4 (Continued)
SUMMARY OF FACILITY MITIGATION MEASURES BY IMPACT

Impact	Mitigation Measure(s)
Impact 4.7-3: Impacts on historical significance of a historic district or a contributor to a historic district.	Cultural Resources Measures 4.7-4a thru 4.7-4f, described below. **Measure 4.7-3, Protection of Historic Districts:** A qualified historian will assess the city's water system facilities affected by WSIP facility projects for their potential contribution to a historic district. If a historic district would be affected by one or more proposed WSIP facility projects, develop and implement mitigation measures for effects with attention to the potential district as a whole. Should a historic district be identified at the project level, it should be recorded as such, using National/California Register criteria of significance. Document the district by completing the State of California Department of Parks and Recreation 523 forms and submit to the State Historic Preservation Officer.
Impact 4.7-4: Impacts on the historical significance of individual facilities resulting from demolition or alteration.	**Measure 4.7-4a, Alternatives Identification and Resource Relocation:** Identify feasible project alternatives to eliminate or reduce the need for demolition or removal of a historic resource to the greatest extent possible. If preservation of the affected historical resource at the current site is determined to be infeasible, the structure will, if feasible, be stabilized and relocated to other appropriate nearby sites. After relocation, the resource will be treated according to the Secretary of the Interior's *Standards for the Treatment of Historic Properties.* If the affected historical resource is to be demolished, consult with local historical societies and governmental agencies regarding salvage of materials for public information or reuse in other locations. **Measure 4.7-4b, Historical Resources Documentation:** Prepare documentation of historical resources prior to any construction work associated with demolition or removal. The appropriate level of documentation will be selected by a qualified professional who meets the standards for history, architectural history, and/or architecture (as appropriate) set forth by the Secretary of the Interior's *Professional Qualification Standards* (36 CFR 61) in consultation with a preservation specialist assigned by the San Francisco Planning Department and the local jurisdiction, if deemed appropriate by the Planning Department. **Measure 4.7-4c, Secretary of the Interior's Standards for Treatment of Historic Properties:** Prepare materials describing and depicting the proposed project. Review the proposed project for compliance with the Secretary of the Interior's *Standards for the Treatment of Historic Properties*. If a project is determined to be inconsistent with the *Standards for the Treatment of Historic Properties*, pursue and implement redesign of the project such that consistency with the standards is achieved. **Measure 4.7-4d, Historic Resources Survey and Redesign:** Undertake a historic resources survey to identify and evaluate potential historical resources that may exist in the project's area of potential effect. If a survey identifies one or more historical resources, assess the impact the project may have on those historical

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TABLE S.4 (Continued)
SUMMARY OF FACILITY MITIGATION MEASURES BY IMPACT

Impact	Mitigation Measure(s)
Impact 4.7-4 (cont.)	resources. If the project will cause a substantial adverse change to a historical resource, assign a preservation specialist to review the proposed project, for compliance with the Secretary of the Interior's *Standards for the Treatment of Historic Properties*. If the project is determined to be inconsistent with those standards, pursue and implement redesign of the project such that consistency with the standards is achieved. **Measure 4.7-4e, Historic Resources Protection Plan:** A qualified historian will prepare a plan that specifies procedures for protecting and monitoring historical resources during construction. **Measure 4.7-4f, Preconstruction Surveys and Vibration Monitoring:** Include geotechnical investigations if vibration-related impacts could affect historical resources. Follow recommendations of the final geotechnical reports. Conduct a preconstruction survey of existing conditions and monitor the adjacent buildings for damage during construction, if recommended.
Impact 4.7-5: Impacts on adjacent historic architectural resources.	Cultural Resources Measures 4.7-4a thru 4.7-4f, described above.
Impact 4.8-1: Temporary reduction in roadway capacity and increased traffic delays.	**Measure 4.8-1a, Traffic Control Plan Measures:** Elements of the traffic control plan could include: circulation and detour plans, designated truck routes, sufficient staging area, access to driveways, use of standard construction specifications for controlling construction vehicle movements, restrictions on truck trips during peak morning and evening commute hours, lane closure restrictions, maintenance of alternate one-way traffic flow, detour signing, pedestrian and bicycle access and circulation, equipment and materials storage, construction worker parking, roadside safety protocols, considerations for sensitive land uses, coordination with local transit service providers, roadway repair, conformance with the *California Manual on Uniform Traffic Control Devices for Streets and Highways: Part 6 Temporary Traffic Control and Caltrans' 2006 Standard Plans*. **Measure 4.8-1b, Coordination of Individual Traffic Control Plans:** In the event that more than one construction contract is issued for work along existing or new pipelines, and where construction could occur within and/or across multiple streets in the same vicinity, coordinate the traffic control plans in order to mitigate the impact of traffic disruption by including measures that address overlapping construction schedules and activities, truck arrivals and departures, lane closures and detours, and the adequacy of on-street staging requirements.
Impact 4.8-2: Short-term traffic increases on roadways.	Traffic, Transportation, and Circulation Measures 4.8-1a and 4.8-1b, described above.
Impact 4.8-3: Impaired access to adjacent roadways and land uses.	Traffic, Transportation, and Circulation Measure 4.8-1a, described above.

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TABLE S.4 (Continued)
SUMMARY OF FACILITY MITIGATION MEASURES BY IMPACT

Impact	Mitigation Measure(s)
Impact 4.8-4: Temporary displacement of on-street parking.	Traffic, Transportation, and Circulation Measure 4.8-1a, described above. **Measure 4.8-4, Accommodation of Displaced Public Parking Supply for Recreational Visitors:** Include an additional measure in the traffic control plans to accommodate any anticipated visitor parking demand that would be displaced by proposed projects at public recreational facilities.
Impact 4.8-5: Increased traffic safety hazards during construction.	Traffic, Transportation, and Circulation Measure 4.8-1a, described above.
Impact 4:8-6: Long-term traffic increases during facility operation.	None required.
Impact 4.9-1: Construction emissions of criteria pollutants.	**Measure 4.9-1a, SJVAPCD Dust Control Measures:** Include San Joaquin Valley Air Pollution Control District (SJVAPCD) Basic Control Measures in contract specifications for all construction sites. Include SJVAPCD Enhanced Control Measures in contract specifications when required to mitigate significant PM_{10} impacts. Include SJVAPCD Additional Control Measures in contract specifications for construction sites that are large in area, located near sensitive receptors, or which for any other reason warrant additional emissions reductions. Include SJVAPCD Rule 9510, Indirect Source Review, Section 6.1, Construction Equipment Emissions in contract specifications for any project subject to discretionary approval by a public agency that ultimately results in the construction of a new building, facility, or structure or reconstruction of a building, facility, or structure for the purpose of increasing capacity or activity and also involving 9,000 square feet of space. **Measure 4.9-1b, SJVAPCD Exhaust Control Measures:** Include SJVAPCD Exhaust Control Measures in contract specifications, where applicable, for heavy-duty equipment to limit exhaust emissions within the San Joaquin Region. **Measure 4.9-1c, BAAQMD Dust Control Measures:** For projects in the Sunol Valley, Bay Division, Peninsula, and San Francisco Regions, include Bay Area Air Quality Management District (BAAQMD) Basic Control Measures in contract specifications for all construction sites. Include BAAQMD Enhanced Control Measures in contract specifications for sites over four acres. Include BAAQMD Optional Control Measures in contract specifications for sites that are large in area, located near sensitive receptors, or which for any other reason warrant additional emissions reductions. **Measure 4.9-1d, BAAQMD Exhaust Control Measures:** For projects in the Sunol Valley, Bay Division, Peninsula, and San Francisco Regions, include BAAQMD Exhaust Control Measures to limit exhaust emissions, where applicable.

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TABLE S.4 (Continued)
SUMMARY OF FACILITY MITIGATION MEASURES BY IMPACT

Impact	Mitigation Measure(s)
Impact 4.9-2: Exposure to diesel particulate matter during construction.	**Measure 4.9-2a, Health Risk Screening or Use of Soot Filters:** Complete a health risk screening if truck volumes associated with a particular project along a particular haul route exceed 40,000 truck trips over the entire construction period. If a potentially significant impact is indicated, complete a site-specific health risk assessment. Consider diesel particulate matter (DPM) emission rates in separate project-level analysis at the time of construction. Develop a mitigation program based on the site-specific health risk assessment implementing methods of reducing DPM emission or exposure to a less-than-significant level. **Measure 4.9-2b, Vacate SFPUC Land Managers' Residences in Sunol Valley:** Vacate the two SFPUC Land Managers' residences in the Sunol Valley during construction of the Calaveras Dam or SVWTP – Treated Water Reservoirs projects or complete a health risk screening (and, if warranted, a health risk assessment) to determine health risks at these residences from either of these two projects.
Impact 4.9-3: Exposure to emissions (possibly including asbestos) from tunneling.	**Measure 4.9-3, Tunnel Gas Odor Control:** Add water scrubbers and appropriate chemicals to tunnel ventilation systems if odorous gases become a nuisance odor problem (i.e., odor complaints are received).
Impact 4.9-4: Air pollutant emissions during project operation.	None required.
Impact 4.9-5: Odors generated during project operation.	None required.
Impact 4.9-6: Secondary emissions at power plants.	None required.
Impact 4.9-7: Conflict with implementation of applicable regional air quality plans addressing criteria air pollutants and state goals for reducing greenhouse gas emissions.	None required.
Impact 4.10-1: Disturbance from temporary construction-related noise increases.	**Measure 4.10-1a, Noise Controls:** For all WSIP projects located within 500 feet of any noise-sensitive receptors, implement appropriate noise controls to reduce daytime construction noise levels to meet the 70-dBA daytime speech interference criterion to the extent feasible. For all WSIP projects involving nighttime construction and located within 3,000 feet of any noise-sensitive receptors, implement appropriate noise controls to maintain noise levels at or below any applicable ordinance nighttime noise limits or the 50-dBA nighttime sleep interference criterion to the extent feasible. **Measure 4.10-1b, Vacate SFPUC Caretaker's Residence at Tesla Portal:** Vacate caretaker's residence at Tesla Portal during construction of the Advanced Disinfection and Tesla Portal Disinfection Station projects as well as those portions of the San Joaquin Pipeline System and Rehabilitation of Existing San Joaquin Pipelines projects located at Tesla Portal.
Impact 4.10-2: Temporary noise disturbance along construction haul routes.	**Measure 4.10-2a, Limit Hourly Truck Volumes:** Haul and delivery truck routes for all WSIP projects will, to the extent feasible, avoid local residential streets and follow local designated truck routes. Total project-related haul and delivery truck volumes on any particular haul truck route will be limited to 80 trucks per hour.

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TABLE S.4 (Continued)
SUMMARY OF FACILITY MITIGATION MEASURES BY IMPACT

Impact	Mitigation Measure(s)
Impact 4.10-2 (cont.)	**Measure 4.10-2b, Restrict Truck Operations:** Prohibit haul and delivery trucks from operating within 200 feet of any residential uses during the nighttime hours. For receptors beyond 200 feet from a haul route, limit noise levels to the 50-dBA sleep interference criterion at the closest receptor. **Measure 4.10-2c, Vacate SFPUC Land Manager's Residence:** Vacate Land Manager's residence adjacent to Alameda East Portal during offsite truck operations associated with the New Irvington Tunnel project, if truck operations occur during the nighttime hours (10 p.m. to 7 a.m.) and are estimated to exceed the 50-dBA sleep interference criterion at this residence.
Impact 4.10-3: Disturbance due to construction-related vibration.	**Measure 4.10-3a, Vibration Controls to Prevent Cosmetic or Structural Damage:** Incorporate restrictions into all contract specifications (primarily for sheetpile driving, pile driving, or tunnel construction activities), whereby surface vibration will be limited to 0.2 in/sec peak particle velocity (PPV) for continuous vibration (e.g., vibratory equipment and impact pile drivers) and 0.5 in/sec PPV for controlled detonations at the closest receptors to ensure that cosmetic or structural damage does not occur. **Measure 4.10-3b, Limit Vibration Levels at or Below Vibration Perception Threshold:** Maintain vibration levels at or below the vibration perception threshold at adjacent properties to the extent feasible during nighttime. If vibration complaints are received, operational adjustments will be made to reduce vibration annoyance effects. **Measure 4.10-3c, Limit Tunnel-Related Detonation to Daylight Hours:** Limit controlled detonation associated with tunnel construction to daylight hours, Monday through Saturday.
Impact 4.10-4: Disturbance due to long-term noise increases.	None required.
Impact 4.11-1: Potential temporary damage to or disruption of existing regional or local public utilities.	**Measure 4.11-1a, Notify Neighbors of Potential Utility Service Disruption:** Notify residents and businesses in project area of potential utility service disruption two to four days in advance of construction. **Measure 4.11-1b, Locate Utility Lines Prior to Excavation:** Locate overhead and underground utility lines prior to excavation work. **Measure 4.11-1c, Confirmation of Utility Line Information:** Find the exact location of underground utilities by safe and acceptable means. Confirm information regarding the size, color, and location of existing utilities before construction activities commence. **Measure 4.11-1d, Safeguard Employees from Potential Accidents Related to Underground Utilities:** While any excavation is open, protect, support, or remove underground utilities as necessary to safeguard employees.

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TABLE S.4 (Continued)
SUMMARY OF FACILITY MITIGATION MEASURES BY IMPACT

Impact	Mitigation Measure(s)
Impact 4.11-1 (cont.)	**Measure 4.11-1e, Notify Local Fire Departments:** 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. **Measure 4.11-1f, Emergency Response Plan:** Develop an emergency response plan in the event of a leak or explosion prior to commencing construction activities.
	Measure 4.11-1g, Prompt Reconnection of Utilities: Promptly reconnect any disconnected utility lines. **Measure 4.11-1h, Coordinate Final Construction Plans with Affected Utilities:** Coordinate final construction plans and specifications with affected utilities.
Impact 4.11-2: Temporary adverse effects on solid waste landfill capacity.	**Measure 4.11-2, Waste Reduction Measures:** Incorporate into contract specifications for each WSIP project the requirement to obtain any necessary waste management permits prior to construction and to comply with conditions of approval attached to project implementation.
Impact 4.11-3: Impacts related to compliance with statutes and regulations related to solid waste.	Public Services and Utilities Measure 4.11-2, described above.
Impact 4.11-4: Impacts related to the relocation of utilities.	Public Services and Utilities Measures 4.11-1a thru 4.11-1h, described above.
Impact 4.12-1: Temporary conflicts with established recreational uses during construction.	Traffic, Transportation, and Circulation Measures (4.8-1a and 4.8-1b); Air Quality Measures (4.9-1a, 4.9-1b, 4.9-2a, 4.9-2b); and Noise Measures (4.10-1a, 4.10-1b, 4.10-2a thru 4.10-2c, and 4.10-3a thru 4.10-3b), described above. **Measure 4.12-1, Coordination with Golf Course/Recreational Facility Managers:** Coordinate with managers of golf courses or other recreational facilities directly affected by pipeline construction to minimize adverse impacts on golfers and other recreational users.
Impact 4.12-2: Conflicts with established recreational uses due to facility siting and project operation.	Land Use and Visual Quality Measures 4.3-4a thru 4.3-4d, described above. **Measure 4.12-2, Appropriate Siting of Proposed Facilities:** Locate WSIP project facilities on park and recreation properties in consultation with park planning staff to minimize the direct loss of recreation and play space and to minimize inconvenience to park and recreation users.
Impact 4.13-1: Temporary conflicts with established agricultural resources.	Traffic, Transportation, and Circulation Measures (4.8-1a and 4.8-1b); Air Quality Measures (4.9-1a thru 4.9-1d, and 4.9-2a and 4.9-2b); and Noise Measures (4.10-1a, 4.10-b, 4.10-2a thru 4.10-2c, and 4.10-3a thru 4.10-3c), described above. **Measure 4.13-1a, Supplemental Noticing and Soil Stockpiling:** For the San Joaquin Pipeline projects (San Joaquin System and Rehabilitation of Existing San Joaquin Pipeline), stockpile and replace topsoil in mapped areas of Prime and Unique Farmland and Farmland of Statewide Importance that would be temporarily disturbed by pipeline construction, unless other actions are required under specific agreements with individual landowners.

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TABLE S.4 (Continued)
SUMMARY OF FACILITY MITIGATION MEASURES BY IMPACT

Impact	Mitigation Measure(s)
Impact 4.13-1 (cont.)	**Measure 4.13-1b, Avoidance or Soil Stockpiling:** Minimize any potential impacts on agricultural lands in the Sunol Valley by avoiding these resources wherever possible. Where this is not possible, stockpile, replace, and hydroseed topsoil to prevent erosion, unless other actions are required as a result of contracts affecting use of the property or under specific agreements with individual landowners.
Impact 4.13-2: Conversion of farmlands to non-agricultural uses.	**Measure 4.13-2, Siting Facilities to Avoid Prime Farmland:** Avoid areas identified as Prime Farmland, Unique Farmland, or Farmland of Statewide Importance. If avoidance is not feasible, adopt a permanent set-aside for an equivalent acreage of similarly valued farmland in the area.
Impact 4.14-1: Potential to encounter hazardous materials in soil and groundwater.	**Measure 4.14-1a, Site Health and Safety Plan:** For all projects where the site assessment indicates the potential to encounter hazardous materials, prepare a site health and safety plan identifying the chemicals present, potential health and safety hazards, monitoring, soils-handling methods, appropriate personnel protective equipment, and emergency response procedures. **Measure 4.14-1b, Materials Disposal Plan:** For all projects where the site assessment indicates the potential to encounter hazardous materials in the soil, prepare a materials disposal plan that specifies the disposal method and approved disposal site for the soil. **Measure 4.14-1c, Coordination with Property Owners and Regulatory Agencies:** Based on regulatory agency file reviews, assess the potential to encounter unacceptable levels of hazardous materials at known environmental cases, for construction activities to cause groundwater plume migration or interfere with ongoing remediations at known environmental cases, and for increased water levels in reservoirs or lakes to inundate known environmental cases. Modify construction or remediation activities.
Impact 4.14-2: Exposure to naturally occurring asbestos.	**Measure 4.14-2, Health Risk Screening and Airborne Asbestos Monitoring Plan:** For tunneling projects where soil or rock may contain naturally occurring asbestos, conduct a health risk screening assessment to identify acceptable levels of asbestos in tunnel emissions. Prepare an airborne asbestos monitoring plan for approval by the BAAQMD.
Impact 4.14-3: Risk of fires during construction.	None required.
Impact 4.14-4: Gassy conditions in tunnels.	None required.
Impact 4.14-5: Exposure to hazardous building materials.	**Measure 4.14-5, Hazardous Building Materials Surveys and Abatement:** For all WSIP projects involving demolition or renovation of existing facilities, perform a hazardous building materials survey for each structure prior to demolition or renovation activities. If any friable asbestos-containing materials, lead-containing materials, or hazardous components of building materials are identified, implement adequate abatement practices prior to demolition or renovation.
Impact 4.14-6: Accidental hazardous materials release from construction equipment.	None required.

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TABLE S.4 (Continued)
SUMMARY OF FACILITY MITIGATION MEASURES BY IMPACT

Impact	Mitigation Measure(s)
Impact 4.14-7: Increased use of hazardous materials during operation.	None required.
Impact 4.14-8: Emission or use of hazardous materials within 1/4 mile of a school.	None required.
Impact 4.15-1: Construction-related energy use.	Air Quality Measures 4.9-1b and 4.9-1d, described above.
Impact 4.15-2: Long-term energy use during operation.	**Measure 4.15-2, Incorporation of Energy Efficiency Measures:** Consistent with the Energy Action Plan II priorities for reducing energy usage, ensure that energy-efficient equipment is used in all WSIP projects. Prepare a repair and maintenance plan for each facility to minimize power use. Evaluate the potential for use of renewable energy resources.
Impact 4.16-1a: Collective temporary and permanent impacts on existing land uses in the vicinity of proposed facility sites.	None required.
Impact 4.16-1b: Collective temporary and permanent impacts on the visual character of the surrounding area.	None required.
Impact 4.16-2: Collective exposure of people or structures to geologic and seismic hazards.	None required.
Impact 4.16-3: Collective WSIP impacts related to the degradation of surface waters and flooding hazards.	None required.
Impact 4.16-4: Collective loss of sensitive biological resources.	**Measure 4.16-4a, Bioregional Habitat Restoration Measures:** Address the following bioregional effects and implement conservation principles when implementing habitat compensation mitigation required for individual WSIP facility projects: compound impacts on functional units of habitat as WSIP projects simplify vegetation structure and increase “edge” (the boundary between two different habitats); increased habitat impacts due to the spread of weedy, non-native plant species; genetic diversity impacts on small populations; impacts on wildlife movement due to habitat fragmentation; suppression of natural disturbance regimes; and reduced population recovery opportunities from stochastic events. **Measure 4.16-4b, Coordination of Construction Staging and Access:** Coordinate construction contractor(s) to minimize surface disturbance when construction schedules for WSIP projects affecting the same areas overlap.
Impact 4.16-5: Collective increase in impacts related to archaeological, paleontological, and historical resources.	None required.
Impact 4.16-6: Collective traffic increases on local and regional roads.	**Measure 4.16-6a, SFPUC WSIP Projects Construction Coordinator:** Identify a qualified construction coordinator to coordinate project-specific traffic control plans; develop a public information campaign to inform the public of construction activities, detour routes, and alternate routes; work with local and regional agencies to pursue additional traffic mitigation measures and incorporate such measures into the project-specific traffic control plans.

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TABLE S.4 (Continued)
SUMMARY OF FACILITY MITIGATION MEASURES BY IMPACT

Impact	Mitigation Measure(s)
Impact 4.16-6 (cont.)	**Measure 4.16-6b, Combined San Joaquin Traffic Control Plan:** Develop a San Joaquin Traffic Control Plan that coordinates the project-specific traffic control plans and identifies additional measures (consistent with the standards of San Joaquin County, Stanislaus County, and Caltrans) to minimize the combined impacts of multiple WSIP project construction traffic on I-580, Chrisman Road, and Vernalis Road. **Measure 4.16-6c, Combined Sunol Valley Traffic Control Plan:** Develop a Sunol Valley Traffic Control Plan that coordinates the project-specific traffic control plans and identifies additional measures (consistent with the standards of Alameda County and Caltrans) to minimize the impacts of construction traffic on Calaveras Road and I-680.
Impact 4.16-7: Collective increases in construction and/or operational emissions in the region.	**Measure 4.16-7a, Dust and Exhaust Control Measures for All WSIP Projects:** Require implementation of Air Quality Measures 4.9-1a thru 4.9-1d for all WSIP projects to address collective construction-related air quality impacts. **Measure 4.16-7b, Health Risk Screening or Use of Soot Filters for All Projects in the San Joaquin and Sunol Valley Regions**: Require Measure 4.9-2a for all WSIP projects in the San Joaquin and Sunol Valley Regions to address collective DPM impacts. When this requirement is applied to the New Irvington Tunnel project, it will be applied to both the Sunol Valley and Fremont tunnel portals, taking into account truck traffic from other WSIP projects in the vicinity of both portals. **Measure 4.16-7c, Vacate SFPUC Land Managers' Residences for All Projects in the Sunol Valley Region:** Require Measure 4.9-2b for all WSIP projects in the Sunol Valley Region to address collective DPM impacts.
Impact 4.16-8: Collective increases in construction-related and operational noise.	**Measure 4.16-8a, Limiting Hourly Truck Volumes and Restricting Truck Operations on Haul Routes for Multiple WSIP Projects:** Apply Measures 4.10-2a and 4.10-2b to total haul and delivery truck volumes attributable to all WSIP projects on any particular haul truck route (including haul routes in the Tesla Portal, Irvington Portal, and Lower Crystal Springs Dam vicinities as well as haul routes in the San Francisco Region) to address collective truck-related noise impacts. **Measure 4.16-8b, Vacate Land Manager's Residence for All Projects in Sunol Valley Region:** To address collective noise impacts, vacate Land Manager's residence adjacent to Alameda East Portal during construction truck operations associated with all WSIP projects in this region if collective daytime truck volumes exceed the 70-dBA speech interference criterion or nighttime truck volumes exceed the 50-dBA sleep interference criterion.
Impact 4.16-9: Collective impacts on utilities and landfill capacity.	None required.
Impact 4.16-10: Collective effects on recreational resources during construction.	None required.

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TABLE S.4 (Continued)
SUMMARY OF FACILITY MITIGATION MEASURES BY IMPACT

Impact	Mitigation Measure(s)
Impact 4.16-11: Collective conversion of farmland to nonagricultural uses.	None required.
Impact 4.16-12: Collective effects related to hazardous conditions and exposure to or release of hazardous materials.	None required.
Impact 4.16-13: Collective increases in the use of nonrenewable energy resources.	None required.
Impact 4.17-1: Cumulative disruption of established communities, changes in existing land use patterns, and impacts on the existing visual character.	None required.
Impact 4.17-2: Cumulative exposure of people or structures to geologic and seismic hazards.	None required.
Impact 4.17-3: Cumulative impacts related to the degradation of water quality, alteration of drainage patterns, increased surface runoff, and flooding hazards.	None required.
Impact 4.17-4: Cumulative loss of sensitive biological resources.	None required.
Impact 4.17-5: Cumulative increase in impacts on archaeological, paleontological, and historical resources.	None required.
Impact 4.17-6: Cumulative traffic increases on local and regional roads.	**Measure 4.17-6, SFPUC WSIP Projects Construction Coordinator – Other Agencies:** The SFPUC WSIP construction coordinator designated in accordance with Measure 4.16-6a will also consider the effects of any traffic generated by SFPUC maintenance activities and other SFPUC projects; and coordinate with Caltrans, other county agencies, and local jurisdictions regarding construction of other private and public development projects so as to minimize traffic impacts on local access roads.
Impact 4.17-7: Cumulative increases in construction and/or operational emissions in the region.	None required.
Impact 4.17-8: Cumulative increases in construction-related and operational noise.	**Measure 4.17-8, Coordination of Truck Traffic on Local Streets:** The SFPUC WSIP construction coordinator designated in Measure 4.17-6 will also be responsible for coordinating truck traffic generated on these same streets by SFPUC maintenance activities and other SFPUC projects so that SFPUC-related truck noise increases are maintained at or below threshold levels specified in Measures 4.10-2a and 4.10-2b to the extent feasible.
Impact 4.17-9: Cumulative impacts related to disruption of utility service or relocation of utilities.	None required.
Impact 4.17-10: Cumulative effects on recreational resources during construction.	None required.
Impact 4.17-11: Cumulative conversion of farmland to nonagricultural uses.	None required.
Impact 4.17-12: Cumulative effects related to hazardous conditions and exposure to or release of hazardous materials.	None required.
Impact 4.17-13: Cumulative increases in the use of nonrenewable energy resources.	None required.

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- Temporary noise disturbance could occur along construction haul routes under the following projects: Advanced Disinfection, San Joaquin Pipeline System, Rehabilitation of Existing San Joaquin Pipelines, Tesla Portal Disinfection Station, Bay Division Pipeline Reliability Upgrade, BDPL Nos. 3 and 4 Crossovers, Seismic Upgrade of BDPL Nos. 3 and 4 at Hayward Fault, Baden and San Pedro Valve Lots Improvements, HTWTP Long-Term Improvements, San Andreas Pipeline No. 3 Installation, Groundwater Projects, and Recycled Water Projects. This impact is conservatively considered potentially significant and unavoidable because haul routes, truck volumes, and hours of truck operations have not yet been determined for these projects (Chapter 4, Section 4.10).

- If any construction activities were to generate vibration in proximity to sensitive receptors during the nighttime hours, potentially significant and unavoidable vibration impacts could occur under the following projects: San Joaquin Pipeline System, Rehabilitation of Existing San Joaquin Pipelines, Additional 40-mgd Treated Water Supply, Bay Division Pipeline Reliability Upgrade, BDPL Nos. 3 and 4 Crossovers, Seismic Upgrade of BDPL Nos. 3 and 4 at Hayward Fault, Baden and San Pedro Valve Lots Improvements, San Andreas Pipeline No. 3 Installation, Groundwater Projects, and Recycled Water Projects (Chapter 4, Section 4.10).

- Collective temporary impacts on residences near the Irvington Tunnel portal in Fremont (Bay Division Region) could result during construction because staging and access for both the New Irvington Tunnel and Bay Division Pipeline Reliability Upgrade projects would overlap in this vicinity. Since the feasibility of coordinating construction activities for these projects cannot be determined at this stage of project planning, such an effect is conservatively considered to be potentially significant and unavoidable (Chapter 4, Section 4.16).

- WSIP projects in the Sunol Valley Region would have a potentially significant and unavoidable collective impact on biological resources because of the number of WSIP projects in this region and the extent of overlap in terms of construction activity timing and location (Chapter 4, Section 4.16).

- Potentially significant and unavoidable collective impacts on special-status plant species could occur during construction of the Crystal Springs/San Andreas Transmission Upgrade and Lower Crystal Springs Dam projects in the Peninsula Region; incidental disturbance of plants along the road shoulder would be difficult to completely avoid, even with proposed mitigation measures (Chapter 4, Section 4.16).

- WSIP projects within the Sunol Valley and Peninsula Regions could collectively cause substantial adverse changes to historic districts, but until more detailed assessments are completed to determine if any historic districts exist, this potential collective impact is conservatively considered to be potentially significant and unavoidable (Chapter 4, Section 4.16).

- Even with proposed control measures, construction-related criteria air pollutant emissions associated with all of the WSIP projects would have a potentially significant and unavoidable collective impact on air quality, since the projects would contribute to the nonattainment status for ozone and particulate matter in both the San Francisco Bay Area and San Joaquin Valley Air Basins (Chapter 4, Section 4.16).

- Since the hours of construction as well as haul routes, truck volumes, and hours of truck operations have not yet been determined for all of WSIP facility projects within the San Joaquin, Bay Division, Peninsula, and San Francisco Regions, there is the potential that

collective noise impacts could result from construction of multiple WSIP projects near Tesla Portal, Irvington Tunnel portal in Fremont, and Lower Crystal Springs Dam. Also, there could be collective truck traffic increases along any overlapping haul routes in these regions. Given these unknowns, such collective effects are conservatively considered to be potentially significant and unavoidable (Chapter 4, Section 4.16).

- Several WSIP projects and several other SFPUC projects could cumulatively affect individual historical resources or potential historic districts (if historic districts are determined to be present), and until project-level analysis is completed, this cumulative effect is conservatively considered to be potentially significant and unavoidable (Chapter 4, Section 4.17).

- Construction-related traffic generated by the WSIP projects would contribute to potentially significant and unavoidable cumulative traffic impacts (e.g., increased travel times), particularly if the travel routes of individual drivers coincided with the construction routes for the WSIP projects, other SFPUC projects, and/or other public and private projects within one or more regions, and/or when construction vehicles associated with the cumulative projects utilize regional facilities (Chapter 4, Section 4.17).

- Construction emissions associated with the WSIP projects, other SFPUC projects, and other public and private projects would cumulatively contribute to the nonattainment status for ozone and particulate matter, a potentially significant and unavoidable cumulative impact (Chapter 4, Section 4.17).

- Potential overlap of the WSIP's construction truck traffic with construction truck traffic of other public and private projects could result in cumulative increases in diesel particulate matter (DPM) and noise on local roadways. Since the SFPUC would have no control over the construction schedules or traffic routes for other projects outside its jurisdiction, potential DPM and noise impacts are considered to be potentially significant and unavoidable (Chapter 4, Section 4.17).

Facility Operations Effects

Implementation of WSIP facility improvement projects would also result in long-term effects associated with facility operations. Effects associated with long-term maintenance and operations activities would occur, such as new permanent sources of light and glare, effects on scenic vistas, effects of treated water discharge on water quality and aquatic resources, and long-term energy use. These impacts would be mitigated to a less-than-significant level through implementation of the mitigation measures described in Chapter 6.

Effects of Water Supply and System Operations (Chapter 5)

Chapter 5 of this PEIR addresses the effects of the proposed water supply and system operations on the Tuolumne River system, Alameda Creek system, Peninsula system, and Westside Basin groundwater resources. In addition, Chapter 5 identifies the cumulative effects of implementing the WSIP water supply option and system operations in combination with other past, present, and reasonably foreseeable future projects within each of these watersheds; it also discusses the potential effects of climate change and global warming on the regional water system. **Tables S.5** through **S.8** summarize the water supply and system operations effects associated with the WSIP and the mitigation measures proposed to address the effects found to be potentially significant.

TABLE S.5
SUMMARY OF WATER SUPPLY IMPACTS AND MITIGATION MEASURES – TUOLUMNE RIVER SYSTEM AND DOWNSTREAM WATER BODIES

Impact	Significance Determination					Mitigation Measures
	All Impacts (except Biological Resources)	Biological Resource Impacts				
		Sensitive Habitats	Key Special-Status Species	Other Species of Concern	Common Habitats and Species	
STREAM FLOW						
Impact 5.3.1-1: Effects on flow along the Tuolumne River below O'Shaughnessy Dam.	LS					None required.
Impact 5.3.1-2: Effects on flow along Cherry Creek below Cherry Dam.	LS					None required.
Impact 5.3.1-3: Effects on flow along Eleanor Creek below Eleanor Dam.	LS					None required.
Impact 5.3.1-4: Effects on flow along the Tuolumne River below La Grange Dam.	LS					None required.
Impact 5.3.1-5: Effects on flow along the San Joaquin River and the Sacramento–San Joaquin Delta.	LS					None required.
GEOMORPHOLOGY						
Impact 5.3.2-1: Effects on sediment transport and channel characteristics between O'Shaughnessy Dam and Don Pedro Reservoir.	LS					None required.
Impact 5.3.2-2: Effects on sediment transport and channel characteristics below La Grange Dam.	LS					None required.
SURFACE WATER QUALITY						
Impact 5.3.3-1: Effects on water quality in Hetch Hetchy Reservoir and along the Tuolumne River below O'Shaughnessy Dam.	LS					None required.
Impact 5.3.3-2: Effects on water quality in Don Pedro Reservoir and along the Tuolumne River below La Grange Dam.	LS					None required.
Impact 5.3.3-3: Effects on water quality along the San Joaquin River and the Sacramento–San Joaquin Delta.	LS					None required.

[a] Mitigation measure text is summarized; please see Chapter 6 for details.

Not applicable

TABLE S.5 (Continued)
SUMMARY OF WATER SUPPLY IMPACTS AND MITIGATION MEASURES – TUOLUMNE RIVER SYSTEM AND DOWNSTREAM WATER BODIES

Impact	Significance Determination					Mitigation Measures
	All Impacts (except Biological Resources)	Biological Resource Impacts				
		Sensitive Habitats	Key Special-Status Species	Other Species of Concern	Common Habitats and Species	
SURFACE WATER SUPPLIES						
Impact 5.3.4-1: Effects on Tuolumne River, San Joaquin River, and Stanislaus River water users.	LS					None required.
Impact 5.3.4-2: Effects on Delta water users.	LS					None required.
GROUNDWATER						
Impact 5.3.5-1: Alteration of stream flows along the Tuolumne River, which could affect local groundwater recharge and groundwater levels.	LS					None required.
Impact 5.3.5-2: Alteration of stream flows along the Tuolumne River, which could affect local groundwater quality.	LS					None required.
FISHERIES						
Impact 5.3.6-1: Effects on fishery resources in Hetch Hetchy Reservoir.	LS					None required.
Impact 5.3.6-2: Effects on fishery resources along the Tuolumne River between Hetch Hetchy Reservoir and Don Pedro Reservoir.	LS					None required.
Impact 5.3.6-3: Effects on fishery resources in Don Pedro Reservoir.	LS					None required.
Impact 5.3.6-4: Effects on fishery resources along the Tuolumne River below La Grange Dam.	PSM					**Measure 5.3.6-4a, Avoidance of Flow Changes by Reducing Demand for Don Pedro Reservoir Water:** The SFPUC will pursue a water transfer arrangement with MID/TID and/or other water agencies which would offset the WSIP's effects on water storage in Don Pedro Reservoir and minimize WSIP-induced changes in releases from La Grange Dam. **If Measure 5.3.6-4a proves to be infeasible, the SFPUC will implement Measure 5.3.6-4b.

Not applicable

TABLE S.5 (Continued)
SUMMARY OF WATER SUPPLY IMPACTS AND MITIGATION MEASURES – TUOLUMNE RIVER SYSTEM AND DOWNSTREAM WATER BODIES

Impact	Significance Determination					Mitigation Measures
	All Impacts (except Biological Resources)	Biological Resource Impacts				
		Sensitive Habitats	Key Special-Status Species	Other Species of Concern	Common Habitats and Species	
FISHERIES (cont.)						
Impact 5.3.6-4 (cont.)						**Measure 5.3.6-4b, Fishery Habitat Enhancement:** The SFPUC will implement or fund one of two fishery habitat enhancement projects that are consistent with the Lower Tuolumne River Restoration Plan; augmentation of spawning gravel at three selected sites or the filling or isolation from the river of one of the existing inactive quarry pits.
Impact 5.3.6-5: Effects on fishery resources along the San Joaquin River.	LS					None required.
TERRESTRIAL BIOLOGY						
Impact 5.3.7-1: Impacts on riparian habitat and related biological resources in Hetch Hetchy Reservoir and along the bedrock channel portions of the Tuolumne River from O'Shaughnessy Dam to Don Pedro Reservoir.		LS	LS	LS	LS	None required.
Impact 5.3.7-2: Impacts on alluvial features that support meadow and riparian habitat along the Tuolumne River from O'Shaughnessy Dam to Don Pedro Reservoir.		PSM	PSM	PSM	PSM	The SFPUC will implement Measure 5.3.7-2 to reduce adverse impacts on sensitive habitats, key special-status species, other species of concern, and common habitats and species to a less-than-significant level. **Measure 5.3.7-2, Controlled Releases to Recharge Groundwater in Streamside Meadows and Other Alluvial Deposits:** The SPPUC will manage releases to the Tuolumne River from Hetch Hetchy Reservoir during the spring with the goal of recharging groundwater that supports meadow and riparian habitat. The SFPUC will periodically survey meadow habitat to determine the efficacy of release management and will modify releases as necessary to sustain meadow habitat.
Impact 5.3.7-3: Impacts on biological resources in Lake Eleanor and along Eleanor Creek.		LS	LS	LS	LS	None required.
Impact 5.3.7-4: Impacts on biological resources in Lake Lloyd and along Cherry Creek.		LS	LS	LS	LS	None required.

Not applicable

TABLE S.5 (Continued)
SUMMARY OF WATER SUPPLY IMPACTS AND MITIGATION MEASURES – TUOLUMNE RIVER SYSTEM AND DOWNSTREAM WATER BODIES

Impact	Significance Determination					Mitigation Measures
	All Impacts (except Biological Resources)	Biological Resource Impacts				
		Sensitive Habitats	Key Special-Status Species	Other Species of Concern	Common Habitats and Species	
TERRESTRIAL BIOLOGY (cont.)						
Impact 5.3.7-5: Impacts on biological resources in Don Pedro Reservoir.		LS	LS	LS	LS	None required.
Impact 5.3.7-6: Impacts on biological resources along the Tuolumne River below La Grange Dam.		PSM	PSM	PSM	PSM	The SFPUC will implement Measures 5.3.6-4a or 5.3.7-6 to reduce adverse impacts on sensitive habitats, key special-status species, other species of concern, and common habitats and species to a less-than-significant level. **Measure 5.3.6-4a, Avoidance of Flow Changes by Reducing Demand for Don Pedro Reservoir Water** – see description above. **If Measure 5.3.6-4a proves to be infeasible, the SFPUC will implement Measure 5.3.7-6. **Measure 5.3.7-6, Lower Tuolumne River Riparian Habitat Enhancement:** Consistent with the Lower Tuolumne River Restoration Plan, the SFPUC will protect and enhance one mile of riparian vegetation within the contemporary floodplain.
Impact 5.3.7-7: Conflicts with the provisions of adopted conservation plans or other approved biological resources plans for the Tuolumne Wild and Scenic River.		LS				None required.
RECREATIONAL AND VISUAL RESOURCES						
Impact 5.3.8-1: Effects on reservoir recreation due to changes in water system operations.	LS					None required.
Impact 5.3.8-2: Effects on river recreation due to changes in water system operations.	LS					None required.
Impact 5.3.8-3: Effects on the aesthetic values of the Tuolumne Wild and Scenic River.	LS					None required.
ENERGY RESOURCES						
Impact 5.3.9-1: Effects on hydropower generation at facilities along the Tuolumne River	B					None required.

Not applicable

TABLE S.6
SUMMARY OF WATER SUPPLY IMPACTS AND MITIGATION MEASURES – ALAMEDA CREEK WATERSHED

Impact	Significance Determination					Mitigation Measures
	All Impacts (except Biological Resources)	Biological Resource Impacts				
		Sensitive Habitats	Key Special Status-Species	Other Species of Concern	Common Habitats and Species	
STREAM FLOW						
Impact 5.4.1-1: Effects on flow along Calaveras Creek below Calaveras Reservoir.	LS					None required
Impact 5.4.1-2: Effects on flow along Alameda Creek below the diversion dam.	SU					**Measure 5.4.1-2, Diversion Tunnel Operation:** The SFPUC will implement operational criteria for the diversion dam which will require that water not needed to fill Calaveras Reservoir would be released to Alameda Creek below the diversion dam.
Impact 5.4.1-3: Effects in San Antonio Reservoir and along San Antonio Creek.	LS					None required.
Impact 5.4.1-4: Effects on flow along Alameda Creek below the confluence of San Antonio Creek.	LS					None required.
GEOMORPHOLOGY						
Impact 5.4.2-1: Effects on channel formation and sediment transport along Calaveras Creek.	LS					None required.
Impact 5.4.2-2: Effects on channel formation and sediment transport along Alameda Creek downstream of the diversion dam and downstream of the San Antonio Creek confluence.	LS					None required.
Impact 5.4.2-3: Effects on channel formation and sediment transport along San Antonio Creek downstream of San Antonio Reservoir.	LS					None required.
SURFACE WATER QUALITY						
Impact 5.4.3-1: Effects on water quality in Calaveras Reservoir.	LS					None required.
Impact 5.4.3-2: Effects on water quality in San Antonio Reservoir.	LS					None required.
Impact 5.4.3-3: Changes in water quality along Calaveras, San Antonio, and Alameda Creeks.	LS					None required.

[a] Mitigation measure text is summarized; please see Chapter 6 for details.

Not applicable

TABLE S.6 (Continued)
SUMMARY OF WATER SUPPLY IMPACTS AND MITIGATION MEASURES – ALAMEDA CREEK WATERSHED

Impact	Significance Determination					Mitigation Measures
	All Impacts (except Biological Resources)	Biological Resource Impacts				
		Sensitive Habitats	Key Special Status-Species	Other Species of Concern	Common Habitats and Species	
GROUNDWATER BODIES						
Impact 5.4.4-1: Changes in groundwater levels, flows, quality, and supplies.	LS					None required.
FISHERIES						
Impact 5.4.5-1: Effects on fishery resources in Calaveras Reservoir.	B					None required.
Impact 5.4.5-2: Effects on fishery resources along Calaveras Creek below Calaveras Dam and along Alameda Creek below confluence with Calaveras Creek.	B					None required.
Impact 5.4.5-3: Effects on fishery resources along Alameda Creek downstream of Alameda Creek Diversion Dam.	PSM					**Measure 5.4.5-3a, Minimum Flows for Resident Trout on Alameda Creek:** The SFPUC will release a minimum flow of approximately 10 cubic feet per second from the diversion dam and monitor the effects of the release on resident trout spawning and egg incubation. ** If monitoring results for Measure 5.4.5-3a indicate the measure is unsuccessful, the SFPUC will implement Measure 5.4.5-3b. **Measure 5.4.5-3b, Alameda Diversion Dam Restrictions or Fish Screens:** If after 10 years the minimum release does not sustain the resident trout population, the SFPUC will either increase releases from the diversion dam or install a fish passage barrier on the diversion tunnel.
Impact 5.4.5-4: Effects on fishery resources in San Antonio Reservoir.	B					None required.
Impact 5.4.5-5: Effects on fishery resources along San Antonio Creek below San Antonio Reservoir.	LS					None required.
Impact 5.4.5-6: Effects on fishery resources along Alameda Creek below confluence with San Antonio Creek.	LS					None required.

Not applicable

TABLE S.6 (Continued)
SUMMARY OF WATER SUPPLY IMPACTS AND MITIGATION MEASURES – ALAMEDA CREEK WATERSHED

Impact	Significance Determination					Mitigation Measures
	All Impacts (except Biological Resources)	Biological Resource Impacts				
		Sensitive Habitats	Key Special Status-Species	Other Species of Concern	Common Habitats and Species	
TERRESTRIAL BIOLOGY						
Impact 5.4.6-1: Effects on riparian habitat and related biological resources in Calaveras Reservoir.		PSM	PSM	LS	LS	The SFPUC will implement Measure 5.4.6-1 to reduce adverse impacts on sensitive habitats and key special-status species to a less-than-significant level. **Measure 5.4.6-1, Compensation for Impacts on Terrestrial Biological Resources:** The SFPUC will protect, restore. and enhance existing riparian habitat and/or create new habitat that compensates for WSIP-induced habitat losses at Calaveras Reservoir. Compensatory habitat may be provided as part of the SFPUC's Habitat Reserve Program.
Impact 5.4.6-2: Effects on riparian habitat and related biological resources along Alameda Creek, from below the diversion dam to the confluence with Calaveras Creek.		LS	PSM	LS	N/A	The SFPUC will implement Measures 5.4.1-2 and 5.4.5-3a to reduce adverse impacts on key special-status species to a less-than-significant level. **Measure 5.4.1-2, Diversion Tunnel Operation** – see description above. **Measure 5.4.5-3a, Minimum Flows for Resident Trout on Alameda Creek** – see description above.
Impact 5.4.6-3: Effects on riparian habitat and related biological resources along Calaveras Creek, from Calaveras Reservoir to the confluence with Alameda Creek.		LS	PSM	LS	LS	The SFPUC will implement Measure 5.4.6-3 to reduce adverse impacts on key special-status species to a less-than-significant level. **Measure 5.4.6-3, Operational Procedures for Calaveras Dam Releases:** The SFPUC will manage releases from Calaveras Reservoir to mimic a more natural hydrologic regime in the creek for the benefit of terrestrial biological resources. The specifics of this mitigation measure will be determined as part of project-level CEQA review.

Not applicable

TABLE S.6 (Continued)
SUMMARY OF WATER SUPPLY IMPACTS AND MITIGATION MEASURES – ALAMEDA CREEK WATERSHED

Impact	Significance Determination					Mitigation Measures
	All Impacts (except Biological Resources)	Biological Resource Impacts				
		Sensitive Habitats	Key Special Status-Species	Other Species of Concern	Common Habitats and Species	
TERRESTRIAL BIOLOGY (cont.)						
Impact 5.4.6-4: Effects on riparian habitat and related biological resources along Alameda Creek, from the confluence with Calaveras Creek to the confluence with San Antonio Creek.		LS	PSM	LS	LS	The SFPUC will implement Measures 5.4.6-3 and 5.4.5-3a to reduce adverse impacts on key special-status species to a less-than-significant level. **Measure 5.4.6-3, Operational Procedures for Calaveras Dam Releases** – see description above. **Measure 5.4.5-3a, Minimum Flows for Resident Trout on Alameda Creek** – see description above.
Impact 5.4.6-5: Effects on riparian habitat and related biological resources in San Antonio Reservoir.		LS	LS	LS	LS	None required.
Impact 5.4.6-6: Effects on riparian habitat and related biological resources along San Antonio Creek between Turner Dam and the confluence with Alameda Creek.		LS	LS	LS	N/A	None required.
Impact 5.4.6-7: Effects on riparian habitat and related biological resources along Alameda Creek below the confluence with San Antonio Creek.		LS	LS	LS	N/A	None required.
Impact 5.4.6-8: Conflicts with the provisions of adopted conservation plans or other approved biological resources plans.		LS				None required.
RECREATION AND VISUAL						
Impact 5.4.7-1: Effects on recreational facilities and/or activities.	LS					None required.
Impact 5.4.7-2: Visual effects on scenic resources or visual character of the water bodies.	LS					None required.

Not applicable

TABLE S.7
SUMMARY OF WATER SUPPLY IMPACTS AND MITIGATION MEASURES – PENINSULA WATERSHEDS

Impact	Significance Determination					Mitigation Measures
	All Impacts (except Biological Resources)	Biological Resource Impacts				
		Sensitive Habitats	Key Special-Status Species	Other Species of Concern	Common Habitats and Species	
STREAM FLOW						
Impact 5.5.1-1: Effects on flow along San Mateo Creek.	LS					None required.
Impact 5.5.1-2: Effects on flow along Pilarcitos Creek.	LS					None required.
GEOMORPHOLOGY						
Impact 5.5.2-1: Changes in sediment transport and channel morphology in the Peninsula watershed.	LS					None required.
WATER QUALITY						
Impact 5.5.3-1: Effects on water quality in Crystal Springs Reservoir, San Andreas Reservoir, and San Mateo Creek.	LS					None required.
Impact 5.5.3-2: Effects on water quality in Pilarcitos Reservoir and along Pilarcitos Creek.	PSM					**Measure 5.5.3-2a, Low-head Pumping Station at Pilarcitos Reservoir:** The SFPUC will install a permanent low-head pumping station at Pilarcitos Reservoir which would enable the SFPUC to access and use an additional 350 acre-feet of water from Pilarcitos Reservoir. In years when the WSIP would cause releases from Pilarcitos Reservoir to Pilarcitos Creek to be reduced to reservoir inflow earlier in the summer than under the existing condition (about 25 percent of years in the hydrologic record), the SFPUC will use the pumping station to augment flow in Pilarcitos Creek with water from the reservoir. The pumping station will draw water from the cool pool of water below the thermocline during times when the reservoir is stratified. The pumping station outlet will be designed to ensure that water discharged to the creek is adequately aerated. **Measure 5.5.3-2b, Aeration System at Pilarcitos Reservoir:** The SFPUC will install a permanent aeration system at Pilarcitos Reservoir. The SFPUC will operate the aeration system as necessary to avoid anoxic conditions and maintain good water quality conditions at the reservoir.

[a] Mitigation measure text is summarized; please see Chapter 6 for details.

Not applicable

TABLE S.7 (Continued)
SUMMARY OF WATER SUPPLY IMPACTS AND MITIGATION MEASURES – PENINSULA WATERSHEDS

Impact	Significance Determination					Mitigation Measures
	All Impacts (except Biological Resources)	Biological Resource Impacts				
		Sensitive Habitats	Key Special-Status Species	Other Species of Concern	Common Habitats and Species	
GROUNDWATER						
Impact 5.5.4-1: Alteration of stream flows along Pilarcitos Creek, which could affect groundwater levels and water quality.	LS					None required.
FISHERIES						
Impact 5.5.5-1: Effects on fishery resources in Crystal Springs Reservoir (Upper and Lower).	PSU					**Measure 5.5.5-1, Create New Spawning Habitat Above Crystal Springs Reservoir:** The SFPUC will survey the extent and quality of fish spawning habitat lost due to inundation and, if feasible, create new spawning habitat at a higher elevation. The specifics of this mitigation measure will be determined as part of project-level CEQA review.
Impact 5.5.5-2: Effects on fishery resources in San Andreas Reservoir.	LS					None required.

Not applicable

TABLE S.7 (Continued)
SUMMARY OF WATER SUPPLY IMPACTS AND MITIGATION MEASURES – PENINSULA WATERSHEDS

Impact	Significance Determination					Mitigation Measures
	All Impacts (except Biological Resources)	Biological Resource Impacts				
		Sensitive Habitats	Key Special-Status Species	Other Species of Concern	Common Habitats and Species	
FISHERIES (cont.)						
Impact 5.5.5-3: Effects on fishery resources along San Mateo Creek.	LS					None required.
Impact 5.5.5-4: Effects on fishery resources in Pilarcitos Reservoir.	PSM					**Measure 5.5.3-2b, Aeration System at Pilarcitos Reservoir –** see description above.
Impact 5.5.5-5: Effects on fishery resources along Pilarcitos Creek below Pilarcitos Reservoir.	PSM					**Measure 5.5.3-2a, Low-head Pumping Station at Pilarcitos Reservoir** – see description above. **Measure 5.5.5-5 Establish Flow Criteria, Monitor and Augment Flow –** The SFPUC will develop a monitoring and operations plan for Stone Dam to ensure WSIP-related flow reductions downstream of Stone Dam do not impair steelhead passage and spawning during the winter months of normal and wetter hydrologic years.
TERRESTRIAL BIOLOGY						
Impact 5.5.6-1: Impacts on biological resources in Upper and Lower Crystal Springs Reservoirs.		PSM	PSM	PSM	PSM	The SFPUC will implement Measures 5.5.6-1a and 5.5.6-1b to reduce adverse impacts on sensitive habitats, key special-status species, other species of concern, and common habitats and species to a less-than-significant level. In addition, the SFPUC will implement Measure 5.5.6-1c to mitigate adverse impacts to key special-status plant species (i.e., fountain thistle) adapted to serpentine seeps. **Measure 5.5.6-1a, Adaptive Management of Freshwater Marsh and Wetlands at Upper and Lower Crystal Springs Reservoirs:** The SFPUC will develop an adaptive management plan to minimize adverse effects of the WSIP-induced rise in average water levels, and periodic drawdown of reservoir water levels for maintenance, on San Francisco garter snakes and red-legged frogs. **Measure 5.5.6-1b, Compensation for Impacts on Terrestrial Biological Resources:** The SFPUC will protect, restore, and enhance existing wetland and upland habitat and/or create new habitat that compensates for WSIP-induced habitat losses at

Not applicable

TABLE S.7 (Continued)
SUMMARY OF WATER SUPPLY IMPACTS AND MITIGATION MEASURES – PENINSULA WATERSHEDS

Impact	Significance Determination					Mitigation Measures
	All Impacts (except Biological Resources)	Biological Resource Impacts				
		Sensitive Habitats	Key Special-Status Species	Other Species of Concern	Common Habitats and Species	
						Crystal Springs Reservoir. Compensatory habitat may be provided as part of the SFPUC's Habitat Reserve Program. **Measure 5.5.6-1c, Compensation for Serpentine Seep-Related Special-Status Plants:** The SFPUC will protect, restore, and enhance existing habitat and/or create new habitat that compensates for WSIP-induced habitat losses for plant species adapted to serpentine seeps.

Not applicable

TABLE S.7 (Continued)
SUMMARY OF WATER SUPPLY IMPACTS AND MITIGATION MEASURES – PENINSULA WATERSHEDS

Impact	Significance Determination					Mitigation Measures
	All Impacts (except Biological Resources)	Biological Resource Impacts				
		Sensitive Habitats	Key Special-Status Species	Other Species of Concern	Common Habitats and Species	
TERRESTRIAL BIOLOGY (cont.)						
Impact 5.5.6-2: Impacts on biological resources in San Andreas Reservoir.		LS	LS	LS	LS	None required.
Impact 5.5.6-3: Impacts on biological resources along San Mateo Creek below Lower Crystal Springs Dam.		LS	LS	LS	LS	None required.
Impact 5.5.6-4: Impacts on biological resources in Pilarcitos Reservoir.		LS	PSM	LS	LS	**Measure 5.5.3-2c, Habitat monitoring and Compensation** - The SFPUC will protect, restore, and enhance existing habitat and/or create new habitat that compensates for WSIP-induced habitat losses at Pilarcitos Reservoir. Compensatory habitat may be provided as part of the SFPUC's Habitat Reserve Program.
Impact 5.5.6-5: Impacts on biological resources along Pilarcitos Creek below Pilarcitos Reservoir.		LS	LS	LS	LS	None required.
Impact 5.5.6-6: Impacts along Pilarcitos Creek below Stone Dam.		LS	LS	LS	LS	None required.
Impact 5.5.6-7: Conflicts with the provisions of adopted conservation plans or other approved biological resource plans.		LS				None required.
RECREATIONAL AND VISUAL RESOURCES						
Impact 5.5.7-1: Effects on recreational facilities and/or activities.	LS					None required.
Impact 5.5.7-2: Visual effects on scenic resources or the visual character of water bodies.	LS					None required.

86 Not applicable

TABLE S.8
SUMMARY OF WATER SUPPLY IMPACTS AND MITIGATION MEASURES – WESTSIDE GROUNDWATER BASIN

Impact	Significance Determination		Mitigation Measures
	North Westside Groundwater Basin	South Westside Groundwater Basin	
Impact 5.6-1: Basin overdraft due to pumping from the Westside Groundwater Basin.	PSM	LS	The SFPUC will implement Measure 5.6.1 to reduce adverse impacts to the North Westside Groundwater Basin to a less-than-significant level. **Measure 5.6-1, Groundwater Monitoring to Determine Basin Safe Yield:** The SFPUC will continue ongoing groundwater and lake level monitoring programs to determine the safe yield of the North Westside Groundwater Basin in order to avoid overdraft and associated effects including adverse effects on surface water features and seawater intrusion
Impact 5.6-2: Changes in water levels in Lake Merced and other surface water features, including Pine Lake, due to decreased groundwater levels in the Westside Groundwater Basin.	PSM	N/A	The SFPUC will implement Measures 5.6.1 and 5.6-2 to reduce adverse impacts to the North Westside Groundwater Basin to a less-than-significant level. **Measure 5.6-1, Groundwater Monitoring to Determine Basin Safe Yield** – see description above. **Measure 5.6-2, Implementation of a Lake Level Management Plan:** The SFPUC will develop and implement a lake level management plan identifying strategies for altering pumping patterns or lake augmentation to maintain Lake Merced water levels within the desired long-term range.
Impact 5.6-3: Seawater intrusion due to decreased groundwater levels in the Westside Groundwater Basin.	PSM	LS	The SFPUC will implement Measure 5.6.1 to reduce adverse impacts to the North Westside Groundwater Basin to a less-than-significant level. **Measure 5.6-1, Groundwater Monitoring to Determine Basin Safe Yield** – see description above.
Impact 5.6-4: Land subsidence due to decreased groundwater levels in the Westside Groundwater Basin if the historical low water levels are exceeded.	LS	LS	None required.

[a] Mitigation measure text is summarized; please see Chapter 6 for details.

TABLE S.8 (Continued)
SUMMARY OF WATER SUPPLY IMPACTS AND MITIGATION MEASURES – WESTSIDE GROUNDWATER BASIN

Impact	Significance Determination		Mitigation Measures
	North Westside Groundwater Basin	South Westside Groundwater Basin	
Impact 5.6-5: Contamination of drinking water due to groundwater pumping in the Westside Groundwater Basin.	PSM	PSM	The SFPUC will implement Measure 5.6.5 to reduce adverse impacts to the North Westside and South Westside Groundwater Basins to a less-than-significant level. **Measure 5.6.5, Drinking Water Source Assessments for Groundwater Wells:** The SFPUC will develop and implement a source water protection program for wells constructed under the Local and Regional Groundwater Projects that are considered vulnerable to contamination on the basis of the drinking water source assessment prepared in accordance with Department of Health Services regulations.
Impact 5.6-6: Drinking water contaminants above maximum contaminant levels and adverse effects of adding treated groundwater to the distribution system.	LS	LS	None required.

TABLE S.9
SUMMARY OF WATER SUPPLY IMPACTS AND MITIGATION MEASURES – CUMULATIVE WATER SUPPLY

Cumulative Water Supply Impact	Cumulative Impact Significance Determination							Mitigation Measures
	Hydrology	Geomorphology	Surface Water Quality	Groundwater	Fisheries	Terrestrial Biology	Recreation / Visual Quality	
Impact 5.7.2-1: Tuolumne River – Hetch Hetchy Reservoir to Don Pedro Reservoir.	LS	LS	LS	LS	LS	LS	LS	None required.
Impact 5.7.2-2: Tuolumne River – Don Pedro Reservoir to the San Joaquin River.	LS	LS	LS	LS	LS	LS	LS	None required.
Impact 5.7.2-3: San Joaquin River, Stanislaus River, and the Delta.	LS	LS	LS	LS	LS	LS	LS	None required.
Impact 5.7.3-1: Alameda Creek watershed.	N/A	LS	LS	LS	LS	LS	LS	None required.
Impact 5.7.4-1: San Mateo Creek watershed.	LS	LS	LS	LS	LS	LS	LS	None required.
Impact 5.7.4-2: Pilarcitos Creek watershed.	LS	LS	LS	LS	LS	LS	LS	None required.
Impact 5.7.5-1: North Westside Groundwater Basin.				LS				None required.
Impact 5.7.5-2: South Westside Groundwater Basin.				LS				None required.

NOTE: Significance determinations presented in this table assume implementation of all mitigation measures as they are presented in Chapter 5, Section 5.6, and described in Chapter 6.

Due to the proposed increase in diversions from the Tuolumne River and changes in system operations, implementation of the WSIP would result in changes in reservoir levels and associated changes in downstream flows in rivers or creeks in the three affected watersheds. In all three watersheds, these hydrologic changes could in turn result in impacts on geomorphology of the water body, groundwater, water quality, fisheries, terrestrial biological resources, and recreational and visual resources. In the Tuolumne River watershed, changes in stream flow could also affect downstream water supplies and hydropower generation. In the Alameda Creek and Peninsula watersheds, implementation of the WSIP would include restoration of the historical storage capacities of Calaveras and Lower Crystal Springs Reservoirs, respectively, resulting in impacts on reservoir levels, downstream flows, fisheries, terrestrial biological resources, and visual resources. In addition, implementation of the WSIP would include development of groundwater supplies in the North Westside Groundwater Basin as well as a conjunctive-use program in the South Westside Groundwater Basin. Identified impacts on these resources were determined to be less than significant with implementation of the mitigation measures described in Chapter 6, with the exception of the following:

- The WSIP would result in a significant and unavoidable impact in the Alameda Creek watershed on the flow along Alameda Creek below the Alameda Creek Diversion Dam (Chapter 4, Section 5.4.1).

- The WSIP would result in a potentially significant and unavoidable impact in the San Mateo Creek watershed on fishery resources in Crystal Springs Reservoir (Chapter 4, Section 5.5.5).

Growth Inducement (Chapter 7)

The WSIP would support planned growth in the existing SFPUC service area, although some growth associated with the availability of water would occur irrespective of the WSIP due to already planned increases in water delivery efficiencies throughout the service area (e.g., plumbing code changes), conservation, and other water supply sources. Some customers have multiple sources of supply and do not rely on the SFPUC system to meet all of their existing or future water demands; in these areas, other sources of supply may also support additional growth in the service area. In some areas, the WSIP could support a degree of population and/or employment above that planned for in jurisdictions' adopted general plans, as indicated by a comparison of the levels of growth assumed in WSIP demand studies and general plan documents. In some jurisdictions (Foster City, Half Moon Bay, Milpitas, and Burlingame), the WSIP could support more population growth than is forecasted in adopted general plans. In other jurisdictions (East Palo Alto, Foster City, San Bruno, Fremont, Newark, and Union City), the WSIP could support more employment growth than is forecasted in the adopted general plans of the respective jurisdictions.

The existing service area includes areas in four counties (San Francisco, San Mateo, Santa Clara, and Alameda) that are within the core of the nine-county Bay Area. Growth in the communities served by the SFPUC regional system would primarily be infill development within already developed Bay Area communities. This growth is representative of the "smart growth" principles

promoted by the Association of Bay Area Governments (ABAG) to minimize urban and suburban sprawl and concentrate additional development in the existing core areas.

Indirect Effects of Growth Supported by the WSIP

As identified in Impact 7-1, the WSIP would indirectly contribute to environmental impacts caused by growth; some of these impacts would be unavoidable. The WSIP would support some of the growth that is reflected in the adopted land use plans of jurisdictions in the SFPUC service area. The EIRs prepared for general plans and related land use plans in the service area identified impacts of planned growth and mitigation measures to reduce the impacts. Some of the impacts of planned growth cannot be reduced to a less-than-significant level. In these cases, the respective decision-making body (e.g., city council) identified overriding considerations that justified adoption of the general plan despite its adverse impacts. Due to the longer planning horizon of the WSIP and relative age of some of the adopted general plans, as well as differing expectations about the level of job growth that will occur in the coming decades, in some jurisdictions not all of the growth that the WSIP would in part support has been addressed in adopted land use plans or evaluated in the plans' CEQA documents. Therefore, growth supported by the WSIP could result in impacts that are somewhat more severe than those identified in the general plan EIRs, although it is likely that the impacts would be similar in kind to those previously identified.

Potential impacts beyond those previously identified would generally be related either to increased density of development or to the conversion of less developed areas to urban uses. The measures specified in adopted general plans and related land use plans and their CEQA documents to mitigate the impacts of growth should also serve to reduce the impacts of growth supported by the WSIP. In addition, although the EIRs reviewed for this PEIR were prepared prior to the passage of the California Global Warming Solutions Act of 2006 and do not include assessments of impacts from greenhouse gas emissions, it is expected that planned growth in the area could result in a significant and unavoidable contribution to greenhouse gas emissions resulting from increased fossil fuel use for transportation, increased industrial and commercial activities, domestic fuel combustion, operation of power plants, and oil refining. The key regional effects of planned growth relate to air quality, traffic congestion, and water quality. Regional agencies, including the Metropolitan Transportation Commission, Bay Area Air Quality Management District, and Regional Water Quality Control Board, and the jurisdictions in the service area, are working both regionally and locally to address these impacts.

By providing water to support planned growth, the WSIP would help to mitigate the impact of insufficient water supply that was identified in the general plans EIRs of some jurisdictions in the service area.

Significant, Irreversible Environmental Changes

Construction and operational impacts associated with implementation of the WSIP projects would result in an irretrievable and irreversible commitment of natural resources through the use of fossil fuels and construction materials. Operation of project facilities would

incrementally increase power consumption associated with water facilities, even though operation of SFPUC facilities would predominantly use hydropower. The program's incremental increased use of these resources, however, would not significantly increase the overall commitment of resources associated with water treatment and distribution. The program would involve only minor incremental use of nonrenewable resources and would locate facilities primarily on lands already committed to water treatment and supply purposes. Furthermore, since the SFPUC would implement the mitigation measures identified in this PEIR in concert with other ongoing stewardship and watershed protection activities, implementation of the WSIP would not result in significant irreversible environmental changes. When completed, the program would provide a high level of public health protection against potential seismic hazards as well as increase the long-term reliability of the drinking water throughout the SFPUC service area.

S.4 Areas of Controversy and Issues to be Resolved

Areas of Controversy

The San Francisco Planning Department circulated a Notice of Preparation (NOP) to prepare an EIR on the WSIP on September 6, 2005. Comments submitted during the NOP review period and scoping meetings raised issues regarding the scope and content of the Draft PEIR as well as the WSIP. Appendix A further describes the scoping process and summarizes the public comments received. Areas of controversy highlighted in this section include select items of particular public concern (as evidenced by the number of comments received during scoping on a topic and/or by a divergence of opinion on an issue) as well as topics identified during preparation of the Draft PEIR. These topics are organized into the following categories: Proposed Program; Impact Analysis – Assumptions and Methods; Environmental Impacts; and Alternatives.

Proposed Program

Comments received during the scoping process raised questions about the level of service objectives established by the SFPUC for the regional system and reflected in the WSIP, as follows:

- *Demand Estimates / Customer Purchase Request Increase.* Comments were received on the methods used for estimating future water needs, and whether and how the SFPUC's customers incorporated conservation and local water recycling projects into their future purchase request estimates. The approach to developing the customer purchase requests for 2030 is explained in detail in the 2004 San Francisco Public Utilities Commission Purchase Estimates Technical Memorandum. This approach is summarized in Chapter 3, Program Description, and Chapter 7, Growth-Inducement Potential.

  Comments were received on the ability to accurately project growth and associated water supply requirements through 2030. Water agencies must routinely develop relatively long-range projections (e.g., 15 to 25 years) regarding water supply and reliability service needs within their service areas in order to guide water system improvement and supply

planning efforts. The SFPUC worked closely with its wholesale customers to support the development of future purchase estimates for their communities. Many customers, in turn, used growth projections prepared by ABAG. ABAG is the agency responsible for providing regional growth projections for the Bay Area and issues revised projections every five years. Chapter 7 includes an evaluation of the consistency between customers' demand projections and the corresponding future purchase requests using ABAG projections. Finally, while implementation of the WSIP would prepare the SFPUC to meet the projected 2030 customer purchase requests, customers would only purchase and receive additional water as needed when additional demand for water actually occurs.

- *Unfiltered Water Goal / Filtration Avoidance*. The SFPUC considers maintaining a system that can deliver high-quality water that does not require filtration to be an overarching principle to be used in developing the WSIP. Some commentors raised concerns that this objective limits the potential to consider other water supply alternatives, since few supply sources can meet this goal. The discussion and analysis in Chapter 9, Alternatives, considers the filtration avoidance principle along with other program objectives and factors in the evaluation of alternatives to the proposed program.

- *Drought Planning Assumptions – Design Drought*. Comments were provided during scoping on the drought assumptions used by the SFPUC to develop the WSIP. A necessary aspect of future water supply planning includes drought planning. Water agencies typically consider one or more potential drought scenario(s), or "design drought," in developing their drought response plans. The SFPUC developed and used an 8.5-year design drought for its planning purposes. The most recent drought experienced in the Bay Area was 6.5 years (1986 through 1992). The 8.5-year design drought represents a reasonable, worst-case scenario for planning purposes. Some commentors expressed concern that this planning assumption was too conservative and that the SFPUC should lower its objective for drought planning. Since the PEIR analysis assumes the SFPUC's 8.5-year design drought, the analysis considers the effect of actions needed in the event such a drought occurred. If this assumed drought scenario does not occur in the future, some impacts identified in the PEIR would be less severe than assumed, particularly those associated with actions taken to recover from such a severe drought.

- *Rationing Objective*. As part of its drought response planning for service through 2030, the SFPUC established a goal of limiting rationing to a maximum of 20 percent systemwide and used this level of service objective in developing the WSIP. Under the WSIP, the SFPUC could impose systemwide rationing of up to 20 percent in any one year of a drought. Commentors have argued that this planned maximum level of rationing is both too high and too low. Specifically, the BAWSCA expressed concern on behalf of its member agencies (the SFPUC wholesale customers) that this level of rationing would result in substantial hardship and economic impact on customers in the regional system service area. Other commentors suggested that system customers could implement higher levels of rationing and water conservation to reduce the need for additional water supplies during a drought. Chapter 8, WSIP Variants, analyzes a variation of the proposed WSIP that includes a 10 percent maximum systemwide rationing goal rather than the 20 percent goal. Chapter 9, Alternatives, further discusses the potential for additional conservation by the system customers and the potential effects of rationing that is greater than 20 percent.

- *San Joaquin Pipelines*. Many commentors raised concerns during scoping about an initial proposal to include a San Joaquin Pipeline No. 4 project in the WSIP to construct a new, fourth pipeline across the San Joaquin Valley, and that the PEIR needed to fully analyze the effects of such a pipeline project on the SFPUC's ability to expand the capacity of the water system in the future. This project was subsequently removed from the program and replaced with a modified version of the original proposal. The modified proposal does not include construction of a completely new fourth pipeline extending across the valley, but instead adds segments of new pipeline in select reaches along with two crossover facilities between the existing pipelines. A description of the modified project (San Joaquin Pipeline System) is included in Chapter 3, Program Description.

Impact Analysis – Assumptions and Methods

- *Environmental Baseline*. The CEQA Guidelines indicate that, in most cases, the potential environmental impacts of a project should be determined relative to the existing conditions that occur at the time the environmental process is initiated. In accordance with CEQA, mitigation measures are required, if feasible, when a project would have a significant effect on the existing environmental conditions. A project sponsor is not required to implement mitigation measures to remedy the environmental impacts caused by past actions. The effects of past actions are taken into consideration in the impact analysis insofar as the existing environmental conditions reflect the effects of such past actions. For example, the existing condition of riparian habitat along a creek may be degraded today because of a past action, such as the previous construction of a dam that altered downstream flows; or conversely, a particular fishery population may have been enhanced as a result of a past action, such as construction of a reservoir. The environmental conditions that currently exist reflect the effects of past actions and ongoing activities and operations.

  For the WSIP, the environmental conditions as they existed in the year 2005, when the PEIR process began, represent the environmental baseline for the purpose of determining the impacts of the WSIP. As discussed above, while these existing baseline conditions reflect the effects of past actions, the EIR does not analyze the impacts of past actions on those existing conditions, nor does it require mitigation for past environmental impacts.

- *Evaluation of Water Resource Impacts and Use of Modeling Tools*. Comments were received about the approach to evaluation of potential water resource impacts and, with respect to the Tuolumne River, about the need for environmental baseline studies prior to PEIR preparation. Concerns were raised about the use of computer models as part of the impact analysis, and whether the models would be accurate enough to adequately identify impacts.

  The PEIR makes use of the best available information regarding the environmental setting in areas potentially affected by the WSIP and also employed computer modeling tools to aid in the impact analysis. The SFPUC has developed a computerized mathematical model to assist in the evaluation of its water system operations: the Hetch Hetchy/Local Simulation Model (HH/LSM). This water supply planning model represents the best available tool for assessing the effects on water resources resulting from changes in regional system operations. Section 5.1 provides a summary description of the model; additional detail is provided in Appendix H.

The model includes information about key aspects of the SFPUC regional system and provides the most comprehensive approach to evaluating changes throughout the system. The model makes use of 82 years of historical hydrologic data (actual past precipitation data) and simulates system operations over the course of this 82-year sequential hydrologic period, from July 1920 through September 2002. This 82-year period includes many different types and sequences of actual hydrologic events ranging from floods to droughts of different magnitude and duration. Because natural river systems are dynamic and runoff and flow vary each year, and as it is not possible to predict future precipitation, it is a necessary and standard industry practice to use a long-term historical record to represent the range of hydrologic conditions that can be expected in the future. The model is used to assess both how the regional water system would perform in terms of meeting the system objectives established for the WSIP and what types of impacts the program might have under a broad range of hydrologic conditions.

The model does have limitations in terms of its ability to reflect the changing day-to-day operations of the system. The model uses a monthly time step, reporting changes on a monthly basis in such factors as reservoir storage levels or the volume of water released from a reservoir. This monthly timeframe is adequate for the assessment of most impact issues. However, the system operators can and do make changes in system operations on a weekly or even daily basis in some instances. To address those instances where monthly information is not sufficient for the analysis of a particular impact, the PEIR also makes use of information from the actual regional system operators rather than the model.

Environmental Impacts

- *Alameda Creek – Potential Steelhead Restoration in Alameda Creek*. Commentors raised concerns about potential effects of the program on steelhead and the potential for steelhead restoration in Alameda Creek. For the purposes of full disclosure, the PEIR provides a discussion of steelhead in lower Alameda Creek and the potential for steelhead to be restored to the upper reaches of Alameda Creek (above the BART weir). In addition to migration barriers, reduced winter and spring flows in Alameda Creek above the BART weir would limit migration and spawning if steelhead were to gain access upstream. The Alameda Creek Fisheries Restoration Workgroup (Workgroup), formed for the purpose of restoring steelhead to Alameda Creek, will be undertaking a series of flow studies to determine the flows necessary to support steelhead in the watershed. The Workgroup includes the SFPUC, Alameda County Flood Control and Water Conservation District, Alameda County Resource Conservation District, Alameda County Water District, Alameda Creek Alliance, California State Coastal Conservancy, California Department of Fish and Game, East Bay Regional Park District, National Marine Fisheries Service, Natural Resources Defense Council, Pacific Gas and Electric Company, and the Zone 7 Water Agency.

  While this restoration planning is in progress, because steelhead access does not currently exist and there is no current steelhead migration above the BART weir, there would be no impact on steelhead migration, spawning, or juvenile rearing upstream of the BART weir as a direct result of WSIP implementation compared to the existing condition. However, to address the potential that steelhead could regain access to the upper Alameda Creek watershed in the event that planned and proposed projects and actions designed to restore steelhead in Alameda Creek are successfully implemented, a cumulative impact assessment for potential future-occurring steelhead was conducted.

- *Economic Impacts.* Comments were raised about potential economic impacts associated with proposed rationing during a drought. CEQA requires analysis of physical changes in the environment and does not require analysis of potential economic effects, unless an economic effect would, in turn, indirectly result in a physical environmental effect. Chapter 5, Water Supply and Systems Operations, evaluates the environmental effects of the proposed water supply option, and Chapter 9, Alternatives, discusses the potential environmental effects of alternatives to the program, including increased levels of conservation and increased rationing requirements. The discussion in Chapter 9 acknowledges that increased rationing and/or aggressive conservation could result in economic impacts within the SFPUC service area, but these effects would not be expected to result in significant, physical environmental effects.

  With respect to potential economic effects due to increased Tuolumne River diversions, as discussed in Chapter 5, Section 5.3, the WSIP's impact on hydrology and related effects on recreational resources would be less than significant or could be mitigated to a less-than-significant level; consequently, there are no expected economic effects from the WSIP on Tuolumne River recreational users.

- *Growth-Inducement Potential and Secondary Effects.* Comments on growth inducement primarily concerned whether the 2030 customer purchase requests for water supply associated with the WSIP would provide for growth beyond the SFPUC's existing service area. The proposed program would not expand the existing service area to support 2030 customer purchase requests, but would support urban infill development. The existing service area includes four counties (San Francisco, San Mateo, Santa Clara, and Alameda) and areas within those counties that are within the core of the nine-county Bay Area. Growth in the communities served by the SFPUC regional system would primarily be infill development within already developed Bay Area communities. This growth is representative of the "smart growth" principles promoted by ABAG to minimize urban and suburban sprawl and concentrate additional development in the existing core areas.

Alternatives

- *Restore Hetch Hetchy Valley / Remove O'Shaughnessy Dam.* Construction of Hetch Hetchy Reservoir was controversial when it was approved by Congress in 1913 and remains so today. Commentors requested analysis of a proposal to remove O'Shaughnessy Dam and to restore Hetch Hetchy Valley. Doing so would require developing a replacement water supply for the SFPUC regional system. In 2004, the Environmental Defense Fund prepared a planning-level analysis for replacing the water and hydropower benefits provided by the Hetch Hetchy Reservoir and O'Shaughnessy Dam. The suggested supply alternatives included expansion of New Melones Reservoir on the Stanislaus River, expansion of Don Pedro Reservoir downstream on the Tuolumne River, and/or diversion from the Delta.

  Regardless of the merits of removing O'Shaughnessy Dam under this proposal, as explained in Chapter 9, Alternatives, the dam removal proposal does not satisfy the CEQA requirements for an alternative to the WSIP. The CEQA Guidelines state that an 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 avoid or substantially lessen any significant adverse environmental effects. This proposed alternative is a different project proposal in its own right, with a completely different set of goals and

objectives from the WSIP; water supply replacement is required by this proposal, but upgrading the regional system facilities and improving the system's water quality, seismic, delivery, and supply reliability are not central objectives of this proposal. Further, this alternative proposal is not reasonably related to the reduction or elimination of the significant impacts that could occur with implementation of the proposed program, but suggests far greater changes than would be necessary to address any impacts that the WSIP would cause on the Tuolumne River and related resources. To the extent that Tuolumne River water would continue to be diverted under this alternative proposal, it would be likely to result in similar impacts as the WSIP. Further, the proposal itself is likely to result in numerous, significant environmental impacts associated with construction and operation of unknown new storage, conveyance, and treatment facilities at unknown locations and would require increased long-term energy requirements compared to the Hetch Hetchy system, which is gravity-driven and not subject to water filtration requirements. In addition, there would likely be significant impacts related to the diversion of Tuolumne River water elsewhere, as well as impacts on any other surface water bodies developed to replace Tuolumne River supply and their associated resources. For these reasons, this alternative is not evaluated in detail in this PEIR.

- *Alternative Water Supply Sources Other than the Tuolumne River*. Increasing diversions from the Tuolumne River is controversial. Many commentors requested evaluation of alternatives to this element of the WSIP, including increasing demand management efforts (conservation and water recycling) and other alternative supply sources. Further, the San Francisco Board of Supervisors has called for the PEIR to evaluate an alternative that involves no increase in Tuolumne River diversions. These alternative supply proposals are controversial for the SFPUC's water customers, since the Tuolumne River is a high-quality, secure source of supply to which the CCSF already has rights, and the use of additional Tuolumne River water would maximize the use of existing facilities and require few additional facility projects in contrast to other alternatives. In Chapter 9, the PEIR discusses the following alternatives to address these requests for program alternatives: Aggressive Conservation/Water Recycling and Local Groundwater (with and without supplemental Tuolumne River diversions), Year-round Desalination at Oceanside, and Regional Desalination for Drought.

Issues to Be Resolved

Section S.5, below, identifies the actions necessary for the overall adoption and approval of the WSIP. Following certification of the PEIR by the San Francisco Planning Commission, in order to adopt the WSIP, the SFPUC must make findings for each significant effect identified in the PEIR and determine whether it will adopt each mitigation measure (and if not, why).

As further project details are known about the facility improvement projects and site-specific information is gathered, it is possible that individual project effects identified in this document might not occur or that additional project effects not identified in this document would occur. Such changes in project details will be addressed during project-specific environmental review.

In considering approval of the WSIP as proposed, the SFPUC would be considering a commitment to: (a) meet the 2030 customer purchase request increase, (b) secure and develop the proposed water supply portfolio for long-term supply to the regional service area,

(c) establish a 20 percent maximum system rationing limit during a drought, (d) implement the 22 facility improvement projects evaluated in the PEIR to improve the regional water system, and (e) operate the system in accordance with the level of service goals and system performance objectives established for the WSIP. The proposed water supply option adds recycled water, local groundwater, conservation, water transfers, and regional groundwater conjunctive use to the SFPUC's water supply portfolio for the system, while continuing to rely predominantly on Hetch Hetchy system water and local watershed supply captured in local reservoirs.

S.5 Required Actions and Approvals (Chapter 3)

The following list identifies the approvals necessary for overall adoption and approval of the WSIP, including adoption of the proposed levels of service and water supply option, and general approval of the facility improvement projects. The approval and adoption of the overall WSIP as a program and policy are distinct actions from the approvals for individual facility improvement projects.

Approvals and actions applicable to the overall WSIP include:

- *San Francisco Planning Commission*
  - Certifies Final PEIR on the WSIP
- *San Francisco Public Utilities Commission*
  - Reviews Final PEIR and adopts CEQA findings and mitigation monitoring and reporting program
  - Approves and adopts the WSIP
- *San Francisco Board of Supervisors*
  - Hears and decides any appeals of the Planning Commission's certification of the Final PEIR

Implementation of the WSIP could involve the following additional discussion and actions by the agencies listed below:

- *San Francisco Public Utilities Commission*
  - Approves any water transfer agreements with TID, MID, or other agencies
  - Approves contracts for the construction of WSIP facility improvement projects
  - Approves operating agreements for the Westside Basin conjunction-use program
  - Annually reviews its cost of utility service and revises the rate schedules applicable to retail water sales as required[1]

[1] Retail water sales include sales to Lawrence Livermore National Laboratory, the Town of Sunol, and approximately 190 other retail customers (see list of major water customers in Table 3.1). The SFPUC sells water to Groveland Community Services District under the terms of a 1984 contract that allows the water rate to be adjusted every four years.

  - Approves any water sales agreements with SFPUC wholesale and retail customers

- *San Francisco Planning Department/Planning Commission*
  - Conducts ongoing environmental review of individual facility improvement projects as well as compliance with mitigation and monitoring reporting program during WSIP implementation
  - Makes determinations of consistency with the San Francisco General Plan, if needed, for projects requiring certain approvals by the Board of Supervisors

- *San Francisco Board of Supervisors*
  - Appropriates funding for implementation of the WSIP projects, including general obligation bond monies and annual budget appropriations
  - May reject rates and charges that the SFPUC establishes for water customers by resolution within 30 days of adoption by the SFPUC
  - Considers appeals of EIR certifications and negative declaration approvals by the San Francisco Planning Department

- *State Water Resources Control Board*
  - Reviews and authorizes any transfer under a post-1914 water right that may be necessary to implement long-term water transfers with TID or MID

- *Turlock and Modesto Irrigation Districts*
  - Review and approve water transfer agreements with the SFPUC and/or amendments to the SFPUC's water bank account in Don Pedro Reservoir

- *SFPUC wholesale and retail water customers*
  - Approves any agreements between SFPUC and individual wholesale and retail customers

- *Daly City, California Water Service Company's South San Francisco service area, and San Bruno*
  - Approve operating agreement(s) for the Westside Basin conjunctive-use program (Regional Groundwater Projects), including approval of new system wells

S.6 WSIP Variants (Chapter 8)

The SFPUC requested that the PEIR also include environmental assessment of four variants to the WSIP. The WSIP variants are essentially the same as the proposed program except for minor differences in water supply sources or rationing limits. The variants are not intended to serve as CEQA alternatives, which are discussed separately in the PEIR. This evaluation of the variants is provided to allow decision-makers to compare the environmental impacts of the variants to those of the WSIP.

Variant 1 – All Tuolumne

Variant 1 – All Tuolumne is the same as the proposed program in all respects except for one. Instead of developing 10 mgd of additional supply sources through recycled water, groundwater, and conservation projects in San Francisco, the SFPUC would rely exclusively on increased diversions from the Tuolumne River to serve the 2030 increase in purchase requests of 35 mgd during most (nondrought) years. All other aspects of the proposed water supply option would be the same, and all of the same facility improvement projects would be implemented, with the exception of the recycled water and groundwater projects in San Francisco. The environmental analysis determined that Variant 1 would result in slightly more severe impacts on the Tuolumne River resources compared to the WSIP, although it would avoid potential impacts on the North Westside Groundwater Basin. However, all other water supply and system operations impacts and mitigation measures would be the same as under the WSIP. There would be no additional impacts, and no additional mitigation measures would be required. Facilities-related impacts under Variant 1 would be slightly less than those of the WSIP, since construction and operational impacts associated with the recycled water and groundwater projects in San Francisco would not occur.

Variant 2 – Regional Desalination for Drought

Variant 2 – Regional Desalination for Drought would be identical to the WSIP except that, instead of relying on water transfers with TID and MID as a supplemental dry-year supply, the SFPUC would receive water from a regional desalination plant during droughts. All other aspects of the proposed water supply option would be the same, and all of the same facility improvement projects would be implemented. The SFPUC is currently participating with the East Bay Municipal Utility District, Contra Costa Water District, and Santa Clara Valley Water District in studying the feasibility of developing a Bay Area Regional Desalination Plant (BARDP). Depending on the location of BARDP, the SFPUC would either receive desalinated water directly from the plant for blending in the regional system or arrange for an exchange with other water agencies through existing interties connected to the regional system. The environmental impacts of Variant 2 would be essentially the same as those of the WSIP, with a very slight reduction in impacts on Tuolumne River resources, since water transfers from TID and MID during dry years would not occur. However, due to the extent of additional facilities required for the BARDP and associated conveyance facilities, this variant would have substantially greater facilities-related impacts than the WSIP, most notably the increased energy impacts and water quality/biological resources impacts associated with seawater intake structures and brine disposal.

Variant 3 – 10% Rationing

Variant 3 – 10% Rationing would be the same as the WSIP in all respects, except that the maximum systemwide rationing limit during droughts would be reduced from 20 to 10 percent. To achieve this reduction in the rationing limit, the SFPUC would increase the amount of water transfers with TID and MID during dry years, increasing average annual diversions from the Tuolumne River. Variant 3 would otherwise include the same water supply options and facility

improvement projects as the WSIP. Variant 3 would result in all the same impacts as the WSIP, except for somewhat more severe impacts on Tuolumne River resources. However, all impacts would be the same as under the WSIP, and no additional mitigation measures would be required.

Variant 4 – Phased WSIP

Variant 4 – Phased WSIP would generally be the same as the WSIP, except that an interim mid-term planning horizon of 2018 would be used instead of the WSIP 2030 planning horizon. Under this variant, all facility improvement projects would be implemented, and the SFPUC would make a decision about future water supply to its customers through 2018 only and defer a decision regarding long-term water supply until after 2018. Variant 4 would limit deliveries from SFPUC watersheds to an annual average of 265 mgd through 2018 and would promote development and implementation of 10 to 20 mgd of additional local conservation, water recycling, and groundwater projects. The environmental impacts of Variant 4 would be essentially the same as those for the WSIP or Modified WSIP Alternative, except for a reduction in impacts on Tuolumne River resources. However, it would result in additional impacts associated with construction and operation of recycled water and groundwater facilities similar to those of the Modified WSIP Alternative.

S.7 Alternatives to the Proposed Program (Chapter 9)

Based on a review of the environmental impacts identified in the PEIR for the WSIP and on input received during the public scoping period, numerous alternative concepts were screened to assess their ability both to meet most of the program objectives established by the SFPUC for the WSIP and to avoid or minimize the significant environmental effects of the proposed program. A range of program alternatives was selected for more detailed review in comparison to the WSIP, as required by CEQA. The alternatives analyzed in the PEIR are summarized below.

With the exception of the No Program Alternative, these alternatives were included in the PEIR because of their apparent ability to meet most of the program's basic objectives, their ability to reduce one or more of the significant impacts associated with program implementation, their potential feasibility, and their collective ability to provide a reasonable range of alternatives to foster informed decision-making and public participation. Analysis of the No Program Alternative is included as required by CEQA.

No Program Alternative

Under the No Program Alternative, the SFPUC would implement only those facility improvement projects driven by regulatory requirements or existing agreements with regulatory agencies. The system would meet the water quality goals of the WSIP, but it would fail to meet the seismic and delivery reliability goals and would have limited ability to serve the increase in customer purchase requests through 2030, particularly during drought periods. The SFPUC would endeavor to meet increasing customer purchase requests through 2030 by diverting

additional Tuolumne River water only when available. It would not secure an additional dry-year supply transfer of Tuolumne River water, implement the Westside Basin groundwater conjunctive-use program, or develop the proposed recycled water and groundwater projects in San Francisco. The wholesale customers may decide to pursue supplemental supply sources and/or conservation measures to make up for the reduced reliability and the supply shortfall under this alternative. Compared to the WSIP, this alternative would develop less in terms of new water supplies for the regional system and would implement far fewer of the proposed facility improvement projects.

No Purchase Request Increase Alternative

The No Purchase Request Increase Alternative is designed to serve wholesale customers only the amount of water required under the existing Master Water Sales Agreement between CCSF and each of the wholesale customers; therefore, this alternative would not fully meet the purchase request increase by the SFPUC wholesale customers for additional supply through

2030. Under the No Purchase Request Increase Alternative, the SFPUC would implement all of the proposed WSIP facility improvement projects. It is expected the wholesale customers would pursue supplemental supply sources and/or conservation measures to make up the supply shortfall under this alternative. This alternative was included in the alternatives analysis in an effort to avoid or minimize the potential growth-inducing effects and secondary effects of growth associated with providing more water to the regional customers, and it evaluates the consequences of the SFPUC not meeting the full future purchase request increase.

Aggressive Conservation/Water Recycling and Local Groundwater Alternative

Under this alternative, the SFPUC would implement all of the proposed WSIP facility improvement projects, but would endeavor to serve the projected increase in customer purchase requests through 2030 only through additional conservation, water recycling, and local groundwater projects. It does not appear feasible to fully meet the 2030 purchase requests with reasonably foreseeable conservation, recycled water, and groundwater projects within the service area. Therefore, under the Aggressive Conservation/Water Recycling and Local Groundwater Alternative, the SFPUC would have to either: (a) limit future customer purchase deliveries to the level that can be met, short of the 2030 requests (approximately 294 mgd instead of 300 mgd average annual) and increase the level of rationing to 25 percent or more during droughts, or (b) provide a supplemental supply to make up the delivery shortfall to meet the 300 mgd. As a result, two scenarios are discussed in the PEIR:

> **No Supplemental Tuolumne River Supply** – The SFPUC would not provide a supplemental supply of water from the Tuolumne River to augment this alternative to meet the 2030 customer purchase requests of 300 mgd.
>
> **With Supplemental Tuolumne River Supply** – The SFPUC would supplement this alternative with additional Tuolumne River diversions under its existing water rights.

These two alternatives represent alternative sources of supply and different demand delivery levels for the regional system compared to the WSIP. They are evaluated to address the impacts on resources in the Tuolumne River, Alameda Creek, and Peninsula watersheds, including Pilarcitos Creek.

Lower Tuolumne River Diversion Alternative

Under the Lower Tuolumne River Diversion Alternative, the SFPUC would implement all of the proposed facility improvement projects and would serve the projected increase in customer purchase requests through 2030 through diversions from the lower Tuolumne River near its confluence with the San Joaquin River, assuming it could reach agreement with TID and MID. This alternative would include construction and operation of additional conveyance and treatment facilities to divert, transport, treat, and blend the new supply into the regional system. Compared to the WSIP, this alternative represents an alternative source of supply and is evaluated to address impacts on the Tuolumne River and related resources.

Year-round Desalination at Oceanside Alternative

Under the Year-round Desalination at Oceanside Alternative, the SFPUC would implement all of the proposed WSIP facility improvement projects and would construct a 25-mgd desalination plant in San Francisco to serve the projected increase in customer purchase requests through 2030. This alternative would not involve increased levels of diversions from the Tuolumne River. The desalination plant would provide year-round supplies during all hydrologic year types to blend into the regional system at the Sunset Reservoir in San Francisco. Compared to the WSIP, this alternative represents an alternative source of supply and is evaluated to address the impacts on the Tuolumne River, Alameda Creek, and Peninsula watersheds, including Pilarcitos Creek, and related resources.

Regional Desalination for Drought Alternative

Under the Regional Desalination for Drought Alternative, the SFPUC would implement all of the proposed WSIP facility improvement projects and would partner with other Bay Area water agencies to construct and operate a regional desalination plant that would provide the SFPUC with supplemental supply during drought years. Compared to the WSIP, this alternative represents an alternative source of supply and is evaluated to address the impacts on the Tuolumne River, Alameda Creek, and Peninsula watersheds, including Pilarcitos Creek, and related resources.

Modified WSIP Alternative

Under the Modified WSIP Alternative, the SFPUC would implement all of the proposed facility improvement projects, but would modify proposed system operations to minimize environmental effects. This alternative would include the implementation of key mitigation measures identified in this PEIR, including acquiring a water transfer of conserved water as a supplemental dry-year source, implementing a minimum instream flow requirement for resident fish in a portion of Alameda Creek, modifying operations to accommodate increased demands from the Coastside County Water District, managing the inundation levels at Crystal Springs Reservoir to preserve upland habitat to the extent possible, and increasing recycled water, conservation, and local groundwater in partnership with wholesale customers. This alternative is similar to the WSIP but includes alternate supply sources and system operations. It is evaluated to address the impacts on the Tuolumne River, Alameda Creek, and Peninsula watersheds, including Pilarcitos Creek and Crystal Springs Reservoir, and related resources.

Comparison of Alternatives to the Proposed WSIP

The eight alternatives analyzed in the PEIR would have varying abilities to meet the goals and objectives established by the SFPUC for the WSIP and would have a wide range of additional environmental effects. The No Program, No Purchase Request Increase, and Aggressive Conservation/Water Recycling and Local Groundwater Alternatives would fail to meet one or more key program objectives, while the Lower Tuolumne River Diversion, Year-round Desalination at Oceanside, Regional Desalination for Drought, and Modified WSIP Alternatives appear to meet most of the basic project objectives.

Two alternatives—the Aggressive Conservation/Water Recycling and Local Groundwater Alternative (Without Supplemental Tuolumne River Water) and the Year-round Desalination at Oceanside Alternative—do not involve increases in Tuolumne River diversion over existing average annual levels. Impacts on the Tuolumne River and related resources would be reduced under these alternatives compared to the WSIP, but would not be completely avoided due to changes in the regional system operations that could affect the Tuolumne River in some years under all alternatives, regardless of whether there are additional average annual diversion increases. Other alternatives would also reduce impacts on the Tuolumne River compared to the WSIP, but impacts would remain potentially significant and require mitigation, similar to the WSIP. Most alternatives would result in similar impacts on Alameda Creek, Crystal Springs Reservoir and Pilarcitos Creek and related resources; impacts on these water bodies and their associated resources are primarily the result of specific facility improvement projects that must be implemented under all alternatives to meet regulatory requirements, and are not affected by which sources of supply are selected to augment the regional system supply portfolio.

All alternatives could also affect other water bodies not affected by the WSIP. The Lower Tuolumne River Diversion Alternative would result in direct impacts on the lower Tuolumne River due to construction and operation of a new intake structure on the river that would not occur under the WSIP. The Year-round Desalination at Oceanside Alternative and the Regional Desalination for Drought Alternative would affect the offshore waters of the Pacific Ocean and the upper San Francisco Bay, respectively, due to water intake for desalination treatment and discharge of the concentrated brine following treatment. The WSIP would not affect these water bodies. Under the other alternatives that require additional conservation, water recycling and local groundwater use and/or those alternatives that result in a supply or reliability shortfall for the wholesale customers, supplemental water supply projects could affect other surface water bodies, including rivers north or south of the Delta and the Delta as well as local groundwater aquifers.

All alternatives, except for the No Program Alternative, would include implementation of the 22 facility improvement projects within the regional system proposed under the WSIP. However, all alternatives would also require the construction and operation of additional major facility projects. These other facility projects would be required as part of securing alternative water supply sources and/or supplemental water supplies that the SFPUC or BAWSCA (and the wholesale customers) would need to pursue to insure the program objectives are met. The other facilities that would be required in addition to the facility improvement projects for the SFPUC regional system vary by alternative, but include new recycled water treatment, storage and transmission facilities; new groundwater wells a desalination plant and associated storage and transmission facilities and/or a new water treatment plant and associated new river intake and transmission facilities. Consequently, each alternative would result in greater impacts from facility construction and operation than the WSIP because additional new or expanded facilities would be required.

All alternatives are expected to have growth inducement potential and associated secondary effects of growth similar to those of the WSIP. The No Purchase Request Increase Alternative evaluates an option in which the SFPUC would not to fully serve its customers' purchase

request through 2030, even under this alternative, BAWSCA and the wholesale customers are expected to pursue supplemental supply sources to make up for any supply delivery or drought reliability shortfall from the regional system such that the communities in the service area could implement their planned growth. Thus, withholding additional supply from the regional system to the wholesale customers would not necessarily reduce the growth in the communities within the service area.

Environmentally Superior Alternative

CEQA requires the identification of an environmentally superior alternative from among the proposed project and the set of alternatives evaluated. The CEQA Guidelines further state that if the No Program Alternative is the environmentally superior alternative, then the EIR must also identify which of the action alternatives is the environmentally superior alternative. In this case, the No Program Alternative is not the environmentally superior alternative. As summarized above, under the No Program Alternative, the SFPUC would be unable to meet most of the program objectives. The No Program Alternative would leave the SFPUC and its customers at significant risk of supply reduction or disruption during an earthquake or other emergency, or during a drought. This is not a feasible or acceptable alternative for the SFPUC.

Although it appears that fewer facility improvement projects would be implemented under the No Program Alternative and that, as a result, there would be fewer facility and construction impacts, it is expected that there would be much more emergency facility repair and replacement projects under this alternative as the system continues to age without proactive improvement. Ultimately, through required repair and replacement efforts, a similar level of facility improvement projects as that proposed under the WSIP might have to be conducted under the No Program Alternative, resulting in much of the same facility impacts as the WSIP; however, these repair and replacement projects would likely occur over a longer period of time and in a less coordinated and comprehensive manner. In addition, implementing system improvements through a piecemeal and largely emergency response approach could result in greater environmental impacts and less mitigation for such impacts; when projects are implemented under emergency conditions, they often require little or no environmental review and thus could be implemented without the same level of mitigation and mitigation compliance monitoring that would be required for the WSIP. Furthermore, piecemeal implementation could also increase the cumulative effects of multiple, sequential facility repair and replacement projects throughout the system.

With respect to impacts on water resources, the No Program Alternative's effects on the Tuolumne River would be similar to but less than those of the WSIP because river diversions would not increase quite as much as with the WSIP; however, the No Program Alternative would result in the same significant impacts on the Tuolumne River as the WSIP and would require the same mitigation. As summarized above, the No Program Alternative would also have the same impacts as the WSIP on the Alameda Creek / Alameda watershed resources and on the Peninsula watersheds (including Pilarcitos Creek) resources. The No Program Alternative would have the same growth-inducement potential and associated secondary effects

of growth as the WSIP because BAWSCA and the wholesale customers would be expected to secure supplemental supplies to meet any supply delivery and reliability shortfall from the regional system that would result under the No Program Alternative.

Finally, under this alternative, BAWSCA and/or the wholesale customers might have to construct and operate additional facilities in order to develop supplemental surface water supplies, recycled water, or groundwater. Required facilities could include new treatment plants, storage and transmission facilities, and groundwater wells. The impacts of constructing and operating these facilities would be in addition to those resulting from improvement and repair of the regional system. Thus, the No Program Alternative could result in greater facility impacts than the WSIP. Because the No Program Alternative would not appreciably lessen the environmental impacts of the WSIP, might result in additional impacts due to the need for supplemental supply development and associated facility construction, and would not meet most of the basic program objectives, it is not considered the environmentally superior alternative.

The Modified WSIP Alternative is considered to be the environmentally superior alternative. It would reduce key impacts of the proposed WSIP on natural resources along the lower Tuolumne River, along Alameda Creek below the diversion dam, at Pilarcitos Reservoir and along Pilarcitos Creek, and in Crystal Springs Reservoir, but it would continue to meet the WSIP's primary goals and objectives. Like the WSIP, this alternative would maximize the use of existing facilities and the largely gravity-driven system without also requiring the construction of additional major facilities called for under many other alternatives, or substantially increasing the energy demand of the system or need for pumping. While some of the other alternatives would avoid or lessen certain WSIP impacts, they would also result in substantial additional impacts that the WSIP would not generate, because these alternatives would require substantial additional major facilities and affect other environmental resources in different geographic locations in addition to those affected by the WSIP.

The Modified WSIP Alternative includes implementation of more conservation, water recycling and local groundwater projects within the regional service area than under the WSIP, which would also require construction of some additional facilities in some areas not affected by the WSIP but not to the same extent as other alternatives. However, while construction of these facilities would cause temporary construction disruption and related environmental impacts, long-term implementation of these regional conservation, water recycling, and local groundwater projects would offset impacts of the operational modifications proposed under the Modified WSIP Alternative on the Tuolumne River. Depending on the extent of these projects implemented by wholesale customers in collaboration with the SFPUC, they could also help reduce the amount of additional diversion required from the Tuolumne River to serve the 2030 customer purchase requests. Compared to the WSIP, the Modified WSIP Alternative would result in slightly greater impacts on land use, air quality, noise, traffic, and energy in urban environments (expected to be largely mitigable), but fewer and significantly less severe impacts on biological and fishery resources in natural habitats.