9 CEQA Alternatives

CHAPTER 9
CEQA Alternatives

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9.1 Introduction

9.1.1 CEQA Guidance for Alternatives Analysis

The California Environmental Quality Act (CEQA) Guidelines, Section 15126.6(a), state that an environmental impact report (EIR) must describe and evaluate a reasonable range of alternatives to the proposed project that would feasibly attain most of the project's basic objectives, but that would avoid or substantially lessen any significant adverse environmental effects of the project. An EIR is not required to consider every conceivable alternative to a proposed project. Rather, it must consider a reasonable range of potentially feasible alternatives that will foster informed decision-making and public participation. CEQA Guidelines Section 15126.6(e) states that, "The specific alternative of 'no project' shall also be evaluated along with its impact" (which, in the case of this Program EIR, is referred to as the No *Program* Alternative). The EIR must evaluate

the comparative merits of the alternatives and include sufficient information about each alternative to allow meaningful evaluation, analysis, and comparison with the proposed project.

9.1.2 WSIP Goals and Objectives

Program alternatives were evaluated for their ability to attain most of the basic objectives of the proposed Water System Improvement Program (WSIP or program), consistent with CEQA. The WSIP goals, objectives, and proposed levels of service (presented in Chapter 3, Program Description, Section 3.3) are repeated here for ease of reference. The goals and objectives, based on a planning horizon through 2030, 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 for the regional water system 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. The system performance objectives provide design guidelines for facility improvement projects and provide the basis for the proposed system operations and water supply option. **Table 9-1** presents the WSIP goals and objectives, and **Table 9-2** summarizes and compares the levels of service under the existing condition and the proposed program.

9.1.3 Organization of this Chapter

This chapter presents the key alternatives analysis and results, then describes the background process and evaluation that led to those results, as follows:

- Section 9.2 presents the alternatives selected for inclusion in the PEIR based on CEQA criteria. The section describes each alternative, including the No Program Alternative, and discusses San Francisco Public Utilities Commission (SFPUC) actions as well as possible wholesale customer actions associated with each alternative. For each alternative, the section also describes feasibility issues associated with its implementation, as well as its ability to meet WSIP objectives and its effectiveness in avoiding or reducing environmental impacts. Section 9.2 then compares the environmental effects of each alternative with the effects of the WSIP.

- Section 9.3 summarizes and compares the alternatives, identifying trade-offs and the environmentally superior alternative.

- Section 9.4 describes the process used to identify program alternatives. It summarizes the significant adverse impacts of the WSIP, identifies strategies to avoid or substantially lessen these effects that could be implemented through an alternative to the WSIP rather

TABLE 9-1
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 point) 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 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 and 2006.

TABLE 9-2
EXISTING AND PROPOSED REGIONAL SYSTEM LEVELS OF SERVICE[a]

Operating Parameter	Existing Level of Service (2005)	Proposed Level of Service with WSIP (2030)
Water Quality	Meet all existing local, state, and federal water quality requirements	Meet all local, state, and federal water quality requirements in 2030
Seismic Response After Major Earthquake	Not defined	Provide basic service[b] of 229 mgd within 24 hours; average-day service of 300 mgd within 30 days
Delivery During System Maintenance	Not defined	Average day demand of 300 mgd
Average Annual Water Supply	265 mgd	300 mgd
Regional System Firm Yield[c]	219 mgd	256 mgd
Drought-Year Rationing	No maximum limit to rationing	Up to 20 percent systemwide rationing

[a] Level of service flow rates are defined on a systemwide basis and are not specific to any customer turnout (i.e., water diversion point).
[b] Basic service is defined as winter-month demand, estimated to be 229 mgd systemwide in 2030.
[c] System firm yield is defined as the average annual water delivery that can be sustained by the regional water system during an extended drought. The SFPUC uses an 8.5-year design drought for planning purposes. Currently, due to operating restrictions imposed on Calaveras Dam by the California Division of Safety of Dams in December 2001, the system firm yield is reduced from its normal system firm yield of 226 mgd to about 219 mgd.

SOURCE: SFPUC, 2006.

than through mitigation measures, and reviews suggestions and concepts for alternatives that were raised during the scoping period. Section 9.4 presents the rationale and screening process used for accepting or rejecting potential alternatives and summarizes the reasons for eliminating alternatives from further consideration.

- Section 9.5 provides additional background information about and more detail on the reasons for rejecting alternative concepts identified in Section 9.4 that were considered but rejected either as part of the WSIP development process or as part of the CEQA alternatives analysis process.

9.2 Alternatives Analysis

9.2.1 Selected Alternatives for Comparative Analysis

In accordance with CEQA, appropriate alternatives for EIR analysis are those that meet most of a project's basic objectives *and* avoid or substantially lessen the significant environmental impacts of the proposed project. As described in more detail in Section 9.4, several steps were taken to identify potential alternatives and assemble a reasonable range of alternatives for evaluation in the PEIR in comparison in the WSIP, including:

1. Review the significant effects resulting from the WSIP and identify possible strategies to avoid or lessen such impacts.

2. Review ideas and alternative concepts suggested during the PEIR scoping process.

3. Categorize and evaluate strategies and concepts for the ability to both meet the basic project objectives and avoid or lessen significant impacts.

4. Develop preliminary alternatives based on strategies and concepts retained from preliminary screening. Evaluate feasibility with respect to technical, institutional, cost, and regulatory considerations.

5. Select and refine a final set of alternatives for CEQA analysis.

From this process seven alternatives, in addition to the required No Program Alternative, were selected for further evaluation and comparison to the WSIP. Together, this set of eight alternatives represents a broad range of options in terms of how key aspects of the proposed program could be implemented. Each alternative in the set differs from the WSIP in one or more of the following important ways:

- *Demand level served*. The WSIP plans to meet an average annual delivery requirement of 300 mgd by 2030 reflecting the customer purchase request increase of 35 mgd over current average annual demand. Two alternatives do not fully satisfy customer purchase requests in 2030.

- *Water supply source(s) / level of additional Tuolumne River diversion.* The WSIP proposes to increase Tuolumne River diversion under the CCSF's existing water rights coupled with development of additional recycled water, conservation, and local groundwater in San Francisco, a conjunctive groundwater use program in the Westside Basin (San Mateo County), and acquisition of a dry-year surface water transfer. Two alternatives include a smaller increase in diversion of Tuolumne River water compared to the WSIP and two alternatives include no increase in Tuolumne River water diversion; one of these alternatives looks at demand management strategies (conservation and water recycling) while the other evaluates an alternative supply source – seawater desalination. Another alternative considers a new point of diversion on the lower Tuolumne River, which, although it is still Tuolumne River water, represents an alternative source of supply in terms of shifting from a Sierra Nevada supply source to a Central Valley supply source.

- *Level of drought rationing.* As part of implementing the WSIP the SFPUC proposes to meet an objective of up to 20 percent maximum systemwide rationing in any year of a drought. Two alternatives require higher levels of rationing.

- *Facilities – number of projects required / extent of facilities construction.* The WSIP includes implementation of 22 facility improvement projects evaluated in this PEIR. One alternative, the No Program Alternative, includes only a few of these facility improvement projects. Seven of the eight alternatives include all 22 of the facility improvement projects plus additional required facilities ranging from a new desalination plant and transmission pipelines to additional recycled water treatment plants, groundwater wells, and distribution facilities.

As noted in Section 9.4, many other alternative concepts were identified that would modify the WSIP in one of the key areas identified in the bullet list above. However, the set of eight alternatives selected for further evaluation was judged to best represent the range of identified strategies and concepts. For example, a Delta water supply source was one of the supply source

concepts proposed as an alternative to increasing diversion from the Tuolumne River. However, an alternative to divert water off the lower Tuolumne River better represents the concept of diverting, in effect, Tuolumne River water from a point downstream in the valley, lower in the watershed. Similarly, a seawater desalination alternative is included in the range of alternatives evaluated as a supply source alternative that involves no additional Tuolumne River water. Section 9.4, below, describes the alternatives development and screening process in further detail and explains the reasons for eliminating various strategies and concepts from further evaluation.

This section evaluates the comparative merits of the selected alternatives relative to the WSIP. Since the alternatives are generally conceptual, the evaluation is based on the available information and reasonable assumptions about how each alternative would be implemented. For each alternative, this section presents the following:

- Description of the alternative, including associated facility improvement projects, water supply sources, and system operations. The descriptions include SFPUC actions as well as reasonable expectations regarding the wholesale customer actions that would occur under each alternative. The description includes a review of potential feasibility issues as well.

- Ability to meet primary WSIP goals and objectives

- Environmental impacts of each alternative compared to those of the WSIP. This section is divided into three groups: facility impacts (construction and operation), water supply and system operations impacts, and growth-inducement impacts. Under the facility impacts, impacts associated with each alternative are compared to those described in Chapter 4 of this PEIR for the proposed WSIP facility improvement projects; additionally, impacts of other facilities that would or could be required under an alternative but not under the WSIP are described, along with associated potential impacts on other water bodies and associated resources not affected by the WSIP. Under the water supply and system operations impacts, the potential impacts within the SFPUC regional system under each alternative are compared to those analyzed for the WSIP in Chapter 5 of this PEIR.[1] The comparative evaluation of growth-inducement impacts is discussed based on the analysis presented in Chapter 7 of this PEIR.

Table 9-3 identifies the eight CEQA alternatives evaluated in detail in this PEIR. There are seven main alternatives but there are also two variations of the Aggressive Conservation / Water Recycling and Local Groundwater Alternative that are each evaluated in detail in comparison to the WSIP; thus these are counted as two separate alternatives, for a total of eight. The table provides a brief description of each alternative and highlights how it differs from the WSIP and what impact areas it is intended to address.

[1] The potential impacts of the WSIP on water supply and system operations were determined based on modeling results of the Hetch Hetchy/Local Simulation Model, as described in Section 5.1. Modeling results for the CEQA alternatives are discussed in Appendices H1 through H3. It should be noted that development of the conceptual alternatives continued after the performance of modeling for the CEQA alternatives; however, results presented in this PEIR are adequate to assess the comparative impacts of the alternatives and the WSIP. In particular, the modeling results of the CEQA alternatives do not account for restoration of the historical capacity of Crystal Springs Reservoir (i.e., implementation of the Lower Crystal Springs Dam project, PN-4) and the associated 1 mgd of system firm yield; however, the comparative analysis qualitatively addresses the change in system operations that would occur with implementation of PN-4.

TABLE 9-3
SELECTED ALTERNATIVES FOR CEQA ANALYSIS

Alternative / Description	How Does This Alternative Differ From The WSIP?	What WSIP Impacts Is The Alternative Intended to Address?
No Program –SFPUC would implement only those WSIP facility improvement projects driven by regulatory requirements or existing agreements with regulatory agencies. It would endeavor to meet increasing customer purchase requests through the year 2030 by diverting additional Tuolumne River water only when available under CCSF's existing water rights. The wholesale customers would have to pursue supplemental supply sources and/or conservation measures to make up the supply shortfall/reduced reliability under this alternative.	▪ *2030 Avg. Annual Delivery Target:* Same ▪ *Supply Sources*: Tuolumne River. No dry-year water transfer, Westside Groundwater basin, or 10 mgd recycled water / conservation / groundwater in SF ▪ *Additional Tuolumne River diversion*: Less ▪ *Level of Rationing*: Allow for greater than 20% systemwide rationing ▪ *Facility projects*: Fewer	▪ Required by CEQA ▪ Fewer facilities construction impacts (fewer facilities would be constructed)
No Purchase Request Increase – SFPUC would implement all of the proposed WSIP facility improvement projects but would limit wholesale customers' future purchases to the terms of the existing Master Water Sales Agreement instead of providing all of their 2030 purchase requests. The wholesale customers would have to pursue supplemental supply sources and/or conservation measures to make up the supply shortfall under this alternative.	▪ *2030 Avg. Annual Delivery Target:* Less ▪ *Supply Sources*: Same ▪ *Additional Tuolumne River diversion*: Less ▪ *Level of Rationing*: Same ▪ *Facility projects*: Same	▪ Growth inducement potential and associated secondary effects of growth ▪ Impacts on Pilarcitos Creek
Aggressive Conservation/Water Recycling and Local Groundwater – The SFPUC would implement all of the proposed WSIP facility improvement projects and endeavor to serve the projected 2030 delivery target of 300 mgd solely through additional conservation, water recycling, and local groundwater projects. A maximum of 19 mgd of the 25 mgd projected annual average increase in purchase requests might be met through such local projects, as feasible. Since this alternative would not meet the full 2030 customer purchase request, the SFPUC would have to either (a) limit future deliveries to the level that can be met under this alternative (estimated to be 294 mgd or less) or (b) supplement supply to make up the delivery shortfall. Two variations of this alternative are evaluated as follows: ***No Supplemental Tuolumne River Supply*** – The SFPUC would not provide supplemental 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.	***No Supplemental Tuolumne River Supply*** ▪ *2030 Avg. Annual Delivery Target:* Less ▪ *Supply Sources*: More recycled water and local groundwater. No additional Tuolumne River; no dry-year water transfer; no Westside Groundwater Basin ▪ *Additional Tuolumne River diversion*: None ▪ *Level of Rationing*: Requires greater than 20 percent rationing ▪ *Facility projects*: Same ***With Supplemental Tuolumne River Supply*** ▪ *2030 Avg. Annual Delivery Target:* Same ▪ *Supply Sources*: More recycled water and local groundwater. Less additional Tuolumne River; no dry-year water transfer; no Westside Groundwater Basin ▪ *Additional Tuolumne River diversion*: Less ▪ *Level of Rationing*: Same	▪ Impacts on the Tuolumne River, Alameda Creek and Peninsula Watershed water resources including Pilarcitos Creek

TABLE 9-3 (continued)
SELECTED ALTERNATIVES FOR CEQA ANALYSIS

Alternative / Description	How Does This Alternative Differ From The WSIP?	What WSIP Impacts Is The Alternative Intended to Address?
Lower Tuolumne River Diversion – The SFPUC would implement all of the proposed WSIP facility improvement projects and would serve the projected increase in customer purchase requests through 2030 through diversions on the lower Tuolumne River per an agreement with the Turlock and Modesto Irrigation Districts (TID and MID) and construction of conveyance and treatment facilities to blend the new supply into the regional system.	▪ *2030 Avg. Annual Delivery Target:* Same ▪ *Supply Sources*: Same but new Tuolumne River diversion point ▪ *Additional Tuolumne River diversion*: Same ▪ *Level of Rationing*: Same ▪ *Facility projects*: More	▪ Impacts on the Tuolumne River
Year-round Desalination at Oceanside – The SFPUC would implement all of the proposed WSIP facility improvement projects and construct a 25-mgd desalination plant in San Francisco at Oceanside to serve the projected increase in customer purchase requests through 2030. The plant would provide year-round supplies during all hydrologic year types to blend into the regional system.	▪ *2030 Avg. Annual Delivery Target:* Same ▪ *Supply Sources*: Desalinated seawater ▪ *Additional Tuolumne River diversion*: None ▪ *Level of Rationing*: Same ▪ *Facility projects*: More	▪ Impacts on the Tuolumne River, Alameda Creek and Peninsula watershed water resources including Pilarcitos Creek
Regional Desalination for Drought – The SFPUC would implement all of the proposed WSIP facility improvement projects and would partner with other Bay Area water agencies to develop a regional desalination plant that would provide supplemental supply to the SFPUC during drought years.	▪ *2030 Avg. Annual Delivery Target:* Same ▪ *Supply Sources*: Desalinated brackish bay water ▪ *Additional Tuolumne River diversion*: Less ▪ *Level of Rationing*: Same ▪ *Facility projects*: More	▪ Impacts on the Tuolumne River, Alameda Creek and Peninsula watershed water resources including Pilarcitos Creek
Modified WSIP – The SFPUC would implement all of the proposed facility improvement projects. This alternative would modify proposed system operations to minimize environmental effects and increase conservation, water recycling and local groundwater development as part of the water supply option.	▪ *2030 Avg. Annual Delivery Target:* Same ▪ *Supply Sources*: Additional conservation, water recycling and/or local groundwater ▪ *Additional Tuolumne River diversion*: Similar ▪ *Level of Rationing*: Same ▪ *Facility projects*: Additional regional water recycling and groundwater facilities ▪ Modifies proposed system operations	▪ Impacts on the Tuolumne River, Alameda Creek and Peninsula watershed water resources including Pilarcitos Creek and Crystal Springs Reservoir

The following series of tables provides summary information about key aspects of each alternative in comparison to the proposed WSIP and supports the description and evaluation of each of the eight alternatives that follows in this section. The tables provide summary information and evaluations that are explained in detail in the text.

Table 9-4 describes the characteristics of each of these alternatives in comparison with existing conditions and the proposed program. **Table 9-5** indicates the estimated average annual diversions from the Tuolumne River that would occur under each alternative compared to the WSIP over the modeled 82-year period of hydrologic record and presents estimates of the extent of drought-year shortages associated with each alternative based on modeling results. Two estimates of drought-year shortages are presented. First presented is the total number of years over the modeled 82-year hydrologic record that there would be shortages of 10, 20, and/or greater than 20 percent. Second, the table shows the number of years during the 8.5-year design drought that shortages of 10, 20, or greater than 20 percent would occur. The information in these two tables is used to evaluate how each alternative performs with respect to some of the key level of service goals and system performance objectives established for the WSIP. This information is also used in the subsequent discussion of the extent to which each alternative meets the program objectives. **Table 9-6** summarizes the ability of each alternative to meet the objectives established by the SFPUC for the WSIP. This table uses the following terms to simplify and abbreviate the detailed information provided on each alternative in the following sections:

> "Yes" indicates that an alternative fully meets one of the specific sub-objectives.
>
> "No" indicates that an alternative does not meet the sub-objective.
>
> "Partial" indicates that an alternative could meet the sub-objective in part but it would not fully meet the sub-objective of a level of service equivalent to the WSIP; this may be because the alternative would only serve a reduced 2030 delivery target, and/or would increase the facility requirements.
>
> "Uncertain" reflects the fact that there are questions about supply availability and reliability in addition to outstanding feasibility, cost, regulatory and public acceptance issues.

With respect to environmental impacts, **Tables 9-7**, **9-8**, and **9-9** summarize the comparison of significant water supply and system impacts (identified in Chapter 5) between the proposed WSIP and each alternative. No tables are used to illustrate how the alternatives compare to the WSIP in terms of impacts resulting from facility improvement projects or growth inducement potential and the associated secondary effects of growth, but these topics are evaluated for each alternative in the following text.

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TABLE 9-4
DESCRIPTION OF CEQA ALTERNATIVES

Program Element	Existing Condition	Proposed Program	No Program Alternative	No Purchase Request Increase Alternative	Aggressive Conservation/Water Recycling and Local Groundwater Alternative		Lower Tuolumne River Diversion Alternative	Year-round Desalination at Oceanside Alternative	Regional Desalination for Drought Alternative (Variant 2)	Modified WSIP Alternative
					No Supplemental Tuolumne River Water	With Supplemental Tuolumne River Water				
Planning Year	2005	2030	2030	2030	2030	2030	2030	2030	2030	2030
Target Delivery Level (annual average)	265 mgd	300 mgd	300 mgd	275 mgd	300 mgd	300 mgd	300 mgd	300 mgd	300 mgd	300 mgd
Water Supply Sources (during nondrought and drought periods)	▪ Local watersheds (with Calaveras and Lower Crystal Springs Reservoirs operating at reduced levels based on Division of Safety of Dams restrictions) ▪ Tuolumne River	▪ Local watersheds (with Calaveras and Lower Crystal Springs Reservoirs restored) ▪ Tuolumne River, with increased average annual diversions ▪ Recycled water/ groundwater/additional conservation in San Francisco, 10 mgd	▪ Local watersheds (with Calaveras and Lower Crystal Springs Reservoirs restored) ▪ Tuolumne River, with increased average annual diversions	▪ Local watersheds (with Calaveras and Lower Crystal Springs Reservoirs restored) ▪ Tuolumne River, with increased average annual diversions ▪ Recycled water/ groundwater/additional conservation in San Francisco, 10 mgd ▪ *Wholesale customers expected to pursue supplemental supply or conservation to make up for 2030 supply shortfall*	▪ Local watersheds (with Calaveras and Lower Crystal Springs Reservoirs restored) ▪ Tuolumne River, with no increase in average annual diversions ▪ Recycled water/ groundwater/additional conservation in San Francisco, 10 mgd ▪ Regional recycled water/ groundwater/ conservation in service area outside of San Francisco, 19 mgd ▪ *Wholesale customers expected to pursue supplemental supply (e.g., water transfer) to make up for 2030 supply shortfall*	▪ Local watersheds (with Calaveras and Lower Crystal Springs Reservoirs restored) ▪ Tuolumne River (during nondrought years), with increased average annual diversions ▪ Recycled water/ groundwater/additional conservation in San Francisco, 10 mgd ▪ Regional recycled water/ groundwater/ conservation in service area outside of San Francisco, 19 mgd ▪ *Wholesale customers expected to pursue supplemental supply (e.g., water transfer) to make up for 2030 supply shortfall*	▪ Local watersheds (with Calaveras and Lower Crystal Springs Reservoirs restored) ▪ Tuolumne River, with increased average annual diversions ▪ Recycled water/ groundwater/additional conservation in San Francisco, 10 mgd	▪ Local watersheds (with Calaveras and Lower Crystal Springs Reservoirs restored) ▪ Tuolumne River, with no increase in average annual diversion ▪ Recycled water/ groundwater/additional conservation in San Francisco, 10 mgd ▪ Potable water from SFPUC desalination plant	▪ Local watersheds (with Calaveras and Lower Crystal Springs Reservoirs restored) ▪ Tuolumne River, with increased average annual diversions ▪ Recycled water/ groundwater/additional conservation in San Francisco, 10 mgd	▪ Local watersheds (with Calaveras and Lower Crystal Springs Reservoirs restored, but with managed use of the restored historical capacity of Lower Crystal Springs Reservoir) ▪ Tuolumne River, with increased average annual diversions ▪ Recycled water/ groundwater/additional conservation in San Francisco, 10 mgd ▪ 5 – 10 mgd of regional recycled water / groundwater / conservation in regional service area
Supplemental Dry-Year Water Supply Sources (for implementation during drought periods only)	None	▪ Additional Tuolumne River diversions from Turlock and Modesto Irrigation District (TID and MID) transfers of 23 mgd (average over design drought) ▪ Westside Basin conjunctive use, 6 mgd (average over design drought)	None ▪ *Wholesale customers expected to pursue supplemental dry-year supply (e.g., water transfer) to make up for drought period supply shortfalls*	▪ Additional Tuolumne River diversions from TID and MID transfers of 1 mgd (average over design drought) ▪ Westside Basin conjunctive use, 6 mgd (average over design drought) ▪ *Wholesale customers expected to pursue supplemental dry-year supply (e.g., water transfer) to make up for drought period supply shortfalls*	None ▪ *Wholesale customers expected to pursue supplemental dry-year supply (e.g., water transfer) to make up for drought period supply shortfalls*	None ▪ *Wholesale customers expected to pursue supplemental dry-year supply (e.g., water transfer) to make up for drought period supply shortfalls*	▪ Additional Tuolumne River diversions from TID and MID transfers of 23 mgd ▪ Westside Basin conjunctive use, 6 mgd (average over design drought)	▪ Westside Basin conjunctive use, 6 mgd (average over design drought)	▪ Potable water from regional desalination plant, 23 mgd (average over design drought) ▪ Westside Basin conjunctive use, 6 mgd (average over design drought)	▪ Additional Tuolumne River diversions from TID and MID transfers of 23 mgd – conserved water only[1] ▪ Westside Basin conjunctive use, 6 mgd (average over design drought)
Maximum Drought Rationing Policy	No defined limit, but assumed incidental rationing of up to 25%	20%	No defined limit, but assumes 30% would be needed during design drought conditions	20% at reduced target delivery level	25%	20%	20%	20%	20%	20%
System Firm Yield	219 mgd	256 mgd	226 mgd	233 mgd	226 mgd	226 mgd	256 mgd	256 mgd	256 mgd	~ 256 mgd
WSIP PEIR Facility Improvement Projects	None	All projects	▪ Advanced Disinfection (SJ-1) ▪ Alameda Creek Fishery Enhancement (SV-1) ▪ Calaveras Dam Replacement (SV-2) ▪ SVWTP – Treated Water Reservoirs (SV-5)	All projects, but facilities reevaluated and sized appropriately for a reduced target delivery level	All projects, but facilities reevaluated and sized appropriately for a reduced target delivery level	All projects, but facilities reevaluated and sized appropriately given the different supply sources	All projects, but facilities reevaluated and sized appropriately given the different supply sources	All projects, but facilities reevaluated and sized appropriately given the different supply sources	All projects	All projects

TABLE 9-4 (Continued)
DESCRIPTION OF CEQA ALTERNATIVES

Program Element	Existing Condition	Proposed Program	No Program Alternative	No Purchase Request Increase Alternative	Aggressive Conservation/Water Recycling and Local Groundwater Alternative		Lower Tuolumne River Diversion Alternative	Year-round Desalination at Oceanside Alternative	Regional Desalination for Drought Alternative (Variant 2)	Modified WSIP Alternative
					No Supplemental Tuolumne River Water	With Supplemental Tuolumne River Water				
WSIP PEIR Facility Improvement Projects (cont.)			▪ Lower Crystal Springs Dam Improvements (PN-4)							
Other Facility Improvements	None	None	None by the SFPUC *Wholesale customers expected to develop other facilities or projects to secure supplemental supply to improve water supply reliability, including drought supplies*	None by the SFPUC *Wholesale customers expected to develop other facilities or projects to meet additional demands*	Additional regional and local recycled water and groundwater projects in the wholesale customer service area, outside of San Francisco. *Wholesale customers expected to develop other facilities or projects to meet additional demands*	Additional regional and local recycled water and groundwater projects in the wholesale customer service area, outside of San Francisco	▪ Intake pipeline in lower Tuolumne River and pumping plant ▪ 2.5-mile raw water pipeline ▪ Lower Tuolumne River water treatment plant ▪ Treated water pump station	▪ SFPUC desalination plant in San Francisco and associated seawater intake structure, intake pipeline, pump stations, and treatment facilities ▪ Treated water pump station ▪ 2.4-mile treated water pipeline	▪ Bay Area regional desalination plant(s) and associated pumping plant(s) and pipelines needed for intertie facilities	▪ Alameda Creek bypass structure ▪ Additional facilities for regional recycled water/ groundwater/ conservation projects in the wholesale service area
Delivery, Operations, and Maintenance	As described in Chapter 2, Section 2.3	Improved to meet WSIP goals and objectives (as described in Chapter 3, Section 3.8)	Similar to existing conditions, except increased frequency of shortages and need for rationing; during drought years, rationing could be up to 30% Lack of comprehensive maintenance program and likely increased emergency repairs and replacement projects.	Similar to proposed program (but adjusted for the reduced target delivery level)	Similar to proposed program, except increased water demands served with regional recycled water, conservation and groundwater projects that would require operation and maintenance by wholesale customers in coordination with the SFPUC	Similar to proposed program, except increased water demands served with regional recycled water, conservation and groundwater projects that would require operation and maintenance by wholesale customers in coordination with the SFPUC	Similar to proposed program, except for additional operation and maintenance requirements for lower Tuolumne River diversion, conveyance, treatment, and blending facilities.	Similar to proposed program, except for additional operation and maintenance requirements for desalination and blending facilities. Customers on the westside of San Francisco would receive predominantly desalinated water.	Same as proposed program except for participation in additional operation and maintenance requirements for regional desalination facilities and any interties or transfers among the participating agencies.	Similar to proposed program, but with modified operations, specifically at the Alameda Creek Diversion Tunnel and at Crystal Springs Reservoir
Permits, Approvals, and other Decisions/Actions	As described in Chapter 2, Sections 2.4 and 2.5	▪ San Francisco Planning Commission certifies final PEIR ▪ SFPUC adopts CEQA findings/mitigation monitoring and reporting program and approves and adopts the WSIP ▪ Water transfer agreements with TID and MID ▪ Operating agreements with Daly City, San Bruno, and California Water Service Company for Westside Basin conjunctive-use program ▪ Water sales agreements with retail and wholesale customers (see Chapter 3, Section 3.13)	Same as existing conditions, except SFPUC would be required to submit an explanation describing reason for change in the proposed program to the California Department of Health Service and Seismic Safety Commission for AB 1823 compliance	Same as proposed program except: ▪ Transfer agreements with TID and MID for 1 mgd instead of 23 mgd during drought years ▪ Agreements with California Department of Health Services for any new drinking water sources developed by wholesale customers that would be introduced into the regional system	Same as proposed program except: ▪ Addition of various permits and agreements with wholesale customers to develop and implement recycled water, conservation, and groundwater projects ▪ No agreements with Daly City, San Bruno, and California Water Service. There would be no Westside Basin conjunctive-use program ▪ No water transfer agreements with TID and MID ▪ Agreements with California Department of Health Services for any new drinking water sources	Same as proposed program except: ▪ Addition of various permits and agreements with wholesale customers to develop and implement recycled water, conservation, and groundwater projects ▪ No agreements with Daly City, San Bruno, and California Water Service, There would be no Westside Basin conjunctive-use program ▪ No water transfer agreements with TID and MID ▪ Agreements with California Department of Health Services for any new drinking water sources	Same as proposed program except: ▪ The State Water Resources Control Board could require additional water appropriation permit or license ▪ Right-of-way purchase and permits to construct pipelines through levees, access the river, and protect the river and fish ▪ Agreement/coordination with TID/MID regarding operational schedule for releases at La Grange Dam ▪ Agreements with California Department of Health Services for any new drinking water sources	Same as proposed program except: ▪ Brine disposal would require a National Pollutant Discharge Elimination System permit ▪ Watershed sanitary survey needed, in accordance with California Department of Health regulations ▪ Impingement and entrainment study for the California Coastal Commission would be required to determine impacts on aquatic resources ▪ Project review and approval by the U.S. Army Corps of Engineers ▪ Agreements with California Department of Health Services for any new drinking water sources. ▪ No water transfer agreements with TID and MID	Same as proposed program except: ▪ Agreements with partners in Bay Area regional desalination project ▪ See Table 8.4 for a list of potential permits for the Bay Area regional desalination plant ▪ No water transfer agreements with TID and MID ▪ Agreements with California Department of Health Services for any new drinking water sources	Same as proposed program except: ▪ Agreements for participation in regional recycled water / conservation/ local groundwater projects that could offset SFPUC supply

Italic text indicates expected action by wholesale customers.

[1] In this alternative the water transfer of conserved water would be acquired for use every year, not just for dry-year supplement; this would avoid all impacts below La Grange Dam associated with the SFPUC's increased diversion of Tuolumne River water.

SOURCE: SFPUC, 2007b.

TABLE 9-5
AVERAGE ANNUAL TUOLUMNE RIVER DIVERSIONS AND DROUGHT-YEAR SHORTAGES FOR THE CEQA ALTERNATIVES (2030)

	Estimated Tuolumne River Diversions Over the 82-Year Period of Hydrologic Record		Drought-Year Shortages Based on 82-Year Period of Hydrologic Record				Drought-Year Shortages During Design Drought (8.5 years)		
Program/Alternative	Average Annual Increase by the SFPUC[1] (mgd)	Average Annual Diversions by the SFPUC (mgd)	Years of Shortages (10% Shortage)	Years of Shortages (20% Shortage)	Years of Shortages >20% Shortage)	No. of Years Drought-Year Supplies Triggered	Years of Shortages (10% Shortage)	Years of Shortages (20% Shortage)	Years of Shortages (25% to 30% Shortage)
Existing Conditions	N/A	218	6 out of 82 (1 in 14 years)	8 out of 82 (1 in 10 years)	None	N/A	1	5	1.5
Proposed Program	27	245	6 out of 82 (1 in 14 years)	2 out of 82 (1 in 41 years)	None	24	3	3.5	None
No Program Alternative	8	226	24 out of 82 (1 in 3 years)	10 out of 82 (1 in 8 years)	8 out of 82 (1 in 10 years)	No drought supplies. Rationing would be needed 42 out of 82 years	0	1	6.5
No Purchase Request Increase Alternative	3	221	9 out of 82 (1 in 9 years)	2 out of 82 (1 in 41 years)	None	17	3	3.5	None
Aggressive Conservation/Water Recycling and Local Groundwater Alternative – No Supplemental Tuolumne River Water	0	218	N/A	N/A	15 at 25%	There are no supplemental drought supplies	N/A	N/A	7.5
Aggressive Conservation/Water Recycling and Local Groundwater Alternative – With Supplemental Tuolumne River Water	5	223	7 out of 82 (1 in 12 years)	8 out of 82 (1 out of 10 years)	None	There are no supplemental drought supplies	1	6.5	None
Lower Tuolumne River Diversion	27	245	6 out of 82 (1 in 14 years)	2 out of 82 (1 in 41 years)	None	24	3	3.5	None
Year-round Desalination at Oceanside Alternative	0	218	6 out of 82 (1 in 14 years)	2 out of 82 (1 in 41 years)	None	24	3	3.5	None
Regional Desalination for Drought Alternative (Variant 2)	20	238	6 out of 82 (1 in 14 years)	2 out of 82 (1 in 41 years)	None	23	3	3.5	None
Modified WSIP Alternative (assumes no reduction in WSIP levels of service performance	~27	~245	Approximately the same as the WSIP				Approximately the same as the WSIP		None

[1] Represents the difference in average annual diversion modeled over 82-year historical hydrology, but does not represent year-to-year variation. Thus, even with zero average annual increase in diversions, there would still be year-to-year variations in diversions compared to the existing condition due primarily to modified system operations for maintenance and implementation of the conjunctive use program.

TABLE 9-6
SUMMARY OF ABILITY OF ALTERNATIVES TO MEET PROGRAM OBJECTIVES[1]

Objectives	Proposed Program	No Program Alternative	No Purchase Request Increase Alternative	Aggressive Conservation/Water Recycling and Local Groundwater Alternative		Lower Tuolumne River Diversion Alternative	Year-round Desalination at Oceanside Alternative	Regional Desalination for Drought Alternative	Modified WSIP Alternative
				No Supplemental Tuolumne River Water	With Supplemental Tuolumne River Water				
Water Quality									
Design improvements to meet current and foreseeable future federal and state water quality requirements?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Provide clean, unfiltered water originating from Hetch Hetchy Reservoir and filter all other surface water sources?	Yes	Yes	Yes	Yes	Yes	Partial	Yes	Yes	Yes
Continue to implement watershed protection measures?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Seismic Reliability									
Complies with current seismic standards?	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Capable of delivering basic service to all regions in the service area following a major earthquake?	Yes	No	Partial	Uncertain	Uncertain	Uncertain	Yes	Yes	Yes
Facilities restored to meet average-day demand within 30 days of a major earthquake?	Yes	No	Partial	Partial	Partial	Partial	Yes	Yes	Yes
Delivery Reliability									
Provides operational flexibility to allow for planned maintenance without service interruptions?	Yes	No	Yes	Yes	Yes	Partial	Partial	Yes	Yes
Provides operational flexibility and system capacity to replenish local reservoirs, as needed?	Yes	No	Yes	Uncertain	Uncertain	Uncertain	Yes	Yes	Yes
Capable of minimizing risk of service interruption due to unplanned facility upsets or outages?	Yes	No	Yes	Uncertain	Uncertain	Uncertain	Yes	Yes	Yes

TABLE 9-6 (continued)
SUMMARY OF ABILITY OF ALTERNATIVES TO MEET PROGRAM OBJECTIVES

Objectives	Proposed Program	No Program Alternative	No Purchase Request Increase Alternative	Aggressive Conservation/Water Recycling and Local Groundwater Alternative		Lower Tuolumne River Diversion Alternative	Year-round Desalination at Oceanside Alternative	Regional Desalination for Drought Alternative	Modified WSIP Alternative
				No Supplemental Tuolumne River Water	With Supplemental Tuolumne River Water				
Delivery Reliability (cont.)									
Capable of serving average 2030 demand of 300 mgd with one planned shutdown of a major facility and one unplanned facility outage?	Yes	No	Partial	Uncertain	Uncertain	Uncertain	Yes	Yes	Yes
Water Supply									
Meets average annual purchase requests of 300 mgd during nondrought years for system demands through 2030?	Yes	Partial	No, 275 mgd	No, 294 mgd	Yes	Yes	Yes	Yes	Yes
Meets 20% systemwide rationing limit during droughts?	Yes	No	Partial	No	Uncertain	Yes	Yes	Yes	Yes
Meets system firm yield of 256 mgd?	Yes	No	No	No	No	Yes	Yes	Yes	Yes
Diversifies water supply options during nondrought and drought periods?	Yes	No	Yes	Partial	Partial	Yes	Yes	Yes	Yes
Improves use of new water sources and drought management, including use of groundwater, recycled water, conservation, and transfers?	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Sustainability									
Manages natural resources and physical systems to protect watershed ecosystems?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Meets current and anticipated legal requirements for protection of fish and other wildlife habitat?	Yes	Yes	Yes	Yes	Yes	Uncertain	Uncertain	Uncertain	Yes
Manages natural resources and physical systems to protect public health and safety?	Yes	No	Yes	Yes	Yes	Uncertain	Uncertain	Uncertain	Yes

TABLE 9-6 (continued)
SUMMARY OF ABILITY OF ALTERNATIVES TO MEET PROGRAM OBJECTIVES

Objectives	Proposed Program	No Program Alternative	No Purchase Request Increase Alternative	Aggressive Conservation/Water Recycling and Local Groundwater Alternative		Lower Tuolumne River Diversion Alternative	Year-round Desalination at Oceanside Alternative	Regional Desalination for Drought Alternative	Modified WSIP Alternative
				No Supplemental Tuolumne River Water	With Supplemental Tuolumne River Water				
Cost-effectiveness									
Ensure cost-effective use of funds?	Yes	No and likely greater cost	Unknown, but greater cost	Unknown, but greater cost	Unknown, but greater cost	Unknown, but greater cost	Unknown, but greater cost	Unknown, but greater cost	Same, but greater cost
Maintains gravity-driven system?	Yes	Yes	Yes	Partial	Partial	Partial	Partial	Partial	Partial
Implement regular inspection and` maintenance program for all facilities?	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes

NOTES: 1. This assessment is based on SFPUC actions under each alternative only and does not account for the actions that BAWSCA and/or the wholesale customers might take in order to make up for any shortfall in the regional system's ability to meet the program objectives. See text for full discussion of ability of each alternative to meet objectives. In general, the terms in the table are used as follows:

Yes: Indicates that the alternative would fully meet the sub-objective at an equivalent level to the WSIP.

Partial: Indicates that the alternative could meet the objective in part, but it would not fully meet the objective at an equivalent level to the WSIP, due to variation associated with an alternative such as the reduced delivery targets, increased facility requirements and associated issues.

No: Indicates the alternative would not meet the sub-objective.

Uncertain: Indicates that there are outstanding questions regarding supply availability and reliability; feasibility, cost or other issues that require further study; and/or institutional, regulatory or permitting issues to be resolved.

TABLE 9-7
SUMMARY OF SIGNIFICANT WATER SUPPLY AND SYSTEM OPERATIONS IMPACTS FOR CEQA ALTERNATIVES – TUOLUMNE RIVER WATERSHED

Impact	Proposed Program	No Program Alternative	No Purchase Request Increase Alternative	Aggressive Conservation/Water Recycling and Local Groundwater Alternative		Lower Tuolumne River Diversion Alternative	Year-round Desalination at Oceanside Alternative	Regional Desalination for Drought Alternative	Modified WSIP Alternative
				No Supplemental Tuolumne River Water	With Supplemental Tuolumne River Water				
Section 5.3.6, Fisheries									
Impact 5.3.6-4: Effects on fishery resources along the Tuolumne River below La Grange Dam									
	In wet or above-normal years when Don Pedro Reservoir is being filled, changes in the timing and duration of releases from the reservoir would decrease average monthly flows along the lower Tuolumne River beneath La Grange Dam. The greatest average flow reductions would occur during June and could potentially result in elevated water temperatures. Changes to stream flow and water temperature would result in a reduction in the linear extent of suitable habitat for rearing Chinook salmon and oversummering steelhead/rainbow trout, potentially adversely affecting these fish populations in the lower Tuolumne River. (PSM)	Similar to but less than proposed program. (PSM)	Similar to but much less than proposed program. (LS)	Similar to existing condition. (LS)	Similar to but much less than proposed program. (LS)	Similar to proposed program. (PSM)	Similar to existing condition. (LS)	Similar to but less than proposed program (PSM)	Similar to existing condition (LS)
Section 5.3.7, Terrestrial Biological Resources									
Impact 5.3.7-2: Impacts on meadow / alluvial features along the Tuolumne River below O'Shaughnessy Dam									
▪ Sensitive habitats	Delayed snowmelt releases, reductions in flow, and the resulting reduction in groundwater recharge would result in an incremental reduction in the extent and diversity of wetland and riparian habitats, including sensitive wetland and riparian habitats in the Poopenaut Valley. (PSM)	Similar to but less than proposed program. (PSM)	Similar to but less than proposed program. (PSM)	Similar to but less than proposed program. (PSM)	Similar to but less than proposed program. (PSM)	Similar to proposed program. (PSM)	Similar to but less than proposed program. (PSM)	Similar to proposed program (PSM)	Similar to proposed program (PSM)
▪ Key special status species	A reduction in wetland and riparian habitat would reduce suitable breeding habitat for key special-status species potentially occurring along this reach (e.g., foothill yellow-legged frog, California red-legged frog, and willow flycatcher), the populations of which are already critically reduced in the Sierra Nevada. (PSM)	Similar to but less than proposed program. (PSM)	Similar to but less than proposed program. (PSM)	Similar to but less than proposed program. (PSM)	Similar to but less than proposed program. (PSM)	Similar proposed program. (PSM)	Similar to but less than proposed program. (PSM)	Similar to proposed program (PSM)	Similar to proposed program (PSM)
▪ Other species of concern	A reduction in the extent and diversity of wetland and riparian habitats would reduce habitat quality and extent for animal and plant species of concern. (PSM)	Similar to but less than proposed program. (PSM)	Similar to but less than proposed program. (PSM)	Similar to but less than proposed program. (PSM)	Similar to but less than proposed program. (PSM)	Similar to proposed program. (PSM)	Similar to but less than proposed program. (PSM)	Similar to proposed program (PSM)	Similar to proposed program (PSM)
▪ Common habitats and species	All habitats affected by the WSIP are considered sensitive. A large number of common animal species depend on sensitive meadows and larger riparian areas potentially affected by the WSIP for food and cover. (PSM)	Similar to but less than proposed program. (PSM)	Similar to but less than proposed program. (PSM)	Similar to but less than proposed program. (PSM)	Similar to but less than proposed program. (PSM)	Similar to proposed program. (PSM)	Similar to but less than proposed program. (PSM)	Similar to proposed program (`PSM)	Similar to proposed program (PSM)
Impact 5.3.7-6: Impacts on biological resources along Tuolumne River below La Grange Dam									
▪ Sensitive habitats	Delayed spring releases and reductions in average and total flow (particularly during and following an extended drought) below La Grange Dam would reduce or eliminate suitable conditions for recruitment of some riparian species along the river. (PSM)	Similar to but less than proposed program. (PSM)	Similar to but much less than proposed program. (LS)	Similar to existing condition. (LS)	Similar to but much less than proposed program. (LS)	Similar to proposed program. (PSM)	Similar to existing condition. (LS)	Similar to but less than proposed program (PSM)	Similar to existing condition (LS)
▪ Key special status species	Because of the known presence of key special-status species and the very limited amount of remaining suitable habitat along this reach of the Tuolumne River, this incremental impact would be potentially significant. (PSM)	Similar to but less than proposed program. (PSM)	Similar to but much less than proposed program. (LS)	Similar to existing condition. (LS)	Similar to but much less than proposed program. (LS)	Similar to proposed program. (PSM)	Similar to existing condition. (LS)	Similar to but less than proposed program (PSM)	Similar to existing condition (LS)
▪ Other species of concern	Species of concern that would be adversely affected by changes in the extent and quality of suitable riparian habitat include western pond turtle, several bat species, and a wide variety of riparian- and marsh-associated bird species. (PSM)	Similar to but less than proposed program. (PSM)	Similar to but much less than proposed program. (LS)	Similar to existing condition. (LS)	Similar to but much less than proposed program. (LS)	Similar to proposed program. (PSM)	Similar to existing condition. (LS)	Similar to but less than proposed program (PSM)	Similar to existing condition (LS)
▪ Common habitats and species	The populations of common species that depend on riparian habitat could be adversely affected by the alteration of habitat. (PSM)	Similar to but less than proposed program. (PSM)	Similar to but much less than proposed program. (LS)	Similar to existing condition. (LS)	Similar to but much less than proposed program. (LS)	Similar to proposed program. (PSM)	Similar to existing condition. (LS)	Similar to but less than proposed program (PSM)	Similar to existing condition (LS)

LS = Less than Significant, no mitigation required
SM or PSM = Significant or Potentially Significant, can be Mitigated to less than significant
SU or PSU = Significant Unavoidable or Potentially Significant Unavoidable, cannot be mitigated to less than significant

TABLE 9-8
SUMMARY OF SIGNIFICANT WATER SUPPLY AND SYSTEM OPERATIONS IMPACTS FOR CEQA ALTERNATIVES – ALAMEDA WATERSHED

Impact	Proposed Program	No Program Alternative	No Purchase Request Increase Alternative	Aggressive Conservation/Water Recycling and Local Groundwater Alternative		Lower Tuolumne River Diversion Alternative	Year-round Desalination at Oceanside Alternative	Regional Desalination for Drought Alternative	Modified WSIP Alternative
				No Supplemental Tuolumne River Water	With Supplemental Tuolumne River Water				
Section 5.4.1, Stream Flow and Reservoir Water Levels									
Impact 5.4.1-2: Effects on flow along Alameda Creek below diversion dam.									
	In all year types, system operations under the WSIP would increase diversions from Alameda Creek to Calaveras Reservoir between the months of December and May, nearly eliminating low and moderate (1 to 650 cubic feet per second) flows in Alameda Creek downstream of the diversion dam and substantially reducing many higher (greater than 650 cubic feet per second) flows that have occurred since 2002. The resultant reduction in stream flows and alteration of the stream hydrograph is considered an adverse effect. (SU)	Similar to proposed program, but winter diversions from Alameda Creek would be greater. (SU)	Similar to proposed program, but winter diversions would be slightly less. (SU)	Similar to proposed program, but winter diversions would be slightly less. (SU)	Similar to proposed program, but winter diversions would be slightly less. (SU)	Similar to proposed program. (SU)	Similar to proposed program. (SU)	Similar to proposed program (SU)	Similar to proposed program (SU)
Section 5.4.5, Fisheries									
Impact 5.4.5-3: Effects on fishery resources.									
	Following implementation of the Calaveras Dam Replacement project (SV-2), operation of Calaveras Reservoir and the Alameda Creek Diversion Dam would be restored to pre-2002 conditions. A substantial increase in diversions from Alameda Creek to Calaveras Reservoir would reduce flows in this stretch of the creek. Diversion of most or all flows during late winter and spring months would reduce the ability of resident rainbow trout to spawn and for eggs to incubate. In addition, the increased diversion of flows to the reservoir would divert fish from Alameda Creek to the reservoir, prevent fish passage to downstream reaches of the creek, and increase the potential for fish entrainment since there are currently no screens on the diversion. (PSM)	Similar to proposed program. (PSM)	Similar to proposed program. (PSM)	Similar to proposed program. (PSM)	Similar to proposed program. (PSM)	Similar to proposed program. (PSM)	Similar to proposed program. (PSM)	Similar to proposed program (PSM)	Much less than proposed program (LS)
Section 5.4.6, Terrestrial Biological Resources									
Impact 5.4.6-1: Impacts on riparian habitat and related biological resources in Calaveras Reservoir.									
▪ Sensitive Habitats	Increased reservoir storage elevations would result in inundation and permanent loss of seasonal wetlands, seeps, perennial freshwater marsh, and riparian habitat that have established since 2002. (PSM)	Same as proposed program. (PSM)	Same as proposed program. (PSM)	Same as proposed program. (PSM)	Same as proposed program. (PSM)	Same as proposed program. (PSM)	Same as proposed program. (PSM)	Same as proposed program (PSM)	Same as proposed program (PSM)
▪ Key Special Status species	Since 2002, yellow-legged frogs have occupied approximately 10,000 linear feet of stream channel along Arroyo Hondo between the maximum reservoir elevation mandated by the Division of Safety of Dams and the spillway elevation. Higher maintained reservoir levels would reduce the length of this high-quality habitat along the creek and adversely affect existing populations of foothill yellow-legged frog. (PSM)	Same as proposed program. (PSM)	Same as proposed program. (PSM)	Same as proposed program. (PSM)	Same as proposed program. (PSM)	Same as proposed program. (PSM)	Same as proposed program. (PSM)	Same as proposed program (PSM)	Same as proposed program (PSM)
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.									
▪ Key special status species	A reduction in the frequency, duration, and magnitude of flows below the diversion dam would reduce the total available aquatic breeding habitat and food sources for California red-legged frog and foothill yellow-legged frog populations that currently occupy this reach of Alameda Creek. (PSM)	Similar to proposed program. (PSM)	Similar to proposed program. (PSM)	Similar to proposed program. (PSM)	Similar to proposed program. (PSM)	Similar to proposed program. (PSM)	Similar to proposed program. (PSM)	Similar to proposed program (PSM)	Similar to proposed program (PSM)
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.									
▪ Key special status species	Future outlet works at Calaveras Dam would have the capacity to make higher volume releases than under existing conditions. Depending on the timing and volume of operational releases, they could adversely affect the reproductive success of special-status amphibian species along this reach (e.g., California red-legged frog and foothill yellow-legged frog). (PSM)	Similar to proposed program. (PSM)	Similar to proposed program. (PSM)	Similar to proposed program. (PSM)	Similar to proposed program. (PSM)	Similar to proposed program. (PSM)	Similar to proposed program. (PSM)	Similar to proposed program (PSM)	Similar to proposed program (PSM)
Impact 5.4.6-4: Effects on riparian habitat and related biological resources along Alameda Creek from Calaveras Creek to San Antonio Creek,									
▪ Key special status species	Depending on annual rainfall and localized site conditions along this creek segment, changes in winter and summer flows along this reach could result in both beneficial and adverse impacts on habitat for California red-legged frog and foothill yellow-legged frog populations. (PSM)	Similar to proposed program. (PSM)	Similar to proposed program. (PSM)	Similar to proposed program. (PSM)	Similar to proposed program. (PSM)	Similar to proposed program. (PSM)	Similar to proposed program. (PSM)	Similar to proposed program (PSM)	Similar to proposed program (PSM)

TABLE 9-8 (continued)
SUMMARY OF SIGNIFICANT WATER SUPPLY AND SYSTEM OPERATIONS IMPACTS FOR CEQA ALTERNATIVES – ALAMEDA WATERSHED

Impact	Proposed Program	No Program Alternative	No Purchase Request Increase Alternative	Aggressive Conservation/Water Recycling and Local Groundwater Alternative		Lower Tuolumne River Diversion Alternative	Year-round Desalination at Oceanside Alternative	Regional Desalination for Drought Alternative	Modified WSIP Alternative
				No Supplemental Tuolumne River Water	With Supplemental Tuolumne River Water				
Section 5.4.7, Recreational and Visual Resources									
Impact 5.4.7-1: Effects on recreation									
	Operations under the WSIP would substantially reduce flows along Alameda Creek in the Sunol Regional Wilderness during winter and early spring months and adversely affect the recreational experience of hikers; however, with the changes in project description for the Calaveras Dam Replacement (SV-2) project, bypass flows would be reduced from the diversion dam when flows are present. (LS)	Same as proposed program. (LS)	Same as proposed program. (LS)	Same as proposed program. (LS)	Same as proposed program. (LS)	Same as proposed program. (LS)	Same as proposed program. (LS)	Same as proposed program (LS)	Same as proposed program (LS)
Impact 5.4.7-2: Visual effects									
	WSIP-induced reductions in stream flows along Alameda Creek would substantially change the quality of visual resources in the Sunol Regional Wilderness; however, with the changes in project description for the Calaveras Dam Replacement (SV-2) project, bypass flows would be reduced from the diversion dam when flows are present. (LS)	Same as proposed program. (LS)	Same as proposed program. (LS)	Same as proposed program. (LS)	Same as proposed program. (LS)	Same as proposed program. (LS)	Same as proposed program. (LS)	Same as proposed program (LS)	Same as proposed program (LS)

LS = Less than Significant, no mitigation required
SM or PSM = Significant or Potentially Significant, can be Mitigated to less than significant
SU or PSU = Significant Unavoidable or Potentially Significant Unavoidable, cannot be mitigated to less than significant

TABLE 9-9
SUMMARY OF SIGNIFICANT WATER SUPPLY AND SYSTEM OPERATIONS IMPACTS FOR CEQA ALTERNATIVES – PENINSULA WATERSHED

Impact	Proposed Program	No Program Alternative	No Purchase Request Increase Alternative	Aggressive Conservation/Water Recycling and Local Groundwater Alternative		Lower Tuolumne River Diversion Alternative	Year-round Desalination at Oceanside Alternative	Regional Desalination for Drought Alternative	Modified WSIP Alternative
				No Supplemental Tuolumne River Water	With Supplemental Tuolumne River Water				
Section 5.5.3, Surface Water Quality									
Impact 5.5.3-2: Water quality in Pilarcitos Reservoir									
	Proposed operations would generally be within the same range as existing conditions although replacement Measure 5.5.3-2a would cause Pilarcitos Reservoir to be drawn down earlier in the summer compared to existing conditions. Water temperature could increase and dissolved oxygen content could be reduced. During dry years, summertime releases from Pilarcitos Reservoir to Pilarcitos Creek would be eliminated or reduced to a low level for a longer period of time with the WSIP, which would increase the temperature of instream flows between Pilarcitos Creek and Stone Dam and reduce the creek's ability to support designated cold freshwater habitat along this reach. (PSM)	Similar to proposed program. (PSM)	Similar to but much less than proposed program. (LS)	Similar to proposed program. (PSM)	Similar to proposed program. (PSM)	Similar to proposed program. (PSM)	Similar to proposed program. (PSM)	Similar to proposed program (PSM)	Similar to but much less than proposed program (LS)
Section 5.5.5, Fisheries									
Impact 5.5.5-1: Effects on fishery resources in Crystal Springs Reservoir									
	Elevated water levels in Crystal Springs Reservoir would inundate approximately 1,500 linear feet of trout spawning habitat upstream of the reservoir along Laguna and San Mateo Creeks. (PSU)	Same as proposed program. (PSU)	Same as proposed program. (PSU)	Same as proposed program. (PSU)	Same as proposed program. (PSU)	Same as proposed program. (PSU)	Same as proposed program. (PSU)	Same as proposed program (PSU)	Similar to proposed program (PSU)
Impact 5.5.5-4: Effects on fisheries resources in Pilarcitos Reservoir									
	Proposed operations would be within the same range as existing conditions although replacement Measure 5.5.3-2a would cause Pilarcitos Reservoir to be drawn down earlier in the summer compared to existing conditions. This would reduce the volume and quality of coldwater habitat available for resident fish species. (PSM)	Similar to proposed program. (PSM)	Similar to but much less than proposed program. (LS)	Similar to proposed program. (PSM)	Similar to proposed program. (PSM)	Similar to proposed program. (PSM)	Similar to proposed program. (PSM)	Similar to proposed program (PSM)	Similar to existing condition (LS)
Impact 5.5.5-5: Effects on fisheries resources along Pilarcitos Creek below Pilarcitos Reservoir									
	Under the WSIP, the extended period of no or very little flow in Pilarcitos Creek below Pilarcitos Reservoir during summer months of dry years would result in significant impacts on resident trout, other resident fish species and aquatic resources, and habitat quality and availability for anadromous steelhead. Increased drawdown of Pilarcitos Reservoir would increase the temperature of releases in summer and fall and reduce the quality and availability of habitat for coldwater fish species. A reduction in the frequency and magnitude of spills over Stone Dam would reduce flows along the lower reach. Reduced instream flows during winter months would adversely affect migratory fish habitat. (PSM)	Similar to proposed program. (PSM)	Similar to but less than proposed program. (PSM)	Similar to proposed program. (PSM)	Similar to proposed program. (PSM)	Similar to proposed program. (PSM)	Similar to proposed program. (PSM)	Similar to proposed program (PSM)	Similar to existing condition (LS)
Section 5.5.6, Terrestrial Biological Resources									
Impact 5.5.6-1: Impacts on biological resources in Upper and Lower Crystal Springs Reservoirs									
▪ Sensitive Habitats	Implementation of the Lower Crystal Springs Dam Improvements project (PN-4) would raise average monthly water levels in Crystal Springs Reservoir and result in a short-term reduction in the overall extent of freshwater marsh as the reservoir fills. Proposed changes in operations would maintain maximum reservoir levels during summer for longer periods than under existing conditions, which could affect the composition and structure of riparian habitats. In addition, sensitive upland habitats that are unable to tolerate these longer periods of inundation would be lost. (PSM)	Same as proposed program. (PSM)	Same as proposed program. (PSM)	Same as proposed program. (PSM)	Same as proposed program. (PSM)	Same as proposed program. (PSM)	Same as proposed program. (PSM)	Same as proposed program (PSM)	Similar to pre-1983 conditions (LS)
▪ Key special status species	Elevated reservoir levels would inundate existing populations of special-status plant species, including serpentine-associated fountain thistle and Marin western flax, and their habitat could be permanently lost. The extent of available habitat for San Francisco garter snake and California red-legged frog would be temporarily reduced during reservoir refill, but wetland habitat that would establish at higher elevations could potentially be more extensive. Raised reservoir levels would provide greater opportunities for largemouth bass and other predators to access frogs and snakes. Periodic drawdown during planned maintenance could adversely affect San Francisco garter snake foraging habitat. (PSM)	Same as proposed program. (PSM)	Same as proposed program. (PSM)	Same as proposed program. (PSM)	Same as proposed program. (PSM)	Same as proposed program. (PSM)	Same as proposed program. (PSM)	Same as proposed program (PSM)	Similar to pre-1983 conditions (LS)

TABLE 9-9 (Continued)
SUMMARY OF SIGNIFICANT WATER SUPPLY AND SYSTEM OPERATIONS IMPACTS FOR CEQA ALTERNATIVES – PENINSULA WATERSHED

Impact	Proposed Program	No Program Alternative	No Purchase Request Increase Alternative	Aggressive Conservation/Water Recycling and Local Groundwater Alternative		Lower Tuolumne River Diversion Alternative	Year-round Desalination at Oceanside Alternative	Regional Desalination for Drought Alternative	Modified WSIP Alternative
				No Supplemental Tuolumne River Water	With Supplemental Tuolumne River Water				
Section 5.5.6, Terrestrial Biological Resources (cont.)									
▪ Other species of concern	Changes in wetland habitat due to reservoir refill and proposed operations would adversely affect reptile and bird species of concern, particularly if permanent changes in the composition of wetland vegetation occur. Permanent loss of upland habitat, including upland trees, grassland, and coastal scrub, would result in significant impacts on several bird and mammal species of concern. Serpentine- and grassland-associated plant species unable to tolerate extended periods of inundation would be lost. (PSM)	Same as proposed program. (PSM)	Same as proposed program. (PSM)	Same as proposed program. (PSM)	Same as proposed program. (PSM)	Same as proposed program. (PSM)	Same as proposed program. (PSM)	Same as proposed program (PSM)	Similar to pre-1983 conditions (LS)
▪ Common Habitats and species	Due to the extent of area involved, impacts on common habitats and species would be significant. (PSM)	Same as proposed program. (PSM)	Same as proposed program. (PSM)	Same as proposed program. (PSM)	Same as proposed program. (PSM)	Same as proposed program. (PSM)	Same as proposed program. (PSM)	Same as proposed program (PSM)	Similar to pre-1983 conditions (LS)
Impact 5.5.6-4: Impacts on biological resources in Pilarcitos Reservoir									
▪ Key special status species	Proposed operations would be within the same range as existing conditions, although replacement Measure 5.5.3-2a would cause Pilarcitos Reservoir to be drawn down earlier in the summer compared to existing conditions. This would reduce the extent of suitable habitat for California red-legged frog and San Francisco garter snake. Special-status species that utilize adjacent upland vegetation would not be affected. (PSM)	Similar to proposed program. (PSM)	Similar to but much less than proposed program. (LS)	Similar to proposed program. (PSM)	Similar to proposed program. (PSM)	Similar to proposed program. (PSM)	Similar to proposed program. (PSM)	Similar to proposed program (PSM)	Similar to existing condition (LS)
Impact 5.5.6-5: Impacts on biological resources along Pilarcitos Creek									
▪ Sensitive habitats	Proposed operations would result in flows within the range of historical conditions, to which sensitive habitats have adapted. (LS)	Similar to proposed program. (LS)	Similar to proposed program. (LS)	Similar to proposed program. (LS)	Similar to proposed program. (LS)	Similar to proposed program. (LS)	Similar to proposed program. (LS)	Similar to proposed program (LS)	Similar to proposed program (LS)

LS = Less than Significant, no mitigation required
SM or PSM = Significant or Potentially Significant, can be Mitigated to less than significant
SU or PSU = Significant Unavoidable or Potentially Significant Unavoidable, cannot be mitigated to less than significant

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9.2.2 No Program Alternative

The No Program Alternative is the scenario that would most likely unfold between now and 2030 if the WSIP were not implemented. CEQA Guidelines Section 15126.6(e) provides the following guidance on the "no project" alternative:

- The specific alternative of "no project" shall also be evaluated along with its impact. The purpose of describing and analyzing a no project alternative is to allow decision-makers to compare the impacts of approving the proposed project with the impact of not approving the proposed project.

- The no project alternative is not the baseline for determining whether the proposed project's environmental impacts may be significant, unless it is identical to the existing environmental setting analysis, which does establish that baseline.

- The no project analysis shall discuss the existing conditions at the time the Notice of Preparation is published as well as what would be reasonably expected to occur in the foreseeable future if the project were not approved, based on current plans and consistent with available infrastructure and community services.

- When the proposed project is the revision of an ongoing operation, the no project alternative will be the continuation of the existing operation into the future.

- If the proposed project is a development project on identifiable property, the no project alternative is the circumstance under which the project does not proceed.

Consistent with the above guidance, the No Program Alternative reflects continued operation of the regional system and system upgrades and maintenance as well as implementation of actions that are reasonably expected to occur if the WSIP as a comprehensive program or policy is not approved. 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 project.

Description of SFPUC and Wholesale Customer Actions

SFPUC Actions

Under the No Program Alternative, the SFPUC would continue to rely on water supply sources from local watersheds and the Tuolumne River. Similar to existing conditions, the SFPUC would have no supplemental dry-year water supply sources and there would be no diversification of water supply sources from groundwater development, recycled water projects, water transfers, or additional conservation beyond what is occurring now and what is mandated by regulation (i.e., the plumbing code). This alternative assumes that the SFPUC would endeavor to serve the projected 2030 increase in purchase requests when water is available. The additional water demand would be served from increased diversions from the Tuolumne River under the City and County of San Francisco's (CCSF) existing water rights as well as increased use of local watershed supplies, primarily associated with the restoration of Calaveras and Lower Crystal Springs Reservoirs (discussed below). Under the No Program Alternative, the SFPUC would continue its existing operation of the regional water system and associated facilities, including

compliance with all regulatory requirements and ongoing system maintenance. Thus, under this alternative, it is assumed that by 2030 the SFPUC would implement the following WSIP facility improvement projects that have been mandated or previously agreed to by regulatory agencies:

- *Advanced Disinfection (SJ-1)*. This project must be implemented to comply with the Long Term 2 Enhanced Surface Water Treatment Rule under the federal Safe Drinking Water Act.

- *Alameda Creek Fishery (SV-1)*. This water recapture project would ensure compliance with the 1997 Memorandum of Understanding (MOU) between the SFPUC and California Department of Fish and Game (described in Chapter 2, Section 2.5.3) following completion of the Calaveras Dam project (SV-2). The MOU, which stipulates the magnitude and timing of flows released from Calaveras Reservoir for the purpose of improving habitat conditions for fisheries along Alameda and Calaveras Creeks, also states that the water released to meet minimum flow requirements may be recaptured downstream for consumptive use in the SFPUC service area. Although the Alameda Creek Fishery project would not in itself increase the firm yield of the system, it is necessary to avoid the loss of yield associated with fishery releases from Calaveras Reservoir.

- *Calaveras Dam (SV-2)*. The existing dam is currently operating under California Division of Safety of Dams (DSOD) interim restrictions, as described in Chapter 2, Section 2.2.3. The DSOD restrictions include maximum operating levels, with the provision that the SFPUC pursue an aggressive schedule for remediation of Calaveras Dam. Therefore, long-term operation of the reservoir at this restricted level is not an option (Verigin, 2003). The proposed replacement dam would not increase the delivery capacity of the regional water system above its historical (pre-2002) value and would restore the reservoir's operating storage to the level allowed before the DSOD placed restrictions on the reservoir. Use of local watershed supplies provided by Calaveras Dam and Reservoir is a fundamental part of the SFPUC's existing system operations, and restoring Calaveras Reservoir to historical storage levels is thus considered a continuation of the existing operation into the future.

- *Treated Water Reservoirs (SV-5)*. This project is needed in order to comply with requirements of the California Department of Health Services for water quality and public health purposes.

- *Lower Crystal Springs Dam (PN-4)*. The DSOD has placed operational restrictions on Lower Crystal Springs Dam due to concerns regarding the ability of the dam to provide adequate protection from the probable maximum flood (described in Chapter 2, Section 2.2.5). The DSOD has indicated that if the SFPUC does not implement improvements to the dam, it would likely impose further, more severe restrictions on reservoir operations due to updated calculations of the probable maximum flood (Mavroudis, 2007). The extent of these more severe restrictions would result in substantial adverse effects on water supply and delivery reliability and reduce existing water quality reliability, severely limiting continuation of existing system operations into the future.

Implementation of the above projects would be subject to environmental review under CEQA as determined by the San Francisco Planning Department. However, if any of the regional system facilities were to fail in the future, such as in the event of an earthquake or other disaster, the SFPUC would proceed with the necessary emergency repairs/replacements, which may not be subject to CEQA, and those repairs or replacements would be conducted on an individual basis and not as part of a comprehensive and coordinated program. The No Program Alternative also

assumes that the SFPUC would proceed with implementation of other capital improvement projects and related activities funded under the WSIP but not considered part of the program analyzed in this PEIR (as described in Chapter 3, Sections 3.13 and 3.4.6). Under the No Program Alternative, it is assumed that the SFPUC would continue to maintain water sales agreements with wholesale and retail customers to meet the supply assurance of 184 mgd and make further sales to the wholesale customers on an interruptible, as-available basis to reduce the rate impact on City retail customers.

If the SFPUC were to adopt a change in the proposed program, such as the No Program Alternative, the CCSF would be required to submit an explanation to the California Department of Health Services and the Seismic Safety Commission as described in Assembly Bill No. 1823 (the Wholesale Regional Water System Security and Reliability Act).

Wholesale Customer Actions

As described in more detail below under Ability to Meet Program Objectives, the regional water system would have reduced seismic, delivery, and water supply reliability under the No Program Alternative compared to the WSIP. According to hydrologic modeling, regional system customers could experience water shortages as often as every one in two years (refer to Table 9-5) compared to one in ten years for the proposed program, and wholesale customers (as well as retail customers) would likely need to implement water rationing, up to 30 percent.

The wholesale customers have obligations, through laws, contracts, and other legal instruments, to provide water service to their customers. The ability of wholesale customers to impose limits on urban growth as a means of controlling demand is limited. Consequently, in the absence of reliable water service from the SFPUC, the wholesale customers would likely pursue other projects, either individually or collectively,[2] to meet their water needs for both drought and nondrought periods. Numerous factors inhibit the ability of the wholesale customers to address the decreased reliability associated with this alternative, including the following:

- The WSIP addresses sudden (emergency) as well as gradual changes in water availability. The ability of the wholesale customers to meaningfully influence the reliability of their water supplies is very limited in the event of emergency conditions (for example, if part of the regional system failed due to an earthquake). Under the No Program Alternative, most of the key projects needed to improve the seismic reliability would not be implemented.

- Water demand among all customers is highest when supplies are most constrained (i.e., during dry years and warm-weather periods) and therefore more difficult to secure. Securing water supplies in California is increasingly difficult, particularly in dry years, as overall demand increases and conflicts among competing interests for water supply arise.

- A major new water supply project can take as many as 20 to 25 years to complete (Johnson and Loux, 2004).

[2] Bay Area Water Supply and Conservation Agency (BAWSCA) has the authority to pursue and secure water supplies on behalf of the SFPUC wholesale customers (its members) as well as to coordinate recycled water and conservation projects to benefit its members. While it is likely that BAWSCA would lead any effort to secure water supplies, either BAWSCA or individual SFPUC wholesale customer agencies could pursue such actions.

- Some wholesale customers are wholly reliant on SFPUC for water, whereas others have multiple sources of supplies. Customers with diverse water supply portfolios would likely have more flexibility to augment supplies from sources other than the SFPUC. Under existing conditions, the SFPUC meets more than 50 percent of the demand for all but three of the wholesale customers; 16 wholesale customers rely entirely on the SFPUC for water purchases to meet existing demand.

- The wholesale customers' purchase requests already include a foreseeable level of increased conservation and recycling in addition to existing conservation and recycling. (The next subsection describes the opportunities for, and challenges to implementing, aggressive conservation and recycling programs.)

- The current urban water management plans for the wholesale customers do not address the issue of developing substitute supplemental supplies, since the customers anticipate receiving and have requested supplemental supply from the SFPUC.

In short, the ability of the wholesale customers to develop additional water supplies is uncertain, and further studies would be required to evaluate technical and institutional feasibility. Determining (a) the specific projects that each wholesale customer would pursue and (b) the likelihood that the wholesale customers could successfully implement the projects is speculative and outside the control of the SFPUC. A discussion of representative projects that the wholesale customers might pursue is presented below. This discussion is intended to provide decision-makers and other interested parties with information about the potential options that exist, the challenges associated with each, and attendant environmental impacts.

The basic water management strategies that the wholesale customers could pursue to offset the severely reduced reliability under the No Program Alternative involve increasing supplies and decreasing demand. Among the options associated with these strategies are water purchases or transfers, groundwater management/use, aggressive recycling and conservation, and desalination. Water purchases/transfers and conjunctive use are discussed below. Currently, some of the wholesale customers are already actively developing recycled water/groundwater/ conservation projects to address their increasing demands and it is assumed that the wholesale customers will continue to do so in the future. Additional aggressive recycling, groundwater, and conservation is described separately under its own alternative (presented in Section 9.2.4). Similarly, there are two separate alternatives addressing desalination (presented in Sections 9.2.6 and 9.2.7).

Regarding water purchases or transfers, statewide trends indicate that while urban water use is increasing, agricultural water use is decreasing, in part because agricultural water users are selling water rights or contracts to urban agencies (Department of Water Resources, 2005). Potential sources of supplies for the wholesale customers include water-rights holders north of the Delta, in the Delta, or south of the Delta. The agencies with the rights to the greatest quantities of water in the state, the U.S. Bureau of Reclamation (USBR) and California Department of Water Resources (DWR), would not be sources of new water supply contracts/agreements because of their commitments to existing contractors and to the protection, restoration, and enhancement of fish and wildlife habitat. Challenges to water purchases and transfers pertain to restrictions associated with entitlements, contracts, and water rights; permitting requirements; effects caused by the cessation of water application to an area (e.g., land fallowing, economic impacts); Delta pumping

restrictions; and wheeling arrangements[3] (Johnson and Loux, 2004). Existing water delivery infrastructure could theoretically be used through agreements with other agencies (such DWR, USBR, SFPUC, East Bay Municipal Utility District, Alameda County Water District, or Santa Clara Valley Water District) to convey water to the wholesale customers, if and when system capacity is available. Construction or expansion of interties or connecting pipelines in urban areas would likely be required.

A supplemental water supply must be available concurrent with annual and seasonal demands or must be stored during periods of adequate supply and low demand. An agency could pursue its own storage project, either through conjunctive use of a groundwater basin or through construction of a new storage facility. Conjunctive use of a groundwater basin is likely a potential option only for agencies that currently utilize groundwater. Review of current urban water management plans for the wholesale customers indicates that seven customers currently rely on groundwater for part of their supply; however, the ability of these agencies to implement additional conjunctive-use projects beyond any existing or planned projects to help offset any supply shortfall under this alternative is uncertain. Challenges to implementing conjunctive-use projects pertain to the sustainable yield of the groundwater basin, restrictions on appropriative rights, and existing regional and local groundwater management policies, ordinances, and practices. Regarding construction of new storage facilities for surface water supplies, very few agencies have constructed major reservoirs in Northern California in recent decades due to ecological impacts, cost, availability of suitable sites, and other issues, although several proposals to increase storage at existing reservoirs that provide water to the Bay Area are currently under study. The ability of a wholesale customer to acquire, through agreements with other agencies, use of a portion of an existing storage facility is uncertain; the terms of such agreements favor the dry-year and seasonal supply needs of the reservoir owner/operator. A key issue associated with use of existing storage is whose water spills first and is therefore “lost” before it can be used.

Feasibility Issues

While the No Program Alternative would present no engineering or technical feasibility issues, it would raise some fundamental institutional issues regarding the ability of the SFPUC to fulfill its basic mission to provide reliable, high quality and affordable water to its customers. The No Program Alternative would place the regional system at significant risk to seismic hazards, increased facility failures, and increased supply shortages on a day-to-day basis, as well as result in prolonged service disruptions to many customers in the event of an earthquake or other emergency due to inadequate facility redundancy and operational flexibility. The SFPUC customers would likely seek alternatives, as described above, and it is unlikely that the public would support this alternative. In addition, this alternative could add substantial long-term costs due to the increased likelihood of facility failures and increased need for emergency repairs or replacement in the event of an earthquake or other emergency. This unknown and likely substantial additional cost raises questions about cost and financing feasibility and customer rate impacts.

[3] Wheeling arrangements are agreements to use existing infrastructure owned by a third party to transport/convey water from a source to a customer.

The feasibility of rationing at levels of 20 percent or more and the effects of such rationing are key issues facing the regional system customers raised by the No Program Alternative and several of the other alternatives that require the wholesale customers to address average annual supply shortfalls and/or less dry-year reliability from the regional system on top of being prepared for dry-year rationing. Since the last drought (1987 – 1992), the state's population has increased and the amount of agricultural plantings that require water during drought years (i.e., vineyards and orchards) has increased. At the same time virtually all of the State's largest water agencies have implemented conservation and other demand management actions. Residential, commercial and industrial sectors have reduced water demand through conservation, and to a lesser extent, water recycling. The SFPUC wholesale customers already implement some level of conservation and some have existing water recycling projects; they have factored additional conservation and water recycling into their projections and used these as the basis for determining their 2030 purchase request from the SFPUC regional system. To the extent that water conservation is already being practiced and will increase in the future, the more difficult it will be to implement adequate cutbacks in water use in the future to achieve the rationing that may be required during a drought period. Demand hardening refers to the increasing difficulty and expense of achieving short-term water conservation levels during shortages as more long-term conservation measures are implemented and water-use efficiency is maximized. As described by the California Department of Water Resources, demand hardening:

> "occurs when agencies implement water conservation programs that result in permanent reductions in water use, such as retrofitting plumbing fixtures or installing low-water-use landscaping. These measures lessen agencies ability to implement rationing to reduce water use during droughts, and can result in great impacts to urban water users (e.g., loss of residential landscaping) when rationing is imposed. For example, the extensive Los Angeles retrofit program helped the city maintain reductions in urban per capita water use it achieved during the last drought. These permanent water use reductions will make it more difficult for the city to duplicate its previous 15 percent water use reduction goal during a future drought" (Department of Water Resources (DWR), 2005)

With respect to the effects of droughts and rationing on customers, droughts gradually affect water service. The socioeconomic effects of drought-related shortages depend on many factors, including the frequency, size, and duration of the supply shortage; types of water use affected; the options available to an agency and water users for managing shortages; the drought management strategies implemented, customer response to drought management strategies, and the costs of contingency water management and losses associated with shortages (DWR, 2000). From a statewide perspective, examples of drought impacts include (DWR, 2000):

- Lost jobs and revenue in landscaping / nursery industries
- Homeowner costs for replacing lawns and landscaping
- Unemployment and other socioeconomic impacts in farming-dependent communities
- Increased wildfire damages
- Widespread loss of trees in the Sierra Nevada
- Declines in fish populations

- Lost revenues to water-based recreation business
- Reduced hydroelectric power generation

The most recent prolonged drought lasted six years (1987 – 1992). Much of the information available about the economic consequences of this drought focuses on the agricultural sector. At the time, little information was available on the comprehensive, statewide impacts to urban customers from droughts. The California Urban Water Agencies (CUWA) formed in 1990 in part to study such effects and to promote the need for reliable, high quality water supplies for current and future urban water users. CUWA commissioned several reports on the adverse consequences of drought to urban customers.[4] Findings from those studies, as well as other literature reviewed are summarized in the following bullet item list. The experiences among water suppliers and their customers during the 1987-1992 drought varied considerably:

- *Distribution of Water Shortage Impacts*. Water shortages were not evenly distributed throughout the state. The cumulative deficit was worst in the Central Coast region. The degree of water shortage varied among agencies and, although target cutbacks ranged from 15 to 30 percent, there were differences between planned and actual cutbacks.

- *Drought Management Strategies.* The different drought management policies implemented by water suppliers created different consumption patterns and attendant economic losses.[5] For example, the City of Santa Barbara implemented mandatory conservation directives with steeply rising tiered water rates, resulting in a 62 percent reduction in consumption for single-family residences; neighboring Goleta Water District implemented quantity restrictions and higher flat rates for water, resulting in a 40 percent reduction in consumption for single-family residences (Rand, 1993).

- *Impacts Among Customer Types*. Cutbacks were not evenly distributed among residential, commercial, and industrial customers. Residential customers typically were cut back more than industrial or commercial users, although the horticulture sector of commercial customers suffered substantial losses.

- *Exterior and Interior Water Use.* Urban rationing programs typically shift the worst impacts to residential exterior and commercial landscaping uses and away from industrial use, commercial non-landscaping use, and residential interior use (DWR, 2005). Consequently a 30 percent shortage overall can translate to a 35 percent shortage for residential users, for example.

- *Other effects.* Because there was an economic recession in 1990-1991, water use and production output reductions in the commercial and industrial sectors during these years may not have been due to drought.

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4 The CUWA-commissioned studies include: *Assessment of the Economic Impacts of California's Drought on Urban Areas, A Research Agenda* (RAND, 1993); *Drought Management Policies and Economic Effects in Urban Areas of California, 1987 – 1992* (RAND, 1996); *Cost of Industrial Water Shortages* (Wade, et al, 1991); *The Value of Water Supply Reliability: Results of a Contingent Valuation Survey of Residential Customers* (Barakat & Chamberlin, Inc, August 1994); Water Reliability Analysis and Planning (WRAP) (Barakat & Chamberlin, Inc, August 1993); and *CUWA Survey of 1991 Drought Management Measures*, June 1991.

5 Examples of the drought management policies implemented during the 1987 – 1992 drought include: quantity restrictions, type-of-use restrictions, public education programs, device distribution program (e.g., low-flow shower heads), price increases, supply augmentation strategies (greater groundwater pumping, greater use of recycled water, and water transfers) (Rand, 1993).

According to DWR, genuine health and safety concerns (i.e., running out of water for drinking, sanitation, and firefighting) during the past recorded droughts generally have been limited to small, rural communities relying on marginal water sources. Estimated losses to residences from droughts vary, and studies of actual monetary losses sustained by residential customers are uncommon. A survey of impacts to residents in Alameda County Water District, which modeled household response to steeply increasing water rate structure, calculated average welfare losses per household in the range of $14-$23 per household for the period July 1991 to December 1992.

Because of the challenges in quantifying economic losses in the residential sector, CUWA determined that contingent valuation, or willingness to pay, was the best available method for studying residential water shortage losses. Contingency valuation is based on estimating how much people will pay for something that is not available on the private market, in this case, how much people are willing to pay to avoid water shortages of varying magnitude and frequency (Barakat and Chamberlain, 1994). Using the willingness to pay methodology, the 1994 survey found concluded that California residents were willing to pay $12 to $17 more per month per household for water to avoid the kinds of water shortages that occurred in the 1987–1992 drought. An estimate of impacts to Orange County residents used the same methodology to estimate economic losses by residents from 20 percent cutbacks over three years at about $13 billion in 2002 dollars (Orange County Business Council, 2003). As noted in DWR (2005), property values for residential users and their quality of life may be lower in an area with less reliable dry-year water services if the expected cost of shortage-related landscaping replacement is high enough to discourage planting high-investment landscaping.

Based on data collected in a 1990 industry survey, the report *Cost of Industrial Water Shortages* (Spectrum Economics, Inc., 1991) indicated that direct losses in industry production from a 30 percent shortage in 1990 dollars would be $0.93 billion for Alameda County, $5.3 billion for Santa Clara County, $0.9 billion for San Francisco County, and $7.6 billion for San Mateo County. In May 2005, BAWSCA submitted a report to the SFPUC regarding the economic consequences to the Bay Area of water shortages (Wade, 2005). The report, which advocates that the SFPUC reconsider the 20 percent maximum systemwide rationing goal established for the WSIP, characterizes water use in the industrial sector of wholesale customer communities as follows:

> The companies that account for the majority of industrial sector water use are those in the computer equipment and electronic component manufacturing categories. These water-dependent industries are the backbone of the Bay Area economy. In some industries, water is an essential element of the production process, not ancillary to plant production and employee use. For example, 75 percent of the water use in the food products industry is employed directly in the process. Water essentially is the product for many beverage processors. Microchips are manufactured in a wet environment. … Biotechnology, an emerging industry in the Bay Area requires water. Genentech, for example, is the largest industrial user of water in South San Francisco. Over 75 percent of the water used in its South San Francisco plant is employed directly in the manufacturing process, while research and development uses account for most of the remainder.

The report estimates the value of production losses (lost value of shipments in 2001 dollars) in water-critical industries located in the BAWCA service area caused by water shortage of up to 20 percent at $2.5 billion to $7.7 billion per year, and notes that this estimate is conservative because of demand hardening. The report also cited the following information from an SFPUC report to the Federal Energy Regulatory Commission (FERC) (Hetch Hetchy Water and Power Department, 1993)

- "The economic impact resulting from a water supply cutback will be concentrated in two industries: electronic components and accessories, and computer office equipment. Other industries could experience larger production cutbacks, but their economic impact will be small by comparison, except for the beverage industry.

- A 15 percent cutback in water supply could reduce direct shipments from the electronic component industry in 1990 dollars by $68 million and $163 million from the computer industry. The secondary impact could increase loss from these two industries by $294 million.

- A 15 percent cutback in water supply could result in more than 2,000 jobs lost in the two industries and their ancillary service areas.

- At a 15 percent cutback in water supply, the beverage industry would experience the largest production cutback of 10.4 percent and lost sales of approximately $72.4 million (1990 dollars)."

Although the information on the effects of water shortages during drought is limited, studies completed to date indicate that rationing cutbacks of 15 to 20 percent can have substantial economic impact on commercial, industrial and residential sectors and well as lifestyle effects on residents. To date, these studies have not identified significant environmental impacts resulting from such rationing in urban areas and the economic consequences do not appear to have resulted in major physical changes such businesses and/or residents leaving the area to an extent that land use patterns change. However, requiring rationing of up to 20 percent during a drought of customers who have already implemented aggressive conservation and water recycling would result in more severe economic and lifestyle effects.

Ability to Meet Program Objectives

Tables 9-5 and 9-6, above, show how the No Program Alternative would perform in terms of meeting the level of service goals and system performance objectives established for the WSIP (no assumptions are made regarding the ability of the wholesale customers to develop alternative supplies to offset water supply shortages or reduced system reliability). While this alternative could occasionally satisfy the 2030 customer purchase requests of 300 mgd, the alternative would fail to meet the WSIP level of service goals with respect to seismic, delivery, and water supply reliability. The water quality level of service goal would be achieved, since the SFPUC would implement required facility improvements to meet federal and state water quality regulations for the regional system (assuming no new supply would be wheeled through the SFPUC's system from wholesale customer actions; the SFPUC would not be responsible for regulatory compliance for any new sources obtained by wholesale customers).

Under the No Program Alternative, the regional system could not reliably meet the average 2030 demand of 300 mgd during nondrought years. With the restoration of Calaveras and Lower Crystal Springs Reservoirs under this alternative, water supply reliability would be somewhat improved over existing conditions, but this alternative would still not meet the WSIP level of service goals for seismic and delivery reliability due to other system deficiencies related to water availability during maintenance or outages, storage, conveyance, and treatment. In addition, this alternative would fail the WSIP objective of limiting drought-year rationing to a maximum of 20 percent systemwide. Systemwide shortages of greater magnitude and frequency would occur compared to both existing conditions and the proposed program. Using the Hetch Hetchy/Local Simulation Model (HH/LSM) and assuming a maximum rationing of 30 percent, the regional system would experience shortages during 42 years of the 82-year period of hydrologic record—as much as one in every two years. There would be no supplemental dry-year sources (e.g., the Westside Groundwater Program) to potentially forestall customer shortages.

With the exception of the Calaveras Dam project (SV-2), key WSIP facility improvement projects that were identified as needed to meet the seismic reliability performance objectives would not be implemented.[6] As a result, the system would continue to be subject to seismic hazards. In the event of a major earthquake, critical facilities could fail, leading to prolonged outages; customers could be without water service (including drinking water supplies and water for firefighting) for more than 14 days and possibly more than 30 days. Furthermore, without the WSIP facility improvement projects, the system would not have sufficient redundancy to reliably maintain or quickly restore basic service following a major earthquake.

Under the No Program Alternative, comprehensive maintenance and repair of the regional system would continue to be deferred, resulting in an increasing risk of failure and service disruption; in addition, some facilities (such as the Irvington Tunnel) could not be inspected, serviced, or repaired without loss of service to customers. The system would also have a limited ability to respond to unplanned outages resulting from power failures, earthquakes, or water quality events at Hetch Hetchy Reservoir. Aging infrastructure and substandard maintenance under the No Program Alternative would severely compromise overall delivery reliability[7] compared to existing conditions, due to increased demand on the system coupled with a greater likelihood of facility failure. Facilities would not be in place to replenish local reservoirs as needed to prepare for drought, and, as previously stated, customers would be subject to more severe and more frequent shortages and rationing.

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[6] Key WSIP projects needed to meet seismic reliability levels of service include Calaveras Dam (SV-2), New Irvington Tunnel (SV-4), BDPL Reliability Upgrade (BD-1), BDPL 3 and 4 Seismic Upgrade at Hayward Fault (BD-3), Baden and San Pedro Valve Lots (PN-1), CS/SA Transmission (PN-2), HTWTP Long-Term (PN-3), and SAPL 3 Installation (SF-1). In addition, two WSIP projects identified as having independent utility—New Crystal Springs Bypass Tunnel and Bay Division Pipelines Nos. 3 and 4 Crossover/Isolation Valve at Hayward Fault—would be required (SFPUC, 2006).

[7] Key WSIP projects needed to meet delivery reliability levels of service during maintenance conditions include SJPL System (SJ-3), 40-mgd Treated Water (SV-3), New Irvington Tunnel (SV-4), BDPL Reliability Upgrade (BD-1), CS/SA Transmission (PN-2), and HTWTP Long-Term (PN-3). Key WSIP projects needed to meet delivery reliability levels of service during a Hetch Hetchy water quality event or unplanned outage include Calaveras Dam (SV-2), 40-mgd Treated Water (SV-3), and HTWTP Long-Term (PN-3) (SFPUC, 2006).

If the wholesale customers and/or BAWSCA were to pursue supplemental water sources to compensate for the reduced reliability of the SFPUC's regional system under the No Program Alternative, additional studies would be required to determine both the technical and institutional feasibility of such supplemental sources. The resultant ability of the alternative to meet the program objectives would then depend in part on the wholesale customer actions and would be outside the control of the SFPUC.

While the SFPUC would continue to provide watershed protection and meet legal requirements for protection of fish and other wildlife, under the No Program Alternative, the system would not be managed in a comprehensive and coordinated manner to best manage natural resources and physical systems; therefore, the system would not meet all the sustainability objectives. Similarly, while the system would maintain its gravity-driven attributes, the system would not meet all of the WSIP cost-effectiveness objectives because the increased risk of facility failures and outages and likely increased need for emergency repairs and replacement would not be considered efficient or cost-effective use of resources or funds and the SFPUC would not be able to implement a regular inspection and maintenance program for all facilities.

Environmental Impacts Compared to those of the WSIP

Facility Construction and Operations Impacts

WSIP Facilities

Under the No Program Alternative, only five WSIP facility improvement projects would be constructed—Advanced Disinfection (SJ-1), Alameda Creek Fishery (SV-1), Calaveras Dam (SV-2), Treated Water Reservoirs (SV-5), and Lower Crystal Springs Dam (PN-4). None of the impacts attributable to the other WSIP facility projects would occur. The construction and operational impacts of these five facilities would be identical to those described in Chapter 4, Sections 4.3 to 4.15. As with the WSIP, the program-level analysis indicates that implementation of these five projects would result in potentially significant and unavoidable construction-related noise increases. In addition, implementation of the Advanced Disinfection project would result in potentially significant and unavoidable impacts related to temporary noise disturbance along construction haul routes; the Calaveras Dam project would result in potentially significant and unavoidable impacts related to visual resources as well as to historic districts and the historical significance of individual facilities; the Lower Crystal Springs Dam project would result in potentially significant impacts related to the historical significance of individual facilities. All other identified program-level impacts for these five projects would either be less than significant or could be mitigated to a less-than-significant level with implementation of identified mitigation measures.

Potentially significant unavoidable impacts associated with construction noise would be avoided at the 17 remaining WSIP facility improvement project sites. Impacts in the San Joaquin Region would be limited to the Tesla Portal area, and potentially significant unavoidable land use and/or vibration impacts associated with the SJPL System (SJ-3) and SJPL Rehabilitation (SJ-4) projects would be avoided. Impacts in the Sunol Valley Region would be limited to the Alameda Creek,

Calaveras Dam, and Sunol Valley Water Treatment Plant (WTP) areas; and potentially significant unavoidable land use and/or cultural resource impacts associated with the 40-mgd Treated Water (SV-3), New Irvington Tunnel (SV-4), and SABUP (SV-6) projects would be avoided. There would be no construction or operations impacts in the Bay Division Region, and potentially significant unavoidable land use and/or vibration impacts associated with the three projects in this region would be avoided. Impacts in the Peninsula Region would be limited to the Crystal Springs Reservoir area, and potentially significant unavoidable land use and cultural resource impacts associated with the CS/SA Transmission project (PN-2) as well as potentially significant unavoidable vibration impacts associated with the Baden and San Pedro Valve Lots project (PN-1) would be avoided. There would be no construction or operations impacts in the San Francisco Region, and potentially significant unavoidable land use and/or vibration impacts associated with the three projects in this region would be avoided.

Under the No Program Alternative, all potentially significant collective impacts (with the exception of cultural resources) would be less than significant or avoided due to the greatly reduced number of projects. Only two of the three projects in the Sunol Valley—Alameda Creek Fishery (SV-1) and Calaveras Dam (SV-2)—would have overlapping construction schedules, and project-specific mitigation measures would be adequate to reduce any combined effects of construction activities on Calaveras Road to a less-than-significant level. Thus, multi-regional and overlapping collective impacts under the No Program Alternative would be less than significant.

Unlike the proposed program, the contribution of facilities impacts under the No Program Alternative to cumulative impacts on traffic and biological resources would be mitigated through project-specific mitigation; other WSIP-related activities such as the Habitat Reserve Program (if implemented, see Chapter 3, Section 3.12) would also reduce cumulative impacts on biological resources. However, similar to the proposed program, the contribution of the No Program Alternative's impacts to cumulative impacts on air quality and cultural resources would be cumulatively considerable, particularly due to the extent of construction activities associated with the Advanced Disinfection (SJ-1) and Calaveras Dam (SV-2) projects.

Other Facilities Potentially Implemented Under this Alternative

The ability of the wholesale customers to develop additional water supplies is uncertain and outside the control of the SFPUC. The types of projects that the wholesale customers might pursue and the potential facility and operations impacts associated with such projects are presented in **Table 9-10** for consideration by decision-makers and other interested parties. In general, certain types of impacts are common to water supply transfers/acquisition and include: the cessation of water application to lands irrigated by the water being transferred; changes related to flows, fisheries, and water quality; and impacts caused by the use of existing or the construction of new infrastructure. Typically, the water rights-holder previously applied the water to agricultural land. The transfer can result in the conversion of agricultural land to nonagricultural land. Beneficial environmental effects (related to retiring drainage-impaired lands, reducing the application of pesticides, etc.) can also occur. The need for new facilities and/or changes in the operations of existing facilities depend on the source of supply (e.g.,

TABLE 9-10
SUMMARY OF POTENTIAL IMPACTS AND MITIGATION STRATEGIES ASSOCIATED WITH REPRESENTATIVE WATER SUPPLY ACQUISITION PROJECTS

Actions Associated with Water Supply Acquisition Projects	Potential Impacts	Mitigation Strategy
Supplemental Water Supply Source		
Increased Water Use Efficiency/Conservation (e.g., conversion to drip irrigation); tiered water pricing	Reduced groundwater recharge. Exposure of soils to wind erosion leading to air quality impacts. Could lead to increased groundwater pumping.	None required. See below regarding increased groundwater pumping.
Conversion of More Water-Intensive to Less Water-Intensive Crops, Land Fallowing	Land fallowing could create pressure to convert land to urban uses and loss of agricultural land. Economic impacts to community.	Include consideration of farming interests in decision-making process for transfer.
Increased Groundwater Pumping/Conjunctive Use of Groundwater	Groundwater level reductions and overdraft if there is insufficient sustainable yield to accommodate increased pumping. Water quality issues include decreased aesthetic quality in drinking water (hardness, tastes, odors), health risk from potential contaminants in groundwater basin.	Determine sustainable yield of the basin, implement monitoring program, regulate groundwater pumping to preserve safe yield, provide treatment and/or blending if necessary to remove contaminants and control taste and odor. Local assistance programs for remediation of affected wells.
Delta Diversions	Potential impacts on sensitive Delta fisheries including: winter-run, spring-run Chinook salmon, Delta smelt, steelhead trout, and Delta splittail.	Compliance with existing and future pumping requirements related to threatened and endangered species protection.
	Changes in Delta inflow, outflow. Potential impacts on flows associated with wheeling Delta transfers through the Delta, resulting in secondary impacts on Delta fisheries and other biological resources.	Transfer would require review/approval by applicable regulatory agencies. Analysis of flow impacts and commitment to minimize adverse secondary impacts on biological resources (e.g., through transfer timing, pumping restrictions).
	Water quality for the Delta and downstream water users (including salinity, bromides, potential contaminants from agricultural and industrial run-off, taste and odor problems, disinfection byproducts, and temperature).	Compliance with existing and future applicable water quality control. Regulations. Treatment to bring up to water quality equitable to Tuolumne River.
	Water quality for the Delta and downstream water users (including salinity, bromides, and temperature).	Transfer would require review/approval by applicable regulatory agencies. Analysis of flow impacts and commitment to minimize adverse impacts on other water users (e.g., through transfer timing, pumping restrictions).

TABLE 9-10 (Continued)
SUMMARY OF POTENTIAL IMPACTS AND MITIGATION STRATEGIES ASSOCIATED WITH REPRESENTATIVE WATER SUPPLY ACQUISITION PROJECTS

Actions Associated with Water Supply Acquisition Projects	Potential Impacts	Mitigation Strategy
Facilities Required		
Conveyance	Mostly temporary impacts from construction of pipelines, valves, and pumps (disturbance of soils, surface water quality, biological resources, cultural resources, air quality, traffic, noise, land use, hazardous materials, aesthetics).	Most impacts associated with facility construction could be mitigated to a less-than-significant level with the types of measures identified in Chapter 6. As is the case with the proposed WSIP facilities, some impacts (e.g., short-term noise and traffic) could be unavoidable.
Pumping	Noise, energy consumption, air pollutant emissions from energy consumption.	Muffle noise. Use energy-efficient pumps and alternative energy sources.
Treatment	Temporary construction impacts, including land use, traffic, noise and air quality impacts. Potential long-term impacts could include increase in energy consumption, air pollutant and greenhouse gas emissions from energy consumption.	Use standard construction mitigations. Use energy-efficient pumps and alternative energy sources.
Groundwater Basin Storage of Surface Water	Potential degradation of groundwater quality, hydrofracturing (injection).	Pretreatment, groundwater quality monitoring, groundwater basin modeling, modifications to recharge and pumping practices.
Storage – Development of New Offstream Storage	Temporary and long-term impacts from construction of dam, pipelines, pumps, and appurtenant features (direct and indirect impacts on wetland and upland fish and wildlife and attendant habitat; impacts related to cultural resources, air quality, traffic, noise, land use, aesthetics, etc.).	Most impacts associated with facility construction could be mitigated to a less-than-significant level with the types of measures identified in Chapter 6. Some impacts would likely be unavoidable.

Tuolumne River through transfers with TID and MID, water-rights holders north of the Delta, in the Delta, or south of the Delta), the quantity of supply, and the means of conveyance. Construction or expansion of interties or connecting pipelines could be required, potentially resulting in impacts similar to those described for WSIP pipeline projects. The use of existing infrastructure to convey water to the wholesale customer would require extensive hydrologic, hydraulic and seismic reliability modeling to confirm that there would be no adverse consequences to the supply availability of other system users under all normal and emergency conditions. Without the WSIP improvements, capacity is already extremely limited, so ability to provide additional conveyance capacity is unlikely.

Water Supply and System Operations Impacts

Under the No Program Alternative, the estimated average annual diversions from the Tuolumne River would be 226 mgd, based on HH/LSM modeling of the no-program assumptions over the 82-year hydrologic record. This amount is 19 mgd less than the 245 mgd average annual diversions from the Tuolumne River under the WSIP, but 8 mgd more than the 218 mgd average annual diversions under existing conditions, as shown in Table 9-5, above. The potential impacts on water resources in the Tuolumne River, Alameda Creek, and Peninsula watersheds associated with this level of diversion are described below and compared to the impacts that would occur under the WSIP.

Tuolumne River Watershed

Currently, water storage in Hetch Hetchy Reservoir follows a seasonal pattern. The SFPUC typically draws the reservoir down in the summer, fall, and winter. During the summer, fall, and winter, only the minimum required release is made to the Tuolumne River below O'Shaughnessy Dam. The SFPUC refills Hetch Hetchy Reservoir with snowmelt in the spring and, once it is full, or in anticipation of it filling, releases excess to the river. The amount of the release in any particular year depends on the mass of snow that has accumulated in the previous winter.

Based on projected increases in customer water demand in 2030 the amount of water delivered to customers by the SFPUC regional system under the WSIP would be greater than under the existing condition. To meet the increased demand under the WSIP, the SFPUC would draw down Hetch Hetchy Reservoir to a greater extent in the summer, fall, and winter compared to the existing condition. A higher proportion of the snowmelt runoff would be required to refill the reservoir in the spring, and a smaller proportion would be released to the Tuolumne River below O'Shaughnessy Dam. Average annual releases to the Tuolumne River would be reduced by about 3.5 percent. The reduction in average annual releases to the river would manifest itself as a delay in the start of the spring release. The average delay would be 1 day, the maximum delay would be 8 days and a delay greater than 2 day would occur about once every 4 years.[8] The delay in spring releases would have a significant adverse effect on terrestrial biological resources in streamside meadows, particularly in the Poopenaut Valley, as described in Section 5.3.7.

[8] The estimates of delay in spring releases are based on the assumption that operators would release water from Hetch Hetchy Reservoir at a rate of 3,000 cfs. Review of past practice indicates that this a typical springtime release rate. If the release rate was reduced, as might happen in a dry year, the delay would be extended.)

The No Program Alternative would also result in a delay in spring releases from Hetch Hetchy Reservoir. This delay would occur because, under the No Program Alternative, water demand would increase (as it would with the WSIP), and the SFPUC would attempt to satisfy the increase in demand by drawing more water from Hetch Hetchy Reservoir. The SFPUC would not draw as much water from Hetch Hetchy Reservoir with the No Program Alternative as it would with the WSIP because it would not provide the same level of delivery reliability during drought it would with the WSIP. This substantial reduction in delivery reliability during drought results in more frequent reductions to full deliveries during nondrought years. The average annual release of water to the Tuolumne River below O'Shaughnessy Dam would still be reduced (by about 1.3 percent). The delay in spring releases would be less with the No Program Alternative than with the WSIP. With the No Program Alternative the average delay would about half a day and the maximum delay would be 5.5 days. Delays of more than two days would occur about once every six years. The delays would still have a significant adverse effect on terrestrial biological resources.

Water storage in Don Pedro Reservoir also follows a seasonal pattern. The Turlock Irrigation District (TID) and Modesto Irrigation District (MID) typically draw the reservoir down in the summer and early fall by diversion to their service areas and releases from La Grange Dam to the Tuolumne River. During the summer and fall, typically only the minimum required release is made to the Tuolumne River below La Grange Dam. TID and MID replenish storage in Don Pedro Reservoir with rainfall runoff from the watershed in the winter and snowmelt in the spring. Because one of the purposes of Don Pedro Reservoir is flood control, space must be retained in the reservoir through the winter to capture runoff from large winter storms. In years when runoff exceeds the available capacity of the reservoir, TID and MID release the excess to the river below La Grange Dam. The amount of the release in any particular year depends on the size and frequency of winter storms and the mass of snow that has accumulated in the upper watershed in the previous winter. Releases may occur in a series of pulses rather than in a single defined spring release as typically occurs at Hetch Hetchy Reservoir.

As noted above, water demand in 2030 would be greater than under the existing condition. To meet the increased demand, with the WSIP the SFPUC would divert more water from the Tuolumne River at Hetch Hetchy Reservoir than under the existing condition. There would be a corresponding reduction in inflow to Don Pedro Reservoir. As a result, Don Pedro Reservoir would be drawn down farther by the late fall than it is under the current condition. A higher proportion of the rainfall and snowmelt runoff would be required to replenish storage in Don Pedro Reservoir in the winter and spring, and a smaller proportion would be released to the Tuolumne River below La Grange Dam. The reduction in average annual releases to the river with the WSIP would manifest itself as a delay in the start of pulse releases in the winter and spring. The combination of a reduction in the average annual volume of releases (of about 4 percent) and a delay in releases would have a significant adverse effect on fisheries in the Tuolumne River and on terrestrial biological resources in the riparian corridor, as described in Sections 5.3.6 and 5.3.7.

As noted above, water demand would increase with the No Program Alternative (as it would with the WSIP), and the SFPUC would attempt to satisfy the increase in demand by drawing more

water from Hetch Hetchy Reservoir. Withdrawal of more water from Hetch Hetchy Reservoir would reduce inflow into Don Pedro Reservoir and result in a greater drawdown of storage in that reservoir compared to the existing condition. The No Program Alternative would reduce the average annual release of water to the Tuolumne River below La Grange Dam (by about 1.3 percent) and delay the initial release, but to a much lesser extent than with the WSIP. The reduction in total releases and the delay in the initial release would have an adverse effect on fisheries in the Tuolumne River and on terrestrial biological resources in the riparian corridor, but the impact would be less than significant.

Alameda Creek Watershed

The proposed improvements to Calaveras Dam included under the WSIP would also occur under the No Program Alternative. As a result of the improvements and associated modification in system operations, the maximum water level in Calaveras Reservoir would rise by about 50 feet. The rise in water level would have significant adverse impacts on terrestrial biological resources, as described in Section 5.4.6.

Under the No Program Alternative, as with the WSIP, restoration of historical water levels at Calaveras Reservoir would enable greater diversions of water from Alameda Creek into the reservoir. The consequent reductions in flow would have significant and unavoidable impacts on the hydrology of the creek below the diversion dam and significant adverse impacts on fisheries and terrestrial biological resources. The improvements to Calaveras Dam would also lead to changes in flow in Calaveras Creek and Alameda Creek below the Calaveras Creek confluence, which would have significant adverse impacts on terrestrial biological resources. The changes in water level in Calaveras Reservoir and changes in flow in the creeks would have a significant adverse effect on recreational and visual resources. Under the No Program Alternative, the SFPUC would operate its facilities in the Alameda Creek watershed in a similar manner as it would with the WSIP. Consequently, the environmental impacts of the No Program Alternative would be similar to those of the WSIP.

Peninsula Watershed

Currently, water storage in Pilarcitos Reservoir follows a seasonal pattern. The SFPUC typically draws the reservoir down in the summer. During the summer, water is released from the reservoir to Pilarcitos Creek to supply the Coastside County Water District (CWD). Coastside CWD diverts water from Pilarcitos Creek at Stone Dam. By late summer, Pilarcitos Reservoir is typically drawn down to its minimum, and the SFPUC supplies Coastside CWD from Crystal Springs Reservoir. The SFPUC refills Pilarcitos Reservoir in the winter and spring.

Water demand in 2030 would be greater than under the existing condition, including water demand in the Coastside CWD service area. To meet the increased demand in the Coastside CWD service area, the SFPUC would draw down Pilarcitos Reservoir more rapidly in the summer than under the existing condition and end stored water releases to Pilarcitos Creek at an earlier date. The more rapid drawdown and the earlier cessation of releases to Pilarcitos Creek would have a significant adverse effect on water quality, fisheries, and terrestrial biological resources in the reservoir and the creek, as described in Sections 5.5.3, 5.5.5, and 5.5.6.

Water demand would increase with the No Program Alternative, as it would with the WSIP. The SFPUC would try to serve increased demand in the Coastside CWD service area from Pilarcitos Reservoir, exactly as it would with the WSIP. The consequent, more rapid drawdown of Pilarcitos Reservoir and the earlier cessation of stored water releases to Pilarcitos Creek would have a significant adverse effect on water quality, fisheries, and terrestrial biological resources in the reservoir and the creek.

The improvements to Lower Crystal Springs Dam that would occur with the WSIP would also be part of the No Program Alternative. As a result of the improvements and associated modification in system operations, the maximum water level in Crystal Springs Reservoir would rise by about 20 feet. The rise in water level would have significant adverse impacts on terrestrial biological resources, as described in Section 5.5.6. Because the No Program Alternative would include the same improvements to Lower Crystal Springs Dam as the WSIP, the SFPUC would generally operate its facilities in the Peninsula watershed in a similar manner as it would with the WSIP. Consequently, the environmental impacts of the No Program Alternative would be similar to those of the WSIP.

Growth-Inducement Potential and Secondary Effects of Growth

The growth-inducement potential for this alternative is expected to be similar to that of the proposed program. Under this alternative, the SFPUC would not be able to provide a water supply with a reliability comparable to the WSIP in all nondrought years, or in dry years and drought periods; nonetheless, it is reasonable to expect that the SFPUC wholesale customers (either separately or together through BAWSCA) would seek to acquire supplemental dry-year water supplies to complement the supply increases the SFPUC is able to deliver under this alternative and to provide a comparable level of supply reliability. As a result, this alternative would have the same indirect, secondary effects of growth as the proposed program. As discussed in Chapter 7, growth has occurred in some communities, such as San Francisco, without a corresponding increase in water supply. In the future, the projected population and/or employment growth for some communities are clearly greater than the corresponding projected increase in water supply need, indicating that water use efficiency is increasing and that additional supply is not necessarily required for growth to occur. It is possible that approval of additional development within the SFPUC's wholesale customer service areas might be slowed somewhat in some communities because the wholesale customers would have to pursue other projects and actions to achieve adequate dry-year supplies and reliability, but it is not expected that this would deter communities from taking actions to support planned growth.

9.2.3 No Purchase Request Increase Alternative

Under the No Purchase Request Increase Alternative, the SFPUC would implement all of the proposed WSIP facility improvement projects but would limit wholesale customers' future purchases to terms of the existing Master Water Sales Agreement instead of providing for their 2030 purchase requests. The wholesale customers would have to pursue supplemental supply sources and/or conservation measures to make up the supply shortfall under this alternative. This alternative assumes there would be no increase in the existing level of supply assurance

(275 mgd, annual average which reflects the wholesale customer supply assurance under the Master Water Sales Agreement of 184 and a demand of 91 mgd in the SFPUC retail service area), but there would be a slight increase in demand compared to the existing purchase request level of 265 mgd. With the inclusion of 10 mgd of recycled water, groundwater and conservation projects in San Francisco, there would be limited need for additional Tuolumne River diversions except for drought supplies.

This alternative was included in the PEIR alternatives analysis to evaluate the consequences of the SFPUC not meeting the future increase requested by its customers 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.

Description of SFPUC and Wholesale Customer Actions

SFPUC Actions

Table 9-4 summarizes the main characteristics of this alternative in comparison to those of the proposed program. Under the No Purchase Request Increase Alternative, the SFPUC would implement the same water supply option and facility improvement projects as those proposed under the WSIP; however, instead of serving the full 2030 purchase requests of 300 mgd (average annual), the SFPUC would limit customer deliveries to 275 mgd (as compared to current deliveries of 265 mgd), with 184 mgd for wholesale customers and 91 mgd for retail customers. Master Water Sales Agreement Terms

Currently, the SFPUC's wholesale customers purchase an annual average of 170 mgd from the regional water system. The wholesale customers estimate that, by 2030, they will need to purchase an annual average of 209 mgd from the regional system. Under the WSIP, the regional system would meet the needs of wholesale customers for water. The No Purchase Request Increase Alternative assumes that the SFPUC would be able to limit the wholesale customers' future purchases to the terms of the existing Master Water Sales Agreement it holds with the wholesale customers, who are represented by BAWSCA (see Chapter 2, Section 2.5.5 for a description of the agreement). Under this agreement, the CCSF has agreed that the wholesale customers may collectively purchase up to 184 mgd on an average annual basis, subject to reductions in the event of a drought, water shortage, earthquake, other natural disaster, or rehabilitation and maintenance of the system ("the supply assurance"). Additional sales are made on an interruptible basis to San Jose and Santa Clara. The current master contract expires in 2009, but in the event the contract is not renewed or renegotiated, or the parties agree to a new contract without an increase in the supply assurance, the current supply assurance of the contract would remain in force. Thus, under the No Purchase Request Increase Alternative, it is assumed that the SFPUC and its customers would choose not to negotiate a new contract and instead would continue with the existing contract in which the customer water delivery for 2030 would be 184 mgd for the wholesale customers instead of 209 mgd and would be the same as under the WSIP for retail customers (91 mgd). Therefore, under the No Purchase Request Increase Alternative, the wholesale customers would receive 25 mgd (average annual) less than under the WSIP. It is assumed that the wholesale customers, either individually or collectively, would seek

sources other than the SFPUC, through alternative supply sources, additional conservation, water recycling, or other demand management approaches, as described below. The SFPUC would need to work closely with BAWSCA to define where the additional 10 mgd would be served, and would need to redefine level of service objectives for seismic and delivery reliability based on the decreased supply and revised supply distribution.

Water Supply Characteristics

Under the No Purchase Request Increase Alternative, it is assumed that the total customer purchase requests to be served by the regional system by 2030 would be 275 mgd, consisting of 184 mgd for the wholesale customers and 91 mgd for the retail customers. As shown in Table 9-4, the increased water demand would be served through additional Tuolumne River diversions under existing CCSF water rights, increased use of local watershed supplies due to restoration of Calaveras and Crystal Springs Reservoirs, and 10 mgd from recycled water, groundwater, and conservation projects in San Francisco. During drought sequences, this supply would be supplemented by additional Tuolumne River diversions through a water transfer with TID and MID, similar to the proposed program, but for 1 mgd instead of 23 mgd. The supplemental dry-year supplies would also include implementation of the Westside Basin conjunctive-use program for 6 mgd (same as under the proposed program).

WSIP Facility Improvement Projects

The No Purchase Request Increase Alternative assumes that the SFPUC would implement all 22 WSIP facility improvement projects to meet the water quality, seismic reliability, and delivery reliability objectives of the WSIP. However, the design of some of the WSIP facilities would need to reevaluated and sized appropriately to meet the reduced delivery levels and corresponding adjusted performance objectives under this alternative. In addition, the No Purchase Request Increase Alternative assumes that the SFPUC would proceed with implementation of other capital improvement projects and related activities not considered part of the program analyzed in this PEIR (as described in Chapter 3, Sections 3.13 and 3.4.6).

Wholesale Customer Actions

Under this alternative, the SFPUC would serve 184 mgd out of the 209 mgd in wholesale customer purchase requests (demand) by 2030. BAWSCA and/or individual SFPUC wholesale customers could pursue supplemental water supplies on their own to compensate for the 25 mgd in additional demand, or possibly develop additional conservation programs or other demand management approaches. A potential approach for BAWSCA and the wholesale customers to secure supplemental water supplies and associated issues are described under the No Program Alternative. However, unlike the No Program Alternative (under which the SFPUC could at times meet the full purchase requests but with uncertain reliability), the No Purchase Request Increase Alternative would on average provide 184 mgd, or 88 percent, of wholesale customer demand with a high level of reliability. Nevertheless, the wholesale customers might elect to obtain supplemental supplies to meet the additional 25 mgd in demand using an approach similar to that described above under the No Program Alternative.

Feasibility Issues

Similar to the No Program Alternative, the No Purchase Request Increase would present no engineering or technical feasibility issues, but it would likely result in institutional and legal issues since it assumes that the SFPUC and it customers would collectively agree to maintain the current Master Water Sales Agreement contract provisions (and other individual contracts). However, without such an agreement BAWSCA and/or wholesale customers would likely pursue legal remedies to compel the SFPUC to meet the 2030 customer purchase request. Whether or not the SFPUC could agree with its customers on such an alternative, BAWSCA and/or wholesale customers would also likely seek other water supply sources to meet customer water needs; each alternate water source would have its own set of technical, cost, legal, and regulatory considerations that would require additional studies. With respect to public acceptance, it is unlikely that the SFPUC's regional system customers would support this alternative. In addition, depending on the outcome of customer actions, this alternative could add substantial capital and/or operation and maintenance costs as a result of having to accommodate alternate water sources in addition to the costs of the 22 facility improvement projects included in the WSIP. This unknown but possibly substantial additional cost raises questions about total program cost and financing feasibility and customer rate impacts.

Ability to Meet Program Objectives

Table 9-6, above, shows how the No Purchase Request Increase Alternative would perform in terms of meeting the WSIP level of service goals and system performance objectives compared to the proposed program. This alternative would fully meet the WSIP level of service goal with respect to water quality for the SFPUC system (although the SFPUC would not be responsible for regulatory compliance of new water sources obtained by wholesale customers; in addition, if new sources are to be "wheeled" through the SFPUC system, then the water quality objective may not be achieved). Seismic reliability would be improved over existing conditions, but due to the reduced target delivery level, the alternative would not meet the WSIP objective of providing 300 mgd average day demand but would meet a reduced objective of 275 mgd average day demand. In addition, there is no certainty about where the distribution of the additional 10 mgd would occur, so the seismic performance objectives of serving 70 percent of turnouts and meeting average day demand in the three customer regions (South Bay, Peninsula and San Francisco) could not be guaranteed and would need to be reevaluated to determine if the WSIP performance objective could be achieved. Delivery reliability of the regional system would be improved similar to the proposed program; however, this alternative would only partially meet those objectives, since it would not meet the average annual demand of 300 mgd under maintenance or outage conditions but instead meet the reduced target delivery level of 275 mgd. Comprehensive and regular repair and maintenance of the regional system would occur without service interruptions, and the risk of service interruptions due to unplanned facility upsets or outages would be minimal. Facilities would be in place to replenish local reservoirs as needed to prepare for drought, and the system would remain essentially gravity-driven.

The No Purchase Request Increase Alternative would fail to achieve the WSIP's water supply level of service goal during nondrought and drought periods and would not meet the 2030

customer purchase requests of 300 mgd. Under this alternative, the regional system would be capable of serving average annual purchase requests of 275 mgd during nondrought conditions (compared to 265 mgd delivered on average under existing conditions). Deliveries would be limited to an annual average of 275 mgd. Similarly, while this alternative would meet the WSIP objective of limiting drought-year rationing to a maximum of 20 percent systemwide, it would achieve this objective at the reduced demand level of 275 mgd. Unless wholesale customers were to obtain alternative supplies from other sources to supplement the SFPUC deliveries, the combined effect of reduced deliveries from the SFPUC and 20 percent rationing during droughts could effectively require rationing of over 20 percent of total demand during an extended drought sequence. However, the No Purchase Request Increase Alternative would succeed in diversifying the SFPUC water supply portfolio and improve use of new water sources during nondrought and drought periods.

In order to reevaluate levels of service objectives at a target delivery level of 275 mgd, system modeling using the hydrologic, hydraulic and seismic reliability models would need to be performed, and the level of service objectives would need to be revised to become compatible with the lower system delivery target. The distribution of future demands would need to be evaluated in order to determine if the seismic criteria of 70 percent of turnouts and average day demand to the three regional customer groups following a seismic event could be achieved.

If the wholesale customers and/or BAWSCA were to pursue supplemental water sources to compensate for the reduced supply provided by the SFPUC's regional system under this alternative, additional studies would be required to determine both the technical and institutional feasibility of such supplemental sources. The resultant ability of the alternative to meet the WSIP water supply and delivery reliability objectives would then depend in part on the wholesale customer actions and would be outside the control of the SFPUC.

Similarly, the No Purchase Request Increase Alternative would meet the WSIP sustainability objectives, within the bounds of the SFPUC actions, but it would be unknown with respect to the wholesale customer actions. If the wholesale customers were to take independent action from the SFPUC under this alternative, this would result in inefficient use of resources and funds and would not meet the WSIP objective for cost-effectiveness. The capital, operation and maintenance cost of the 22 facility improvement projects would be the same as the WSIP, but additional costs would be incurred from conservation or supply projects implemented by customers in place of the WSIP supply.

Environmental Impacts Compared to those of the WSIP

Facility Construction and Operations Impacts

WSIP Facilities

The No Purchase Increase Alternative assumes that all WSIP facility improvement projects would be implemented to meet the intent of the water quality, seismic reliability, and delivery reliability objectives of the WSIP. Therefore, the identical facility-related impacts described in Chapter 4 would occur under this alternative.

Other Facilities Potentially Implemented Under this Alternative

The ability of the wholesale customers to develop additional water supplies is uncertain and outside the control of the SFPUC. A potential approach for BAWSCA and the wholesale customers to secure supplemental water supplies is described under the No Program Alternative. The types of projects that the wholesale customers might pursue and the potential facility and operations impacts associated with such projects are presented in Table 9-10, above, for consideration by decision-makers and other interested parties.

This alternative could result in construction and operation of extensive additional recycled water, groundwater, and water conveyance facilities in the wholesale customer service areas; thus, collective impacts in the Bay Division and Peninsula Regions and associated cumulative effects (such as traffic, air quality, noise and vibration) would be more severe than those of the WSIP.

Water Supply and System Operations Impacts

Under the No Purchase Request Increase Alternative, the estimated average annual diversions from the Tuolumne River would be 221 mgd, based on HH/LSM modeling of this alternative over the 82-year hydrologic record. This amount is 24 mgd less than the 245 mgd average annual diversions from the Tuolumne River under the WSIP, but 3 mgd more than the 218 mgd average annual diversions under existing conditions, as shown in Table 9-5, above. The slight increase in diversions is due to the small increase in purchase request and the improvement in delivery reliability. The potential impacts on water resources in the Tuolumne River, Alameda Creek, and Peninsula watersheds associated with this level of diversion are described below and compared to the impacts that would occur under the WSIP.

Tuolumne River Watershed

Under the No Purchase Request Increase Alternative, the SFPUC would meet more purchase requests by 2030 than under the existing condition, but less than it would under the WSIP or any of the other alternatives analyzed in Section 9.2. The No Purchase Request Increase Alternative would result in a small reduction (less than 0.5 percent) in average annual releases to the Tuolumne River from Hetch Hetchy Reservoir and some reduction and delay in the spring releases on occasion compared to the existing condition. The reduction and delay in spring releases would occur because storage deficits in a series of dry years would accumulate in Hetch Hetchy Reservoir. The reduction and delay in spring releases would be less than with the WSIP, and a delay of more than two days would occur much less frequently, about once in every 10 years, with the No Purchase Request Increase Alternative than with the WSIP. The delay is still judged to be sufficient to have a significant adverse effect on terrestrial biological resources because of the ecological sensitivity of riverside meadows and their flora and fauna.

The No Purchase Request Increase Alternative would result in a small reduction in average annual releases to the Tuolumne River from La Grange Dam (less than 0.5 percent) and some reduction and delay in the winter/spring releases compared to the existing condition. The delay in winter/spring releases would have an adverse effect on fisheries in the Tuolumne River and on terrestrial biological resources in the riparian corridor, but the impact would be less than significant.

Alameda Creek Watershed

The improvements to Calaveras Dam that would occur with the WSIP would also be part of the No Purchase Request Increase Alternative. Furthermore, under this alternative, the SFPUC would operate its facilities in the Alameda Creek watershed in a similar manner as with the WSIP. Consequently, the environmental impacts of the No Purchase Request Increase Alternative would be similar to those of the WSIP.

Peninsula Watershed

Average annual system delivery to the wholesale customers would increase with the No Purchase Request Increase Alternative compared to the existing conditions, but to a much lesser degree than with the WSIP (10 mgd more rather than 25 mgd). The SFPUC would try to serve the smaller increase in demand in the Coastside CWD service area from Pilarcitos Reservoir, as it would with the WSIP. Drawdown of Pilarcitos Reservoir would occur more rapidly than under the existing condition but less rapidly than with the WSIP under the No Purchase Request Increase Alternative. Stored water releases to Pilarcitos Creek would cease earlier in the summer than under the existing condition but later than with the WSIP. The changes attributable to the No Purchase Request Increase Alternative would adversely affect water quality, fisheries, and terrestrial biological resources in the reservoir and the creek, but the impact would be less than significant.

The improvements to Lower Crystal Springs Dam that would occur with the WSIP would also be part of the No Purchase Request Increase Alternative. As a result of the improvements and associated modifications in system operations, the maximum water level in Crystal Springs Reservoir would rise by about 20 feet. The rise in water level would have significant adverse impacts on terrestrial biological resources, as described in Section 5.5.6. Since the No Purchase Request Increase Alternative would include improvements to Lower Crystal Springs Dam, the SFPUC would generally operate its facilities in the Peninsula watershed in a similar manner as it would with the WSIP. Consequently, the environmental impacts of this alternative would be similar to those of the WSIP.

Growth-Inducement Potential and Secondary Effects of Growth

This alternative, would have less growth-inducement potential than the WSIP, because the SFPUC would only provide additional water to its wholesale customers up to the existing contract amount of 184 mgd (average annual), compared with 209 mgd (average annual) under the WSIP. Under this alternative, the SFPUC would only improve system reliability for existing customers, providing for water delivery in accordance with the existing Master Sales Agreement between the SFPUC and the wholesale customers. As discussed above in the description of this alternative, it is reasonable to assume that the SFPUC wholesale customers would seek to acquire (either separately or together through BAWSCA) supplemental water supplies to meet their projected needs, as represented by the increased purchase requests they submitted to the SFPUC.

As discussed in Chapter 7, growth has occurred in some communities, such as San Francisco, without a corresponding increase in water supply. In the future, the projected population and/or

employment growth in some communities are clearly greater than the corresponding projected increase in water supply needs, indicating that water use efficiency is increasing and that additional supply is not necessarily required for growth to occur. It is possible that approval of additional development within the SFPUC's wholesale customer service area might be slowed somewhat in some communities because the wholesale customers would have to pursue other projects and actions to achieve adequate dry-year supplies and reliability, but it is not expected that this would deter communities from taking actions to support planned growth. Thus, the growth-inducement potential under this alternative could be similar to that of the proposed program. The difference is that the WSIP would not support this additional growth, but the growth would occur anyway as a result of SFPUC wholesale customers and/or BAWSCA pursuing substitute supplemental water supplies.

Even assuming that growth potential under this alternative were appreciably reduced within Bay Area communities served by the regional system, it is nonetheless likely that growth pressure would increase elsewhere in the Bay Area, such as eastern Contra Costa County, Solano and Sonoma Counties, and southern Santa Clara County, or beyond to tributary areas in the Central Valley. It is also likely that growth in these outlying areas would have similar types of environmental impacts but of potentially greater magnitude and consequence due to the effects of new development or "sprawl" versus the infill that would occur in the existing Bay Area communities served by the SFPUC's regional system.

9.2.4 Aggressive Conservation/Water Recycling and Local Groundwater Alternative (with and without Tuolumne River Supplement)

The Aggressive Conservation/Water Recycling and Local Groundwater Alternative examines the potential for the SFPUC and the wholesale customers to meet the 2030 service goals for the regional system, including serving the 2030 customer purchase requests of 300 mgd average annual supply through a combination of additional conservation efforts and recycled water and local groundwater projects. Since the WSIP already includes some conservation, water recycling, and local groundwater projects, this alternative would require aggressive efforts in these three areas that go beyond those proposed as part of the WSIP. This alternative represents alternate sources of supply and different target delivery levels for the regional system compared to the WSIP. This alternative is evaluated to address the impacts to the Tuolumne River, Alameda Creek, and the Peninsula watershed, including Pilcarcitos Creek.

Conservation, water recycling, and local groundwater projects are already included in the proposed program in three ways. First, the effects of plumbing codes currently in place in the SFPUC service area (which provide passive conservation savings) are already incorporated into the projected total service area demand. Second, in the development of their 2030 purchase requests, the wholesale customers incorporated their current and anticipated future conservation programs and water recycling projects as well as local groundwater projects. The estimated 2030 purchase requests to the SFPUC reflect the wholesale customers' current assessment of the conservation, groundwater, and water recycling potential in their service areas. In addition, the proposed WSIP water supply

option includes a combination of conservation, water recycling, and groundwater use in San Francisco to achieve an additional offset of 10 mgd of potable water demand from the regional system by the year 2030 (under the Groundwater and Recycled Water Projects, SF-2 and SF-3).

It is assumed that the wholesale customers would continue to actively participate in developing additional local and/or regional recycled water/groundwater/conservation projects to reduce the increased demand on surface water supplies during nondrought and drought periods in addition to the groundwater, recycled water, and conservation projects they are already committing to implement locally.

The SFPUC undertook a study, in coordination with its wholesale customers and BAWSCA, to assess the potential for more aggressive conservation coupled with local recycled water and naturally renewable groundwater projects[9] for potential regional development within the SFPUC service area. In preparing the *Investigation of Regional Water Supply Option No. 4 Technical Memorandum*, the SFPUC interviewed representatives of 27 wholesale customers to identify potential recycled water and groundwater projects that were not already considered implemented locally prior to estimating SFPUC regional water system purchases through the year 2030, and that could potentially be implemented regionally to offset SFPUC regional water system deliveries. In all, 53 recycled water and groundwater projects were identified for investigation of the potential to offset demand on the SFPUC regional water system. In addition, regional conservation programs consisting of between 8 and 23 conservation measures were evaluated. The regional conservation measures evaluated for the programs included a subset of the original 32 conservation measures evaluated in the 2004 conservation potential study (all but 8 of the original 32 measures that involved city of county ordinances or would be difficult to implement regionally), as well as four new measures and two revised original measures. The measures were evaluated individually and grouped into three regional programs. These conservation programs and the identified groundwater and recycled water projects were then screened to identify the feasibility and likelihood of implementation for each project/program.

The SFPUC assessed the likelihood of implementation on the basis of the degree to which various milestones in the project development and approval process had been completed by the local sponsoring agency, including: feasibility studies, cost estimate, conceptual engineering, CEQA environmental review, user commitments, community support, plans, and specifications. The projects identified as being eligible for the program (those that could potentially offset SFPUC regional water system deliveries) fell into three categories according to the likelihood of implementation with up to about 11 mgd in Category 1 (likely to be implemented), up to about 15.2 mgd in Category 2 (in early planning stages), and up to about 2.25 mgd in Category 3 (projects considered potentially eligible for future consideration). Due to their higher likelihood of implementation, the SFPUC incorporated the Category 1 San Francisco local projects into the WSIP's proposed water supply option for 10 mgd of additional supply (see Chapter 3, Section 3.6 for a description of these projects). The remaining projects in Categories 1, 2 and 3 have varying

[9] Naturally renewable groundwater was defined as groundwater that, when pumped out of the ground, is naturally recharged in such a way that there is minimal or immeasurable effect on the beneficial uses of surface water. Further, this is groundwater that can be withdrawn from the ground at a sustainable rate without requiring imported surface water for recharge and without adversely affecting the local water resource.

degrees of feasibility; because most remain in the early stages of development and evaluation, information about their yield and ability to be implemented in a reasonable timeframe is limited, as well as their ability to ultimately offset SFPUC regional water system deliveries. This is likely the reason the SFPUC customers did not include them in their original SFPUC regional water system purchases estimates.

Table 9-11 lists the identified potential conservation, recycled water, and groundwater projects that could potentially provide for up to 19 mgd of water supply to meet the increasing delivery requests assuming it is determined that they can offset SFPUC regional water system supplies and are implementable. The 19 mgd is an optimistic, high estimate that combines the estimated high-range yield of remaining Category 1 projects as well as both projects in Categories 2 and 3, including some projects only at a conceptual stage. The implementation of the identified projects is uncertain due to numerous unknown factors, including water quality issues, end-users, long-term sustainable yield, production rates, feasibility, institutional arrangements, and permitting. Among many unknown factors, for example, is the degree to which other water agencies that serve some of the same customers as the SFPUC may choose to pursue the same actions and seek to reduce their use of other water supplies. Therefore, while the list of identified projects illustrates that there are opportunities within the service area to develop more conservation, recycled water, and local groundwater, the total yield of these potential projects is unknown. For purposes of analysis, this PEIR evaluates a maximum supply/supply offset of 19 mgd, identified as the high-range of potential yield that might offset SFPUC purchases, might be developed through this alternative over the planning horizon.

This discussion is intended to provide decision-makers and interested parties with information about the potential options that exist, the challenges associated with each, and (as discussed in a subsequent section) attendant environmental impacts. Even assuming that 19 mgd could be developed through these projects, this alternative could meet approximately 75 percent of the additional projected 2030 average annual water supply need. However, at least 6 mgd of the projected average annual 2030 demand would be unmet, and this alternative would also provide less drought supply reliability compared to the WSIP, requiring increased frequency of rationing at 20 percent.

Tuolumne River Supplement

For purposes of the analysis of alternatives, the PEIR considers a second scenario for this alternative in which the SFPUC would provide supplemental Tuolumne River water to fully meet the 2030 customer purchase requests.

In the first scenario, the SFPUC would not divert additional water from the Tuolumne River. SFPUC rationing of its deliveries would increase above the 20 percent objective during a drought. It is expected that the wholesale customers would pursue a supplemental supply, such as a water transfer, to augment this alternative to serve their 2030 purchase requests. Potential effects of pursuing a water transfer are described generally under Section 9.2.2 No Program Alternative, above. In the second scenario, the SFPUC would provide for the full 2030 customer purchase requests of 300 mgd by augmenting the 19 mgd of additional conservation, water recycling, and

TABLE 9-11
REGIONAL RECYCLED WATER, GROUNDWATER, AND CONSERVATION PROJECTS INCLUDED IN THE AGGRESSIVE CONSERVATION/WATER RECYCLING AND LOCAL GROUNDWATER ALTERNATIVE

Location/Jurisdiction	Type of Supply	Description	Low Range Yield (mgd)	High-Range Yield (mgd)
Category 1 – Projects Likely to be Implemented				
City of Daly City	Recycled Water	Expansion of recycled water uses from an existing facility to irrigate an additional park and landscape medians.	-	0.01
North Coast County Water District/San Francisco	Recycled Water	Various irrigation uses for school grounds and highway uses.	0.15	0.58
		Subtotal Category 1	**0.15**	**0.6**
Category 2 – Eligible Projects in Early Planning Stages				
Mountain View	Recycled Water	Irrigation and industrial usage – joint project with City of Palo Alto	-	1
Various	Conservation	Eight conservation measures to be implemented by a regional body	2.3	5.7
Various	Conservation	Seven additional conservation measures to be implemented by a regional body	0.6	1.5
Palo Alto	Recycled Water	Irrigation in Palo Alto and East Palo Alto	-	1
Cal Water–Mid-Peninsula	Groundwater	New well in Mid-Peninsula District for potable use	-	1
Cal Water–Bear Gulch	Groundwater	New well shared with Menlo Park for potable use	-	1
East Palo Alto	Groundwater	Reestablish use of existing well	-	0.5
Redwood City	Recycled Water	Expand recycled water system for use by additional customers outside of service area	2.2	4.5
South San Francisco and San Bruno	Recycled Water	Replace current groundwater irrigation uses with recycled water	-	0.3
		Project Overlap Adjustment[1]		(1.5)
		Subtotal Category 2	**5.1**	**15**
Category 3 – Potentially Eligible Projects for Future Consideration				
Menlo Park	Groundwater	Groundwater well for emergency use	Unknown	Unknown
Sunnyvale	Recycled Water	Extend existing recycled water project	-	0.7
Various	Conservation	Eight additional conservation measures to be implemented by a regional body	0.5	1.4

TABLE 9-11 (continued)
REGIONAL RECYCLED WATER, GROUNDWATER, AND CONSERVATION PROJECTS INCLUDED IN THE AGGRESSIVE CONSERVATION/WATER RECYCLING AND LOCAL GROUNDWATER ALTERNATIVE

Location/Jurisdiction	Type of Supply	Description	Low Range Yield (mgd)	High-Range Yield (mgd)
Category 3 – Potentially Eligible Projects for Future Consideration (cont.)				
Burlingame	Groundwater	Rehabilitate existing well	-	0.02
Burlingame	Recycled Water	Irrigation of commercial landscaping	-	0.25
		Project Overlap Adjustment		(0.14)
		Subtotal Category 3	**0.5**	**2.23**
Total			**5.75**	**~19**

[1] Project overlap adjustment represents the amount of potential conservation program savings overlap with respect to other projects to avoid double counting.

SOURCE: SFPUC, 2007b.

conservation with additional diversions from the Tuolumne River when available. In many years, alternative could fully meet the 2030 customer purchase requests by diverting the additional required amount from the Tuolumne River under the SFPUC's existing water rights. This would require diversion of some additional water from the Tuolumne River (at least approximately 5 mgd, average annual) compared to the existing condition, but substantially less than proposed under the WSIP (27 mgd, average annual). There would continue to be a shortfall in firm water supply during drought which would lead to more frequent need to ration water deliveries at 20 percent. Alternatively, the SFPUC could develop additional water through a desalination project to serve the remaining 6 mgd of average annual delivery demand (see Section 9.2.6 for a discussion of the year-round desalination supply alternative).

For purposes of the analysis of alternatives, the PEIR considers two possible scenarios for this alternative: one in which the SFPUC would not provide supplemental Tuolumne River water and one in which the SFPUC would provide supplemental Tuolumne River water to fully meet the 2030 customer purchase requests.

Description of SFPUC and Wholesale Customer Actions

SFPUC Actions

Under this alternative, the SFPUC would implement all of the same WSIP facility improvement projects as proposed for the WSIP, although the capacities of some of the facilities might be somewhat reduced since some of the supply would be provided by customers. The design of some of the WSIP facilities would need to reevaluated and sized appropriately to meet the delivery

levels and performance objectives under this alternative. In addition, the SFPUC would proceed with implementation of other capital improvement projects and related activities not considered part of the program analyzed in this PEIR (as described in Chapter 3, Sections 3.13 and 3.4.6). The SFPUC would also implement the same system maintenance program and similar operational changes in the regional system as those proposed under the WSIP.

The SFPUC's role in helping its customers develop more aggressive conservation, recycled water, and local groundwater programs under this alternative could range from one of coordination and facilitation, to funding support, to full partnership with one or more customer in the design, construction, and/or operation of regional projects. The SFPUC's role in such projects would need to be defined on a case-by-case basis.

As discussed above, the maximum potential SFPUC regional water system delivery offset identified in the study is about 19 mgd (not including the 10 mgd of San Francisco local projects in the WSIP proposed program). The ability for the SFPUC and its customers to achieve this 19 mgd of yield by the year 2030 is highly uncertain, particularly the Category 3 project portion (2.25 mgd), for which the offset potential has not been determined even if the projects move forward. Assuming the 19 mgd is realized, this alternative still does not fully offset the regional water system increase of 25 mgd average annual supply needed to meet the 2030 purchase requests. In this case, the SFPUC could consider augmenting this alternative by providing an incremental increase in Tuolumne River supply to make up the potential delivery shortfall in years when water is available under their existing water rights. This would involve increasing the average annual Tuolumne River diversion by at least approximately 5 mgd over the existing average annual diversion. Alternatively, the SFPUC could provide a different supplemental source, such as potable water from a new desalination plant (described in Section 9.2.6).

This alternative includes the SFPUC implementing projects in San Francisco to achieve a 10-mgd offset on regional system demand through a combination of conservation, recycled water, and groundwater projects, as in the WSIP proposed program. However, without some additional Tuolumne River diversion there would be no supplemental dry-year water supply sources from water transfers or from the Westside Basin conjunctive-use program which would lead to delivery shortfalls during drought.

Wholesale Customer Actions

For this alternative, it is assumed that the wholesale customers would actively participate in developing additional recycled water/groundwater/conservation projects in their local service areas to reduce the increased regional demand on surface water supplies during nondrought and drought periods in addition to the groundwater, recycled water, and conservation projects they are already committing to implement locally. As indicated in Table 9-11, under this alternative, various wholesale customers, in partnership with the SFPUC and/or BAWSCA, would develop a variety of programs to increase local groundwater extraction and recycled water through more aggressive conservation efforts to offset 19 mgd of increased water demand on the SFPUC regional water system. It is also assumed that the wholesale customers, in coordination with the

SFPUC, would implements these actions in a timely manner so that the water supply/offset would be available as the estimated customer increase in purchase requests are realized.

If the SFPUC does not supplement this alternative with additional Tuolumne River water in order to fully meet the 2030 customer purchase requests, it is expected that the wholesale customers would pursue additional supplemental supply, such as a water transfer.

Feasibility Issues

The Aggressive Conservation/Water Recycling and Local Groundwater Alternatives, (with and without supplemental Tuolumne River supply), would have numerous technical, institutional, financial, and public acceptance issues to overcome prior to implementation. As described above, the estimated 19 mgd from regional conservation/water recycling and local groundwater projects represents an optimistic, high-end estimate based on very preliminary studies. There are numerous uncertainties with regard to water quality issues, end-users, long-term sustainable yield, and production rates; furthermore, in some communities, there remain public acceptance issues with regard to use of recycled water for non-potable uses. Institutional arrangements, funding sources, and permitting requirements for these programs are also unknown. Furthermore, even if these obstacles were overcome, this alternative would have questionable feasibility to require customers 20 percent rationing during drought periods due to demand hardening. It is unlikely that the SFPUC's regional system customers would support this alternative. In addition, this alternative would add substantial cost to overall program as a result of having to implement additional regional conservation/water recycling and local groundwater projects in addition to the costs of the 22 facility improvement projects included in the WSIP. This unknown but substantial additional cost raises questions about cost and financing feasibility and customer rate impacts.

Ability to Meet Program Objectives

The Aggressive Conservation/Water Recycling and Local Groundwater Alternative would meet the WSIP objectives for water quality only for the SFPUC actions; however, the objective could not be guaranteed for new sources provided by customers, nor if new sources are wheeled through the SFPUC's system, unless developed in cooperation with the SFPUC. As shown in Table 9-6, seismic reliability would be improved over existing conditions since all WSIP facility improvement projects would be implemented, but this alternative cannot meet the objective of providing basic service to all regions following a major earthquake with certainty, even with supplemental Tuolumne River water, since the reliability of new sources to be developed by customers is unknown. In addition, there is no certainty about where the distribution of the new sources would occur, so the seismic objectives of serving 70 percent of turnouts and meet basic service in the three customer regions (South Bay, Peninsula and City) could not be guaranteed. However, with implementation of all WSIP facility improvement projects, it is likely that facilities would be restored within 30 days of a major earthquake and the SFPUC could at least partially meet the average day demand.

Based on input from the wholesale customers throughout the SFPUC service area, aggressive conservation, recycled water, and local groundwater projects could partially but not fully meet the

WSIP delivery reliability and water supply performance objectives. Under this alternative, it might be possible to provide for much of (estimated up to approximately 19 mgd but with unknown certainty) but not all of the projected 25 mgd increase in customer purchase requests by 2030. To fully meet the 2030 purchase requests, a supplemental supply of at least 6 mgd would need to be provided to augment this alternative; otherwise, the SFPUC would not be able to fully serve the 2030 customer purchase requests. Even with the Tuolumne River water, the delivery reliability objectives could not be guaranteed due to the lack of SFPUC control over and the uncertainty of the wholesale customers' new sources of supply. Implementation of all the facility improvement projects would permit operational flexibility under planned maintenance conditions, when customer demands are low, but there is uncertainty over the reliability and availability of the full 19 mgd of regional recycled water /groundwater / conservation programs to provide sufficient operational flexibility when needed to replenish local reservoirs or during unplanned facility outages.

In addition, this alternative would provide less dry-year/drought supply reliability than the WSIP and would not meet the WSIP objective for system firm yield. As shown on Table 9-5, customers would experience rationing under this alternative of up to 20 percent (for the Tuolumne River supplemental supply scenario) or 25 percent (for the no supplemental supply scenario) with notably greater frequency than would customers under the WSIP. Furthermore, this degree of rationing would have different implications for customers under the Aggressive Conservation/Water Recycling and Local Groundwater Alternative compared to the WSIP. Demand hardening[10] refers to the increasing difficulty and expense of achieving short-term water conservation levels during shortages as more long-term conservation measures are implemented and water-use efficiency is maximized and is a concern among water conservation agencies regarding aggressive conservation programs. As a result of the water use efficiency or demand "hardening" that would be further institutionalized through this alternative, customers would have limited options for accommodating a period requiring 20 percent or more rationing in terms of what water uses they could cut back. Customers would have already increased their water use efficiency and eliminated less efficient uses such as many types of conventional outdoor use (e.g., landscape irrigation, car washing). In these cases, the water use cutbacks required to achieve 20 percent or more rationing would involve reductions in more essential water uses, such as indoor uses for cleaning and bathing, which could cause greater hardship on customers. This alternative would only partially meet the objective of diversifying water supply, since it does not provide for any dry year water sources.

This objective would meet the WSIP sustainability objectives, within the bounds of the SFPUC actions, but it would be unknown with respect to the wholesale customer actions. If the wholesale customers were to take independent action from the SFPUC under this alternative, this would

[10] As described by the California Department of Water Resources, demand hardening "occurs when agencies implement water conservation programs that result in permanent reductions in water use, such as retrofitting plumbing fixtures or installing low-water-use landscaping. These measures lessen agencies' ability to implement rationing to reduce water use during droughts, and can result in greater impacts to urban water users (e.g., loss of residential landscaping) when rationing is imposed. For example, the extensive Los Angeles retrofit program helped the city maintain reductions in urban per capita water use it achieved during the last drought. These permanent water use reductions will make it more difficult for the city to duplicate its previous 15 percent water use reduction goal during a future drought" (Department of Water Resources, 2005).

result in inefficient use of resources and funds and would not meet the WSIP objective for cost-effectiveness. While the system would remain largely gravity-driven, implementation of additional water recycling and groundwater projects would increase the pumping requirements of the overall system. The capital, operation and maintenance cost of the 22 facility improvement projects would be the same as the WSIP, but unknown and likely substantial additional costs would be incurred from conservation or supply projects implemented by customers in place of the WSIP supply.

Environmental Impacts Compared to those of the WSIP

Facility Construction and Operations Impacts

WSIP Facilities

The Aggressive Conservation/Water Recycling and Local Groundwater Alternative assumes that the same 22 facility improvement projects proposed under the WSIP would be implemented to meet the water quality, seismic reliability, and delivery reliability objectives of the WSIP; therefore, all of the impacts described in Chapter 4 would also occur under this alternative. Although the capacities of some of the proposed facilities, such as those under the SJPL System (SJ-3) and BDPL Reliability Upgrade (BD-1) projects, might be reduced compared to the WSIP, the impacts of constructing and operating these projects would be largely the same under this alternative as with the WSIP. This alternative relies on 19 mgd supply from the wholesale customers. However, as described below, this alternative could result in construction and operation of extensive additional recycled water and groundwater facilities in the wholesale customer service areas; thus, collective impacts in the Bay Division and Peninsula Regions and associated cumulative effects (such as traffic, air quality, noise, energy use, waste disposal, and vibration) would be more severe than those of the WSIP.

If the SFPUC were to supplement this alternative with additional Tuolumne River supply, no additional facilities beyond the proposed WSIP facilities and new customer facilities would be needed, except for recycling facilities or a possible desalination plant, as detailed in the next section. If the SFPUC were to supplement this alternative with a desalinated water supply, it would have to construct and operate a new desalination plant and conveyance facilities to connect to the regional system (see Section 9.2.6 for the discussion of a desalination alternative).

Other Facilities Potentially Implemented Under this Alternative

No significant environmental impacts would be expected from implementation of water conservation measures. However, implementation of the recycled water and groundwater projects listed in Table 9-11 would result in a full range of construction and operational impacts, similar to those described in Chapter 4 for the WSIP facilities, in the South Bay and Peninsula areas. The types of impacts associated with implementation of the local recycled water and groundwater projects are summarized in **Table 9-12** and generally relate to construction of new infrastructure, water quality, and groundwater resources and operational uses of energy and long-term air quality emissions.

TABLE 9-12
SUMMARY OF POTENTIAL IMPACTS AND MITIGATION STRATEGIES FOR RECYCLED WATER AND GROUNDWATER PROJECTS

Potential Impact	Mitigation Strategy
Groundwater Resources. Potential for increased groundwater pumping, groundwater level reductions, and overdraft if there is insufficient sustainable yield to accommodate increased pumping.	Determine sustainable yield of the basin, implement monitoring program, regulate groundwater pumping to preserve safe yield.
Surface Water, Groundwater Quality, and Public Health Issues. Recycled water applied to the irrigated lands would infiltrate through the subsurface levels, potentially affecting surface and groundwater quality. Groundwater may have contaminants with potential health effects. Groundwater lowers the aesthetic quality of the water through increased hardness, and potential for tastes and odors.	Comply with Title 22 Water Recycling Criteria. Groundwater may require disinfection, treatment and/or blending.
Energy use. Operation of both recycled water and groundwater projects would require increased energy use for treatment and distribution, and pumping. Increased energy production to support these activities along with plant operation would, in turn, generate additional air pollutant emissions, including greenhouse gases emissions.	Energy efficiency measures.
Treatment. Temporary construction impacts (disturbance of soils, surface water quality, biological resources, cultural resources, air quality, traffic, noise, land use, hazardous materials). Potential long-term impacts could include odor, depending on treatment processes and location relative to sensitive receptors. Plant operations could also generate long-term noise, traffic, and visual impacts depending on facility site location(s)and increased energy consumption and air pollutant emissions. **Pumping.** (groundwater pumping station)	Most impacts associated with facility construction could be mitigated to a less-than-significant level with the types of measures identified in Chapter 6. As is the case with the proposed WSIP facilities, odor control features (scrubbers) could reduce any odor impacts to a less-than-significant level.
Conveyance. Mostly temporary impacts from construction of pipelines, valves, and pumps (disturbance of soils, surface water quality, biological resources, cultural resources, air quality, traffic, noise, land use, hazardous materials, aesthetics).	Most impacts associated with facility construction could be mitigated to a less-than-significant level with the types of measures identified in Chapter 6. As is the case with the proposed WSIP facilities, some impacts (e.g., short-term noise and traffic) could be unavoidable.
Storage. Temporary construction impacts (disturbance of soils, surface water quality, biological resources, cultural resources, air quality, traffic, noise, land use, hazardous materials) and potential long-term impacts based on site-specific characteristics (e.g., slope stability, location within a scenic viewshed).	Most impacts associated with facility construction could be mitigated to a less-than-significant level with the types of measures identified in Chapter 6. As is the case with the proposed WSIP facilities, some impacts (e.g., short-term noise and traffic) could be unavoidable. Prepare and implement recommendations from a geotechnical study, implement measures to reduce visual contrast with surroundings (e.g., backfilling, earth-tone paint).

If the wholesale customers were to supplement this alternative with additional water through a water purchase, additional storage and/or limited conveyance facilities might be required. See the discussion of this topic under the No Program Alternative.

Water Supply and System Operations Impacts

This discussion addresses both alternative scenarios—the scenario in which the SFPUC would not supplement this alternative with additional supplies (could be anything), and the scenario in which the SFPUC would supplement this alternative with additional Tuolumne River diversions.

Aggressive Conservation/Water Recycling and Local Groundwater Alternative with No Supplemental Tuolumne River Water

Tuolumne River Watershed. Water demand would increase under the Aggressive Conservation/Water Recycling and Local Groundwater Alternative, but for this analysis, it is assumed that none of it would be met with water from the Tuolumne River. There would be no change in average annual releases to the Tuolumne River from Hetch Hetchy Reservoir with the Aggressive Conservation/Water Recycling and Local Groundwater Alternative compared to the existing condition. There may be changes in the pattern of releases from Hetch Hetchy Reservoir because of the improvements to conveyance facilities and improved maintenance practices. These changes could lead to year to year differences in the amount of water diverted from the Tuolumne River. There would be changes in the pattern of spring releases from Hetch Hetchy Reservoir, but these changes would be expected to have less severe impacts than the WSIP. However, the delay would still be enough to have a potentially significant adverse effect on terrestrial biological resources because of the ecological sensitivity of riverside meadows and their flora and fauna.

Similarly, the Aggressive Conservation/Water Recycling and Local Groundwater Alternative would result in no change in average annual releases to the Tuolumne River from La Grange Dam. The net effect of the small increases and decreases in the initial winter/spring releases would have a less-than- significant effect on fisheries in the Tuolumne River and the terrestrial biological resources in the riparian corridor.

Alameda Creek Watershed. The improvements to Calaveras Dam that would occur with the WSIP would also be part of the Aggressive Conservation/Water Recycling and Local Groundwater Alternative. Furthermore, under this alternative, the SFPUC would operate its facilities in the Alameda Creek watershed in a similar manner as the WSIP. Consequently, the environmental impacts of the Aggressive Conservation/Water Recycling and Local Groundwater Alternative would be similar to those of the WSIP.

Peninsula Watershed. Water demand would increase with the Aggressive Conservation/Water Recycling and Local Groundwater Alternative, as it would with the WSIP. The SFPUC would try to serve increased demand in the Coastside CWD service area from Pilarcitos Creek, exactly as it would with the WSIP. The consequent, more rapid drawdown of Pilarcitos Reservoir and the earlier cessation of stored water releases to Pilarcitos Creek would have a significant adverse effect on water quality, fisheries, and terrestrial biological resources in the reservoir and the creek.

The improvements to Lower Crystal Springs Dam that would occur with the WSIP would also be part of the Aggressive Conservation/Water Recycling and Local Groundwater Alternative. As a result of the improvements and associated modifications in system operations, the maximum water level in Crystal Springs Reservoir would rise by about 20 feet. The rise in water level would have significant adverse impacts on terrestrial biological resources, as described in Section 5.5.6. Since this alternative would include improvements to Lower Crystal Springs Dam, the SFPUC would generally operate its facilities in the Peninsula watershed in a similar manner as with the WSIP. Consequently, the environmental impacts of this alternative would be similar to those of the WSIP.

Aggressive Conservation/Water Recycling and Local Groundwater Alternative with Supplemental Tuolumne River Water

Tuolumne River Watershed. Water demand would increase under the Aggressive Conservation/Water Recycling and Local Groundwater Alternative, but a greater portion of the increase would be met by conservation, recycling, and groundwater than under the WSIP. This alternative would result in a small reduction in average annual releases to the Tuolumne River from Hetch Hetchy Reservoir (less than 1 percent) and some reduction and delay in the spring releases on occasion as compared to the existing condition. The reduction and delay in spring releases would occur because storage deficits in a series of dry years would accumulate in Hetch Hetchy Reservoir. The reduction and delay in spring releases would be less than with the WSIP, and a delay of more than two days would occur much less frequently, about once in every 10 years, with the Aggressive Conservation/Water Recycling and Local Groundwater Alternative than with the WSIP. The delay would still be enough to have a significant adverse effect on terrestrial biological resources because of the ecological sensitivity of riverside meadows and their flora and fauna.

The Aggressive Conservation/Water Recycling and Local Groundwater Alternative would result in a small reduction in average annual releases to the Tuolumne River from La Grange Dam (less than 1 percent) and some reduction and delay in the winter/spring releases as compared to the existing condition. The reduction and delay in winter/spring releases would have an adverse effect on fisheries in the lower Tuolumne River and on terrestrial biological resources in the riparian corridor, but the impact would be less than significant.

Alameda Creek Watershed. The improvements to Calaveras Dam that would occur with the WSIP would also be part of the Aggressive Conservation/Water Recycling and Local Groundwater Alternative. Furthermore, under this alternative, the SFPUC would operate its facilities in the Alameda Creek watershed in a similar manner as with the WSIP. Consequently, the environmental impacts of the Aggressive Conservation/Water Recycling and Local Groundwater Alternative would be similar to those of the WSIP.

Peninsula Watershed. Water demand would increase with the Aggressive Conservation/Water Recycling and Local Groundwater Alternative, as it would with the WSIP. The SFPUC would try to serve increased demand in the Coastside CWD service area from Pilarcitos Creek, exactly as it would with the WSIP. The consequent, more rapid drawdown of Pilarcitos Reservoir and the

earlier cessation of stored water releases to Pilarcitos Creek would have a significant adverse effect on water quality, fisheries, and terrestrial biological resources in the reservoir and the creek.

The improvements to Lower Crystal Springs Dam that would occur with the WSIP would also be part of the Aggressive Conservation/Water Recycling and Local Groundwater Alternative. As a result of the improvements and associated modifications in system operations, the maximum water level in Crystal Springs Reservoir would rise by about 20 feet. The rise in water level would have significant adverse impacts on terrestrial biological resources. Since this alternative would include improvements to Lower Crystal Springs Dam, the SFPUC would generally operate its facilities in the Peninsula watershed in a similar manner as with the WSIP. Consequently, the environmental impacts of this alternative would be similar to those of the WSIP.

Growth-Inducement Potential and Secondary Effects of Growth

The growth-inducement potential for the Aggressive Conservation/Water Recycling and Local Groundwater Alternative would be similar to that described above for the No Program Alternative. As discussed above under Ability to Meet Program Objectives, this alternative would meet the 2030 purchase request increase but would not provide the same level of supply reliability as the proposed program. As a result, it is expected that SFPUC wholesale customers and/or BAWSCA would pursue other projects and actions to provide the desired level of reliability. While the need to develop additional projects beyond the WSIP might have some slowing effect on development approvals in some communities, it is not expected to impede growth from continuing in accordance with adopted plans. As a result, this alternative would have similar secondary effects of growth as those described for the proposed program.

9.2.5 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, in accordance with an agreement with TID and MID, and construction of conveyance and treatment facilities to blend the new supply into the regional system. This alternative is based on an alternative developed by the SFPUC planning studies conducted for the WSIP water supply option (SFPUC, 2007b). Compared to the WSIP, this alternative represents an alternative source of supply and is evaluated to address impacts to the Tuolumne River.

Description of SFPUC and Wholesale Customer Actions

SFPUC Actions

Table 9-4 summarizes the main characteristics of the Lower Tuolumne River Diversion Alternative in comparison to those of the proposed program. Under this alternative, the SFPUC would rely on the same water supply sources as it would under the WSIP during both drought and nondrought periods. The increase in purchase requests would be served through the restored

capacity of Calaveras and Crystal Springs Reservoirs, increased diversions from the Tuolumne River, and an equivalent of 10 mgd of supply from recycled water, groundwater, and conservation projects in San Francisco. Unlike the proposed program, however, the SFPUC would secure the increased diversions from the Tuolumne River at a downstream location near the confluence with the San Joaquin River. To meet the increase in purchase requests under this alternative, the SFPUC would release about 25 mgd (average annual) water from Hetch Hetchy Reservoir, allow it to flow to Don Pedro Reservoir, and release it from the New Don Pedro Dam to the lower Tuolumne River, in accordance with an agreement with TID/MID. A new SFPUC diversion facility located near the confluence of the San Joaquin and Tuolumne Rivers would recover the 25 mgd. From the diversion point, the recovered water would be pumped to a new treatment plant near Tesla Portal where it would be filtered and disinfected prior to blending with unfiltered Hetch Hetchy water. The lower Tuolumne River water would require treatment prior to blending into the Coast Range Tunnel because it would not meet the federal or state filtration exemption requirements. A conceptual schematic of this diversion is shown in **Figure 9.1**.

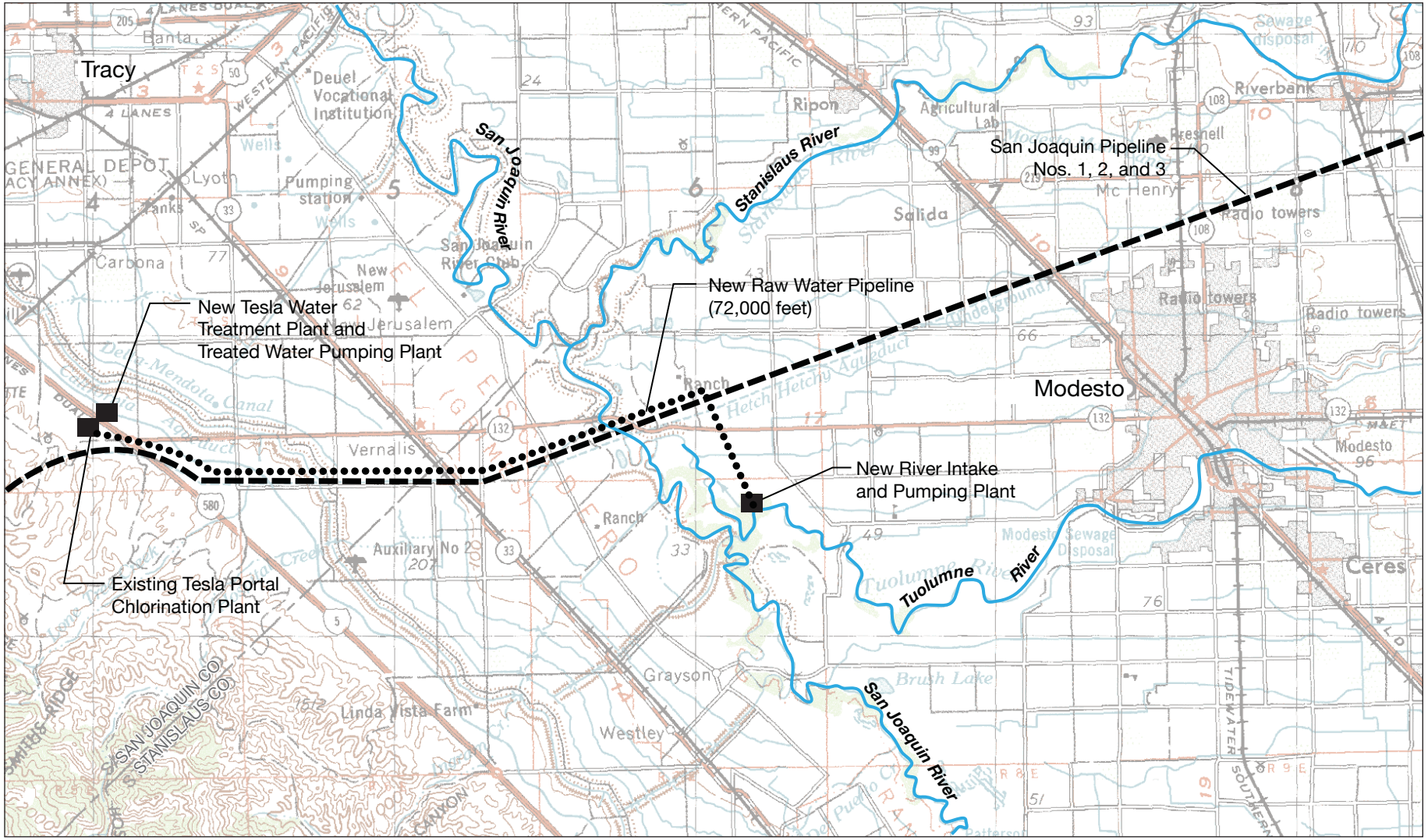
The Lower Tuolumne River Diversion Alternative assumes that all 22 WSIP facility improvement projects would be implemented. However, the design of some of the WSIP facilities would need to reevaluated and sized appropriately to meet the delivery levels and performance objectives under this alternative. In addition, the SFPUC would proceed with implementation of other capital improvement projects and related activities not considered part of the program analyzed in this PEIR (as described in Chapter 3, Sections 3.13 and 3.4.6). The SFPUC would also implement the same system maintenance program and similar operational changes in the regional system as those proposed under the WSIP with the addition of operation and maintenance of the additional facilities described below.

This alternative would require that the SFPUC construct and operate additional facilities not included under the WSIP, as summarized below:

- *Lower Tuolumne River Intake and Pumping Plant*. A new lower Tuolumne River intake and pumping plant would divert the 25 mgd (average annual) and lift the water to a new treatment plant near Tesla Portal. Depending on the suitability of the gravel bed, it is possible that the intake structure would be similar to that of the TID Infiltration Gallery Project, which consists of an array of perforated pipes installed in the lower Tuolumne River bed. If this design is not appropriate, the intake structure would be equipped with a fish screen designed to meet state and federal fish screen criteria. Two sites for the lower Tuolumne River intake and pumping plant have been considered at locations where the flood levels are not in place or already compromised. The facility would be sized appropriately (e.g., 55 mgd) to provide for seasonal diversions.

- *15-Mile Pipeline*. Diverted lower Tuolumne River flows would be pumped to the new treatment plant via a 15-mile, 48-inch-diameter welded steel pipe, the majority of which would run parallel to the existing San Joaquin Pipelines.

- *Lower Tuolumne Water Treatment Plant*. The Lower Tuolumne WTP would filter and disinfect the lower Tuolumne River water. The WTP would be located just north of Tesla Portal within the SFPUC property boundary and have a sustainable capacity of 55 mgd.



SOURCE: ESA+Orion, 2006

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Figure 9.1
Lower Tuolumne River Diversion Alternative
Facilities and Pipeline Alignment

- *Tesla Treated Water Pumping Plant*. The pumping plant would pump treated lower Tuolumne River water to Tesla Portal, where it would be combined with Hetch Hetchy water via a new vertical shaft to the Coast Range Tunnel. However, if the Advanced Disinfection project (SJ-1) is sited at Tesla Portal, a blending structure could be added to the new facility, and a new vertical shaft to the Coast Range Tunnel would not be required.

Wholesale Customer Actions

Like the proposed program, the Lower Tuolumne River Diversion Alternative would fully meet the WSIP delivery reliability and water supply level of service goals. Therefore, the SFPUC would serve the projected 2030 purchase requests for all customers, and wholesale customers would not be required to implement any additional conservation and/or recycled water projects or develop supplemental water supplies from other sources beyond what is identified in their respective urban water management plans.

Feasibility Issues

The Lower Tuolumne Diversion Alternative would pose a number of technical and institutional challenges and there is uncertainty regarding the availability of water at this location. The availability of water on the lower Tuolumne River to the SFPUC would be dependent upon: (1) agreements with TID and MID for making the necessary releases from Don Pedro Reservoir, (2) approval by the State Water Resources Control Board for a change in the point of diversion and possibly additional appropriation license to recover this water, (3) and regulatory constraints under the state and federal Endangered Species Act. Construction of the intake in the lower Tuolumne River and crossing the San Joaquin River could affect critical habitat for steelhead and Chinook salmon. There could also be water quality issues with the new source, depending on the location of the intake and the design of the treatment facility, and the overall quality of the regional system water would be reduced with the addition of treated water from the lower Tuolumne River. This alternative would likely arouse public opposition result in the San Joaquin Valley due to substantial construction and operational impacts, outside of the SFPUC service area. In addition, this alternative would add substantial cost to overall program as a result of having to build and operate a new intake, treatment plant, and transmission pipelines in addition to the costs of the 22 facility improvement projects included in the WSIP. This substantial additional cost raises questions about cost and financing feasibility and customer rate impacts.

Ability to Meet Program Objectives

Table 9-6 shows how the Lower Tuolumne River Diversion Alternative would perform in terms of meeting the WSIP level of service goals and performance objectives compared to the proposed program. This alternative is dependent on agreements with TID/MID to make the requisite water releases from New Don Pedro Dam; State Water Resources Control Board appropriation licenses, if applicable; and regulatory constraints under the California and Federal Endangered Species Acts. Thus, water from the Tuolumne River is reliable but not necessarily available under this scenario.

The Lower Tuolumne River Diversion Alternative would only partially meet the level of service goal related to water quality, since it would require full treatment prior to blending with other Hetch Hetchy supplies. Although both the WSIP and this alternative would meet all applicable water quality requirements, there would be a deterioration in water quality, including potentially more contaminants in the water, and reduced aesthetic quality (tastes and odor, hardness) under the Lower Tuolumne River Diversion Alternative compared to the WSIP.

The Lower Tuolumne River Diversion Alternative would include implementation of the 22 facility improvement projects as proposed under the WSIP needed to meet the seismic and delivery reliability level of service goals. However, due to the unknown availability of the lower Tuolumne River as a year-round source, there is uncertainty of the capability of this alternative to provide adequate delivery to all regions following a major earthquake or to serve average day demand during an unplanned facility outage. Similarly, while the facilities could be restored within 30 days after a major earthquake, this alternative could partially restore service to the customer but the availability of the full average day demand of 300 mgd would depend on the lower Tuolumne River diversion. With implementation of all the facility improvement projects, the system would have increased operational flexibility for planned maintenance, but the extensive increase in facility requirements under this alternative would add additional constraints to systemwide operational flexibility. Comprehensive and regular repair and maintenance of the regional water system would generally occur without interruption, and the risk of service interruptions due to unplanned facility upsets or outages would be minimal, assuming availability of water from the lower Tuolumne River diversion location.

With respect to water supply reliability, the Lower Tuolumne River Diversion Alternative would increase system firm yield to 256 mgd, thus meeting the level of service goals for water supply during drought and nondrought periods. This assumes that diversions from the lower Tuolumne River are feasible during all water years and all seasons, as proposed under this scenario, and that the water transfer from TID/MID could be implemented.

It is uncertain if the Lower Tuolumne River Diversion Alternative would meet the WSIP sustainability objectives, since there are numerous regulatory and permitting issues to be resolved, including effects on steelhead and Chinook salmon, and would require significant increase in long-term energy use compared to the proposed program. While the system would remain largely gravity-driven, the new source of water under this alternative would increase the pumping requirements of the overall system. This alternative would result in inefficient use of resources and funds compared to the WSIP, and would not meet the WSIP objective for cost-effectiveness. The capital, operation and maintenance cost of the 22 facility improvement projects would be the same as the WSIP, but substantial additional capital, operation and maintenance costs would be incurred from the diversion, pumping, conveyance and treatment facilities needed for this alternative.

Environmental Impacts Compared to those of the WSIP

Facility Construction and Operations Impacts

WSIP Facilities

The Lower Tuolumne River Diversion Alternative would include implementation of all 22 WSIP facility improvement projects. Although implementation of the SJPL System project (SF-3) would be slightly different than under the WSIP, the impacts associated with this project would be about the same under both scenarios. Thus, the environmental impacts of constructing and operating each of the 22 WSIP facility projects would be about the same as those described in Chapter 4 for the proposed program. However, as discussed below, this alternative would require the construction and operation of extensive additional facilities in the San Joaquin Valley; thus, collective impacts in the San Joaquin Region and associated cumulative effects (such as traffic, air quality, noise, and vibration) would be more severe than those of the WSIP, depending on the construction schedule for these facilities.

Other Facilities and Actions Potentially Implemented Under this Alternative

In addition to the impacts related to construction and operation of the 22 WSIP facility improvement projects, implementation of the Lower Tuolumne River Diversion Alternative would also result in substantial additional impacts related to the construction and operation of additional facilities, including an intake structure and pumping plant, a new 55-mgd water treatment plant, a 15-mile pipeline to convey diverted flows from the point of diversion to the water treatment plant, and a new Tesla treated water pumping plant to transmit the treated water to Tesla Portal. These facilities would result in the full range of impacts at the proposed facility locations as those described in Chapter 4 for the WSIP facilities and would increase the construction and operational impacts in the San Joaquin Region. Impacts of these facilities would be similar to and in addition to those identified for the WSIP; construction and operational impacts would include effects on biological resources (described below), water quality, air quality, noise, traffic, visual, and recreation.

A primary concern with respect to these additional facilities is the potential for adverse effects on biological resources. Construction activities could affect wetlands and riparian habitat, alkali grasslands, valley oak woodland, agricultural areas, and grassland/ruderal habitat as well as special-status animal and plant species such as Swainson's hawk, vernal pool invertebrates, California tiger salamander, burrowing owl, Valley elderberry longhorn beetle, San Joaquin kit fox, California red-legged frog, and Delta button-celery. Construction of the intake structure at the Tuolumne River and across the San Joaquin River could adversely affect fishery resources, including Central Valley fall- and late-fall-run Chinook salmon and Central Valley steelhead.

The key operational issues associated with the Lower Tuolumne River Diversion Alternative would center around the effects of withdrawals on the Tuolumne River. Operation of the intake could result in the entrainment or impingement of species of concern (Central Valley steelhead and Chinook salmon). If an intake structure similar to that of the TID Infiltration Gallery Project were found to be inappropriate, the intake would be designed with state-of-the art fish screens. In

addition, implementation of this alternative could potentially cause changes in hydrologic conditions along the lower Tuolumne River. Future evaluations would be required to assess hydrologic regime impacts. When compared to the proposed program, the Lower Tuolumne River Diversion Alternative would result in increased annual energy demand related to the operation of new pumping and treatment facilities, which in turn could result in secondary air quality and greenhouse gas emission, depending on the source of power.

Water Supply and System Operations

Under the Lower Tuolumne River Diversion Alternative, the total average annual diversions from the Tuolumne River would be essentially the same as with the WSIP, based on HH/LSM modeling over the 82-year hydrologic record, as shown in Table 9-5. However, due to the change in the point of diversion, system operations would be modified under this alternative compared to the WSIP. The potential impacts on water resources in the Tuolumne River, Alameda Creek, and Peninsula watersheds associated with this modified operation are described below and compared to the impacts that would occur under the WSIP.

Tuolumne River Watershed

Water demand would increase under the Lower Tuolumne River Diversion Alternative, as it would with the WSIP. The increased demand would be met, as it would be with the WSIP, by a combination of conservation, recycling, and groundwater storage and water from the Tuolumne River. However, with the Lower Tuolumne River Diversion Alternative, most of the increased diversion from the Tuolumne River would occur at a point just upstream of the Tuolumne River's confluence with the San Joaquin River, rather than at Hetch Hetchy Reservoir. This alternative would result in an increase in average annual releases to the Tuolumne River from Hetch Hetchy Reservoir of about 5 percent compared to the existing condition. Most of the time, releases to the river would be increased compared to the existing condition with the Lower Tuolumne River Diversion Alternative. Under the existing condition, the minimum required release would be made from Hetch Hetchy Reservoir 84.2 percent of the time (837 months in the 987-month hydrologic record). With the Lower Tuolumne River Diversion Alternative, the minimum required release would be made in many fewer months. The minimum releases would be supplemented by water released from Hetch Hetchy Reservoir for subsequent diversion near the Tuolumne River's confluence with the San Joaquin River in about half of the months in the 82-year hydrologic record. The increase in flow in the river between O'Shaughnessy Dam and Don Pedro Reservoir would benefit resident fish, riparian vegetation, fauna of the riparian corridor and whitewater recreation.

The Lower Tuolumne River Diversion Alternative would increase the average annual releases of water to the Tuolumne River below La Grange Dam, but would reduce and delay winter/spring releases by essentially the same amount as the WSIP. Under the existing condition, the minimum required release would be made from La Grange Dam 72.6 percent of the time (717 months in the 987-month hydrologic record). With the Lower Tuolumne River Diversion Alternative, the minimum required release would be made in fewer months. The minimum releases would be supplemented by water released from La Grange Dam for subsequent diversion near the

Tuolumne River's confluence with the San Joaquin River in many months. The increase in flow in the river between La Grange Dam and the San Joaquin River confluence would benefit resident and migratory fish, riparian vegetation, fauna of the riparian corridor and recreation. As with the WSIP, the reduction and delay in winter/spring releases would have a significant adverse effect on fisheries in the Tuolumne River and terrestrial resources in the riparian corridor.

Alameda Creek Watershed

The improvements to Calaveras Dam that would occur under the WSIP would also be part of the Lower Tuolumne River Diversion Alternative. Furthermore, under this alternative, the SFPUC would operate its facilities in the Alameda Creek watershed in a similar manner as with the WSIP. Consequently, the environmental impacts of the Lower Tuolumne River Diversion Alternative would be similar to those of the WSIP.

Peninsula Watershed

Water demand would increase with the Lower Tuolumne River Diversion Alternative, as it would with the WSIP. The SFPUC would try to serve increased demand in the Coastside CWD service area from Pilarcitos Creek, exactly as it would with the WSIP. The consequent, more rapid drawdown of Pilarcitos Reservoir and the earlier cessation of stored water releases to Pilarcitos Creek would have a significant adverse effect on water quality, fisheries, and terrestrial biological resources in the reservoir and the creek.

The improvements to Lower Crystal Springs Dam that would occur under the WSIP would also be part of the Lower Tuolumne River Diversion Alternative. As a result of the improvements and associated system operations, the maximum water level in Crystal Springs Reservoir would rise by about 20 feet. The rise in water level would have significant adverse impacts on terrestrial biological resources, as described in Section 5.5.6. Since this alternative would include improvements to Lower Crystal Springs Dam, the SFPUC would generally operate its facilities in the Peninsula watershed in a similar manner as with the WSIP. Consequently, the environmental impacts of the Lower Tuolumne River Diversion Alternative in the Peninsula watershed would be similar to those of the WSIP.

Growth-Inducement Potential and Secondary Effects of Growth

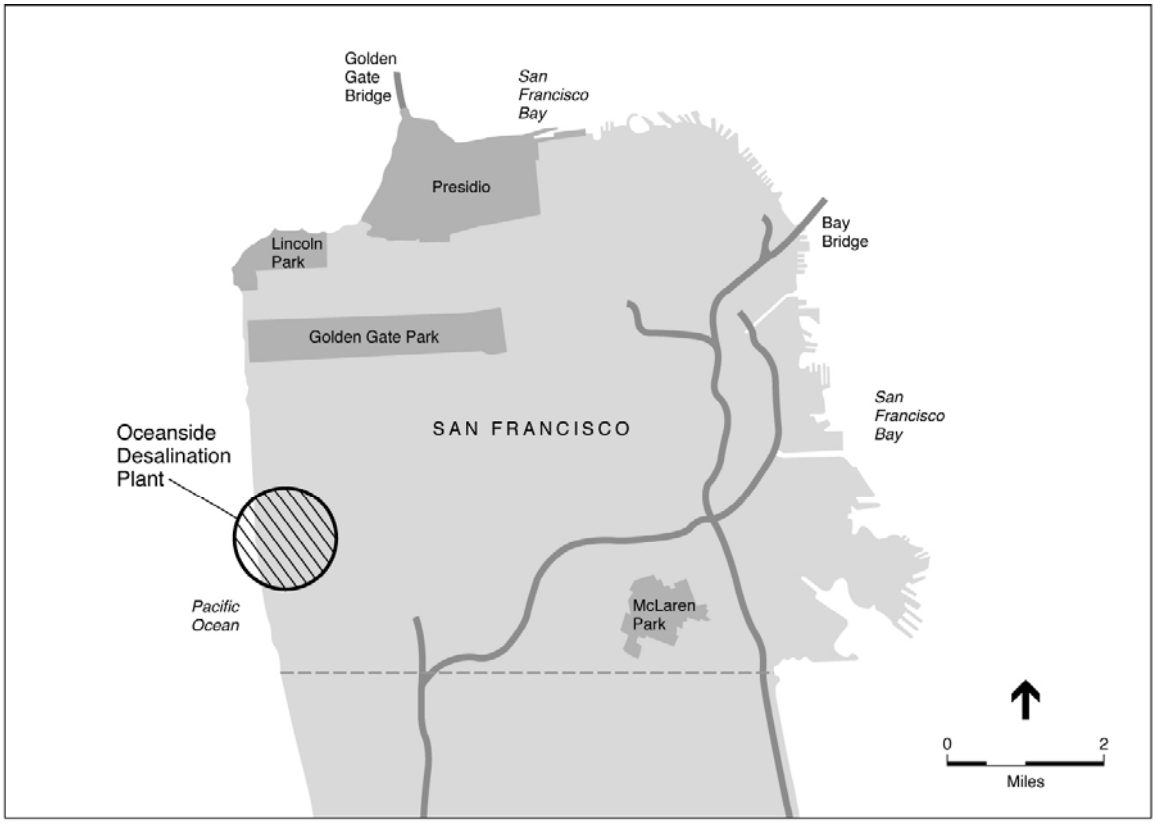
The growth-inducement potential for the Lower Tuolumne River Diversion Alternative would be similar to that of the proposed program, as described in Chapter 7. Since this alternative would meet the WSIP system performance objectives for delivery reliability and water supply, the water service and populations served would be identical. The minor difference in water quality would not affect the growth-inducement potential.

9.2.6 Year-round Desalination at Oceanside Alternative

Under the Year-round Desalination at Oceanside Alternative, the SFPUC would implement all of the proposed facility improvement projects and would construct a 25-mgd desalination plant in San Francisco to serve the projected increase in customer purchase requests. The plant would

provide year-round supplies during all hydrologic year types to blend with the regional system water. This alternative is based on an alternative developed by the SFPUC planning studies conducted for the WSIP water supply option (SFPUC, 2007b). Compared to the WSIP this alternative represents and alternative source of supply and is evaluated to address the impacts to the Tuolumne River, Alameda Creek, and the Peninsula watershed, including Pilcarcitos Creek.

The Year-round Desalination at Oceanside Alternative would involve the construction of the Oceanside Seawater Desalination Plant (OSDP) on the west side of San Francisco near the existing Oceanside Water Pollution Control Plant (WPCP) (see **Figure 9.2**). Under this alternative, 25 mgd of potable water supplies produced by reverse-osmosis technologies would be provided year-round to retail customers in San Francisco during all hydrologic year types to the regional water system. The desalinated water would be introduced into the regional water system at Sunset Reservoir; this reservoir serves only customers in San Francisco and these customers would receive predominantly desalinated water.



SOURCE: ESA+Orion, 2006

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Figure 9.2
Year-Round Desalination at Oceanside Alternative

The Year-round Desalination at Oceanside Alternative assumes that seawater would be pumped through an offshore intake structure and pipeline to the OSDP, which would be designed with a sustainable capacity of 25 mgd. Based on a water recovery rate of approximately 50 percent in modern-day desalination plants, the capacity of the seawater intake structure and pipeline is estimated at 55 mgd. The conceptual process for the desalination plant includes pretreatment using advanced technologies to remove pathogens and suspended solids, a dual-stage reverse-osmosis system to remove salts, and post-treatment to stabilize and disinfect the product water and make it suitable for mixing in drinking water systems. The OSDP would make use of the existing wastewater outfall at the Oceanside WPCP for the discharge of the reverse-osmosis and pretreatment brine.

Description of SFPUC and Wholesale Customer Actions

SFPUC Actions

Table 9-4 summarizes the main characteristics of the Year-round Desalination at Oceanside Alternative in comparison to those of the proposed program. Under this alternative, the SFPUC would accommodate the projected increase of 35 mgd in customer purchase requests through 2030 through construction and operation of the OSDP (25 mgd), increased utilization of Bay Area watershed supplies associated with the restoration of storage in Calaveras Reservoir (SV-2) and Lower Crystal Springs Reservoir (PN-4), and an equivalent of 10 mgd of supply from recycled water, groundwater, and conservation projects in San Francisco. Supplemental drought-year supplies would consist of 25 mgd of desalination water and 6 mgd from implementation of the Westside Groundwater Basin conjunctive-use program.

The Year-round Desalination at Oceanside Alternative would implement all facility improvement projects proposed under the WSIP. However, the design of some of the WSIP facilities would need to reevaluated and sized appropriately to meet the delivery levels and performance objectives under this alternative. In addition, the SFPUC would proceed with implementation of other capital improvement projects and related activities not considered part of the program analyzed in this PEIR (as described in Chapter 3, Sections 3.13 and 3.4.6). The SFPUC would also implement the same system maintenance program and similar operational changes in the regional system as those proposed under the WSIP with the addition of operation and maintenance of the additional facilities described below.

Additional facilities that would be required under this alternative are summarized below:

- *55-mgd Concrete Seawater Intake Structure*. The new concrete intake structure would be located southwest of the desalination plant, approximately one to two miles offshore, at a depth of approximately 40 to 50 feet, depending on the extent of the existing sandbar. The intake structure would be sited and designed so as to minimize sediment intrusion, minimize the entrainment and/or impingement of marine organisms, and maximize water quality.

- *60-inch-Diameter Intake Pipeline*. The intake pipeline would convey 55 mgd of seawater from the intake structure to a new raw water pump station.

- *Seawater Intake Pump Station*. The seawater intake pump station, located onshore next to the OSDP, would be designed with a pumping capacity of 55 mgd and would pump raw water to pretreatment facilities.

- *Oceanside Seawater Desalination Plant*. The OSDP would be located near the existing Oceanside WPCP and would use the existing ocean outfall pipeline for brine disposal. The new plant would include pretreatment facilities, reverse-osmosis modules, and post-treatment facilities, as well as pipelines and pumps needed to convey the brine to the ocean outfall. There are feasibility issues associated with siting of the plant at this location due to space constraints for this plant as well as the proposed WSIP recycled water treatment facilities for the Recycled Water projects (SF-3).

- *25-mgd Treated Water Pump Station*. The treated water pump station would pump the treated water to the Sunset Reservoir for distribution via a new treated water pipeline.

- *48-Inch-Diameter Treated Water Pipeline*. A 2.4-mile 48-inch-diameter pipeline would convey the treated water through city streets to the Sunset Reservoir.

Implementation of the Year-round Desalination at Oceanside Alternative would require numerous additional permits and approvals, including preparation of a watershed sanitary survey in accordance with California Department of Health's safety regulations, approval by the U.S. Army Corps of Engineers for construction of structures in coastal areas, and approval by the Regional Water Quality Control Board for brine disposal. In addition, as required by Clean Water Act Section 316(b), the SFPUC would be required to submit a study to the California Coastal Commission describing the potential impingement and entrainment impacts on aquatic resources.

Wholesale Customer Actions

Like the proposed program, the Year-round Desalination at Oceanside Alternative would fully meet the WSIP delivery reliability and water supply level of service goals. Therefore, the SFPUC would serve the projected 2030 purchase requests for all customers, and wholesale customers would not be required to implement any additional conservation and/or recycled water projects or develop supplemental water supplies from other sources beyond what is identified in their respective urban water management plans.

Feasibility Issues

The major technical feasibility issue of implementing a year-round desalination plant at the Oceanside Water Pollution Control Plant site is due to the limited space available at this location. The site was selected to take advantage of the existing ocean outfall structure at this location, but there are other competing uses for this space, including the recycled water treatment facilities proposed as one of the WSIP facility improvement projects and recreational uses at and near the San Francisco Zoo. While there would be no restrictions on the availability of seawater, there remain site-specific uncertainties regarding the permit conditions for brine disposal and for minimizing impacts on aquatic resources. This alternative would also result in a direct impact on residents on the westside of San Francisco who are served from Sunset Reservoir and would essentially receive desalinated water instead of regional system water. Other public acceptance issues include potential conflicts with nearshore recreational uses in the Ocean Beach area. In

addition, this alternative would add substantial cost to overall program as a result of having to build and operate a new intake structures, pump station, treatment plant, transmission pipelines, and any associated mitigation measures in addition to the costs of the 22 facility improvement projects included in the WSIP. This substantial additional cost raises questions about cost and financing feasibility and customer rate impacts.

Ability to Meet Program Objectives

Table 9-6 shows how the Year-round Desalination at Oceanside Alternative would perform in terms of meeting the WSIP level of service goals and performance objectives compared to the proposed program. Because there are no restrictions on the amount of seawater taken from the Pacific Ocean, this alternative does not have the same supply availability and reliability constraints as the surface water options.

The Year-round Desalination at Oceanside Alternative would increase system firm yield to approximately 256 mgd, thus meeting the level of service goals for water supply during drought and nondrought periods. This alternative would include implementation of all key projects needed to meet the seismic reliability and delivery reliability objectives of the WSIP, although the increase in facility maintenance and operational requirements associated with the desalination facilities would add additional constraints to systemwide operational flexibility. Although the Year-round Desalination at Oceanside Alternative would also meet the level of service objectives related to water quality, assuming the desalinated water would be treated to meet drinking water standards. As discussed above, this alternative would require that the SFPUC conduct a watershed sanitary survey and an impingement/entrainment study to comply with the requirements of the California Department of Health Services and the California Coastal Commission, respectively.

It is uncertain if the Year-round Desalination at Oceanside Alternative would meet the WSIP sustainability objectives, since there are numerous regulatory and permitting issues to be resolved associated with the desalination process, including protection of aquatic resources, water quality, and brine disposal issues, and it would require significant increase in long-term energy use compared to the proposed program. While the system would remain largely gravity-driven, the new source of water under this alternative would increase the pumping requirements of the overall system. This alternative would result in inefficient use of resources and funds compared to the WSIP, and would not meet the WSIP objective for cost-effectiveness. The capital, operation and maintenance cost of the 22 facility improvement projects would be the same as the WSIP, but substantial additional capital, operation and maintenance costs would be incurred from the intake, pumping, conveyance, treatment, and brine disposal facilities needed for this alternative.

Environmental Impacts Compared to those of the WSIP

Facility Construction and Operations Impacts

WSIP Facilities

The Year-round Desalination at Oceanside Alternative would include implementation of all 22 WSIP facility improvement projects. Although depending on a reevaluation of facilities sizing, some of the facilities could be slightly different than as proposed under the WSIP; however, the facilities impacts would be about the same under both scenarios. Thus, the environmental impacts of constructing and operating each of the 22 WSIP facility projects would be about the same as those of the proposed program. However, as discussed below, this alternative would require the construction and operation of extensive additional facilities on the west side of San Francisco; thus, collective impacts in the San Francisco Region and associated cumulative effects (such as traffic, air quality, noise, and vibration) would be more severe than those of the WSIP.

Other Facilities and Actions Potentially Implemented Under this Alternative

The Year-round Desalination at Oceanside Alternative would involve the construction of the OSDP, an intake structure and pipeline, intake pump station, a treated water pump station, and a treated water pipeline. A project-specific EIR would be required for the desalination plant and associated infrastructure. These facilities would result in a full range of construction and operations impacts at the proposed facility locations, similar to those described in Chapter 4 for the WSIP facilities, and would increase the construction and operational impacts in the San Francisco Region.

Construction Impacts. The primary environmental concerns during construction of the desalination plant and transmission pipelines are adverse impacts on sensitive receptors at the San Francisco Zoo and in nearby residential neighborhoods. Dust, noise and traffic generated during construction could affect nearby sensitive receptors, including animals and patrons at the zoo and residents who live along the pipeline routes. Depending on the location of the desalination plant, construction could also result in the displacement of parking at the San Francisco Zoo, result in temporary traffic impacts along pipeline alignments, and/or adversely affect recreational users at Fort Funston. In addition, the construction of the intake structure and pipeline would have a localized impact on marine organisms. Other potential construction-related effects would include cultural resources, hazardous materials, solid waste disposal impacts.

Operational Impacts. The primary concerns related to operation of the OSDP and related transmission facilities are potential impacts on aquatic resources, water quality, energy consumption, air quality, visual resources, geology and soils, land use and planning, traffic, and greenhouse gas emissions related to both traffic and energy use.

With respect to aquatic resources and water quality, operation of the OSDP could result in the entrainment and/or impingement of marine organisms in the intake pipeline and the discharge of potentially toxic substances into the Pacific Ocean from the existing outfall structure, including high-salinity discharges related to brine disposal as well as discharges of chemical and cleaning

compounds. It is expected that significant entrainment and/or impingement impacts could be addressed by installing fine screens at the intake structure and by reducing the velocity of water intake. Discharge toxicity could be reduced by minimizing the use of chemicals during filter backwashing. Dilution modeling would be required to determine whether the new discharge, which would be a mixture of brine and wastewater from the Oceanside WPCP, would meet National Pollutant Discharge Elimination System discharge requirements and whether modifications to the outfall would be required. In addition, although blending of desalinated water with the regional system water would continue to meet all federal and state drinking water standards, there would be a noticeable change in water quality, particular residents in the westside of San Francisco who would receive predominantly desalinated water.

The energy consumption of desalination depends on the quality of the water produced and the feed water composition. The amount of electric power needed to produce potable water is proportional to the salinity of the source water. For this reason, when compared to the proposed program, operation of the Year-round Desalination at Oceanside Alternative would result in substantial increases in energy consumption and greenhouse gas emissions.

Potential impacts on cultural resources would result if the OSDP were sited at the Fleishhacker site or the National Guard Armory site. Construction of the OSDP at the Fleishhacker site would require the removal or modification of the Fleishhacker Bathhouse, which was constructed in the 1920s and thus potentially eligible for historic status. It is uncertain whether the National Guard Armory site has been evaluated for inclusion in the National Register of Historic Places. Cultural resource surveys would be completed during CEQA review and any identified cultural resources would be avoided to the extent feasible.

With respect to geology and soils, the proposed intake structure and pipeline would terminate in or near the surface rupture zone of the active San Andreas fault, which is located on the ocean floor about two miles west of the Oceanside WPCP. In addition, areas along the coast (such as ocean bluffs) can be unstable and are subject to erosion. Geotechnical studies would be conducted to characterize potential geologic and seismic hazards and to develop appropriate design measures.

Operation of the OSDP could also result in land use and planning issues related to the siting of the desalination plant near the coastal zone and potential land use conflicts with the San Francisco Zoo, the Oceanside WPCP, and/or the National Guard Armory.

Water Supply and System Operations

Under the Year-round Desalination at Oceanside Alternative, the total average annual diversions from the Tuolumne River would be essentially the same as the existing condition, based on HH/LSM modeling over the 82-year hydrologic record, as shown in Table 9-5. However, system operations would be modified under this alternative to accommodate the year-round addition of desalinated water to the regional water supply sources as well as to provide for regular system inspection and maintenance, similar to the WSIP. The potential impacts on water resources in the

Tuolumne River, Alameda Creek, and Peninsula watersheds associated with this modified operation are described below and compared to the impacts that would occur under the WSIP.

Tuolumne River Watershed

Water demand would increase under the Year-round Desalination at Oceanside Alternative by the same amount as with the WSIP. The increase in demand would be met with water from a new desalination plant. This alternative would not result in changes in average annual releases to the Tuolumne River from Hetch Hetchy Reservoir compared to the existing condition but changes could occur due to changes in operations attributed to conveyance system maintenance. The changes in spring releases would occur because of storage changes accumulating in Hetch Hetchy Reservoir leading to the delay or earlier initiation in spring releases. These changes would be less than with the WSIP and typically result in greater releases. Compared to current conditions, there could be a delay or an earlier initiation of the day of excess release. The delay would still be enough to have a potentially significant adverse effect on terrestrial biological resources because of the ecological sensitivity of riverside meadows and their flora and fauna.

Similarly, the Year-round Desalination at Oceanside Alternative would result in an occasional difference in the winter/spring releases from La Grange Dam compared to current conditions, sometimes greater and sometimes less year to year with no difference in the average annual releases to the Tuolumne River. In those years when the WSIP resulted in a delay in winter/spring releases it would have an adverse effect on fisheries in the Tuolumne River and on terrestrial biological resources in the riparian corridor, but the impact would be less than significant because this delay represents a minor variation in the flow release pattern.

Alameda Creek Watershed

The improvements to Calaveras Dam that would occur under the WSIP would also be part of the Year-round Desalination at Oceanside Alternative. Furthermore, under this alternative, the SFPUC would operate its facilities in the Alameda Creek watershed in a similar manner as with the WSIP. Consequently, the environmental impacts of the Year-round Desalination at Oceanside Alternative would be similar to those of the WSIP.

Peninsula Watershed

Water demand would increase with the Year-round Desalination at Oceanside Alternative, as it would with the WSIP. The SFPUC would try to serve increased demand in the Coastside CWD service area from Pilarcitos Creek, exactly as it would with the WSIP. The consequent, more rapid drawdown of Pilarcitos Reservoir and the earlier cessation of stored water releases to Pilarcitos Creek would have a significant adverse effect on water quality, fisheries, and terrestrial biological resources in the reservoir and the creek.

The improvements to Lower Crystal Springs Dam that would occur under the WSIP would also be part of the Year-round Desalination at Oceanside Alternative. As a result of the improvements and associated modifications in system operations, the maximum water level in Crystal Springs Reservoir would rise by about 20 feet. The rise in water level would have significant adverse impacts on terrestrial biological resources, as described in Section 5.5.6. Since the Year-round

Desalination at Oceanside Alternative would include improvements to Lower Crystal Springs Dam, the SFPUC would generally operate its facilities in the Peninsula watershed in a similar manner as with the WSIP. Consequently, the environmental impacts of the Year-round Desalination at Oceanside Alternative would be similar to those of the WSIP.

Growth-Inducement Potential and Secondary Effects of Growth

The growth-inducement potential for the Year-round Desalination at Oceanside Alternative would be similar to that of the proposed program, as described in Chapter 7. Since this alternative would meet the WSIP level of service goals for delivery reliability and water supply, the water service and populations served would be identical. The minor difference in water quality would not affect the growth-inducement potential.

9.2.7 Regional Desalination for Drought Alternative (Variant 2)

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 proposed regional desalination plant. The SFPUC would receive supplemental supply from the regional desalination plant during drought years. This scenario is the same as WSIP Variant 2, as described in Chapter 8, Section 8.3, and is repeated here as a CEQA alternative because it would reduce impacts associated with increased diversions from the Tuolumne River.

The Regional Desalination for Drought Alternative (WSIP Variant 2) is similar to the WSIP, except that the SFPUC would receive supplemental drought-year supplies from a proposed regional desalination plant instead of from water transfers from TID and MID. The SFPUC, through its participation in the Bay Area Regional Desalination Project (BARDP), would receive additional water supply of up to 26 mgd during drought periods (an average annual yield of 23 mgd over the 8.5-year design drought). The SFPUC would not need to develop water transfer agreements with TID and MID for supplemental dry-year water, and, as a result, the overall increase in average annual water diversions from the Tuolumne River under this alternative would be less than that required for the proposed program. On an average annual basis, over the 82-year period of hydrologic record, this alternative would result in a 20-mgd increase in diversions from the Tuolumne River over existing conditions, compared to an increase of 27 mgd for the proposed program.

The BARDP involves a partnership among regional water agencies, including the SFPUC, Contra Costa Water District, East Bay Municipal Utility District, and Santa Clara Valley Water District, for the purpose of developing desalination as a regional water supply to improve supply reliability for over 5 million people served by the four agencies. The BARDP would develop and implement one or two desalination plants and associated facilities capable of producing about 65 to 71 mgd of potable water from ocean water, seawater, or brackish water. Participating agencies would either directly receive desalination product water into their water systems or would receive transfers from other agencies that directly receive desalination product water. A more detailed description of the BARDP is provided in Chapter 8, Section 8.3.

At the time of PEIR preparation, the institutional commitments and arrangements to implement a full-scale desalination plant as well as the necessary technical and feasibility studies had not been completed. However, in 2005, participating agencies received a grant from the California Department of Water Resources to complete a feasibility study to evaluate the institutional feasibility of the BARDP, and, in 2006, participating agencies received a second grant from the California Department of Water Resources to construct a desalination pilot plant. The pilot plant and related studies are scheduled to be implemented from 2007 to 2009.

Description of SFPUC and Wholesale Customer Actions

SFPUC Actions

Table 9-4 summarizes the main characteristics of the Regional Desalination for Drought Alternative in comparison to those of proposed program. As previously discussed, with the exception of supplemental drought-year supply sources, this alternative is similar to the proposed program in that the SFPUC would accommodate the projected increase of 35 mgd in customer purchase requests through an increase in average annual diversions from the Tuolumne River (20 mgd), increased utilization of Bay Area watershed supplies associated with the restoration of Calaveras Reservoir (SV-2) and Lower Crystal Springs Reservoir (PN-4), and an equivalent of 10 mgd of supply from recycled water, groundwater, and conservation projects in San Francisco. Unlike the proposed program, however, supplemental drought-year supplies would consist of up to 26 mgd (average annual yield of 23 mgd over the 8.5-year design drought) of desalination water from the BARDP and 6 mgd from implementation of the Westside Groundwater Basin conjunctive-use program.

The Regional Desalination for Drought Alternative would include implementation of all of the 22 facility improvement projects proposed in the WSIP. In addition, the SFPUC would proceed with implementation of other capital improvement projects and related activities not considered part of the program analyzed in this PEIR (as described in Chapter 3, Sections 3.13 and 3.4.6). The SFPUC would also implement the same system maintenance program and similar operational changes in the regional system as those proposed under the WSIP with the addition of participation in the operation and maintenance of the BARDP and related facilities.

The SFPUC is currently participating in the development of feasibility studies and pilot testing to determine the viability of the BARDP. If the project is found to be feasible, the SFPUC would contribute funds towards environmental review, project construction, and operation of the BARDP. Depending on the site(s) selected for development of the full-scale BARDP, the desalination project could require multiple components, including raw water supply/intake facilities, process and treatment facilities, and concentrate disposal facilities/outfall structures. To convey the product water from the desalination plant to the regional water agencies, transmission pipelines and pump station(s) would also be required. It is assumed that the BARDP would use or modify existing distribution and transmission facilities to the extent possible. Under the Regional Desalination for Drought Alternative, the SFPUC would receive transfer water from other participating water agencies, unless the facility were sited in San Francisco.

Wholesale Customer Actions

Like the proposed program, the Regional Desalination for Drought Alternative would fully meet the WSIP delivery reliability and water supply level of service goals. Therefore, the SFPUC would serve the projected 2030 purchase requests for all customers, and wholesale customers would not be required to implement any additional conservation and/or recycled water projects or develop supplemental water supplies from other sources beyond what is identified in their respective urban water management plans.

Feasibility Issues

A feasibility study is currently underway to refine the institutional, technical, environmental and scientific merits of a regional desalination facility. A pilot plant is proposed to test pretreatment options, membrane performance, and approaches for brine disposal. The technical feasibility of this alternative is dependent upon the outcome of these studies and pilot testing, and if determined to be fully feasible, implementation of a full-size regional desalination facility will require institutional arrangements to be formalized among the four partnering agencies as well as completion of environmental studies and permitting negotiations with numerous jurisdictions and resource agencies. In addition, this alternative would add costs to the overall program as a result of having to build and operate a new intake, treatment plant, transmission pipelines, and associated mitigation measures in addition to the costs of the 22 facility improvement projects included in the WSIP. Depending on the institutional and financial arrangements between the partnering agencies, this additional cost raises questions about cost and financing feasibility and customer rate impacts.

Ability to Meet Program Objectives

The Regional Desalination for Drought Alternative would include implementation of the same 22 regional system facility improvement projects as proposed under the WSIP needed to meet the water quality, seismic reliability, and delivery reliability performance objectives of the WSIP. Although this alternative would meet the level of service goals related to water quality, the desalinated water would require treatment to produce potable water supplies and would site-specific regulatory and permitting conditions for the desalination process. This alternative would increase system firm yield to 256 mgd, thus meeting the level of service goals for water supply during drought and nondrought periods.

However, it is uncertain if the Regional Desalination for Drought Alternative would meet the WSIP sustainability objectives, since there are numerous regulatory and permitting issues to be resolved associated with the desalination process, including protection of aquatic resources, water quality, and brine disposal issues, and it would require significant increase in long-term energy use compared to the proposed program. While the system would remain largely gravity-driven, the new source of water under this alternative would increase the pumping requirements of the overall system. This alternative would result in higher costs compared to the WSIP. The capital, operation and maintenance cost of the 22 facility improvement projects would be the same as the WSIP, but substantial additional capital, operation and maintenance costs—to be shared among

the partnering agencies—would be incurred from the intake, pumping, conveyance, treatment, and brine disposal facilities needed for this alternative.

Environmental Impacts Compared to those of the WSIP

Facility Construction and Operations Impacts

WSIP Facilities

Potential impacts related to construction and operation of the WSIP facilities would be the same as those of the proposed program described in Chapter 4. However, as discussed below and in Chapter 8, this alternative would require the construction and operation of extensive additional facilities, and, depending on their location, could contribute to collective and cumulative effects (such as traffic, air quality, noise, and vibration), resulting in more severe collective and cumulative impacts than those of the WSIP.

Other Facilities and Actions Potentially Implemented Under this Alternative

As discussed in Chapter 8, Section 8.3.3, potential impacts resulting from the construction of desalination facilities and appurtenances include temporary conflicts with established uses during construction, temporary degradation of scenic resources, geologic and/or seismic hazards associated with facility siting, short-term impacts on water quality and the potential for short-term depletion of groundwater resources from construction dewatering, impacts on biological resources during construction and/or associated with facility siting, construction-related traffic impacts, increased air quality emissions and odors, construction-related noise, temporary impacts on agricultural resources, and potential impacts associated with encountering hazardous materials in soil and groundwater during construction.

The primary operational concerns would be the entrainment and/or impingement of special-status aquatic organisms in the intake pipeline, the discharge of potentially toxic substances from the outfall structure, and potential impacts on wetlands, marshlands, and other sensitive habitats. In addition, implementation of the BARDP would result in the substantial use of nonrenewable energy resources during construction and operation as well as the generation of greenhouse gases. Additional impacts associated with operation of the desalination plant and facilities include permanent conflicts with existing land uses or permanent degradation of visual resources/scenic views, operational air quality emissions and odors, and permanent increases in noise and vibration. A more detailed discussion of construction and operational impacts related to the BARDP is provided in Chapter 8, Section 8.3.3.

Water Supply and System Operations Impacts

As described in Chapter 8, the Regional Desalination for Drought Alternative would essentially have all the same water supply and system operations impacts as the WSIP. In the Tuolumne River, Alameda Creek, and Peninsula watersheds, all the same impacts would occur as with the proposed program and all the same mitigation measures would apply. During drought, SFPUC would supplement supplies with the desalination supply. However, in nondrought years the SFPUC would serve the customer requests with additional diversions from the Tuolumne River.

While impacts on Tuolumne River resources would be somewhat reduced compared to the proposed program, the significance determination of the impacts would remain the same as those for the proposed program. Refer to Chapter 8, Section 8.5 for further discussion of the water supply and system operations impacts of this alternative.

Growth-Inducement Potential and Secondary Effects of Growth

As described in Chapter 8, the growth-inducement potential under the Regional Desalination for Drought Alternative would be essentially the same as that for the WSIP insofar as the SFPUC's component of the BARDP would be used to serve the 2030 purchase requests of SFPUC customers. Any growth-inducement effects associated with the BARDP beyond this component would be determined as part of the CEQA review of the BARDP.

9.2.8 Modified WSIP Alternative

The Modified WSIP Alternative incorporates changes in the proposed WSIP primarily to modify the proposed water supply and system operations so as to minimize environmental effects.[11] Most of these changes are also proposed as mitigation measures for potentially significant or significant impacts identified in Chapter 5 – Water Supply and System Operations. In addition, the Modified WSIP Alternative includes other supply and operational modifications and actions that would further reduce impacts identified in Chapter 5. As discussed below under Ability to Meet Program Objectives, these supply and system operation modifications could, in some cases, compromise the level of service goals and system performance objectives established for the WSIP.

Description of SFPUC and Wholesale Customer Actions

SFPUC Actions

Under the Modified WSIP Alternative, the SFPUC would implement the identical facility improvement projects as those proposed under the WSIP. In addition, the SFPUC would proceed with implementation of other capital improvement projects and related activities not considered part of the program analyzed in this PEIR (as described in Chapter 3, Sections 3.13 and 3.4.6). The SFPUC would also implement the same system maintenance program and similar operational changes in the regional system as those proposed under the WSIP. The SFPUC would also implement largely the same water supply option package as proposed under the WSIP, but would endeavor to increase the amount of recycled water, conservation, and local groundwater contributing to meeting the regional system demand. Under this alternative, the SFPUC would also implement the following changes in the proposed system operations and supply options:

- *Dry-year water transfer*. The proposed WSIP includes acquisition of a water transfer from TID/MID to provide supplemental dry-year water for the regional system. The specific terms of this water transfer have not been established. Under this alternative, the terms of any water transfer from TID, MID or other agency(ies) would be conditioned such that it involves a transfer of conserved water only, rather than a transfer of stored water. This proposed condition is explained in Measure 5.3.6-4a. Under this alternative, a transfer of conserved water would be acquired for use every year, not only as a dry-year supplement,

[11] The description and analysis of the Modified WSIP Alternative has been updated in the Comment and Responses document. Please see Section **14.10, Master Response on the Modified WSIP Alternative** (Vol. 7, Chapter 14) for detailed information.

and doing so would avoid the WSIP impacts on the lower Tuolumne River below La Grange that result from the SFPUC increasing its diversions from the Tuolumne River.

- *Alameda Creek minimum flow requirement for trout between the Alameda Creek Diversion Dam and the confluence with Calaveras Creek*. To support trout spawning and egg incubation following the replacement of Calaveras Dam and the resumption of flow diversion from Alameda Creek, the SFPUC will meet a minimum flow requirement in the creek reach below the Alameda Creek Diversion Dam to the confluence with Calaveras Creek between December 1 and April 30 at times when precipitation would naturally generate unimpaired flow in this reach. The SFPUC will conduct the necessary site-specific studies to determine the specific minimum flow requirement. Allowing flow to bypass the diversion dam in order to meet this minimum flow requirement would result in some reduction in supply that would otherwise be available to the regional system, and this could compromise the system firm yield level of service objective under the WSIP's water supply goal. This proposed condition is explained in Measure 5.4.5-3a.

- *Water Delivery to Coastside County Water District – modified operations for Pilarcitos Reservoir*. Under the WSIP, the SFPUC would meet increased 2030 demand from Coastside CWD by drawing the additional water from Pilarcitos Reservoir. This would result in a variety of significant or potentially significant impacts on the water quality and fish, aquatic, and terrestrial resources associated with the reservoir and Pilarcitos Creek downstream of the reservoir (see Section 5.5 for a discussion of these impacts). Under this alternative, the SFPUC would serve Coastside CWD's increase in demand from Crystal Springs Reservoir rather than from Pilarcitos Reservoir, which would allow the SFPUC to continue to operate Pilarcitos Reservoir in a manner similar to existing conditions. Under this alternative approach, the SFPUC and Coastside CWD would need to work together to expand conveyance capacity to Coastside CWD to accommodate increased supply delivery from Crystal Springs Reservoir. Serving Coastside CWD from Crystal Springs Reservoir instead of Pilarcitos Reservoir, as proposed under the WSIP, would require additional water from the Hetch Hetchy system (combined Alameda watershed, Crystal Springs watershed, and Tuolumne River supplies) to substitute for the local Pilarcitos watershed supply that would have been used. This proposed condition is explained in Measure 5.5.3-2.

- *Crystal Springs Reservoir – modified operation to manage inundation levels*. As discussed in Section 5.5, the WSIP would result in significant effects on the biological resources associated with and surrounding Crystal Springs Reservoir as a result of increasing water storage levels within the reservoir and maintaining these higher water levels in the reservoir for a longer period each year than was the case under historic operations. The oak woodland habitat that occurs in the proposed reservoir inundation zone would not survive the extended period of inundation each year. The PEIR identifies mitigation measures to reduce these effects to a less-than-significant level, primarily through habitat compensation. One strategy that could substantially lessen these environmental effects would be to operate the regional system such that the water storage levels in Crystal Springs Reservoir would not be increased over existing levels for prolonged periods during the year. Although reservoir water levels still would be increased to the historical maximum under this Modified WSIP Alternative, modifying the proposed future reservoir operation to ensure that the water level fluctuates seasonally and is lowered for some period each year to create conditions that the oak woodland habitat could survive. The proposed modified operations would be similar to the operating conditions in effect prior to 1983, which the oak woodland was apparently able to survive. Because with this modification the water level in the reservoir would not be maintained as full for as long each year as proposed under the WSIP, this modified operation would reduce the amount of water in storage on the Peninsula and could compromise the

system firm yield level of service objective under the WSIP's water supply goal. This is a new operation that SFPUC would implement under this alternative.

- *Increased Recycled Water, Conservation, and Local Groundwater*. Under this alternative, the SFPUC would institute a program to work with the wholesale customers to develop approximately 5 to 10 mgd of supply contribution, as feasible, from recycled water, conservation, and local groundwater projects within the regional wholesale service area. While the analysis of the Aggressive Conservation / Water Recycling and Local Groundwater Alternative in Section 9.2.4 indicates that it does not appear feasible to develop enough additional recycled water, water conservation and local groundwater to serve all or even a majority of the 25 mgd needed to meet the projected 2030 delivery demand for the regional system, it does appear feasible to develop at least some additional increment of supply / supply offset through these types of local projects. Based on the list of potential projects provided by the wholesale customers (see Table 9-11), a target goal of 5 to 10 mgd is proposed under this Modified WSIP Alternative. This is a new program that SFPUC would implement under this alternative.

  Developing additional water supply/ supply offset for the regional system through local water conservation, water recycling and groundwater projects would reduce the amount of additional Tuolumne River diversion required. At a minimum, it is expected that developing this level of additional local supply / supply offset could compensate for the reduction in available system supply resulting from the following operation modifications incorporated into this alternative to lessen or avoid environmental impacts: the Alameda minimum flow requirement, providing water delivery to Coastside CWD from Crystal Springs Reservoir, and the modified operation of Crystal Springs Reservoir. As a result, this alternative is not expected to require increases in Tuolumne River diversion that are greater than those proposed under the WSIP, and it is possible that the diversion increase would be less under this alternative than the WSIP.

  The SFPUC together with its wholesale customers have identified opportunities to expand supply contributions from water recycling, conservation and groundwater. While some of these projects are not cost-effective to pursue at the local level by a single agency or community, they may be more economically viable if developed and funded as regional projects contributing to the overall regional system. This alternative calls for the SFPUC to establish and fund, in conjunction with BAWSCA and the wholesale customers, a proactive regional program that will be supported by the SFPUC and its customers, promotes customer participation, and ultimately benefits the SFPUC regional water system. Based on a review of regional programs being implemented by other water agencies and consideration that the SFPUC provides water to both retail and wholesale customers, the SFPUC has identified several potential approaches for the program, shown in the bullet list below. One of these approaches, or a hybrid alternative featuring a combination of approaches, may best suit the SFPUC, its customers and the set of potential projects. The approaches include:

  – *Regional Entity Provides Financial Incentives.* This approach is structured such that the regional entity provides financial incentives for customers to apply for implementing their projects through the program. This financial assistance may include staff and material support.

  – *Regional Entity Implements Programs Directly.* This approach is structured such that the regional entity directly implements those projects or programs selected.

– *Regional Entity Implements Programs in Cooperation with Local Customers.* This approach is structured such that the regional entity implements those projects or programs selected in cooperation with the individual wholesale customer.

– *Regional Entity Implements a Grant Program.* This approach is structured such that the regional entity provides grants to individual wholesale customers, which are used by the individual wholesale customers to implement the projects.

Wholesale Customer Actions

Like the proposed program, the Modified WSIP Alternative would fully meet the WSIP delivery reliability and water supply level of service goals during nondrought years, and the SFPUC would serve the projected 2030 purchase requests for all customers. The wholesale customers would need to participate with the SFPUC in developing more recycled water, conservation, and local groundwater to contribute to meeting the needs of the regional system. The types of projects that would need to be pursued are discussed above under the Aggressive Conservation/Water Recycling and Local Groundwater Alternative.

Feasibility Issues

The Modified WSIP Alternative would have few feasibility issues, since in large part, this alternative represents the same actions and elements as the WSIP, for which the SFPUC has resolved major feasibility issues. Technical issues would be the same as the WSIP except for the design and implementation of facilities to permit bypass flows on Alameda Creek past the diversion dam. The institutional issues would be essentially the same as under the WSIP, including establishing agreements with local agencies for the regional groundwater conjunctive-use program in Northern San Mateo County and with TID, MID or other agency for water transfer agreements. The only difference would be that the water transfer agreement with TID, MID or other agency(ies) specify *conserved* water. Under this alternative the SFPUC would actively engage in developing regional recycled water, conservation, and local groundwater programs with the wholesale customers. While there remain feasibility issues associated with each specific water recycling, conservation and groundwater project (as discussed in Section 9.2.4, above), pursuing a goal of developing 5 to 10 mgd over time through a coordinated regional program appears achievable. Developing this additional increment of conservation, water recycling, and groundwater projects requires agreement between BAWSCA, the wholesale customers and the SFPUC as well as cooperation from several local agencies including wastewater agencies, stormwater management agencies, and planning departments, among others. Each project also will have its own feasibility questions, such as cost, facility siting, permitting and public acceptance, to resolve.

Ability to Meet Program Objectives

The Modified WSIP Alternative would include implementation of all of the proposed facility improvement projects needed to meet the water quality, seismic reliability, and delivery reliability goals of the WSIP, and would meet these objectives similar to the proposed program. Although the modified operation under this alternative would include actions that would affect the water

supply and system firm yield (i.e., minimum flow requirements on Alameda Creek, reduced use of Pilarcitos Reservoir, and managed inundation levels in Crystal Springs Reservoir), the Modified WSIP Alternative also includes 5 to 10 mgd of regional recycled water / groundwater / conservation that is not part of the proposed program. Long-term implementation of these regional recycled water/local groundwater/conservation projects would offset impacts of the operational modifications proposed under the Modified WSIP Alternative on the Tuolumne River such that it is expected that this alternative would meet all of the water supply level of service goals and system performance objectives of the WSIP.

The Modified WSIP Alternative would meet the WSIP sustainability objective, and would be expected to have slightly greater costs than the WSIP, since there would be additional conservation, water recycling and local groundwater projects within the regional service area than under the WSIP. The water recycling and groundwater elements would add some pumping requirements to the overall regional system. However, it is assumed that planning and implementation of regional recycled water/groundwater/conservation projects in partnership with the wholesale customers would be conducted to incorporate the WSIP objectives for cost-effective use of funds.

Environmental Impacts Compared to those of the WSIP

Facility Construction and Operations Impacts

WSIP Facilities

Potential impacts related to construction and operation of the WSIP facilities would be the same as those of the proposed program, as described in Chapter 4.

Other Facilities Potentially Implemented Under this Alternative

No significant environmental impacts would be expected from implementation of water conservation measures. Implementation of recycled water and groundwater projects would result in a full range of construction and operational impacts in the South Bay and Peninsula areas, similar to those described in Chapter 4 for the WSIP facilities. The types of impacts associated with implementation of the local recycled water and groundwater projects are summarized in Table 9-12, above, and generally relate to construction of new infrastructure, water quality, and groundwater resources.

Water Supply and System Operations Impacts

This alternative incorporates mitigation measures to address some of the impacts identified for the WSIP, namely the effects on fish and riparian habitat in the lower Tuolumne River (Impacts 5.3.6-4 and 5.3.7-6), the effects on trout in Alameda Creek below the diversion dam (Impact 5.4.5-3), the effects on Pilarcitos Reservoir and Creek and associated resources (Impacts 5.5.3-2, 5.5.5-4, 5.5.5-5, 5.5.6-4, and 5.5.6-5), and the effects on fish and terrestrial biological resources around Crystal Springs Reservoir (Impacts 5.5.5-1 and 5.5.6-1). Otherwise, this alternative would have the same water supply and system operations impacts as the WSIP in

the Tuolumne River, Alameda Creek, and Peninsula watersheds and would require the same mitigation measures.

The proposal to modify the proposed operations of Crystal Springs Reservoir would allow storage levels to be returned to their historical maximum; however, the reservoir would have to be operated to allow water levels to fluctuate annually and to provide for a seasonal lowering of the water level so that the oak woodland and other habitat on the periphery of the reservoir would not be inundated throughout the year. Historical vegetation mapping and accounts of habitat in the vicinity of Upper and Lower Crystal Springs Reservoirs (Oberlander, 1952) indicate that the prevailing reservoir levels in the 1950s resulted in more extensive freshwater marsh than at present. An increase in freshwater marsh habitat would benefit San Francisco garter snake and California red-legged frog. Although the overall increase in reservoir elevation under this alternative could still affect the populations of fountain thistle and other sensitive plants that now exist below the proposed maximum reservoir level, the habitat around the reservoir would return to conditions that existed before 1983, and these plant populations would therefore be expected to regain their former extent and distribution. Maintaining reservoir levels similar to historical patterns prior to 1983—and without the more lengthy periods when the reservoir is nearly full as proposed under the WSIP—would reduce or eliminate the adverse impacts on upland habitats such as oak woodland, which could experience extensive mortality if inundated for long periods of time.

With the WSIP, average monthly water levels would rise by 2 to 8 feet compared with existing conditions. Except for periodic drawdowns, all areas below the current maximum reservoir elevation of 283 feet would be permanently inundated, resulting in the loss of all existing freshwater marsh and riparian vegetation below this elevation. The maximum reservoir elevation of 291 feet would be maintained for several weeks longer than maximum elevations under existing and pre-1983 operations. Upland vegetation growing below 291 feet along the reservoir shoreline could not tolerate these longer periods of inundation and would be lost, including oak woodland, mixed evergreen forest, serpentine grassland, valley needlegrass grassland, and exotic forest.

The “bathtub ring” that is a trademark of reservoirs occurs because water remains high enough, for long enough, to exceed the flood tolerance of most woody and shrubby perennial vegetation and is not present long enough for emergent aquatic vegetation to persist. Inundation replaces the air-filled pores in the soil, which limits the amount of oxygen roots can obtain, resulting in increased stress, reduced growth, and eventually mortality. This PEIR predicts that implementation of the WSIP would result in a bathtub ring at some regional water system reservoirs, but this outcome is not inevitable. Most woody plants have some tolerance to flooding, which is a natural phenomenon. It would therefore be possible for the SFPUC to “manage” the inundation zone to allow selected species to survive, while still utilizing the restored historical reservoir capacity. Flood tolerance has been studied for several species. For example, 70 percent of valley oak (*Quercus lobata*) have been shown to survive inundation of over 40 days during the growing season (Walters, 1980). Under a managed inundation scenario, the maximum reservoir elevation would be periodically adjusted to limit inundation to the maximum tolerance of the least flood-tolerant species that are considered to provide valuable habitat components. Since these

tolerances are not known for all of the species currently present, the Modified WSIP Alternative would require a period of adaptive management, during which growth and stress would be studied for a number of years to establish a balance between woody vegetation vigor and diversity and the needs of the proposed program for storage. Although this alternative would not likely avoid impacts on grasslands, much of the biological productivity of the area between 283 and 291 feet elevation would be retained.

Growth-Inducement Potential and Secondary Effects of Growth

The growth-inducement potential for this alternative would be identical to that of the proposed program, as described in Chapter 7.

9.3 Comparison of Alternatives

Based on the information presented in Section 9.2, the following discussion highlights the key similarities and differences between the WSIP and the eight alternatives evaluated in detail in this PEIR with respect to their ability to meet the program objectives and to lessen the severity of the WSIP's environmental impacts. The environmentally superior alternative is also identified from among the proposed WSIP and the alternatives.

9.3.1 Comparison of Alternatives

Ability to Meet Program Objectives

As summarized in Table 9-6, above, three alternatives to the WSIP appear to meet most of the basic project objectives: the Lower Tuolumne River Diversion Alternative, Year-round Desalination at Oceanside Alternative, and Regional Desalination for Drought Alternative. Each of these three alternatives develops additional water supplies to meet the 2030 average annual increase in delivery demand, drought-year needs, and support the 20 percent maximum systemwide rationing goal. There are questions associated with each of these alternatives, including questions of technical and institutional feasibility, cost, and public support as well as regulatory permit challenges; however, assuming these alternatives could be implemented, it appears that they could each largely meet the program objectives. All of them would cost more than the WSIP because each would require implementation of all 22 WSIP facility improvement projects as well as construction and operation of additional major facilities for water diversion, transmission, treatment and distribution. Costs for these alternatives would include all the WSIP facility improvement project costs plus the substantial additional costs for planning, environmental review, design, construction, operation, and mitigation of the additional facilities. All of these alternatives would also require an incremental increase in treatment and pumping facilities to the regional system; they would introduce a water source with different water quality into the system and would involve additions to the system that are not gravity-driven.

Four alternatives – the No Program Alternative, No Purchase Request Increase Alternative, and the Aggressive Conservation / Water Recycling and Local Groundwater Alternative (without and with supplemental Tuolumne River water), would each fail to meet one or more key program

objectives. The No Program Alternative would meet the fewest of the program objectives. Under the No Program Alternative only those facility improvement projects required by current regulation or agreement with regulatory agencies would be implemented, thus, only a few of the many needed repairs and improvements would be made to the regional system. Many other facility improvement projects and supply development actions needed to improve seismic and delivery reliability, and provide adequate supplies to meet both average annual delivery demand and drought-year needs would not be implemented, leaving these objectives wholly or substantially unmet under the No Program Alternative.

The No Program Alternative leaves 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. The SFPUC is responsible for maintaining and upgrading the regional system as needed to meet, at a minimum, the public health and safety needs of its customers. If the SFPUC cannot repair and improve its water system in a planned, comprehensive program like the WSIP, then it will be forced to do so in a piecemeal, reactive, emergency response manner, repairing parts of an aging system as facilities reach the end of their useful life or fail. This alternative is analyzed as required by CEQA to disclose the potential environmental impacts of not implementing the WSIP compared to implementation of the program but is not a practical alternative for the SFPUC.

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; therefore it would not fully meet the purchase request increase by the SFPUC wholesale customers for additional supply through the year 2030. Under this alternative, the SFPUC would choose not to meet the future water requests from its current customers – one of its key program objectives. This alternative was included in this alternatives analysis to evaluate the consequences of the SFPUC not meeting the future increase requested by its customers 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. Neither BAWSCA nor its member agencies is expected to allow their customer needs to go unmet. Therefore, under this alternative, while the SFPUC would not achieve the program objective of meeting customer water delivery needs in 2030, it is expected that customer needs would nonetheless be met through other efforts by BAWSCA and/or the wholesale customers. Likely action by BAWSCA and wholesale customers would be to pursue a water transfer from another agency, similar to that proposed by the SFPUC as part of the WSIP. Consequently, the No Purchase Request Increase Alternative would not avoid the potential growth inducement effects of meeting the 2030 customer purchase requests.

The Aggressive Conservation / Water Recycling and Local Groundwater Alternatives (without and with supplemental Tuolumne River water) appear to meet, or almost meet the supply delivery and reliability objectives. This alternative, without supplemental Tuolumne River water, appears to almost meet the average annual 2030 delivery target of 300 mgd. With supplemental Tuolumne River water (5 mgd) it would meet the 300 mgd target. However, there are significant questions about the feasibility of producing up to 19 mgd of supply / supply offset with this alternative. As discussed in Section 9.2.4, while projects that might produce up to 19 mgd of potential

supply/supply offset were identified within the wholesale customer service area, there are many steps still required to confirm the actual potential yield of each of the projects and assess the technical, cost, and permitting feasibility in addition to public acceptance associated with specific conservation, recycled water and groundwater projects within the wholesale customer service area.

As shown on Table 9-11, above, producing up to 19 mgd of supply/supply offset under this alternative could involve implementation of more than 14 separate conservation/water recycling/ groundwater projects in the wholesale customer service area. This requires coordinated action by the SFPUC and multiple partner agencies to plan, evaluate, design, permit, finance, construct and operate these projects. It also requires community approval and fairly extensive public participation. Of the 19 mgd of potential supply/supply offset shown on Table 9-11, 8.35 mgd or almost half could be recycled water, and conservation represents another 7 mgd; thus the majority would come from increased water recycling and conservation. These two water supply management approaches, perhaps more than any other, require significant community support and participation to implement. Water recycling is becoming more and more common throughout the Bay Area, yet it is not universally accepted by all communities and for all permitted uses. Community support for increasing the recycled water supply and using it primarily for non-potable uses throughout the SFPUC service areas is a critical component for implementing this alternative.

Similarly, implementing aggressive additional conservation actions, beyond existing conservation levels and the planned conservation efforts (already factored into the future water demand estimates by each wholesale customer), also requires widespread community support, participation and compliance. Further, if an aggressive level of conservation can be implemented to reduce the average day water demands, then the question arises, will the community also be able to further reduce its water use enough to achieve the WSIP goal of 20 percent rationing during a drought? As discussed in Section 9.2.2 under the discussion of feasibility for the No Program Alternative, effective, lasting water conservation leads to demand “hardening” such that there may be little flexibility remaining for customers to further reduce water use during a drought without experiencing substantial economic and personal hardship.

From the information gathered by the SFPUC and the wholesale customers to develop and assess this potential alternative it is apparent that there is the potential to implement additional conservation, recycled water projects, and local groundwater projects within the regional service area. However, given the uncertainties in implementing many of the projects assumed under this alternative, it is also apparent that there is not sufficient, reasonably foreseeable potential for these types of projects to fully meet the program objectives for 2030 supply and delivery reliability and drought reliability. As shown on Figure 5.1-2, based on the wholesale customers water demand projections and purchase request increase, planning estimates indicate about half of the total 35 mgd requested increase in water delivery would be needed by 2015. It is unlikely that this much additional supply/supply offset could be developed under this alternative in this short a time. Consequently, the Aggressive Conservation/Water Recycling and Local Groundwater Alternative, as a stand-alone program, would not meet the key program objectives. However,

developing some more conservation, recycled water and local groundwater within the regional service area than is proposed under the WSIP does appear possible and this possibility has been incorporated into the proposed Modified WSIP Alternative. Developing more local conservation efforts, recycled water and local groundwater projects would also contribute to meeting the objective of diversifying the water supply and demand management portfolio for the regional system.

The Modified WSIP Alternative would meet all the program objectives, similar to the WSIP. This alternative was developed to avoid or substantially lessen some of the significant impacts of water system operations under the WSIP. Some of the operational changes included in this alternative would also be implemented if the WSIP and all mitigation measures presented in this PEIR are approved. This alternative also proposes that the SFPUC, in partnership with its wholesale customers, implement more conservation, water recycling and local groundwater projects than are proposed as part of the WSIP. The additional conservation, recycling, and local groundwater projects would offset the increase in diversion from the Tuolumne River made necessary by the operational modifications included in the Modified WSIP Alternative. While there remain feasibility issues associated with each specific water recycling, conservation and groundwater project (as discussed in Section 9.2.4, above), pursuing a goal of developing 5 to 10 mgd over time through a coordinated regional program appears achievable. Developing this additional increment of conservation, water recycling, and groundwater projects requires agreement between BAWSCA, the wholesale customers and the SFPUC as well as cooperation from several local agencies including wastewater agencies, stormwater management agencies, and planning departments, among others. Each project also will have its own feasibility questions, such as cost facility siting, permitting and public acceptance, to resolve.

Environmental Impacts Compared to Those of the WSIP

The following summarizes the chief differences between the WSIP and the alternatives with respect to potential environmental impacts. In some cases an alternative would result in more or less impacts on a particular environmental resource compared to the WSIP, and in other cases an alternative would affect an altogether different geography and environmental resource than the WSIP. This section frames the environmental impact trade-offs raised by each of the alternatives in comparison to the WSIP.

Water Resources Impacts

As summarized below some alternatives would lessen significant impacts of the program on the Tuolumne River, but all alternatives would continue to have significant impacts within the Alameda Creek and Peninsula watersheds because these impacts would result primarily from implementation of two facility improvement projects (Calaveras Dam Replacement Project (SV-2) and Lower Crystal Springs Dam Improvement Project (PN-4)) that are included in each alternative since they must be completed in order to meet regulatory requirements for public safety reasons. In addition, three alternatives would impact other water bodies not affected by the WSIP and three other alternatives might affect other water bodies depending on how they are implemented.

Tuolumne River Watershed

Under the WSIP, the SFPUC would increase average annual diversions from the Tuolumne River by 27 mgd to meet 2030 service area needs; this increase can be served from the CCSF's existing water rights on the Tuolumne River. Six of the eight alternatives considered also involve some level of increased average annual diversion from the Tuolumne River. Two alternatives, the Lower Tuolumne River Diversion Alternative and the Modified WSIP Alternative would require the same or greater increase in average annual Tuolumne River diversions compared to the WSIP. Under four alternatives the increase in average annual Tuolumne River diversion would be less then the WSIP, ranging from an increase of 20 mgd down to an increase of 3 mgd (in descending order): Regional Desalination for Drought Alternative, No Program Alternative, Aggressive Conservation / Water Recycling and Local Groundwater Alternative with supplemental Tuolumne River water, and the No Purchase Request Increase Alternative (see Table 9-5, above). Two alternatives, Aggressive Conservation / Water Recycling and Local Groundwater Alternative without supplemental Tuolumne River water and the Year-round Desalination at Oceanside Alternative, would not require an increase in average annual diversion from the Tuolumne River over the existing condition.

Table 9-7 summarizes the potentially significant impacts on the Tuolumne River and its associated environmental resources that would result from implementation of the WSIP and from each of the alternatives in comparison to the WSIP. Although some alternatives would result in less increase in Tuolumne River diversion than the WSIP (in some cases notably less), none of them would substantially lessen the potential impact on meadows between O'Shaughnessy Dam and Don Pedro Reservoir. All of the alternatives could still result in a potentially significant impact on meadows, in particular in the Poopenaut Valley, as a result of delaying the higher volume spring releases from Hetch Hetchy Reservoir (see Impact 5.3.7-2), similar to the WSIP. Three alternatives — Regional Desalination for Drought, Lower Tuolumne River Diversion, and the Modified WSIP – would involve increasing the average annual diversions by 20 mgd or more, similar to the WSIP and thus would have a similar impact to that described for the WSIP, requiring mitigation. Five other alternatives – No Program, No Purchase Request Increase, Year-round Desalination at Oceanside and the two Aggressive Conservation/Water Recycling and Local Groundwater Alternatives (without and with Supplemental Tuolumne River Water) – would involve either a diversion increase of less than 10 mgd or no increase in average annual diversion (see Table 9.5) and would result in shorter delays that occur less frequently than with the WSIP. Nonetheless, in order to meet the delivery reliability level of service goals, these alternatives would involve a change in system operations that would still result in a delay in spring releases due to the change in diversion patterns. For all but the No Program Alternative and the two Aggressive Conservation/Water Recycling and Local Groundwater Alternatives, the implementation of the Westside Basin Project would also affect the year to year diversions from the Tuolumne River thus potentially affecting spring flow releases. This delay in spring releases was deemed to still result in a significant adverse impact on mountain meadows and associated resources (i.e., sensitive habitats and species). As a result, the analysis determined that the impact would be potentially significant and that mitigation would still be required for these alternatives.

Although the Lower Tuolumne River Diversion Alternative would provide environmental benefits to water quality, habitat, fish, and recreation during most summers, winters and early spring as a result of flow being released to the river below O'Shaughnessy Dam for diversion further downstream, this alternative would still result in delays in the late spring (May and June) releases from O'Shaughnessy Dam, the same as and possibly greater than the WSIP. Therefore, despite the benefits at other times of the year, this delay was deemed to still result in a significant adverse impact on mountain meadows and associated resources (i.e., sensitive habitats and species). As a result, the analysis determined that the impact would be potentially significant and that mitigation would still be required for this alternative.

On the lower reach of the Tuolumne River below La Grange Dam, the WSIP would result in significant impacts on fisheries and riparian habitat, again as a result of reducing the volume and delaying the release of the higher spring flows from Don Pedro Reservoir (see Impacts 5.3.6-4 and 5.3.7-6). Most alternatives would have less impact on these resources in this river reach than the WSIP, except for the Lower Tuolumne River Diversion Alternative. The Lower Tuolumne Diversion Alternative would also result in additional fisheries impacts, including potential impacts on listed Chinook salmon and steelhead, as a consequence of constructing a new water intake facility in the lower river and diverting flow in the reach where listed Chinook salmon and steelhead occur, and would require supplemental mitigation for those effects in addition to the mitigation required under the WSIP. Four alternatives – the Aggressive Conservation / Water Recycling and Local Groundwater Alternative Without Supplemental Tuolumne River Water, the No Purchase Request Increase, the Year-round Desalination at Oceanside, and the Modified WSIP, would avoid this significant impact associated with the delay in spring releases.

Alameda Creek Watershed

In the Alameda Creek Watershed, all alternatives but the Modified WSIP Alternative would have the same significant impacts on fisheries in Alameda Creek below the diversion dam as the WSIP. This is because the impacts in this watershed are associated primarily with the replacement of Calaveras Dam (SV-2), as required by DSOD, and the subsequent revised system operations associated with restoration of storage capacity in the reservoir and are not related to which supply source(s) is selected to meet future customer delivery needs. The Calaveras Dam Replacement Project is required by DSOD to meet regulatory requirements, therefore it would occur under every alternative. Impacts would occur once the SFPUC resumes normal operation of that reservoir. The Modified WSIP Alternative would incorporate, as part of its description, the provision of a minimum flow in Alameda Creek below the Alameda Creek Diversion Dam to support resident trout spawning and egg incubation. (This minimum flow requirement is also proposed as mitigation for the WSIP.) Implementing the minimum flow requires the SFPUC to relinquish some of its supply that otherwise would have been available to customers. This supply reduction would have to be made up through more Tuolumne River diversion or more conservation, recycled water and local groundwater projects. The Modified WSIP Alternative proposes that the SFPUC develop more conservation, recycled water and local groundwater projects to both compensate for operational modifications that reduce supply for customers and reduce the amount of additional diversion required from the Tuolumne River to fully meet the WSIP program objectives, if possible.

Peninsula Watershed

In the Peninsula Watershed all alternatives but the No Purchase Request Increase Alternative and the Modified WSIP Alternative would have the same significant environmental impacts as the WSIP. This is because the impacts in this watershed are not a result of which water supply source is selected but are primarily associated with two actions proposed under the WSIP. The first is increased service to Coastside County Water District (Coastside CWD) to serve its 2030 purchase request and the second is implementation of the Lower Crystal Springs Dam Replacement Project (PN-4).

Coastside CWD assessed its future water supply needs and developed its 2030 customer purchase request from the SFPUC regional system. Coastside CWD requests a supply increase of 1.22 mgd by 2030. Coastside CWD serves Half Moon Bay and surrounding communities on the San Mateo County coast. The SFPUC currently serves Coastside CWD with about equal quantities of water from Pilarcitos Creek and Crystal Springs Reservoir. In order to meet Coastside's purchase request increase, under the WSIP the SFPUC would use more water from the Pilarcitos Creek watershed. However, as discussed in Section 5.5, this could result in significant environmental impacts on resources in and around Pilarcitos Reservoir and Creek. Two alternatives address these impacts; the other six alternatives would have the same impacts on Pilarcitos Reservoir and Creek resources. Under the No Purchase Request Increase Alternative, the SFPUC would not serve Coastside's 2030 purchase request increase and therefore this alternative would lessen the impacts on Pilarcitos Reservoir and Creek identified for the WSIP. Under the Modified WSIP Alternative, the SFPUC would serve Coastside's 2030 purchase request increase but it would modify its proposed system operation within the Peninsula Watershed to provide additional supply to Coastside CWD from Crystal Springs Reservoir instead of the Pilarcitos Creek watershed. As a result, under this alternative Pilarcitos Reservoir would be operated similarly to the way it is under existing conditions and none of the significant impacts associated with the WSIP would occur. However, this operational modification would require the SFPUC to provide Coastside CWD with some additional increment of supply from outside of the Pilarcitos Reservoir watershed from the rest of the regional water system. As discussed under the Alameda Creek Watershed above, this additional supply requirement would have to be made up through either more Tuolumne River diversion or more conservation, recycled water and local groundwater projects. The Modified WSIP Alternative proposes that the SFPUC develop more conservation, recycled water and local groundwater projects to both compensate for operational modifications that increase use of Crystal Springs Reservoir to serve Coastside CWD customers and to reduce the amount of additional diversion required from the Tuolumne River to fully meet the WSIP program objectives, if possible.

With respect to the significant environmental impacts associated with the Lower Crystal Dam Replacement Project and subsequent operation of Crystal Springs Reservoir to utilize the restored historical storage capacity, these impacts would occur under all alternatives because this project must be implemented under all alternatives in order to meet DSOD regulatory requirements. However, the Modified WSIP Alternative includes a modification to the proposed operation of this reservoir that would lessen the significant effects of increasing the reservoir water level on the oak woodland habitat and associated species. With this modification, the reservoir water

levels would be allowed to fluctuate to a greater degree over the year than proposed under the WSIP such that the woodland trees would be able to survive the annual increase in inundation. This operational modification may require that the SFPUC sacrifice some of the increases in system delivery and drought reliability it would gain under the WSIP because it would not be able to store as much water in Crystal Springs Reservoir for as long each year. Additional modeling of this alternative would be needed to determine how it would specifically perform against the WSIP goals and objectives and if other system modifications could compensate for this change.

Westside Groundwater Basin

Three alternatives—No Program Alternative and the two Aggressive Conservation/Water Recycling and Local Groundwater Alternatives—would not include the Westside Basin conjunctive use program as a dry-year supplemental supply. Therefore, these alternatives would not result in potential overdraft or seawater intrusion in the North Westside Groundwater Basin or in the potential to affect Lake Merced levels due to implementation of the WSIP as proposed; however, as stated above, these three alternatives could all result in increased local groundwater pumping within the wholesale customer service area, with similar impacts as the WSIP. The remaining five alternatives would include the conjunctive use program, so groundwater impacts would be the same as for the WSIP.

Other Water Bodies

Three alternatives would affect other water bodies and their associated environmental resources in addition to those affected by the WSIP. The Lower Tuolumne River Diversion Alternative would result in direct impacts on the lower Tuolumne River from construction and operation of a new diversion facility. At the same time, compared to the WSIP this alternative would provide some benefit to both the upstream reach of the Tuolumne River below Hetch Hetchy Reservoir to Don Pedro Reservoir and the downstream reach below La Grange as a result of more water being released from Hetch Hetchy Reservoir for subsequent diversion downstream. However, while the upstream reach of the Tuolumne River supports a resident trout fishery, the downstream reach in the lower Tuolumne supports listed Chinook salmon and steelhead. This alternative would trade-off environmental benefits to both reaches of the river with adverse environmental impacts on the lower Tuolumne River.

The Regional Desalination for Drought Alternative would result in impacts on upper San Francisco Bay (along the eastern Contra Costa County shoreline based on the proposed plant location in the Pittsburg-Antioch area) in addition to the same water bodies affected by the WSIP. Under this alternative, water would be diverted from the bay, treated for use and the brine concentrate would then be discharged back to the Bay. The SFPUC has partnered with other Bay Area water agencies to evaluate the feasibility of this project which will include the ability to mitigate potential impacts to the Bay to a level that is less than significant. Alameda County Water District has successfully implemented a brackish groundwater desalination project to supplement its supply. Marin Municipal Water District is currently evaluating a potential desalination facility and has proceeded with a pilot project. Thus, several agencies are pursuing this type of water supply project. It may be possible to design and operate the proposed regional desalination facility in a manner that does not have significant, unavoidable effects on the Bay,

but additional detailed pilot testing and environmental study are required to assess the site-specific feasibility and environmental effects of the proposed regional desalination facility. This alternative represents a trade-off in terms of environmental effects; it would slightly reduce the amount of additional Tuolumne River to be diverted compared to the WSIP and thus lessen the impact on the river, but it would introduce impacts on San Francisco Bay that would not occur under the WSIP.

Under the Year-round Desalination at Oceanside Alternative, seawater from the Pacific Ocean offshore of the City and County of San Francisco would be diverted for treatment and use in a portion of San Francisco on a year-round basis and the concentrated brine byproduct would be discharged back into the ocean. As described above for the Regional Desalination for Drought Alternative, many water agencies are currently studying potential seawater desalination facilities along the coast of California. It may be possible to design and operate the proposed seawater desalination facility required under this alternative in a manner that does not have significant, unavoidable effects on the ocean, but additional detailed feasibility and environmental study is required to assess whether this is possible. This alternative represents a trade-off in terms of environmental effects; it would substantially reduce the amount of additional Tuolumne River to be diverted compared to the WSIP and thus lessen the impact to the river, but it would introduce impacts on the offshore waters of the Pacific Ocean that would not occur under the WSIP.

The four alternatives that do not fully meet the supply reliability and/or drought reliability objectives - the No Program Alternative, the No Purchase Request Increase Alternative and the Aggressive Conservation / Water Recycling and Local Groundwater Alternative, with and without supplemental Tuolumne River water, would each likely prompt BAWSCA and/or the wholesale customers to pursue alternative supplies to meet their communities' needs through 2030. Actions taken by BAWSCA and/or individual wholesale customers could result in impacts to other water bodies including more pumping of local groundwater supplies, or water transfers from other surface water sources. BAWSCA and/or the wholesale customers would likely pursue water transfers from other water agencies. If BAWSCA and/or wholesale customers were to pursue a water transfer from Modesto Irrigation District or Turlock Irrigation District, it would affect the Tuolumne River and associated resources much as the WSIP (though there would be institutional complexities associated with wheeling water through third party facilities). If BAWSCA and/or wholesale customers were to pursue a water transfer from other entities, this could result in environmental effect on other rivers north or south of the Delta as well as the Delta, itself. Alternatives that result in water transfers from water sources other than as proposed under the WSIP also present environmental impact trade-offs; they could potentially lessen the effects of the WSIP on the Tuolumne River and, in one case to Pilarcitos Reservoir and Creek, but they introduce potential impacts on other water bodies and their associated resources and require additional mitigation.

Under the Aggressive Conservation / Water Recycling and Local Groundwater Alternatives (both without supplement supply and with supplemental Tuolumne River water) and possibly under the No Program and No Purchase Request Increase Alternatives, the wholesale customers would implement groundwater projects, which could result in overdraft and associated impacts to local

groundwater basins, including seawater intrusion, similar to the effects described in Section 5.6 for the Westside Groundwater Basin. These alternatives also present environmental impact trade-offs; they could potentially lessen the effects of the WSIP on the Tuolumne River but they could introduce potential impacts to other water bodies and their associated resources and require additional mitigation.

Facility Impacts

Seven alternatives, except for the No Program Alternative, would involve the construction of all the same 22 facility projects on the SFPUC regional system as proposed under the WSIP. These projects are needed to repair and improve the system to meet the supply delivery and seismic reliability objectives regardless of target delivery demand level or source of supply. The sizing of some facilities would need to be evaluated under the various alternatives and might be revised / reduced from that proposed under the WSIP, but no facility project would be eliminated from the program. As a result all alternatives but the No Program Alternative would have, at a minimum, the same facility construction and operation impacts as the WSIP.

Under the No Program Alternative only five projects required to meet regulatory requirements are assumed to be implemented. Because far fewer facility improvement projects would be built under this alternative there would be much less facility construction and operation impact compared to the WSIP. However, it is expected that there would be much more emergency facility repair under this alternative as the system continued to age without proactive improvement and thus, ultimately, through required repair and rehabilitation efforts, a similar level of facility improvement projects might have to be carried out, resulting in much of the same facility impacts as the WSIP but possibly occurring over a longer period of time and in a less planned and comprehensive manner.

All eight alternatives would require construction and operation of other new facilities in additional to all the WSIP facility improvement projects. The two Aggressive Conservation / Water Recycling and Local Groundwater Alternatives (without and with Tuolumne River supplement), and to a lesser extent the Modified WSIP Alternative, would require the SFPUC and/or the wholesale customers to construct and operate additional water recycling treatment plants and distribution pipelines along with groundwater wells and distribution lines throughout the wholesale customer service area. The number and location of these facilities is not known but several new and/or expanded facilities would be required. Similarly, under the No Program and No Purchase Request Increase alternatives, the wholesale customers might decide to develop additional water recycling and/or groundwater facilities and, in addition, might pursue other surface water supplies that could require new treatment, storage or transmission facilities.

Both desalination alternatives require construction and operation of a new treatment plant, a water intake structure, transmission and distribution pipelines and possible storage. The Lower Tuolumne River Diversion Alternative requires construction and operation of a new water diversion structure on the river, a new water treatment plant and new pipelines. These alternatives would involve substantial additional facility construction and operation impacts, including impacts on land use, traffic, air quality, noise, energy and others. In addition, these alternatives

would use greater amounts of energy than the WSIP and, as a consequence, could contribute additional greenhouse gas emissions along with other air pollutant emissions. The desalination process is particularly energy intensive; thus, the two alternatives that include desalination plants would make a more substantial contribution to increasing energy use and associated greenhouse gas emissions than the other alternatives.

Growth Inducement and Secondary Effects of Growth

As discussed in Chapter 7, the WSIP would provide water supply to some customers to use in supporting additional growth within their communities and, as such, water supply would be less of a potential constraint to growth. The communities within the regional system service area have evaluated their growth plans (i.e., through General Plans and Urban Water Management Plans) and found that there are some significant and, in some cases, significant and unavoidable impacts that could or would occur as a result of planned growth. One alternative, the No Purchase Request Increase Alternative, specifically attempts to reduce or avoid the growth inducing effects of the WSIP and two other alternatives (the No Program Alternative and the Aggressive Conservation, Recycled Water and Local Groundwater Alternative) also appear to have less growth inducement potential than the WSIP

The No Purchase Request Increase Alternative was included in the range of alternatives evaluated in the PEIR specifically to consider the consequences of the SFPUC not fully providing for future water supply needs of its customers in an attempt to avoid or minimize the significant secondary effects associated with planned growth in the service area. As discussed above, while the SFPUC would plan not to fully meet the future 2030 water purchase request from its wholesale customers under this alternative, it is expected that the customers would pursue and secure the additional supplies they require. Thus, with respect to the SFPUC's actions, this alternative would have less growth inducement potential than the WSIP but combined with the wholesale customers actions, the same planned growth is ultimately expected to occur resulting in largely the same secondary effects of growth as would occur with the WSIP. While it is possible that approval of additional development and growth within the wholesale customer service area might be slowed somewhat in some communities as wholesale customers require more time to pursue other water supply and reliability projects, it is not expected that this would deter communities from ultimately taking the actions needed to support planned growth. As a result, this alternative is not an effective approach to avoiding or reducing the significant secondary effects of growth.

The No Program Alternative and the Aggressive Conservation, Recycled Water and Local Groundwater Alternative would both provide additional supplies to partially meet the 2030 average annual delivery demand and drought year needs but the supply would not be as reliable as that provided by the WSIP. As a result, as with the No Purchase Request Alternative, it is expected that the SFPUC wholesale customers and/or BAWSCA would pursue other projects and actions to provide the desired level of supply and supply reliability. While the need to develop additional projects beyond the WSIP might have some slowing effect on development approvals in some communities, it is not expected to impeded growth from continuing in accordance with adopted plans. As a result, this alternative would have similar secondary effects of growth as those described for the proposed program.

The other four alternatives would each have the same growth inducement potential and associated secondary effects of growth as the WSIP.

9.3.2 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.

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, the SFPUC, 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.

In addition to having many of the same environmental impacts as the WSIP, 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.

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. For example, while the Year-round Desalination at Oceanside Alternative would meet the program objectives and lessen some of the impacts associated with the WSIP, it would also cause impacts to the marine environment associated with brine disposal, potential land use compatibility impacts due to space limitations in the vicinity of the proposed shoreline site, and require substantial energy use for the desalination process which would likely make a greater contribution to greenhouse gas and other pollutant emissions than the WSIP or other alternatives.

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 require construction of some additional facilities in some areas not affected by the WSIP. 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.

9.4 Alternatives Identification and Screening

This section presents the process and results of identifying and screening alternative concepts and strategies in order to develop the range of alternatives analyzed in Section 9.2.

9.4.1 Process for Identifying Alternative Concepts

Alternatives to be considered under CEQA are those that can avoid or substantially lessen one or more of the significant environmental effects identified for the proposed program. Many of the adverse environmental impacts of the WSIP described in Chapters 4 and 5 were judged to be less than significant. Other adverse impacts were judged to be significant or potentially significant but could be reduced to a less-than-significant level through the application of mitigation measures. Still others were judged to be significant and unavoidable, even with the application of mitigation measures described in Chapter 6. This section summarizes the chief significant environmental impacts identified for the WSIP and discusses potential strategies to avoid or lessen these significant effects. It also describes the process used to develop and identify the alternatives analyzed above in Section 9.2 and includes descriptions of preliminary alternatives as well as the concepts, strategies, and other elements used to develop the alternatives. The basic process is described below:

1. Review potentially significant/significant mitigable (PSM/SM) and potentially significant/significant unavoidable (PSU/SU) impacts identified in Chapters 4 and 5 of this PEIR and identify strategies to lessen or avoid impacts.

2. Review ideas and alternative concepts suggested during PEIR scoping.

3. Conduct preliminary screening of identified strategies and alternative concepts by determining if the strategy/concept meets both of the following criteria:

   - Does it meet any of the basic WSIP goals and objectives?
   - Would it lessen or reduce identified significant impacts?

   If the answer to either question was “no,” the concept was eliminated from further consideration. If the answer to both questions was “yes,” the concept was retained for further consideration.

4. Develop preliminary alternatives based on strategies and concepts retained for further consideration. Review feasibility issues with respect to technical, institutional, and regulatory concerns. If the preliminary alternative was determined to be infeasible, the conceptual alternative was eliminated from further consideration.

5. Develop and refine final alternatives for CEQA analysis in Section 9.2 and identify preliminary feasibility issues to be considered as part of the alternatives analysis.

Each step in this process is further described below. Section 9.5 provides a more detailed description of the concepts and strategies that were eliminated from further consideration and the reasons for their elimination.

9.4.2 Identified Impacts and Potential Strategies to Avoid or Lessen Significant Effects

Significant Facilities-Related Impacts and Strategies to Avoid or Lessen Effects

As described throughout Chapter 4, implementation of the WSIP would have potentially significant construction and/or operations impacts associated with the 22 facility improvement projects in the five regions analyzed in this PEIR. Chapter 4 identifies potentially significant construction impacts for individual facility improvement projects at and near individual project sites; potentially significant collective effects due to concurrent construction of WSIP facilities in the same and multiple regions (overlapping and multi-regional); and potentially significant impacts related to the WSIP facilities' contribution to cumulative impacts. Potentially significant mitigable (PSM) and potentially significant unavoidable (PSU) impacts were identified for one or more facility improvement project(s), as described below.

Significant Facilities Construction Impacts

- Land Use – temporary disruption of existing land uses, including PSU impact for New Irvington Tunnel (SV-4); and PSU impact for collective, overlapping effects in the Bay Division Region
- Geology – slope instability, squeezing ground/subsidence during tunneling, expansive or corrosive soils
- Hydrology – short-term depletion of groundwater resources
- Biological Resources – impacts on wetlands, aquatic resources, sensitive habitats, common habitats, heritage trees, special-status species, including PSU collective impacts in the Sunol Valley and Peninsula Regions
- Traffic – impacts related to roadway capacity, traffic delays, impaired access, parking, and safety hazards, including PSU collective and cumulative impacts
- Air Quality – emission of air pollutants, and exposure to diesel particulate matter, including PSU collective and cumulative impacts
- Noise and Vibration – disturbance adjacent to sites and haul routes, including PSU construction noise impacts for all projects, PSU vibration impacts for multiple projects, as well as PSU and PSM collective impacts in all regions and PSU cumulative impact
- Public Services and Utilities – impacts related to utility disruption, landfill capacity, compliance with solid waste regulations
- Recreational and Agricultural Resources – temporary conflicts with established uses
- Hazards – temporary exposure to hazardous materials
- Energy – construction energy use

Significant Facilities Siting/Design Impacts

- Land Use – permanent displacement or long-term disruption of existing land uses, including PSU impacts for SJPL System (SJ-3), 40-mgd Treated Water (SV-3), SABUP (SV-6), BDPL Reliability Upgrade (BD-1), CS/SA Transmission (PN-2), Groundwater Projects (SF-2), and Recycled Water Projects (SF-3)
- Visual Quality – effects on scenic vistas or visual character, including PSU impact for Calaveras Dam (SV-2); new sources of light and glare
- Hydrology and Water Quality – flooding impacts, increases in impervious surfaces
- Biological Resources – conflicts with adopted conservation plans
- Cultural Resources – impacts on paleontological resources, archaeological resources, and historic resources, including PSU impacts for Calaveras Dam (SV-2), New Irvington Tunnel (SV-4), CS/SA Transmission (PN-2), and Lower Crystal Springs Dam (PN-4), and PSU collective impacts in the Sunol Valley and Peninsula Regions, and PSU cumulative impacts
- Public Services and Utilities – relocation of utilities
- Recreational and Agricultural Resources – long-term conflicts with established uses

Significant Facilities Operational Impacts

- Biological Resources – water discharge effects on riparian/aquatic resources
- Energy – operational energy use

Strategies to Avoid or Lessen Significant Facilities-Related Impacts

Mitigation measures identified in Chapter 4 and described in Chapter 6 would reduce most of the facilities-related impacts listed above to a less-than-significant level, and include measures that would be implemented at the project level, such as construction controls or footprint or project design features. However, this PEIR identifies many impacts as PSU. Although SFPUC construction measures and additional mitigation measures would be applied to these impacts, the remaining environmental impacts would remain significant or potentially significant and therefore unavoidable. However, in many cases, the PSM and PSU impacts were identified as such because there was not enough site-specific information at this program level of analysis to determine definitively whether the impact would be less than significant or whether the identified mitigation measures could reduce the severity of the impact to a less-than-significant level. Separate, project-level CEQA evaluation of the WSIP projects could either confirm that the impact is less than significant or that mitigation is available to reduce the impact to a less-than-significant level. For the purpose of the PEIR analysis, a conservative determination regarding the level of impact has been made, and the designation of PSU is applied to disclose the potential for such effects.

Regardless of mitigation measures, programmatic strategies that would meet one or more of the basic WSIP objectives and might avoid or lessen the significant facilities impacts include:

- Reduce the number and/or extent of facility improvement projects to avoid construction, siting, or operational impacts associated with one or more project (possibly reducing the ability of the WSIP to fully meet the level of service goals for water quality, seismic reliability, delivery reliability, or water supply). This strategy could also lessen the collective and overlapping effects of multiple WSIP projects.

- Phase/extend the WSIP construction schedule such that fewer projects, especially those with geographic overlap, occur concurrently to lessen the collective regional and multi-regional impacts associated with the effects of multiple WSIP projects.

- Refine project site selections and/or facility layout designs to avoid or minimize impacts on sensitive resources (e.g., biological resources, cultural resources, land use, or agricultural lands).

Significant Water Supply/System Operations Impacts and Strategies to Lessen or Avoid Effects

As described in Chapter 5, implementation of the WSIP would have potentially significant impacts on water bodies and associated resources due to the changes in water supply and system operations. Chapter 5 identifies potentially significant impacts that would occur in the Tuolumne River, Alameda Creek, Peninsula watersheds (San Mateo and Pilarcitos Creeks) and in the Westside Groundwater Basin. Potentially significant water supply and system operations impacts, both mitigable and unavoidable, were identified, as described below.

Significant Tuolumne River Watershed and Downstream Impacts

- Effects on fishery resources below La Grange Dam

- Effects on alluvial features that support montane meadow and riparian habitat between Hetch Hetchy and Don Pedro Reservoirs and on riparian resources below La Grange Dam

Significant Alameda Creek Watershed Impacts

- Changes in flow in Alameda Creek below the diversion dam (significant and unavoidable)

- Effects on fishery resources in Alameda Creek below the diversion dam

- Effects on biological resources in Calaveras Reservoir, Calaveras Creek, and Alameda Creek

- Effects on recreational and visual resources in the Sunol Regional Wilderness near Alameda Creek below the diversion dam

Significant Peninsula Watershed Impacts

- Effects related to water quality, fisheries, and biological resources in Pilarcitos Reservoir and along Pilarcitos Creek

- Effects on fishery resources in tributaries to Crystal Springs Reservoir (PSU)

- Effects on biological resources around Upper and Lower Crystal Springs Reservoirs

Significant Westside Groundwater Basin Impacts

- Potential overdraft in the North Westside Groundwater Basin and related effects, including changes in Lake Merced water levels and seawater intrusion

- Water quality effects on drinking water due to groundwater pumping in the North and South Westside Groundwater Basin

Strategies to Avoid or Lessen Significant Water Supply and System Operations Impacts

Mitigation measures identified in Chapter 5 and described in Chapter 6 would reduce most of the effects listed above to a less-than-significant level, although a few of the impacts were identified as PSU. As an alternative to mitigation measures, programmatic strategies that would meet one or more of the basic WSIP objectives that might avoid or lessen the significant water supply and system operations impacts are presented below.

Reducing the amount of additional water diverted from the Tuolumne River could avoid or substantially lessen the significant impacts of the WSIP on the Tuolumne River watershed. Strategies include:

- Use an alternative supplemental supply source instead of the Tuolumne River to meet future purchase requests and/or dry-year water supply reliability needs.

- Use Tuolumne River water to meet additional water supply needs, but alter the point of diversion to a location downstream from the potentially affected fisheries and biological resources.

- Reduce service, thereby reducing the ability to fully meet the level of service goals for water supply. Specifically, do not meet some or all of the future purchase requests and/or dry-year water supply reliability needs.

- Implement demand management to meet increased purchase requests and dry-year water supply reliability needs through aggressive conservation and water recycling only.

Strategies to avoid or lessen impacts in the Alameda Creek watershed include:

- Do not resume diversions from Alameda Creek above the diversion dam to Calaveras Reservoir after Calaveras Dam is restored (possibly reducing the ability of the WSIP to fully meet the level of service goals for water supply and delivery reliability).

- Do not resume diversions from Alameda Creek above the diversion dam to Calaveras Reservoir to historical (pre-2002) levels after Calaveras Dam is restored, but recapture the flows at a location downstream from the potentially affected resources and pump the recaptured water to the regional system.

Strategies to avoid or lessen impacts in the Peninsula watershed include:

- Do not increase water storage in Crystal Springs Reservoir over existing levels for prolonged periods.
- Do not fully meet the 2030 increased purchase requests from wholesale customers served from Pilarcitos Reservoir.

Strategies to avoid or lessen impacts in the Westside Groundwater Basin include:

- Use an alternative supplemental supply instead of groundwater.
- Implement demand management, including conservation and/or water recycling, to reduce demand for additional potable water and thereby avoid or reduce the need to use groundwater.

Growth-Inducement Impacts and Strategies to Avoid or Lessen Effects

As discussed in Chapter 7, the WSIP would support some additional growth within the SFPUC service area—primarily the planned growth reflected in the adopted general plans of the local communities. This growth would result in potentially significant secondary environmental effects such as increased traffic, air pollution, greenhouse gas emissions, noise, and demand for public services and utilities; loss of open space; and effects on water quality, cultural resources, and habitat and associated biological resources. Local land use jurisdictions have prepared CEQA documents on their general plans to assess the secondary effects of growth; as part of that process, these jurisdictions have adopted mitigation measures for the secondary effects of planned growth and have also adopted statements of overriding considerations in cases where they approved growth that could result in significant and unavoidable impacts.

Strategies to Avoid or Lessen Growth-Inducement Impacts

The secondary effects of growth supported by the WSIP would meet one or more of the basic WSIP objectives that could be avoided or substantially reduced by the following strategy:

- Reduce service, thereby reducing the ability to meet the 2030 customer purchase request increase; meet only purchase request levels reflected in the existing Master Water Sales Agreement with the wholesale customers.

9.4.3 Preliminary Screening of Alternative Strategies and Concepts

This section summarizes the overall alternative strategies and concepts considered in the CEQA alternatives analysis, and it provides a preliminary screening based on the ability of each alternative to meet the WSIP level of service goals. The preliminary screening includes both the strategies identified in Section 9.4.2 as well as the concepts raised during the public scoping period. All of the strategies and concepts are grouped into one of the following four main

categories: strategies/concepts that affect facilities; strategies/concepts that affect system operations; strategies/concepts that affect water supply sources; and other strategies/concepts.

Summary of Strategies to Avoid or Lessen Significant Impacts

Table 9-13 summarizes and categorizes the strategies identified in Section 9.4.2 to avoid or lessen significant impacts of the proposed program. The table also indicates the ability of each strategy to meet the basic WSIP performance objectives and level of service goals as a preliminary screening of alternative strategies.

Alternative Concepts Raised During PEIR Scoping

The WSIP PEIR Scoping Report (see Appendix A) summarizes the comments made during the public scoping process for this PEIR for consideration during the environmental review process. Participants in the scoping process presented numerous suggestions for reducing potential impacts as well as possible alternatives to one or more aspect of the proposed WSIP. **Table 9-14** summarizes the alternative concepts raised during the public scoping process and indicates the ability of each idea to meet the basic WSIP performance objectives and level of service goals as a preliminary screening of these ideas.

9.4.4 Alternative Screening

Tables 9-13 and 9-14 list alternative strategies and concepts that were either developed to reduce significant impacts or suggested during the public scoping period, and indicate the ability of each strategy or concept to meet the basic WSIP objectives. All of the strategies listed in Table 9-13 would meet one or more of the basic objectives and would avoid or lessen at least one significant impact. Many of the concepts in Table 9-14 would meet one or more of the basic objectives; however, some of the concepts would meet none of the basic WSIP objectives, and those concepts were eliminated from further consideration, as indicated in the table. In a few cases where extensive scoping comments were made on a concept, further discussion of the concepts and reasons for elimination is provided in Section 9.5.

This section further develops the strategies and remaining concepts, addresses feasibility issues of each strategy and concept, and provides screening for the alternatives and concepts that were either retained for detailed study in this PEIR, or eliminated from, further consideration as CEQA alternatives. Strategies and concepts were considered in the formulation of the range of alternatives evaluated in Section 9.2 if they were determined to be both feasible to implement and potentially effective in avoiding or reducing the environmental impacts associated with the WSIP. The range of alternatives identified for further evaluation and comparison to the WSIP is presented in Section 9.2.

In this section, alternative concepts or strategies were eliminated from further consideration for one or more of the following reasons: (a) they are a variation on an alternative that is evaluated in this PEIR in detail and thus are already represented in the range of alternatives selected for evaluation, (b) they do not meet the CEQA criteria for an alternative (i.e., meet most of the basic

TABLE 9-13
STRATEGIES TO AVOID OR LESSEN SIGNIFICANT IMPACTS AND PRELIMINARY SCREENING

Strategies to Avoid or Lessen Significant Impacts	Does the Strategy Meet the WSIP Performance Objectives and Level of Service Goals?				Preliminary Screening
	Water Quality	Seismic Reliability	Delivery Reliability	Water Supply	
Strategies that Affect Facilities and Could Reduce Facilities Impacts					
Reduce the number and/or extent of facility improvement projects.	No to partially (depends on which projects)	No to partially (depends on which projects)	No to partially (depends on which projects)	No to partially (depends on which projects)	Concept is addressed under No Program Alternative and analyzed in Section 9.2.
Phase/extend the WSIP construction schedule such that fewer projects, especially those with geographic overlap, occur concurrently to lessen the collective regional and multi-regional impacts associated with the effects of multiple WSIP projects.	Partially (could delay ability to meet water quality requirements)	Yes (but would prolong period of time system is subject to seismic risks)	Yes (but may delay regular maintenance program and ability to keep local reservoirs full)	Yes	Concept is discussed in Section 9.4.4 and screened from further consideration, as described in more detail in Section 9.5.
Refine project site selections and/or facility layout designs that avoid or minimize impacts on sensitive resources (e.g., biological, cultural, land use, or agricultural lands).	Yes	Yes	Yes	Yes	Concept is discussed in Section 9.4.4 and screened from further consideration, as described in more detail in Section 9.5.
Strategies that Affect System Operations and Could Reduce Growth or System Operations Impacts					
Reduced service – do not fully meet the WSIP project objectives for water supply. Specifically, do not meet some or all of the future purchase requests and/or dry-year water supply reliability needs. ▪ Meet purchase request levels reflected in the existing Master Water Sales Agreement with the wholesale customers only ▪ Do not fully meet 2030 purchase requests from customers served from Pilarcitos Reservoir	Yes	Yes	Yes	No	Concept is further developed under No Purchase Request Increase Alternative and analyzed in Section 9.2.
Alter the point of diversion for additional Tuolumne River water needed to meet future water supply needs to a location downstream from the potentially affected fisheries and biological resources.	No, would require treatment prior to mixing with Hetch Hetchy supplies	Yes	Yes	Yes	Concept is further developed under Lower Tuolumne River Diversion Alternative and analyzed in Section 9.2.
Do not resume diversions from Alameda Creek above the diversion dam to Calaveras Reservoir after Calaveras Dam is restored.	Yes	Yes	No	No	Concept is discussed in Section 9.4.4 and screened from further consideration, as described in more detail in Section 9.5.

TABLE 9-13 (Continued)
STRATEGIES TO AVOID OR LESSEN SIGNIFICANT IMPACTS AND PRELIMINARY SCREENING

Strategies to Avoid or Lessen Significant Impacts	Does the Strategy Meet the WSIP Performance Objectives and Level of Service Goals?				Preliminary Screening
	Water Quality	Seismic Reliability	Delivery Reliability	Water Supply	
Strategies that Affect System Operations (cont.)					
Do not resume diversions from Alameda Creek above the diversion dam to Calaveras Reservoir to historical (pre-2002) levels after Calaveras Dam is restored, but recapture the flows at a location downstream from the potentially affected resources and pump the recaptured water to the regional system.	Yes	Yes	No	No	Concept is discussed in Section 9.4.4 and screened from further consideration, as described in more detail in Section 9.5.
Do not increase water storage in Crystal Springs Reservoir over existing levels for prolonged periods.	Yes	Yes	No	No	Concept is further developed under Modified WSIP Alternative and analyzed in Section 9.2.
Strategies that Affect Water Supply Sources and Could Reduce Water Supply Impacts					
Use an alternative supplemental supply source to meet future purchase requests and/or dry-year water supply reliability needs. ▪ Use an alternative supply source instead of additional Tuolumne River water ▪ Use an alternative supply source instead of additional pumping from the North Westside Groundwater Basin	Yes	Yes	Yes	Yes	Concept of alternative supply sources is addressed under Aggressive Conservation/Water Recycling and Local Groundwater Alternative and Year-round Desalination at Oceanside Alternative and analyzed in Section 9.2.
Implement demand management to meet increased purchase requests and dry-year water supply reliability needs through aggressive conservation and water recycling only.	Yes	Yes	Yes	Yes	Concept is addressed under Aggressive Conservation/Water Recycling and Local Groundwater Alternative and analyzed in Section 9.2.

TABLE 9-14
ALTERNATIVE CONCEPTS RAISED DURING PEIR SCOPING PROCESS AND PRELIMINARY SCREENING

Alternative Concept	Does the Concept Meet the WSIP Objective and Level of Service in the following areas?				Preliminary Screening
	Water Quality	Seismic Reliability	Delivery Reliability	Water Supply	
Concepts that Affect Facilities					
Do not expand the capacity of the system to withdraw water.	Yes	No	No	No	Concept does not meet three of the basic program objectives but is discussed under the No Program Alternative – analyzed in Section 9.2.
Enlarge Calaveras Reservoir to increase storage.	Yes	No	No	Possibly	Concept is discussed in Section 9.4.4 and screened from further consideration, as described in more detail in Section 9.5.
Remove O'Shaughnessy Dam and restore Hetch Hetchy Valley and use alternative water and power supplies / Use available storage capacity at New Melones Reservoir.	No	No	No	No	Concept does not meet any of the basic program objectives – eliminated from further consideration but discussed further in Section 9.5.
Build a pump station downstream of Holm Powerhouse to pump water from Cherry Creek to Mountain Tunnel / Larger intertie to Cherry Creek / Cherry Reservoir to Mountain Tunnel.	No	No	No	Possibly	Concept is discussed in Section 9.4.4 and screened from further consideration, as described in more detail in Section 9.5.
Expand downstream and off-stream storage.	No	No	No	Possibly	Concept is discussed in Section 9.4.4 and screened from further consideration, as described in more detail in Section 9.5.
Convey water from Don Pedro Reservoir to San Joaquin Pipelines.	No	No	No	Possibly	Concept is further developed under Lower Tuolumne River Diversion Alternative and analyzed in Section 9.2.
Do not build San Joaquin Pipeline (SJPL) No. 4 / Alternative without SJPL No. 4 / Advantages, disadvantages, and impacts of cross connections among SJPLs Nos. 1, 2, and 3 / Status of crossover on the San Joaquin Pipeline system at Albers Road.	No	No	No	No	Concept does not meet any of the basic program objectives – eliminated from further consideration and not discussed further in this PEIR. The SFPUC removed the SJPL No. 4 project from the WSIP and replaced it with the SJPL System project (SJ-3), which would include improvements to the San Joaquin Pipeline system without installation of a completely new SJPL No. 4. Programmatic impacts of the SJPL System project are evaluated as part of the proposed program and as part of all alternatives analyzed in Section 9.2.
Build pump station near Tesla Portal to reduce need for fourth San Joaquin Pipeline.	No	No	No	No	Concept does not meet any of the basic program objectives – eliminated from further consideration and not discussed further in this PEIR. When compared to the proposed program, the addition of a pump station at Tesla Portal would result in increased construction and operational impacts without reducing any of the impacts identified for the WSIP. This concept was considered during development of the SJPL System project (SJ-3) and may be considered in the project-level alternatives analysis if warranted.
Repair leaky pipelines.	No	No	No	No	Concept does not meet any of the basic program objectives – eliminated from further consideration and not discussed further in this PEIR. This concept is part of the SFPUC's ongoing repair and rehabilitation activities, and while it would improve the efficiency of the existing water supply, it would not be sufficient to meet the delivery reliability or water supply objectives.

TABLE 9-14 (Continued)
ALTERNATIVE CONCEPTS RAISED DURING PEIR SCOPING PROCESS AND PRELIMINARY SCREENING

Alternative Concept	Does the Concept Meet the WSIP Objective and Level of Service in the following areas?				Preliminary Screening
	Water Quality	Seismic Reliability	Delivery Reliability	Water Supply	
Concepts that Affect System Operations					
Filtration of Sierra source water / Expansion of filtration capacity in the SFPUC system / Alternative locations for filtration equipment.	No	No	No	No	Concept does not meet any of the basic program objectives – eliminated from further consideration but discussed further in Section 9.5.
Use of water stored in other reservoirs – Lake Lloyd, Lake Eleanor, Don Pedro Reservoir.	No	No	Possibly	Possibly	Concept is incorporated into the existing conditions as well as the proposed program; under both scenarios, the SFPUC maximizes use of water stored in Lake Lloyd and Lake Eleanor as part of Hetch Hetchy Reservoir operations. Use of water stored in Don Pedro Reservoir is part of the existing condition through the water bank described in Chapter 2; it is also assumed under the WSIP for the proposed water transfers with TID and MID for a supplemental drought supply. See Chapter 3, Program Description, Section 3.6, Proposed Water Supply Sources, and analysis in Chapter 5, Section 5.3. This concept is also incorporated and evaluated as part of all alternatives selected for detailed analysis in Section 9.2.
Assume the maximum releases identified in the 1987 Agreement as the required minimum flows for the Tuolumne River.	No	No	No	No	There is presently no basis for assigning the maximum releases to particular time periods, and the concept does not meet any of the basic program objectives – eliminated from further consideration as an alternative. However, concept is considered in the cumulative impact analysis of water supply and system operations and analyzed in Chapter 5, Section 5.7.
Extend the duration of releases into Pilarcitos Creek from Pilarcitos Reservoir to create a more natural flow regime in the creek.	No	No	No	No	Concept does not meet any of the basic program objectives – eliminated from further consideration and not discussed further in this PEIR. This concept is being considered under the SFPUC's Watershed and Environmental Improvement Program, described in Chapter 3, Section 3.12.
Alternative that will provide increased amount and duration of releases from Holm Powerhouse that can be used for whitewater recreation.	No	No	No	No	Concept does not meet any of the basic program objectives – eliminated from further consideration and not discussed further in this PEIR. Releases from SFPUC facilities for whitewater recreation under the proposed program are described in Chapter 3, Section 3.7.1.
Improve freshwater flows for streams.	No	No	No	No	Concept does not meet any of the basic program objectives – eliminated from further consideration and not discussed further in this PEIR. This concept is being considered under the SFPUC's Watershed and Environmental Improvement Program, described in Chapter 3, Section 3.12.
Alternative that analyzes the maximum conveyance capacity.	No	No	Possibly	No	Operation of the regional system under existing conditions, the proposed program, and all alternatives and variants considers the maximum conveyance capacity of the transmission system in terms of optimizing system reliability at the same time as meeting customer water demands. Under the WSIP, CEQA alternatives, and WSIP variants, the maximum conveyance capacity is

TABLE 9-14 (Continued)
ALTERNATIVE CONCEPTS RAISED DURING PEIR SCOPING PROCESS AND PRELIMINARY SCREENING

Alternative Concept	Does the Concept Meet the WSIP Objective and Level of Service in the following areas?				Preliminary Screening
	Water Quality	Seismic Reliability	Delivery Reliability	Water Supply	
Concepts that Affect System Operations (cont.)					
					evaluated in terms of delivery reliability, which includes provisions for maintenance, replenishment of local reservoirs, and minimizing risk of service interruption. Therefore, this concept is incorporated and analyzed as part of the delivery reliability level of service for the proposed program and all alternatives.
Concepts that Affect Water Supply Sources					
Increased conservation, demand-side management.	No	No	Possibly	Possibly	All three concepts are incorporated into the proposed program as described in Chapter 3 and are analyzed as part of the WSIP. In addition, these concepts are further developed under the Aggressive Conservation/Water Recycling and Local Groundwater Alternative and analyzed in Section 9.2.
Increased recycling to meet demand.	No	No	Possibly	Possibly	
Local and regional groundwater.	No	No	Possibly	Possibly	
Infiltration of groundwater into Mountain Tunnel.	No	No	No	No	Concept does not meet any of the basic program objectives – eliminated from further consideration and not discussed further in this PEIR. Current operations of the regional water system account for groundwater accretions to tunnels, and there would be no change in future operations under the WSIP in this regard.
Conjunctive use / Groundwater banking options.	No	No	No	Possibly	This concept is already incorporated in the proposed program and analyzed in Chapter 5. As described in Chapter 3, the proposed program includes a conjunctive-use program in the Westside Groundwater Basin in northern San Mateo County as a supplemental dry-year water source.
Groundwater banking in Kern County	No	No	No	Possibly	The concept of groundwater banking in Kern County in the Semitropic groundwater bank is discussed in Section 9.4.4 and screened from further consideration, as described in more detail in Section 9.5.
Purchase groundwater storage rights in foothills east of and outside of MID/Central Valley.	No	No	No	Possibly	Concept is discussed in Section 9.4.4 and screened from further consideration, as described in more detail in Section 9.5.
Zero increase in imports from the Tuolumne River / No further depletions from the Tuolumne River.	No	No	No	No	Concept alone does not meet any of the basic program objectives. However, this concept is further developed in combination with other alternative water sources under the Aggressive Conservation/Water Recycling and Local Groundwater Alternative and analyzed in Section 9.2.
Supply from Delta / More interties to other water sources, such as the Delta / Connect to the State Water Project at the California Aqueduct or Central Valley Project at the Delta-Mendota Canal.	No	No	Possibly	Possibly	Concept is discussed in Section 9.4.4 and screened from further consideration, as described in more detail in Section 9.5.

TABLE 9-14 (Continued)
ALTERNATIVE CONCEPTS RAISED DURING PEIR SCOPING PROCESS AND PRELIMINARY SCREENING

Alternative Concept	Does the Concept Meet the WSIP Objective and Level of Service in the following areas?				Preliminary Screening
	Water Quality	Seismic Reliability	Delivery Reliability	Water Supply	
Concepts that Affect Water Supply Sources (cont.)					
Additional intertie with Santa Clara Valley Water District.	No	No	Possibly	Possibly	Concept is discussed in Section 9.4.4 and screened from further consideration, as described in more detail in Section 9.5.
Desalination as water supply source.	No	No	Yes	Yes	Concept is developed and analyzed as Variant 2, Regional Desalination for Drought, in Chapter 8, as well as under the Year-round Desalination at Oceanside Alternative in Section 9.2. The Aggressive Conservation/Water Recycling and Local Groundwater Alternative also includes a component of desalination and is analyzed in Section 9.2.
Purchase water from TID and MID.	No	No	Yes	Yes	Concepts are incorporated into the proposed program, which would include water transfers with TID and MID for a supplemental drought supply. See Chapter 3, Program Description, Section 3.6, Proposed Water Supply Sources, and the Modified Alternative, analyzed in Section 9.2, considers water transfers from other agencies.
Water transfers.	No	No	Yes	Yes	
Different combinations of water sources.	No	No	Yes	Yes	Concept is incorporated into the proposed program, which would augment existing supply sources with conservation, recycled water, and groundwater projects in San Francisco; water transfers with TID and MID; and conjunctive-use program in northern San Mateo County. See Chapter 3, Section 3.6, Proposed Water Supply Sources, and analysis in Chapter 5. The concept is also incorporated into the No Purchase Request Increase and Aggressive Conservation/Water Recycling and Local Groundwater Alternatives analyzed in Section 9.2 as well as WSIP Variant 2 – Regional Desalination for Drought, analyzed in Chapter 8.
Urban stormwater.	No	No	No	No	Concept does not meet any of the basic program objectives – eliminated from further consideration and not discussed further in this PEIR. This concept is considered under one component of the Groundwater Projects (SF-2) to use treated urban stormwater to maintain water levels in Lake Merced as well as under the Recycled Water Projects (SF-3), since San Francisco's combined sewer system captures urban stormwater which would be treated as part of the recycled water. This concept alone would not be sufficient to meet the delivery reliability or water supply objectives.
Other Concepts					
No Program.	No	No	No	No	Concept does not meet any of the basic program objectives but is further analyzed in Section 9.2 as required by CEQA.
Meet only seismic and water quality objectives.	Yes	Yes	No	No	Concept is further developed under the No Purchase Request Increase Alternative and analyzed in Section 9.2.

TABLE 9-14 (Continued)
ALTERNATIVE CONCEPTS RAISED DURING PEIR SCOPING PROCESS AND PRELIMINARY SCREENING

Alternative Concept	Does the Concept Meet the WSIP Objective and Level of Service in the following areas?				Preliminary Screening
	Water Quality	Seismic Reliability	Delivery Reliability	Water Supply	
Other Concepts (cont.)					
Meet only sustainability objective / Provide projects that meet the sustainability objective.	No	No	No	No	Concept does not meet any of the basic program objectives – eliminated from further consideration and not discussed further in this PEIR. However, the SFPUC would meet the sustainability objective through implementation of mitigation measures incorporated into the WSIP. This concept is being implemented through the SFPUC's Watershed and Environmental Improvement Program, described in Chapter 3, Section 3.12, as well as through the Alameda and Peninsula Watershed Management Plans.
Meet goals and objectives without a gravity-driven system.	Not defined	Not defined	Not defined	Not defined	Concept is not sufficiently defined to determine if it could meet program objectives or for it to be analyzed. At a minimum, if any alternative to the WSIP were developed that relied on pumping rather than gravity to convey water supplies from the Sierra to San Francisco, it would result in greater long-term air quality and energy impacts than the WSIP, without reducing any impacts of the WSIP. It would also require construction of additional pumping and transmission facilities, resulting in additional construction impacts. Therefore, this concept is eliminated from further consideration and is not discussed further in this PEIR.
Reduce regional per capita daily consumption / Do not fully meet all of the 2030 customer purchase requests.	Not defined	Not defined	Not defined	Not defined	Concept is further developed under No Purchase Request Increase Alternative and analyzed in Section 9.2.
Alternative rationing objectives / scenarios.	No	No	No	No	Concept alone does not meet any of the basic program objectives. However, an alternative rationing objective is developed under Variant 3, 10% Rationing, and analyzed in Chapter 8. In addition, the No Program Alternative does not define a maximum drought rationing policy, but the analysis in Section 9.2 assumes incidental rationing up to 30 percent.
Provide watershed and fish-passage projects aimed at improving habitat and restoring steelhead in the Pilarcitos Creek watershed, such as through the removal or bypass of Old Stone Dam.	No	No	No	No	Concept does not meet any of the basic program objectives – eliminated from further consideration and not discussed further in this PEIR. This concept is being considered under the SFPUC's Watershed and Environmental Improvement Program, described in Chapter 3, Section 3.12.

project objectives *and* avoid or lessen the impacts of the proposed project), or (c) they are not considered feasible to implement. However, it should be noted that SFPUC decision-makers will ultimately determine whether an alternative is feasible or infeasible at the time of program approval. At that time, decision-makers may consider, among other things, whether the alternatives are desirable from a public policy standpoint in light of the program's objectives and whether they provide a reasonable balance of relevant economic, environmental, social, and technological factors.

Strategies/Concepts that Affect Facilities and Could Reduce Facilities Impacts

Reduce the Number and/or Extent of Facility Improvement Projects

The concept of reducing the number or extent of facility improvement projects implemented as part of the WSIP is addressed under the No Program Alternative. This strategy might avoid or lessen the significant construction effects of individual and/or multiple WSIP projects (such as short-term construction traffic, noise, air quality) and still meet most of the WSIP objectives to some degree, depending on which projects would be removed from the WSIP. However, the SFPUC has a limited ability to reduce the number of facility projects and/or the extent of work proposed as part of the WSIP. Each of the proposed facility improvement projects is an important part of repairing and upgrading the regional system, and all of the projects are needed to assure the program objectives can be met. The No Program Alternative describes the effects of a greatly reduced facilities improvement program. Under this alternative, the SFPUC would still proceed with certain projects in order to comply with future water quality regulations. The No Program Alternative, which is discussed in more detail in Section 9.2, assumes that at least five projects required for current regulatory compliance would be implemented in the near term by the SFPUC, even if the SFPUC did not approve the entire program considered in this PEIR. While the No Program Alternative would reduce overall construction impacts, including avoiding some PSU impacts, this alternative would fail to meet the WSIP level of service goals for seismic, delivery, and water supply reliability.

Among the remaining WSIP PEIR projects (beyond those required for immediate regulatory compliance), the SFPUC has determined that all are critical to achieving the WSIP level of service goals. As shown in Chapter 3, Table 3.10, each of the WSIP projects would be required in order to meet some combination of the water quality, seismic reliability, delivery reliability, water supply, and sustainability objectives. The SFPUC has identified most of the WSIP projects as *key* projects for seismic and/or delivery reliability (SFPUC, 2006), but a few projects not listed as key still represent needed facilities that are critical for long-term maintenance and asset management, such as the Pulgas Balancing Reservoir project (PN-5). It might be possible to delay the few maintenance projects not identified as key, but they would ultimately be needed to ensure responsible and adequate maintenance of the system, or, if deferred too long, would possibly have to be conducted as emergency repair projects.

In some cases, a WSIP project would definitively have a significant unavoidable impact, such as the New Irvington Tunnel project (SV-4), even at this programmatic level of environmental review. Potentially significant, unavoidable impacts related to land use, visual quality, historic

resources, and construction noise were identified for individual WSIP projects, but the only clear strategy to avoiding or substantially reducing the significant and unavoidable construction and siting effects would be to not implement those projects. However, this strategy would not be reasonable. As described above, each of the WSIP projects is needed to meet the proposed level of service goals, and those that are not urgent in terms of regulatory or public safety concerns would still be needed for long-term maintenance and asset management of the regional system.

Since all of the projects would eventually be required, delaying implementation of any one project would only defer rather than avoid the identified construction effects. Eliminating the few maintenance-type projects would not substantially reduce the overall construction impacts of the multiple-project WSIP and could potentially prolong the construction impacts. As a result, this PEIR does not evaluate a "reduced project" alternative beyond that represented by the No Program Alternative.

Phase/Extend the WSIP Construction Schedule

Phasing or extending the WSIP construction schedule so that fewer projects, especially those with geographic overlap, would occur concurrently is one approach that could lessen the collective regional and multi-regional impacts associated with multiple WSIP projects. However, this concept would prolong the duration of construction impacts as a trade-off for reducing impact intensity, which is not considered effective as an alternative to avoid or substantially lessen impacts associated multiple and overlapping construction projects. Therefore, this concept was eliminated from further consideration, as discussed in Section 9.5, below. To some degree, like the refinement of site and facility layouts (see immediately below), the feasibility of minimizing impacts due to concurrent construction of projects in the same geographic area would be examined as part of project-level environmental review. Detailed siting studies and construction requirements for each facility would be needed to identify further opportunities to avoid or minimize these environmental effects, and site-specific evaluations will be conducted as part of project-level CEQA review of each WSIP project. When more project-specific information becomes available, it is expected that the SFPUC would coordinate the phasing of construction schedules to minimize impacts where feasible. These project-specific issues are not evaluated in this PEIR, since these actions affect individual groups of projects only and not the WSIP as a whole and would be best addressed during project-level CEQA review. No further analysis in this PEIR is warranted.

Refine Project Site Selection or Facility Layouts

Refining the individual project site selection and/or the facility layout designs could avoid or minimize impacts on sensitive resources (e.g., biological resources, cultural resources, land use, or agricultural lands) associated with construction of individual facility improvement projects. This concept is deferred to the project-level environmental review of individual WSIP projects and was eliminated from further consideration in the PEIR.

A strategy to avoid or lessen footprint impacts associated with siting a project at a specific location would be to revise and refine individual site selection and/or facility layout designs. As this is a program EIR that provides a program-level review of the overall WSIP, detailed project

siting and layout information, while in development, is not yet available for many WSIP projects. In most cases, the proposed facility improvement projects would be constructed on existing SFPUC property, at or adjacent to existing water system facilities. This basic siting approach has helped reduce the potential footprint effects of the proposed projects, but detailed siting and design studies for each facility would be needed to identify further opportunities to avoid or minimize these environmental effects. Site-specific evaluations will be conducted as part of project-level CEQA review of each WSIP project. During detailed project design and subsequent CEQA review, facility siting and layout designs will be considered. Where appropriate, project-level CEQA review will consider site and design alternatives to avoid or lessen the effects of individual projects. These specific site alternatives are not evaluated in this PEIR, since these actions affect individual projects only and not the WSIP as a whole. In addition, the SFPUC's construction measures along with the mitigation measures identified in this PEIR establish procedures and performance measures to be implemented during siting and design of WSIP projects to minimize environmental impacts where feasible. Therefore, alternatives and refinements to individual site selection would be best addressed during project-level CEQA review. No further analysis in this PEIR is warranted.

Strategies/Concepts that Affect Facilities and Could Reduce Water Supply Impacts

Enlarge Calaveras Reservoir

Enlarging Calaveras Reservoir to increase storage beyond the historical capacity could result in the capture of more water within the upper Alameda Creek watershed and could increase local water supplies. This concept also included the potential to provide pumping facilities and to store Tuolumne River water in an enlarged Calaveras Reservoir, thereby increasing local storage for use during droughts, planned or unplanned outages, or other emergencies. However, this concept would not avoid or reduce identified environmental effects associated with increased diversions from the Tuolumne River and would result in more severe environmental impacts on Alameda Creek than the proposed program; therefore, this concept was eliminated from further consideration, as discussed in Section 9.5, below.

Connect Cherry Creek Directly to Regional Water System

The Cherry Creek water supply could be connected directly to the regional water system by building a pump station downstream of Holm Powerhouse to pump water from Cherry Creek to Mountain Tunnel; this would augment supplies to the regional system to serve increased customer demand instead of increasing diversions from Hetch Hetchy Reservoir. However, this concept was eliminated from further consideration because it would result in far greater environmental effects than the proposed program, as discussed in Section 9.5, below.

Expand Downstream and Off-stream Storage

Expanding downstream and off-stream storage within the regional system could possibly augment regional system supplies to help meet increased customer demand. The SFPUC has a limited ability to develop or expand storage within the existing system beyond the facility improvement projects already incorporated into the WSIP, which are designed to restore

historical storage capacity rather than expand storage (i.e., Calaveras Dam, SV-2, and Lower Crystal Springs Dam, PN-4). The concept to expand storage is incorporated into other strategies discussed below, including Enlarge Calaveras Reservoir and Recapture Upper Alameda Creek Flows Downstream, using the infiltration galleries, quarries, or Alameda County Water District (ACWD) facilities. Both concepts were eliminated from further consideration due to institutional constraints or technical infeasibility, as discussed below in Section 9.5.

Strategies/Concepts that Affect System Operations and Could Reduce System Operations Impacts

Revise Alameda Creek Diversion Dam Operations

This concept involves not resuming historical levels of diversions from Alameda Creek above the diversion dam to Calaveras Reservoir after Calaveras Dam is restored. However, this concept was eliminated from further consideration since it would not meet two fundamental WSIP objectives—water supply and delivery reliability—and would make the system more vulnerable to water supply shortages in the event of drought or Hetch Hetchy system emergency outages because Alameda Creek is a local water supply source. This concept could affect the CCSF's water rights to Alameda Creek drainage, as discussed in Section 9.5, below.

Recapture Upper Alameda Creek Flows Downstream

This concept involves not resuming the historical pattern of diversions from Alameda Creek above the diversion dam to Calaveras Reservoir, recapturing the flows downstream from the potentially affected resources, and pumping the recaptured water to the regional system. The SFPUC explored the possibility of recapturing flows downstream at the Sunol infiltration galleries, the quarries, and ACWD facilities. This concept was eliminated from further consideration because of technical infeasibility, as discussed in Section 9.5, below.

Strategies/Concepts that Affect Water Supply Sources and Could Reduce Water Supply Impacts

Both Tables 9-13 and 9-14 indicate that alternative water supply sources would be a possible strategy to meet future purchase requests and to reduce identified impacts of the WSIP. Possible water supply sources shown in these tables include increased conservation (i.e., demand management), increased water recycling, local and regional groundwater, desalination, Delta groundwater banking/conjunctive use, and interties with other agencies. Conservation, increased water recycling, local groundwater, and desalination are incorporated into alternatives discussed and analyzed in Section 9.2. The overall approach of other water supply sources reviewed are discussed below.

As described in Chapter 3, Section 3.4, the SFPUC has conducted numerous water supply studies over the last 20 years to explore strategies and options for meeting future water purchase requests and dry-year water supply reliability needs. These studies have considered a broad range of water supply alternatives. Appendix C of the *Water Supply Options* report (SFPUC, 2007b), referred to as the WSIP Option 3 study, reviewed three previous water supply reports that considered among

them a total of 28 potential water supply alternative projects to meet the growing water supply needs for the SFPUC system:

- *Alternative Means of Providing Additional Water to the San Francisco Water Department* (Kennedy/Jenks Engineers, 1986) – 12 alternatives evaluated.
- *Water Supply Master Plan* (SFPUC, 2000) – 19 alternatives evaluated.
- *Bay Area Water Quality and Supply Reliability Program – Final Report* (CDM, 2005) – Seven Bay Area water agencies evaluated potential regional projects for improvement of water quality and water supply reliability. A set of 69 concepts was screened, 35 of which were selected for further evaluation.

For the WSIP Option 3 study, the SFPUC screened numerous alternatives identified in previous studies for compatibility with the current WSIP goals and levels of service performance objectives. Alternative water supply sources considered include the following: Sacramento–San Joaquin Delta, direct purchase from neighboring water agencies, desalination of seawater or brackish water, recycled water, and water conservation. In addition, the SFPUC evaluated alternative locations for future Tuolumne River diversions (one location is discussed in Section 9.2). Conservation and water recycling options were addressed separately as part of the WSIP planning process (discussed in Section 9.2.4). The 28 alternative concepts were evaluated for the following major issues:

- Environmental issues – major impacts that have a high risk of not being resolved
- Institutional issues – contractual, jurisdiction authority issues or other permitting requirements that have a high risk of not being resolved
- Operational issues – perceived operation problems, either with the SFPUC system or state/federal water systems, that have a high risk of not being resolved
- Water quality issues – water treatment issues that have a high risk of requiring costly treatment or incurring unnecessary health risks

In addition, the SFPUC's initial screening process considered the following criteria specifically related to its system needs and WSIP level of service goals:

1. Secure a reliable and sustainable 25-mgd supplemental water supply.
2. No additional flows to be diverted from the Tuolumne River above historical levels; however, for this study, additional Tuolumne River diversions could be considered at the downstream end of the lower Tuolumne River near the confluence with the San Joaquin River.
3. Corollary to Criterion 2, no additional infrastructure requirements beyond the those of the proposed program (such as a complete fourth San Joaquin Pipeline extending from Oakdale Portal to Tesla Portal or second Coast Range Tunnel).
4. Maintain "filtration avoidance" for water diverted from Hetch Hetchy Reservoir.

The SFPUC's initial screening process identified 10 alternative concepts for further evaluation. Some of these concepts represented variations rather than distinct alternatives. After further review of the remaining 10 alternative concepts, the SFPUC selected three alternatives for more in-depth evaluation: Lower Tuolumne River Diversion, Oceanside Seawater Desalination Plant, and Delta Diversion. The first two are discussed and analyzed in Sections 9.2.5 and 9.2.6, respectively, as potential CEQA alternatives. The last one, Delta Diversion, was considered and rejected as a CEQA alternative, as discussed below. The list below also includes other water sources that were reviewed or suggested during scoping as possible supplemental supplies during nondrought or drought years, but were rejected from further consideration.

Additional Intertie with Santa Clara Valley Water District

The SFPUC investigated several alternatives for an exchange or transfer with the Santa Clara Valley Water District (SCVWD) as part of the WSIP background studies exploring regional water supply opportunities. The SFPUC and SCVWD explored options using the existing intertie, a new intertie, or exchanges through delivery to the eight customers in common to both the SCVWD and SFPUC. This concept was eliminated from further consideration, as described in more detail in Section 9.5, because it would not provide a dependable future water source for the SFPUC regional system. However, the SFPUC considered this concept in combination with supplemental water supply sources, including Groundwater Banking in Kern County and Delta Exchange, as discussed below.

Groundwater Banking in Kern County

As described in Chapter 3, Section 3.4, the SFPUC explored storage in the Semitropic Water Storage District's groundwater bank near Bakersfield as a possible dry-year water supply. Under this option, during wet years, the SFPUC would deliver Tuolumne River water to the Semitropic groundwater bank using the California Aqueduct and, in dry years, would receive water through the Semitropic Water Storage District's allocations of water from the State Water Project via the Delta and South Bay Aqueduct. Direct participation by the SFPUC in this type of water banking program was determined to pose a significant risk of violation of the Raker Act, and this option was therefore eliminated from further consideration, as described further in Section 9.5. The SFPUC also considered indirect participation in this program through current Bay Area partners, including the SCVWD, Alameda County Flood Control and Water Conservation District Zone 7, and ACWD via Delta exchange, but this was determined to be infeasible, as described in Section 9.5.

Delta Exchange

The SFPUC evaluated various alternatives for exchanging water from the SFPUC regional water system for Delta water. It considered the three Bay Area water agencies that are (1) State Water Project contractors receiving Delta water, and (2) agencies to which a means for transferring SFPUC regional water system supplies was identified. The SFPUC, in collaboration with the three potentially participating agencies (ACWD, Zone 7, and SCVWD), determined that this concept is not technically feasible due to timing and capacity issues, as described below in Section 9.5.

Delta Diversion

The SFPUC explored using diversions from the Delta as a supplemental water source. This scenario would involve the following: purchasing water from a water-right holder in the Delta and/or on one of the rivers tributary to the Delta; transporting the water via the State Water Project or Central Valley Project conveyance facilities to the regional system; treating the water at a new treatment plant at Tesla Portal; and blending the treated Delta supply with the Hetch Hetchy supply in the Coast Range Tunnel. This concept was eliminated from further consideration due to uncertainties regarding the availability of water supplies and pumping capacities (which would make consistent year-round diversions highly unlikely), potential water quality issues, and the significant increase in adverse environmental impacts from facility construction and on Delta resources, as discussed in Section 9.5.

Purchase Groundwater Storage Rights in Foothills East of and Outside of MID/Central Valley

This concept was raised during the public scoping period. The SFPUC has not explored this concept because of the limited information on the infiltration rates and potential groundwater quality issues in this basin as well as potential institutional issues. Therefore, due to technical infeasibility, this concept was eliminated from further consideration as a strategy to incorporate into a CEQA alternative, as discussed further in Section 9.5.

9.5 Alternative Concepts Considered But Rejected

9.5.1 Rejected Strategies/Concepts that Affect SFPUC Facilities

Phase/Extend the WSIP Construction Schedule

Phasing or extending the WSIP construction schedule so that fewer projects, especially those with geographic overlap, would occur concurrently is one approach that could lessen the collective regional and multi-regional impacts associated with construction of multiple WSIP projects. However, this concept was eliminated from further consideration, as discussed below.

The SFPUC has a limited ability to revise the phasing or to extend the proposed WSIP multi-project construction schedule. Critical to the phasing of the construction activities is the ability to maintain full service to customers throughout the entire WSIP construction schedule. Certain projects must be completed in the appropriate sequence to provide ongoing service. In addition, the construction of many of the projects requires certain linkages, which necessarily involve overlapping construction activities and schedules between some projects; this overlap would in fact reduce the duration of construction disturbance at some locations.

As described previously, many of the proposed facility improvement projects are urgent in order to meet public health requirements and water quality objectives as well as key to achieving the seismic and delivery reliability level of service goals. As a result, these projects cannot be delayed without compromising the fundamental WSIP goals and objectives and possibly

jeopardizing public health and safety. In addition, lengthening the overall WSIP construction schedule might reduce the intensity of construction impacts from multiple projects in some areas but would, conversely, increase the duration of these impacts as projects are constructed sequentially rather than concurrently. Because phasing project schedules and extending overall construction would trade potential impact intensity for impact duration, this strategy is not considered effective as an alternative to avoid or substantially lessen impacts associated with multiple and overlapping construction projects. Therefore, the concepts of either revising the phasing of the WSIP construction or extending the construction schedule were eliminated from further consideration.

Enlarge Calaveras Reservoir

Enlarging Calaveras Reservoir to increase storage beyond the historical capacity would capture more water within the upper Alameda Creek watershed and could increase local water supplies. This concept also included the potential to provide pumping facilities and to store Tuolumne River water in an enlarged Calaveras Reservoir, thereby increasing local storage for use during droughts, planned or unplanned outages, or other emergencies. However, this concept would not avoid or reduce identified environmental effects associated with increased diversions from the Tuolumne River and would result in more severe environmental impacts on Alameda Creek than the proposed program; therefore, this concept was eliminated from further consideration, as discussed below.

As part of the development of the WSIP, the SFPUC considered an alternative under which Calaveras Reservoir would be enlarged from its historical capacity of 98,800 acre-feet to 256,000 or 409,000 acre-feet. An enlarged Calaveras Reservoir would enable the SFPUC to capture more water from the Alameda Creek watershed and to store more Tuolumne River water in the Bay Area. This alternative would increase the firm yield of the regional water system.

The SFPUC rejected this concept because of uncertainties about the ability to obtain the necessary water rights and environmental permits within the timeframe needed to replace Calaveras Dam to satisfy DSOD requirements. In 2002, the DSOD imposed interim restrictions on Calaveras Dam operations, with the caveat that the SFPUC continue to pursue an aggressive schedule for the remediation of Calaveras Dam. The Calaveras Dam project (SV-2), proposed as a part of the WSIP, includes design features that would technically allow the dam to be raised in the future and the reservoir capacity to be increased if needed, and water-rights and environmental issues can be resolved at that time.

As a potential CEQA alternative, enlarging Calaveras Reservoir to store more than its original 98,800 acre-feet would not help avoid or lessen the effects to the WSIP. It would not reduce the levels of Tuolumne River diversions, if the proposal includes pumping facilities to store Tuolumne River supplies in Calaveras Reservoir. Alternatively, it could replace that supply in whole or in part with increased diversions from upper Alameda Creek, Arroyo Hondo, and Calaveras Creek. This concept would allow increased diversions from upper Alameda Creek through the Alameda Creek Diversion Tunnel compared to the proposed program, which would exacerbate the identified significant, unavoidable impact on stream flow in Alameda Creek below

the diversion dam as well as worsen the potentially significant impact on fishery resources in this reach of Alameda Creek. Therefore, the alternative of enlarging Calaveras Reservoir beyond its historical capacity was eliminated from further consideration in this PEIR.

Connect Cherry Creek Directly to Regional Water System

The Cherry Creek water supply could be connected directly to the regional water system by building a pump station downstream of Holm Powerhouse to pump water from Cherry Creek to Mountain Tunnel; this would augment supplies to the regional system to serve increased customer demand instead of increasing diversions from Hetch Hetchy Reservoir. However, this concept was eliminated from further consideration because it would result in far greater environmental effects than the proposed program, as discussed below.

This concept would use Cherry Creek to augment the regional water supply sources. It could consist of a pump station downstream of Holm Powerhouse to pump water from Cherry Creek to Mountain Tunnel or, alternatively, could consist of a larger intertie to Cherry Creek and Lake Lloyd (Cherry Reservoir) to Mountain Tunnel. This concept would avoid impacts on sensitive terrestrial biological resources downstream of O'Shaughnessy Dam, such as those in the Poopenaut Valley.

To meet federal and state water quality requirements, this concept would necessitate the construction of a filtration plant, since—unlike the Hetch Hetchy watershed—the Cherry Creek watershed does not meet filtration avoidance criteria (see Chapter 2, Section 2.4). This concept would require either filtration of the Cherry Creek source water prior to blending with Hetch Hetchy water in Mountain Tunnel, or filtration of the entire Hetch Hetchy supply after blending with the Cherry Creek water. In either case, construction of a filtration plant would result in numerous additional construction and operational environmental impacts that would not occur under the proposed program. Increased use of Cherry Creek water supplies to serve customer demand would reduce flows available for whitewater rafting. Furthermore, the concept would be contrary to the fundamental operating principle of maintaining filtration avoidance for the Hetch Hetchy system. Therefore, since this concept would not effectively avoid or substantially lessen WSIP impacts without also resulting in a number of other potentially significant environmental impacts, it was eliminated from further consideration.

9.5.2 Rejected Strategies/Concepts that Affect System Operations

Filtration of Sierra Source Water

During scoping, the suggestion was raised to expand the filtration capacity in the SFPUC system and/or to explore alternative locations for necessary filtration equipment, including locating facilities at Brown Adit or Moccasin, or expanding capacity at the Sunol Valley WTP. As a stand-alone alternative, this concept would not meet any of the basic program objectives, would not avoid or lessen any of the impacts of the WSIP, and would result in adverse construction and operational impacts. As described in Chapter 2, the existing quality of Hetch Hetchy water meets

the full requirements of the state and federal Safe Drinking Water Acts, and the water can be consumed without the need for filtration. Therefore, this concept as a stand-alone alternative was eliminated from further consideration.

This suggestion was likely posed in combination with the concept of removing O'Shaughnessy Dam and restoring the Hetch Hetchy Valley. That concept was rejected since it would neither meet any of the program objectives nor avoid or lessen the significance of any of the WSIP impacts, as discussed below in Section 9.5.4.

Revise Alameda Creek Diversion Dam Operations

This concept would involve not resuming historical levels of diversions from Alameda Creek above the diversion dam to Calaveras Reservoir after Calaveras Dam is restored under the WSIP. However, this concept was eliminated from further consideration since it would not meet two fundamental WSIP objectives, would result in the loss of an irreplaceable local source of water needed during droughts and Hetch Hetchy water quality events, and could affect the CCSF's water rights to Alameda Creek drainage.

As discussed in Section 5.4, the WSIP would result in some significant impacts on the Alameda Creek system and its related environmental resources. Most notably, these impacts include a significant and unavoidable reduction of stream flow in Alameda Creek in the reach below the diversion dam to the confluence with Calaveras Creek, and a significant but mitigable effect on the resident trout fishery in this reach. Since the DSOD restricted the storage capacity of Calaveras Reservoir, the SFPUC has substantially reduced the amount of water it routinely diverts each year from Alameda Creek at the diversion dam. This concept would involve proceeding with implementation of the Calaveras Dam project (SV-2), as required by the DSOD, and allowing the reservoir to resume its historical capacity; however, the Alameda Creek Diversion Tunnel would remain as currently managed and would not resume the operations in existence prior to the DSOD restriction. This concept would avoid the significant, unavoidable impact on the hydrology of Alameda Creek below the diversion dam and maintain stream flow in Alameda Creek equivalent to 2005 conditions.

However, this concept would effectively eliminate Alameda Creek drainage as a local water supply source, and only Arroyo Hondo and Calaveras Creek would drain to Calaveras Reservoir. Alameda Creek drainage to Calaveras Reservoir, under historical operating conditions, represents about one-third of the reservoir's capacity and loss of this supply would constitute a substantial reduction in the regional system's total water supply. Without the contribution of Alameda Creek to the total supply, the SFPUC would be unable to meet the delivery reliability and water supply objectives without securing a replacement water supply. Most importantly, under this concept, the regional system would be more vulnerable to water supply shortages in the event of drought or other emergency, since Alameda Creek is a local water supply source. The need for this supply is especially acute during droughts and Hetch Hetchy system emergency outages. This local supply plays a critical role in providing delivery and water supply reliability and cannot be fulfilled through nonlocal supplies (such as the Tuolumne River or the Delta), since it provides local Bay Area storage within the regional water system in proximity to customers. In addition, this concept

could possibly jeopardize the CCSF's pre-1914 appropriative water rights for this supply. Therefore, this concept was eliminated from further consideration.

Recapture Upper Alameda Creek Flows Downstream

This concept involves not resuming the historical pattern of diversions from Alameda Creek above the diversion dam to Calaveras Reservoir, recapturing the flows downstream from the potentially affected resources, and pumping the recaptured water to the regional system. This concept was eliminated from further consideration because of technical infeasibility, as discussed below.

This concept is similar to the previous concept in that it would avoid the significant, unavoidable impact associated with the reduction in stream flow in Alameda Creek below the diversion dam (by not resuming historical operation of the Alameda Creek Diversion Tunnel) and would maintain current stream flow patterns below the diversion dam. However, under this concept, stream flow equivalent to the volume normally diverted to Calaveras Reservoir would be recaptured farther downstream in the creek and then returned to the regional water system. This approach would allow the SFPUC to retain its local water supply source available for use during droughts, Hetch Hetchy water quality events, and other emergency situations.

The SFPUC explored the possibility of recapturing flows downstream at the Sunol infiltration galleries, the quarries, and ACWD facilities, with a focus on recapturing high winter flows rather than low-volume summer releases (SFPUC, 2007a). (The infiltration galleries are described in Section 5.4.4, and the quarries and ACWD facilities are described in Section 5.7.3.) All of these options were determined to be technically infeasible due to physical limitations, as described below. In addition, implementation of any of these concepts would require extensive new construction in sensitive habitats and would result in a host of additional potentially adverse environmental effects. Furthermore, this concept would only avoid the significant, unavoidable impact for the reach of the creek from the Alameda Creek Diversion Dam to the infiltration galleries/quarries/ACWD facilities, but a significant, unavoidable impact on stream flow in the creek below these facilities would remain.

The Sunol infiltration galleries, built in 1901, were designed to intercept surface water from Alameda Creek into the shallow alluvium of the Sunol Valley and provide a location for temporary aquifer recharge and recovery. Historically, the SFPUC (and its predecessors) operated the Sunol infiltration galleries to divert peak flood flows, to divert releases from Calaveras Reservoir, to divert releases of Hetch Hetchy water to Alameda Creek, and to divert flows from Pleasanton/Arroyo de la Laguna; up to 50 to 60 mgd of water was historically diverted at the infiltration galleries. Use of the galleries historically required installation of seasonal gravel dams to improve percolation rates into the galleries. However, following construction of the Calaveras Pipeline in 1934, and again following construction of San Antonio Dam in 1965, the yield of the infiltration galleries declined. The current capacity of the galleries has been further reduced due to the demolition of Sunol Dam and by aggregate mining upstream. Therefore, it is unknown whether it would be feasible to use the infiltration galleries to capture the flows from upper Alameda Creek that were diverted to Calaveras Reservoir prior to the DSOD restriction. The

physical hydrogeology of the Alameda Creek and groundwater system has altered since the infiltration galleries were used, and it is likely that extensive upstream facilities would be required. This concept would then result in a number of potentially adverse environmental effects downstream of the diversion dam associated with placing new facilities in a sensitive habitat. Due to the extent of additional impacts and unknown feasibility, as well as the limited reduction in adverse effects, use of the infiltration galleries was eliminated from further consideration.

Diversion of Alameda Creek flows to the quarries currently located in the Sunol Valley might be possible when a limited amount of water storage space (approximately 14,000 acre-feet) becomes available at one of the lease sites along the bank of Alameda Creek between Interstate 680 and San Antonio Creek. This diversion would require a surface impounding structure (i.e., a rubber dam) and would also have to be screened to prevent fish entrainment. Use of the quarries for water storage would also require extensive modification of the site. Due to the extent of additional impacts and unknown feasibility, as well as the limited reduction in adverse effects, use of the quarries was eliminated from further consideration.

Similarly, use of ACWD's existing downstream facilities to recapture flows from upper Alameda Creek would be questionably feasible. Flows are currently diverted into streamside intakes behind two rubber dams, and, during the winter, the ACWD must lower its rubber dams if flows exceed 200 cubic feet per second. It may not be feasible to capture additional high winter flows from upper Alameda Creek. Due to the extent of additional impacts and unknown feasibility, as well as the limited reduction in adverse effects, use of ACWD facilities was eliminated from further consideration.

9.5.3 Rejected Strategies/Concepts that Affect Water Supply Sources

Additional Intertie with Santa Clara Valley Water District

As described in Chapter 2, the existing SFPUC intertie with the SCVWD has a capacity of 40 mgd and serves as a means to transfer water between the SFPUC and SCVWD during an emergency or during periods of planned maintenance work on critical facilities. The SFPUC investigated several alternatives for an exchange or transfer with the SCVWD as part of the WSIP background studies exploring regional water supply opportunities. The SFPUC and SCVWD explored options using the existing intertie, a new intertie, or exchanges through delivery to the eight customers in common to both the SCVWD and SFPUC. In general, an exchange would involve the SFPUC advancing water in wet years to the SCVWD in exchange for supplies from the SCVWD in dry years. However, it was determined that the SCVWD does not have capacity or need for additional water supplies during wet years. At times when the SFPUC has additional supplies available for delivery to the SCVWD, the SCVWD cannot use the water directly or store it. Additionally, the SCVWD does not have excess water to transfer to the SFPUC in normal or dry years.

Thus, this intertie or any additional intertie with the SCVWD alone would not provide a dependable future water source for the SFPUC regional system, since the SCVWD is faced with similar water supply issues as the SFPUC due to its projected increase in demand and limited water supply sources. However, the SFPUC considered this concept in combination with supplemental water supply sources, including Groundwater Banking in Kern County and Delta Exchange, as discussed below.

Groundwater Banking in Kern County

Hundreds of feet of permeable geologic strata underlie the southern end of the San Joaquin Valley, creating favorable conditions for groundwater storage and recovery. Water applied to the floor of the San Joaquin Valley in Kern County rapidly percolates into the ground and can be readily recovered by pumping from existing groundwater wells.

For many years, water agencies in Kern County have practiced conjunctive use of their surface and groundwater sources; that is, they actively manage their surface and groundwater sources to take advantage of the different characteristics of the two types of water sources. The availability of surface water supplies varies greatly from year to year, but the availability of groundwater supplies typically does not. When surface water is abundant, water agencies supply their customers with surface water and percolate the excess into the ground. When surface water is scarce, water agencies in Kern County supply their customers with groundwater.

Until about 10 years ago, water agencies in Kern County managed the groundwater basin underlying the San Joaquin Valley portion of Kern County exclusively for their own benefit. In 1994, the first of several water banking projects designed to benefit water agencies outside of Kern County came into operation. The Semitropic Water Storage District (Semitropic) provides groundwater storage capacity to multiple partners, including the Metropolitan Water District of Southern California, ACWD, Zone 7, and SCVWD. The total storage capacity of the Phase I basin is nearly 1 million acre-feet. Semitropic has been pursuing development of a Phase II basin (referred to as the "New Unit") with 650,000 acre-feet of new storage capacity. The project is operated as a storage bank; during wet periods, when the project partners do not need all of their water from the State Water Project or other Delta sources to meet current needs, it places the excess in storage in Semitropic's groundwater bank in Kern County. In dry periods, the project partners expect to recover water from the groundwater bank, either through groundwater extraction or Semitropic's Delta entitlements, to supplement their other supplies.

The SFPUC evaluated storing water in the Semitropic groundwater bank in order to increase the firm yield of the regional water system. Specifically, the storage proposal involved an in-lieu groundwater banking concept in which the SFPUC would supply water in non-dry years under its existing Tuolumne River water rights or use another source of non-dry-year supply to irrigators in Semitropic's service area for surface irrigation. In exchange, the farmers would not pump groundwater, which would be credited to the SFPUC's Semitropic groundwater bank account (less the actual losses in delivery, estimated to be 10 percent). When called on by the SFPUC, Semitropic would provide the SFPUC credited amount of water to the California Aqueduct via a proposed New Unit of the Semitropic groundwater bank, which would, in turn, allow the SFPUC

to draw the equal amount of water from the State Water Project South Bay Aqueduct turnout at San Antonio Reservoir or other locations. Finally, other State Water Project contractors located south of Semitropic would use the actual SFPUC banked water delivered by Semitropic.

However, there is uncertainty regarding the ability of the SFPUC to provide water for storage in the Semitropic groundwater bank. The SFPUC determined that there would be a significant risk that conveyance of Hetch Hetchy water to irrigators in the southern San Joaquin Valley would be in violation of the Raker Act, which stipulates that the CCSF not divert any more Hetch Hetchy water beyond the limits of the San Joaquin Valley than is required for its own domestic or municipal purposes. Therefore, due the institutional and legal uncertainties, this option was screened from further consideration.

The SFPUC then evaluated the possibility of purchasing a Delta water supply through a willing seller and delivering it to Semitropic for storage. The SFPUC concluded that delivering a source of Delta water to Semitropic would be subject to extreme competition for pumping capacity, which is already constrained during the winter and spring, the time that excess water is available. Pumping capacity is least constrained during the summer, when there is less water available. In addition to pumping capacity constraints, there may be constraints on the aqueduct capacity required to transport the water south. There may also be capacity issues with the South Bay Aqueduct. Although it appears that summertime capacity is available (when State Water Project deliveries are reduced, which is most likely when the SFPUC would be transporting its return water back), there is no assurance that the SFPUC would have access to that capacity. In addition, the SFPUC would have a lower priority for use of available capacity in the Bank Pumping Facility and in the South Bay Aqueduct than existing State Water Project customers.

In both of the scenarios described above, the SFPUC would receive State Project Water from the Sacramento–San Joaquin Delta in return for the water conveyed to Semitropic. Delta water is of lower quality than Hetch Hetchy water and requires filtration prior to potable use. Use of Delta water during dry periods would create operational difficulties for the SFPUC and would incur substantial additional cost. The SFPUC rejected the alternative of storing water in Semitropic's groundwater bank for a combination of legal, institutional, operational, and cost factors. In an effort to address these issues, the SFPUC also investigated the possibility of participating in Semitropic's groundwater bank through the ACWD, Zone 7, or SCVWD. These options are discussed below under Delta Exchange.

Delta Exchange

The SFPUC evaluated various alternatives for exchanging water from the SFPUC regional water system for Delta water. It considered the three Bay Area water agencies that are (1) State Water Project contractors receiving Delta water, and (2) agencies to which a means for transferring SFPUC regional water system supplies was identified. These three agencies are the ACWD, Zone 7, and SCVWD.

The general concept would be to advance SFPUC regional system water during wet years to the ACWD, Zone 7, or SCVWD via direct connections or interties, or through increased deliveries to

the SFPUC's and SCVWD's common customers to replace demand otherwise met by the SCVWD. This would allow these water agencies to reduce their deliveries from the State Water Project, which could then be stored in Semitropic's groundwater bank (see Groundwater Banking in Kern County, below), used to allow recharge of their local groundwater basins, or use other storage, if available. In dry years, supplies would be returned to the SFPUC either through a reduction in SFPUC demand from SFPUC/SCVWD common customers or through State Water Project deliveries via the State Water Project South Bay Aqueduct turnout at San Antonio Reservoir or other locations.

The SFPUC obtains all of its water from high-quality sources—the Tuolumne River watershed and protected Bay Area watersheds—and therefore is not required to provide the same level of water treatment as water agencies that obtain water from less high-quality sources. It is difficult for the SFPUC to accept lower quality Delta water as a supplementary source of supply during droughts because it is not well equipped to receive, treat, and deliver it to customers. Because the ACWD, Zone 7, and SCVWD already use Delta water, they are better equipped to receive, treat, and deliver it to customers.

The SFPUC, in collaboration with the potentially participating agencies, determined that a Delta Exchange alternative is not technically feasible. The feasibility of this concept is related to the analysis in the discussion above for the Groundwater Banking in Kern County concept. The constraints to feasibility include: (1) inconsistent timing regarding when SFPUC excess water supplies are available and when storage capacity is available; (2) the limited capacity at the State Water Project pumps to move wet-year water to available storage; or (3) the lack of assurance that dry-year supplies could be provided from the State Water Project. These issues are in addition to potential treatment incompatibilities with SFPUC facilities and related water quality issues. Therefore, this concept was eliminated from further consideration.

Delta Diversion

The SFPUC explored using diversions from the Delta as a supplemental water source. This would involve the following: purchasing water from a water-right holder in the Delta and/or on one of the rivers tributary to the Delta; transporting the water via the State Water Project or Central Valley Project conveyance facilities (i.e., the California Aqueduct or the Delta-Mendota Canal) to the regional system; treating the water at a new treatment plant at Tesla Portal; and blending the treated Delta supply with the Hetch Hetchy supply in the Coast Range Tunnel. This concept was eliminated from further consideration due to uncertainties regarding the availability of water supplies and pumping capacities, which would make consistent year-round diversions unlikely, as discussed below.

The SFPUC developed a Delta Diversion alternative and determined that, in addition to construction of all of the WSIP facility improvement projects, a Delta intake and pumping plant, Delta water treatment plant, and associated pipelines would be required. This alternative would be similar in concept to two ideas raised during the scoping period. One included use of the South Bay Aqueduct to convey Delta water directly to San Antonio Reservoir, and the other involved use of the California Aqueduct/Delta-Mendota Canal to convey water to the Hetch Hetchy system.

The SFPUC evaluated the Delta Diversion alternative with respect to water supply availability and reliability from the source; conveyance capacity availability for the Delta supply option; regional water system performance; operations and maintenance requirements; water quality effects; facility siting considerations, including geotechnical, right-of-way, and environmental resources; permitting requirements; and capital, operating, and life-cycle costs. Overall, the SFPUC determined that the feasibility of this alternative would be limited by the availability of Delta water supplies and the pumping capacity of existing State Water Project/Central Valley Project conveyance facilities. In addition, because of numerous institutional and regulatory uncertainties associated with this alternative (largely dependent on how and where the SFPUC would purchase the water), it is unknown if this alternative could achieve the WSIP level of service goals for delivery and water supply reliability. The quality of Delta water supplies would be lower than that of water from the Hetch Hetchy system.

While this alternative could avoid or lessen the impacts on Tuolumne River resources that would occur under the WSIP (as described in Chapter 5), it would result in other, distinct significant environmental impacts on the Delta and associated environmental resources (e.g., fisheries, aquatic habitat and species, riparian habitat, and water quality affecting other beneficial uses). The alternative would substitute one set of significant environmental impacts with another, thus representing trade-offs among environmental resources and impacts without avoiding or necessarily reducing overall environmental impacts.

Regarding impacts associated with facility construction and operation, the Delta Diversion alternative would neither avoid nor lessen the environmental effects that would result from construction and operation of the WSIP facility improvement projects, as all of the key WSIP projects for water quality, seismic reliability, and delivery reliability would still need to be implemented. At the same time, additional facilities beyond those required for the WSIP would need to be constructed and operated. These facilities would be located in a combination of open space, rural settings, and dense urban settings, resulting in a range of additional environmental impacts.

Therefore, since this alternative would have uncertain water supply reliability and an unknown ability to reduce impacts on Tuolumne River resources, as well as significant additional environmental impacts, it was eliminated from further consideration.

Purchase Groundwater Storage Rights in Foothills East of and Outside of MID/Central Valley

As described above in Section 9.4.4, this concept was raised during the public scoping period, but the SFPUC has rejected this concept due to technical infeasibility. The SFPUC did not explore this concept because of the limited information on the infiltration rates in this groundwater basin and potential sources of groundwater quality impairment associated with dibromochloropropane, chlorine, boron, nitrate, iron, and manganese. In addition, there would be institutional issues concerning the SFPUC's ability to use this basin as a drought supply, since the SFPUC would have lowest priority in times of overdraft. Therefore, this concept is not considered as a feasible strategy and was removed from further consideration in this PEIR.

9.5.4 Other Rejected Concepts

Removal of O'Shaughnessy Dam

In 1913, Congress passed and President Woodrow Wilson signed the Raker Act, granting the CCSF the right to dam the Tuolumne River at the mouth of the Hetch Hetchy Valley in Yosemite National Park. O'Shaughnessy Dam was completed in 1923, and water first flowed to the San Francisco Peninsula in 1934.

The decision to permit flooding of the Hetch Hetchy Valley was controversial; when the Raker Act was approved in the Senate, 43 senators voted in favor, 25 were opposed, and 29 abstained (Simpson, 2005). The controversy continues today, and many parties have expressed an interest in removing O'Shaughnessy Dam and restoring the Hetch Hetchy Valley to its condition before the O'Shaughnessy Dam was completed. A number of studies have been performed to determine the feasibility and cost of removing the dam and restoring the valley. Recently, the State of California examined all prior studies and concluded that restoration was feasible, but that the costs would be between $3 and $10 billion (California Department of Water Resources/California Department of Parks and Recreation, 2006).

In 2004, Environmental Defense prepared a planning-level analysis of replacing the water supply and hydropower benefits provided by Hetch Hetchy Reservoir and O'Shaughnessy Dam (Rosekrans et al., 2004). The study was prepared with the objective of restoring the Hetch Hetchy Valley to conditions that existed prior to the construction of O'Shaughnessy Dam; the restored valley would serve as a natural resource available to the public as part of Yosemite National Park. The study proposes alternatives for water storage (such as available storage in New Melones Reservoir), conveyance and treatment, and replacement of lost hydropower, and acknowledges that these alternatives must be in place before restoration of Hetch Hetchy Valley could begin. This study is considered highly speculative in that there are unresolved legal issues inherent in the proposal regarding the Raker Act and the CCSF, TID, and MID water rights, as well as in these water agencies' obligations to their customers.

Regardless of the merits of removing O'Shaughnessy Dam, dam removal is not considered an alternative to the WSIP that must be evaluated to satisfy the requirements of CEQA in this PEIR. 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 would avoid or substantially lessen any significant adverse environmental effects. This proposal is not reasonably related to a reduction or elimination of the significant impacts that would result with implementation of the proposed program, but suggests far greater changes than would be necessary to address any impacts that this proposed program would cause on the Tuolumne River and related resources. To the extent Tuolumne River water continues to be diverted, it is likely to continue to cause or maintain impacts similar to those that resulted from construction of O'Shaughnessy Dam and created the existing condition. 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 likely require increased long-term energy requirements compared to the Hetch Hetchy

system that is gravity-driven and not subject to water filtration requirements. In addition, there would likely be other significant impacts on diversion of Tuolumne River water elsewhere or any other surface water bodies developed to replace any Tuolumne River supply and associated resources.

In addition, removal of O'Shaughnessy Dam would fail to meet any of the WSIP's basic objectives of improving water quality, seismic reliability, delivery reliability, and water supply. The proposal does not attempt to address any of the goals and objectives of the WSIP, but instead suggests a different way to operate the water system without Hetch Hetchy Reservoir. The purpose of the WSIP is to address the inadequacies of the existing system and to provide for reasonably foreseeable future needs. Removal of O'Shaughnessy Dam would require significantly more funding than is available, significant changes in water supply strategy, construction of additional storage and transmission facilities, and operation of a different water system.

This proposal could reduce the existing level of delivery and water supply reliability to regional system customers, since the status and availability of water supplies and transmission methods to replace the existing water system are unknown. Similarly, the proposal would reduce the reliability and jeopardize the power generation facilities associated with O'Shaughnessy Dam, causing impacts on power customers.

Therefore, since this concept does not meet any of the program objectives, nor does it effectively avoid or substantially lessen WSIP impacts without also resulting in a number of other potentially significant environmental impacts, this concept was eliminated from further consideration in this PEIR.

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