



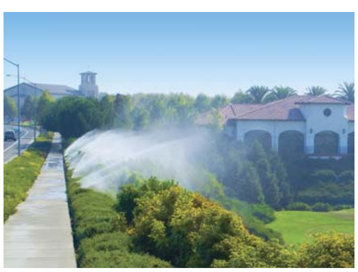


DRAFT

PROGRAM ENVIRONMENTAL IMPACT REPORT

SCH # 2008052006

WSMP 2040

WATER SUPPLY MANAGEMENT PROGRAM 2040

EBMUD

EAST BAY MUNICIPAL UTILITY DISTRICT

FEBRUARY 2009

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for the

WSMP 2040

WATER SUPPLY MANAGEMENT PROGRAM 2040

FEBRUARY 2009

prepared by

EAST BAY MUNICIPAL UTILITY DISTRICT

With assistance from

EDAW | AECOM

in partnership with

RMC

GTC

TOVA

Karen Johnson

Maddaus Water Management

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Table of Contents

List of Figures

List of Tables

Appendices

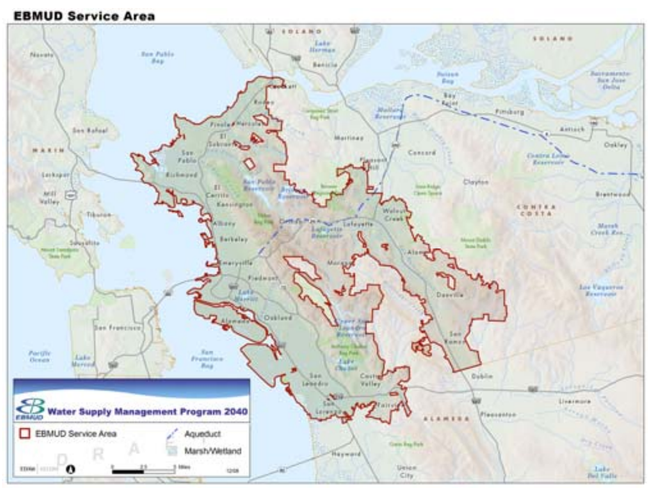
1 EXECUTIVE SUMMARY

1. Executive Summary

This Program Environmental Impact Report (PEIR) evaluates the Water Supply Management Program (WSMP) 2040 proposed by the East Bay Municipal Utility District (EBMUD, or the District).

1.1 Purpose and Need of the WSMP 2040

The WSMP 2040 estimates water supply needs to the year 2040, and proposes a program of policy and project initiatives to meet those needs. The primary purpose of the WSMP 2040 is to identify and recommend solutions to meet dry-year water needs through 2040. The WSMP 2040 advocates performance objectives for EBMUD's water planning (presented in Table 2.1 in Chapter 2), to the benefit of its customers and the environment.



Increased water demand through 2040 by the other water agencies that rely on the Mokelumne Basin for their supply, and expected growth within EBMUD's own service area, coupled with the potential impact(s) climate change could have on watershed yield and customer demand, will increase EBMUD's current inability to rely on existing supplies during drought conditions. Thus, the WSMP 2040 was developed to counteract future dry-year water supply shortages that are likely to occur more frequently. The WSMP 2040 identifies new supplies that would supplement – but not replace – EBMUD's existing water rights and supply from the Mokelumne River.

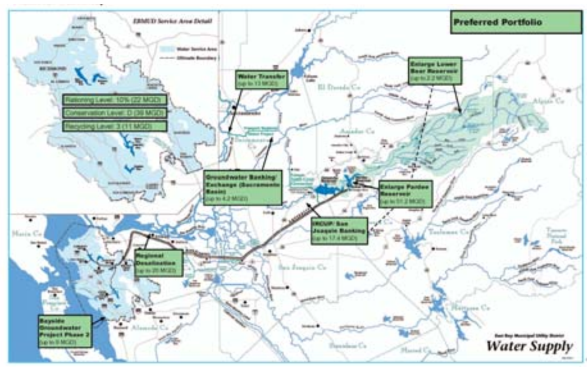
In order to meet water supply needs through 2040, the WSMP 2040 builds upon the foundation of programs and activities created in the process of implementing EBMUD's current WSMP, adopted in 1993.

Further details on the Purpose and Need and the existing EBMUD water supply and system are described in Chapter 2.

1.2 Portfolio Development Process

A range of water supply portfolios were developed for WSMP 2040 to meet the projected future demand. A water supply portfolio consists of a series of related actions in the form of discrete components that would be implemented over time to meet the Need for Water within the EBMUD service area. Several portfolios were considered as alternatives for the overall water supply management program and are presented and analyzed in this PEIR. The development of the Preferred and Alternative Portfolios required detailed evaluation of a wide range of potential dry-year water supply solutions.

The building blocks or components of the proposed WSMP 2040 Preferred and Alternative Portfolios consist of various rationing policies, conservation levels (with conservation elements/programs), recycled water program levels (with project components), and a range of supplemental supply options. Over 50 potential components were initially identified. EBMUD considered many of the components that appeared on the initial list developed for the 1993 WSMP, and revisited several that were previously dismissed as technologically or economically infeasible. The general locations of the components that require new or expanded facilities are shown in Figure 3-1 in Chapter 3. The components were then assembled into 14 distinct water supply portfolios. A thematic approach was used to develop the portfolios to emphasize one or more of the planning objectives (see Table 2.1 in Chapter 2).



These preliminary portfolios were presented to the EBMUD Board of Directors and the WSMP 2040 Community Liaison Committee (CLC) who provided comments that resulted in refinements to the proposed portfolios. The portfolios were then tested using a water supply model to:

- Ascertain operational feasibility and the volume of water delivered during the worst-case drought;
- Determine the frequency and severity of required rationing, and the potential cost of such rationing to customers in the EBMUD service area; and
- Calculate the capital, operating and maintenance costs to the District.

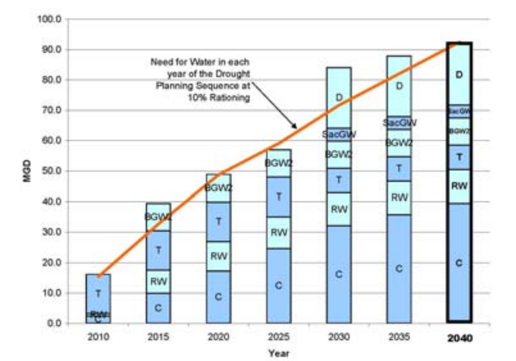
In addition to being tested in the water supply model, the preliminary portfolios were screened and evaluated using the WSMP 2040 Program Objectives. After this process, five portfolios were shown to be of most promise. These five Alternative Portfolios were identified as A, B, C, D and E and carried forward for testing in the water supply model, evaluation against the WSMP 2040 Program Objectives, and analysis in this PEIR. All of the Alternative Portfolios had advantages and disadvantages.

At the June 24, 2008 workshop, the EBMUD Board of Directors guided development of the Preferred Portfolio based on what was learned during the evaluation of the five Alternative Portfolios. More specifically, the Board recommended elements from particular alternatives that were viewed as most appropriate for inclusion in the Preferred Portfolio. The Preferred Portfolio consists of the following:

- A rationing level of 10 percent;
- Conservation Level D (39 million gallons per day (MGD));
- Recycling Level 3 (11 MGD); and
- Several supplemental supply components.

The evaluation process ultimately yielded six portfolios (the Preferred and five Alternative Portfolios), organized according to themes that are reflected in the titles of the alternatives. These are summarized below and are more fully described in Chapter 3.

1.3 Preferred Portfolio and Alternative Portfolios



Key: C = Conservation RW = Recycled Water T = Transfer
Sac GW = Sacramento Groundwater
BGW2 = Bayside Groundwater Project Phase 2
D = Regional Desalination

The Preferred Portfolio Meets the Need for Water over the Planning Period

The intent of each portfolio, including the Preferred Portfolio, is to give EBMUD the ability to respond flexibly to an uncertain water future. These uncertainties include changes in water supply and/or demand, the effects of global climate change, project and program funding availability, legal and institutional barriers, and changing technology. Each component in each portfolio would come online in a stepwise fashion to meet the Need for Water in all years. With the exception of the Rationing and Conservation components, which do not require new construction, plus the Northern California Water Transfers component, which assumes the use of existing Freeport Regional Water Project (FRWP) facilities to accomplish transfers, all other portfolio components will require the expansion of existing facilities and infrastructure.

1.3.1 Preferred Portfolio Components

Rationing

The Preferred Portfolio proposes a maximum 10 percent rationing policy be enacted (as part of the designated Drought Planning Sequence) and assumes that EBMUD will successfully carry out a number of the water conservation, recycled water, and supplemental supply initiatives within the WSMP 2040 planning horizon (see Table 3-1 in Chapter 3 for an overview of all Preferred Portfolio components). EBMUD's current policy is to limit customer rationing to 25 percent. Rationing is a policy matter that, when implemented, results in the reduction of water use by District customers.

No infrastructure or facilities would be required for implementation of the Rationing component.

Conservation

The Preferred Portfolio includes a conservation level target of 39 MGD, which would be achieved by implementing more than 50 conservation measures that target residential, commercial, and industrial customers. Conservation programs rely on behavioral actions and replacement of fixtures, appliances, and equipment on a localized basis. No infrastructure or facilities would be required for implementation of the Conservation component. EBMUD's existing conservation efforts have reduced demand by 22.5 MGD since the original WSMP was implemented in 1993 and by greater amounts since conservation efforts began in the 1970s.

Recycled Water

The Preferred Portfolio proposes to increase the amount of recycled water available for non-potable use by an additional 11 MGD (between the years 2010 and 2040). EBMUD's existing and committed inventory of recycled water projects are estimated to generate 9.3 MGD of recycled water by the year 2010. For purposes of conducting the environmental impact assessment, a typical recycled water project construction scenario (as described in the introduction to Chapter 5) is evaluated in this PEIR.

Supplemental Water Supply

Under the WSMP 2040 Preferred Portfolio, existing supplies in concert with conservation and recycled water use would provide sufficient water to meet normal demands through the year 2040. Those programs alone would not be sufficient to meet year 2040 service area demands during a prolonged drought. During droughts a combination of rationing and additional supplemental water sources will be needed. The supplemental water sources, beyond those already planned or constructed under EBMUD's 1993 WSMP, must be developed to ensure reliability during a multiple-year drought event.

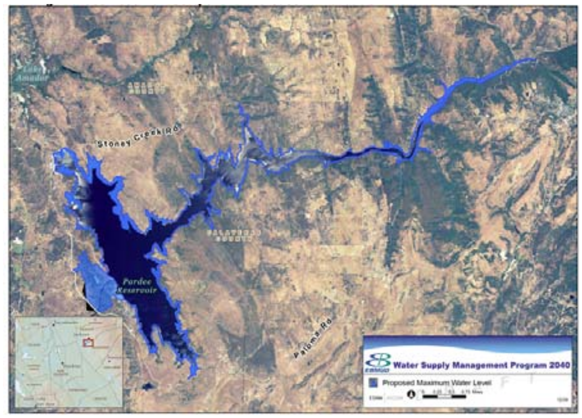
Supplemental supply components included in the Preferred Portfolio and five Alternative Portfolios include water transfers, groundwater banking/exchanges, cooperative development of a regional desalination plant, and enlarging existing reservoirs (see Figure 3-1 in Chapter 3 for locations). For purposes of conducting the environmental impact assessment, typical construction scenarios for the supplemental supply projects (as described in the introduction to Chapter 5) are evaluated in this PEIR.

Specifically, the supplemental supply projects include:

- **Northern California Water Transfers.** Under this component, EBMUD would seek water transfers to supplement their dry-year supply. Water transfer partners have not been identified, so the sources of water are not yet known. For purposes of this PEIR, it is assumed that EBMUD would seek water transfers with partners in the Sacramento Valley, or with partners who have supplies that originate north of the Delta. It is further assumed that conveyance (by EBMUD) of transferred water would be accomplished through the completed FRWP facilities. While these assumptions are necessary to perform the CEQA environmental review, EBMUD does not preclude negotiation of other water transfers.

- **Bayside Groundwater Project Phase 2**. The WSMP 2040 Preferred Portfolio would build upon successful operation of the Bayside Groundwater Project Phase 1 by expanding its extraction and storage capacity by as much as an additional 9 MGD. Bayside Groundwater Project Phase 2 facilities would be designed to inject treated water into the aquifer during years when water is available, and to recover stored groundwater during a drought. The extracted water would be treated prior to distribution to customers.
- **Sacramento Basin Groundwater Banking / Exchange.** The purpose of this component is to develop in-lieu or artificial groundwater recharge and recovery in cooperation / partnership with Sacramento area interests such as the Sacramento County Water Agency (SCWA) and/or the Sacramento County Groundwater Authority. As conceptualized, EBMUD would support development of facilities to recharge the Sacramento groundwater basin, and would receive either groundwater extracted from the basin or surface water in exchange for a portion of the water stored, as a dry-year supply.
- **Regional Desalination.** EBMUD, Contra Costa Water District, the San Francisco Public Utilities Commission, and the Santa Clara Valley Water District are jointly exploring development of the Bay Area Regional Desalination Project, which could consist of one or more desalination facilities. The desalination plant would be operated intermittently as a dry-year supplemental supply, subject to specific agreements between the partner agencies. Under the Preferred Portfolio, the presumed capacity of the completed project is 71 MGD, of which EBMUD's share would be 20 MGD. This PEIR assumes that of the three potential plant locations currently under consideration, the East Contra Costa site would be selected (see Figure 3-8 in Chapter 3).

- **Enlarge Pardee Reservoir** (Component of Regional Upcountry Project*). Enlargement of the reservoir would increase the existing maximum reservoir level by 33 feet, and the maximum flood control elevation would be raised about 46 feet, thereby increasing storage capacity from 209,950 AF to 370,000 AF. The total surface area of the reservoir would increase from 2,200 acres to 3,480 acres. During dry years, this component would create an additional 172,000 AF of storage (at flood pool level), or about 51 MGD of water supply in each dry year for up to three consecutive dry years.



- **Enlarge Lower Bear Reservoir** (Component of Regional Upcountry Project*). Enlargement of Lower Bear Reservoir would raise the dam by 32 feet to increase surface water storage capacity within the upper Mokelumne watershed. Previous studies by Amador Water Agency suggest that Lower Bear Reservoir would provide 18,300 AF of additional yield. For the purposes of this PEIR, it is assumed that EBMUD, as a project partner, would receive approximately 4,500 AF during a wet or normal year, and 2,500 AF during a dry year.
- **Mokelumne Inter-Regional Conjunctive Use Project (IRCUP) / San Joaquin Groundwater Banking / Exchange** (Component of Regional Upcountry Project*). Under this component, one or more IRCUP partners would either obtain a new water right, or modify an existing water right, to enable surface water to be diverted from the Mokelumne River and banked in the Eastern San Joaquin Groundwater Basin for later use by one or more of the parties to the IRCUP.

For purposes of this PEIR, EBMUD developed a probable scenario for implementation of the Preferred Portfolio (see Figures 3-13 and 3-14 in Chapter 3). Table 3-4 in Chapter 3 summarizes this example scenario and the order that components would be pursued throughout the planning period. All of the above-mentioned supplemental supply components are included in the Preferred Portfolio; however, only those components that are most feasible according to the circumstances that arise during the 2010-2040 planning period would be implemented. The implementation scenario presented in Chapter 3 assumes that by 2030, <u>either</u> Regional Desalination <u>or</u> a combination of Upcountry projects (Enlarge Pardee Reservoir, Enlarge Lower Bear Reservoir, and IRCUP / San Joaquin Groundwater Banking / Exchange) would be required to meet the

* This component would be pursued as part of an interrelated set of upcountry components with a common set of partners.

projected Need for Water. If the Need for Water changes substantially from the 2040 demand portrayed in this document, both Regional Desalination and a combination of Upcountry projects might be required to meet the Need for Water, and additional environmental documentation would be prepared.

1.3.2 No Project Alternative and Alternative Portfolios

Under the No Project Alternative, neither the Preferred Portfolio nor any of the Alternative Portfolios would be implemented and the current 1993 WSMP would continue through the end of its planning period (2020). This would mean that during drought or emergency conditions, EBMUD would not have the ability to use supplemental water supplies beyond those programs already planned under the 1993 WSMP.

The five Alternative Portfolios identified as A, B, C, D and E and carried forward for analysis in this PEIR each focus on a theme:

- **Portfolio A: Groundwater/Conjunctive Use and Water Transfers**
  Portfolio A emphasizes water production through water transfers and conjunctive use (groundwater) projects. Specifically, three groundwater projects would be combined with 15 MGD of water transfers, 39 MGD of conservation savings, and 5 MGD of recycled water projects. Also, a 10 percent rationing level would be established (see Figure 3-15 and Table 3-5 in Chapter 3).
- **Portfolio B: Regional Partnerships**
  Portfolio B consists of 37 MGD of conservation, 5 MGD of recycled water, a small water transfer, 10 percent rationing, and is uniquely characterized by its use of partnership projects: a mix of groundwater projects, regional desalination, and enlargement of Lower Bear Reservoir (see Figure 3-17 and Table 3-7 in Chapter 3).
- **Portfolio C: Local System Reliance**
  Portfolio C emphasizes reliance upon new water storage in the EBMUD service area. This portfolio consists of a 15 percent rationing level, 37 MGD of conservation, 5 MGD of recycled water, and a single supplemental supply project: development of Buckhorn Canyon Reservoir (see Figure 3-19 and Table 3-9 in Chapter 3).
- **Portfolio D: Lower Carbon Footprint**
  Portfolio D seeks to reduce energy consumption and greenhouse gas emissions by increasing the hydroelectricity generation capacity at Pardee Powerhouse. In addition, Portfolio D would substantially reduce dry-year water demand by setting a 15 percent (32 MGD) Districtwide rationing level. This portfolio would include 37 MGD of conservation; 5 MGD of recycled water, enlargement of Pardee Reservoir, and implementation of Bayside Groundwater Project Phase 2 (see Figure 3-22 and Table 3-11 in Chapter 3).

- **Portfolio E: Recycled Water and Water Transfers**
  Portfolio E includes a number of recycled water projects and a greater reliance on water transfers as compared with other portfolios. It includes no surface water storage projects. This portfolio would include 37 MGD of conservation, 11 MGD of recycled water, implementation of Bayside Groundwater Project Phase 2, Sacramento Basin Groundwater Banking, and 28.5 MGD of water transfers, (see Table 3-13 and Figure 3-24 in Chapter 3).

Each portfolio and the No Project Alternative were reviewed and rated against the WSMP 2040 Program Objectives as outlined in Table 3-16 (presented at the end of Chapter 3).

Chapter 3 also addresses the preliminary portfolios that were considered during the portfolio development process as described above, but eliminated. The required approvals necessary for adoption and approval of WSMP 2040, and subsequent approval of the component projects and policy initiatives are also addressed in Chapter 3.

1.4 Purpose of the Program EIR

The analysis of the WSMP 2040 Preferred Portfolio and its alternatives are the subject of this PEIR. The document takes a programmatic approach to the analysis of the Preferred Portfolio's environmental impacts. In the near term, EBMUD will consider the information in the PEIR as early indicators of potential adverse effects upon resources affected by the Preferred Portfolio components, the magnitude of those impacts, and the general approach that will be necessary to avoid or mitigate those impacts as future projects are planned and developed. Over the long term, the PEIR will be incorporated by reference into subsequent project-level CEQA analyses.

1.4.1 Environmental Setting and Impacts

The environmental setting information presented in Chapter 4 provides a basis for determining potential program-level impacts that may result from implementation of the WSMP 2040 Preferred Portfolio, which are presented in Chapter 5. Project-level CEQA documents will be prepared prior to implementation of individual Preferred Portfolio components.

Chapter 5 presents the significance criteria used to evaluate the physical changes in the environmental setting to determine potential program-level impacts, discusses potential program-level environmental impacts that could result from the WSMP 2040 Preferred Portfolio, and identifies feasible mitigation measures to reduce potentially significant impacts to less-than-significant levels. Table 1-1, presented at the end of this chapter, presents a summary of potential impacts resulting from the Preferred Portfolio and Table 1-2 presents the mitigation measures identified in this PEIR.

1.4.2 No Project Alternative and Alternative Portfolios

Chapter 6 evaluates how well the No Project Alternative and the Alternative Portfolios achieve the WSMP 2040 objectives, and generally discusses the potential environmental impacts associated with each alternative. A comparison of the Preferred Portfolio and the Alternative Portfolios is also presented.

Environmentally Superior Alternative

As shown in Table 6-2 in Chapter 6, three Alternative Portfolios -- Portfolios A, D and E -- were found to perform well in their ability to meet environmental objectives. The Preferred Portfolio also performed well. While the No Project Alternative would avoid many of the environmental impacts that would result from the action alternatives, it would not meet two key WSMP 2040 objectives: Minimize the vulnerability and risk of disruptions, and Maximize the system's operational flexibility. Further, if future-year demand projections as described in this PEIR are realized, and if a multiple-year drought occurs, the risk of mandatory water rationing beyond the current 25 percent Districtwide goal would be high.

Portfolio A (Groundwater / Conjunctive Use & Water Transfers) scored high for its ability to Minimize adverse impacts to the environment and sensitive resources due to the relatively small footprints of facilities included in this portfolio. However, the energy needed for groundwater pumping and water transport in Portfolio A resulted in only a moderate score for the greenhouse gas emissions and energy efficiency objectives.

Portfolio D (Lower Carbon Footprint) scored high for its ability to reduce greenhouse gas emissions from increased hydroelectric generation but only had a moderate score for its ability to Minimize adverse impacts to the environment and sensitive resources due to reservoir expansion.

Portfolio E (Recycled Water & Water Transfers) rated high for its ability to Minimize impacts to the environment and sensitive resources due to the emphasis on solutions other than surface water storage and the lower need for additional infrastructure. This portfolio only had a moderate score for its ability to Minimize short- and long-term greenhouse gas emissions from construction, Maximize energy efficiency associated with operations and maintenance, and Maximize contributions to AB 32 goals objectives, largely due to the energy required for groundwater pumping.

The Preferred Portfolio, which is a blend of components from the Alternative Portfolios, has the potential to Minimize greenhouse gas emissions due to increased hydroelectric generation (from the Enlarge Pardee Reservoir component). However, these benefits may be negated due to energy required for groundwater pumping, water transport, or desalination. As such, the Portfolio has a moderate response to these objectives: Minimize short- and long-term greenhouse gas emissions from construction, Maximize energy efficiency associated with operations and maintenance, and Maximize contributions to AB 32 goals. Similarly, the Portfolio had only a moderate score for its ability to Minimize adverse impacts to the environment and sensitive resources. The environmental benefits that may be gained by higher goals for conservation and recycled water may be negated by components that call for reservoir enlargement.

While Portfolios A, D and E were determined to be environmentally superior to the other Alternative Portfolios, it is difficult to determine which portfolio would be the environmentally superior alternative because each of these portfolios has different environmental benefits that cannot be quantified for this program-level assessment. However, Portfolio D, Lower Carbon Footprint, is considered to be the Environmentally Superior Alternative because it would generate hydroelectric power to reduce greenhouse gas emissions, and it would avoid the relatively high energy requirements associated with groundwater banking and water transfers.

1.4.3 Growth Inducement

Chapter 7 addresses the potential for the WSMP 2040 Preferred Portfolio to induce growth. As part of the WSMP 2040 planning process, EBMUD conducted a comprehensive study of water demand through 2040 that relied on adopted general plans and consultations with planning staff in jurisdictions served by EBMUD to determine growth projections. A Need for Water analysis conducted in conjunction with the Demand Study concluded that sufficient water would be available to meet needs from existing customers and planned growth in normal and wet years. However, in dry years, particularly multiple dry years, there would be insufficient water to meet projected needs.

The WSMP Preferred Portfolio is a solution to meet EBMUD's dry-water needs through 2040. While the Preferred Portfolio would increase EBMUD's water supply, it is not intended to support unplanned growth. Over the course of the WSMP 2040 planning period, WSMP updates may be needed to re-assess the Need for Water and projected demands, and EBMUD will make updates as needed. Updates will ensure that the solution is adjusted to match the Need for Water. The flexibility that is inherently built into the proposed implementation plan for WSMP 2040 allows that supply will not substantially exceed demand, nor will it substantially fall short of demand. The District recognizes that were either condition to occur, and the flexible implementation plan could not address these conditions, then the WSMP would need to be revised and a subsequent program-level CEQA document would be prepared. Therefore, potential growth-inducing impacts would be ***less than significant***.

1.4.4 Cumulative Impacts

As noted above, the WSMP 2040 Preferred Portfolio would consist of a series of components that would be implemented over the 30-year planning period. These components could be implemented concurrently with other cumulative projects, thus contributing to local and regional cumulative impacts.

Cumulative impacts that would potentially result from implementation of the Preferred Portfolio are presented in Chapter 8. The Preferred Portfolio would have potentially significant cumulative impacts on hydrology, land use, air quality, noise, visual resources and environmental justice. Cumulative impacts on all other resource areas discussed in this PEIR would be less than significant. As future project-level phases of the WSMP 2040 Preferred Portfolio move forward, cumulative impact analyses would be conducted as part of project-level CEQA review.

Chapter 8 also addresses global climate change, including potential impacts of the Preferred Portfolio on climate change as well as the potential impacts of climate change on water resources and the consequences to EBMUD's water supply.

Potential impacts on climate change resulting from construction and operation of the Preferred Portfolio components would be less than significant.

Climate change could directly or indirectly reduce EBMUD's water supply, leading to an increase in rationing in the future, and this is discussed in the document. EBMUD conducted a sensitivity analysis for the WSMP 2040 that models how EBMUD's water system would respond to various shifts in climatic factors and this shows that climate change presently cannot be predicted to have any effects on the implementation of the WSMP 2040 Preferred Portfolio, particularly effects that are not so speculative as to preclude meaningful evaluation. Overall, based on the modeling results, additional storage combined with source diversity (i.e., different watersheds for water supplies) and the low rationing goal stated in the Preferred Portfolio would give the District maximum flexibility to adapt to unknown future conditions.

1.5 Areas of Controversy

Section 15123 of the CEQA Guidelines requires that an EIR identify areas of controversy. The following issues and concerns were raised by agencies or the public:

- Reliability of water transfers
- Preferred Portfolio components should reduce Mokelumne demand
- Potential impacts on Delta water quality
- Potential impacts on Sacramento Water Forum Agreements from ASR components
- Potential degradation of groundwater from ASR components
- Potential impacts on endangered species from water transfers
- Opposition to cross-Delta water transfers
- Opposition to Buckhorn Reservoir

1.6 Issues to be Resolved

Section 15123 of the CEQA Guidelines requires that an EIR identify issues to be resolved. Issues to be resolved for the WSMP 2040 PEIR include the following:

- Identify specific locations of various Preferred Portfolio facilities;
- Determine partners for the Northern California Water Transfers component, and water source locations. The potential impacts of water transfers would then be assessed on a project-level basis;
- Determine partners for the Sacramento Basin Groundwater Banking / Exchange, Enlarge Pardee and Lower Bear Reservoirs, and IRCUP / San Joaquin Groundwater Banking / Exchange components; and
- As needed, depending on the effects of climate change on EBMUD's water supply and timing of droughts, the phasing of the Preferred Portfolio components may need to be adjusted to account for these factors.

Table 1-1: Summary of Potential Impacts Resulting from the WSMP 2040 Preferred Portfolio

IMPACT	RATIONING	CONSERVATION	RECYCLED WATER	NORTHERN CALIFORNIA WATER TRANSFERS	BAYSIDE GROUNDWATER PROJECT PHASE 2	SACRAMENTO BASIN GROUNDWATER BANKING / EXCHANGE	REGIONAL DESALINATION	ENLARGE PARDEE RESERVOIR	ENLARGE LOWER BEAR RESERVOIR	IRCUP/ SAN JOAQUIN GROUNDWATER BANKING / EXCHANGE
HYDROLOGY, GROUNDWATER AND WATER QUALITY										
5.2.A-1: Potential to degrade water quality from construction	--	--	LTSM	LTSM	LTSM	LTSM	LTSM	LTSM	LTSM	LTSM
5.2.A-2 Potential to degrade water quality from waste discharge	--	--	LTS	LTS	LTS	LTS	LTSM	B	B	LTS
5.2.A-3: Potential to violate water quality standards and waste discharge requirements for the land application of recycled water	--	--	LTSM	--	--	LTSM	--	--	--	--
5.2.A-4: Potential to degrade groundwater and drinking water quality from the direct introduction of non-local water into native groundwater basins	--	--	--	--	LTSM	LTSM	--	--	--	LTSM
5.2.A-5: Potential for saltwater intrusion from the operation of groundwater wells	--	--	--	--	LTSM	--	--	--	--	LTSM
5.2.A-6: Potential effects on groundwater supplies and production of existing wells from recharge and/or extraction operations	--	--	--	LTSM	LTSM	LTSM	--	--	--	LTSM
5.2.A-7: Potential alteration of the existing drainage pattern or contribution to existing local or regional flooding	--	--	LTSM	LTSM	LTSM	LTSM	LTSM	LTSM	LTSM	LTSM

-- = No Impact, LTS = Less than Significant, LTSM = Less than Significant with Mitigation, PS = Potentially Significant, B = Beneficial

Table 1-1: Summary of Potential Impacts Resulting from the WSMP 2040 Preferred Portfolio (continued)

IMPACT	RATIONING	CONSERVATION	RECYCLED WATER	NORTHERN CALIFORNIA WATER TRANSFERS	BAYSIDE GROUNDWATER PROJECT PHASE 2	SACRAMENTO BASIN GROUNDWATER BANKING / EXCHANGE	REGIONAL DESALINATION	ENLARGE PARDEE RESERVOIR	ENLARGE LOWER BEAR RESERVOIR	IRCUP/ SAN JOAQUIN GROUNDWATER BANKING / EXCHANGE
5.2.A-8: Potential permanent land subsidence from groundwater withdrawals	--	--	--	LTSM	LTSM	LTSM	--	--	--	LTSM
5.2.A-9: Potential impacts to Sacramento and Delta downstream water users	--	--	--	--	--	PS	--	--	--	PS
5.2.A-10: Potential effects on other intakes and outfalls from operation of the Regional Desalination intake	--	--	--	--	--	--	LTSM	--	--	--
5.2.A-11: Potential changes in Mokelumne River basin hydrologic conditions from enlarged reservoirs	--	--	--	--	--	--	--	LTSM	LTSM	--
5.2.A-12: Potential impacts to downstream Mokelumne River water users	--	--	--	--	--	--	--	--	--	LTS
5.2.A-13: Potential for flooding along the Mokelumne River Basin as posted by the potential for dam failure	--	--	--	--	--	--	--	LTS	LTS	--
5.2.A-14: Potential for inundation by tsunamis, seiches, or mudflows	--	--	LTS	--	LTS	--	LTS	LTS	LTS	--

Table 1-1: Summary of Potential Impacts Resulting from the WSMP 2040 Preferred Portfolio (continued)

IMPACT	RATIONING	CONSERVATION	RECYCLED WATER	NORTHERN CALIFORNIA WATER TRANSFERS	BAYSIDE GROUNDWATER PROJECT PHASE 2	SACRAMENTO BASIN GROUNDWATER BANKING / EXCHANGE	REGIONAL DESALINATION	ENLARGE PARDEE RESERVOIR	ENLARGE LOWER BEAR RESERVOIR	IRCUP/ SAN JOAQUIN GROUNDWATER BANKING / EXCHANGE
GEOLOGY, SOILS AND SEISMICITY										
5.2.B-1: Potential exposure of people or structures to geologic and seismic hazards	--	--	LTSM	LTSM	LTSM	LTSM	LTSM	LTSM	LTSM	LTSM
5.2.B-2: Potential erosion and loss of topsoil during construction	--	--	LTSM	LTSM	LTSM	LTSM	LTSM	LTSM	LTSM	LTSM
BIOLOGICAL RESOURCES										
5.2.C-1: Potential temporary and permanent impacts to sensitive natural communities or wetlands or waters falling under the jurisdiction of the Corps and the State of California	--	--	LTSM	LTSM	LTSM	LTSM	LTSM	LTSM	LTSM	LTSM
5.2.C-2: Potential temporary disturbance to or permanent loss of special-status plant species, sensitive plant communities, or protected trees	--	--	LTSM	LTSM	LTSM	LTSM	LTSM	LTSM	LTSM	LTSM
5.2.C-3: Potential disturbance to or loss of special status invertebrates or their habitats	--	--	LTSM	LTSM	LTSM	LTSM	LTSM	LTSM	LTSM	LTSM

Table 1-1: Summary of Potential Impacts Resulting from the WSMP 2040 Preferred Portfolio (continued)

IMPACT	RATIONING	CONSERVATION	RECYCLED WATER	NORTHERN CALIFORNIA WATER TRANSFERS	BAYSIDE GROUNDWATER PROJECT PHASE 2	SACRAMENTO BASIN GROUNDWATER BANKING / EXCHANGE	REGIONAL DESALINATION	ENLARGE PARDEE RESERVOIR	ENLARGE LOWER BEAR RESERVOIR	IRCUP/ SAN JOAQUIN GROUNDWATER BANKING / EXCHANGE
5.2.C-4: Potential disturbance to or loss of special-status reptiles and amphibians, and their habitat or critical habitat	--	--	LTSM	LTSM	LTSM	LTSM	LTSM	LTSM	LTSM	LTSM
5.2.C-5: Potential disturbance to or loss of nesting birds	--	--	LTSM	LTSM	LTSM	LTSM	LTSM	LTSM	LTSM	LTSM
5.2.C-6: Potential disturbance to or loss of special-status bat species and roosting habitat	--	--	LTSM	--	--	LTSM	LTSM	LTSM	LTSM	LTSM
5.2.C-7: Potential disturbance to or loss of other special-status mammals	--	--	LTSM	LTSM	LTSM	LTSM	LTSM	LTSM	LTSM	LTSM
5.2.C-8: Potential loss of or impacts to fish and aquatic habitats	--	--	LTSM	--	LTSM	LTSM	LTSM	LTSM	LTSM	LTSM
5.2.C-9: Potential entrainment of fish into pumps/intake pipes	--	--	LTSM	LTSM	LTSM	--	LTSM	--	--	LTSM
5.2.C-10: Potential reduction of surface water quality	--	--	LTSM	--	LTSM	--	--	--	--	--
5.2.C-11: Disruption of downstream flow releases	--	--	--	--	--	--	--	LTSM	LTSM	--

Table 1-1: Summary of Potential Impacts Resulting from the WSMP 2040 Preferred Portfolio (continued)

IMPACT	RATIONING	CONSERVATION	RECYCLED WATER	NORTHERN CALIFORNIA WATER TRANSFERS	BAYSIDE GROUNDWATER PROJECT PHASE 2	SACRAMENTO BASIN GROUNDWATER BANKING / EXCHANGE	REGIONAL DESALINATION	ENLARGE PARDEE RESERVOIR	ENLARGE LOWER BEAR RESERVOIR	IRCUP/ SAN JOAQUIN GROUNDWATER BANKING / EXCHANGE
LAND USE AND RECREATION										
5.2.D-1: Potential reduction of agricultural productivity and conversion of farmland to non-agricultural uses	--	--	--	PS	--	LTSM	--	LTSM	LTSM	LTSM
5.2.D-2: Potential impairment of recreation facilities and activities	--	--	LTSM	--	--	LTSM	LTSM		LTSM	--
TRANSPORTATION										
5.2.E-1: Potential reduction of the number or available width of travel lanes on roads from construction, resulting in temporary disruption of traffic flows, increases in traffic congestion, and access to adjacent land uses for both general and emergency access	--	--	LTSM	LTSM	LTSM	LTSM	LTSM	LTSM	LTSM	LTSM
5.2.E-2: Potential short-term increases in vehicle trips during construction	--	--	LTSM	LTSM	LTSM	LTSM	LTSM	LTSM	LTSM	LTSM
5.2.E-3: Potential to generate demand for parking spaces for worker vehicles	--	--	LTS	LTSM	LTS	LTS	LTS	--	--	LTS

Table 1-1: Summary of Potential Impacts Resulting from the WSMP 2040 Preferred Portfolio (continued)

IMPACT	RATIONING	CONSERVATION	RECYCLED WATER	NORTHERN CALIFORNIA WATER TRANSFERS	BAYSIDE GROUNDWATER PROJECT PHASE 2	SACRAMENTO BASIN GROUNDWATER BANKING / EXCHANGE	REGIONAL DESALINATION	ENLARGE PARDEE RESERVOIR	ENLARGE LOWER BEAR RESERVOIR	IRCUP/ SAN JOAQUIN GROUNDWATER BANKING / EXCHANGE
5.2.E-4: Potential increase in wear and tear on designated haul routes from construction vehicles	--	--	LTSM	LTSM	LTSM	LTSM	LTSM	LTSM	LTSM	LTSM
5.2.E-5: Potential to temporarily disrupt bus service along proposed pipeline corridors during construction	--	--	LTSM	LTSM	LTSM	LTSM	LTSM	--	--	LTSM
5.2.E-6: Potential to affect rail operations			LTSM	LTSM	LTSM	LTSM	LTSM			LTSM
AIR QUALITY										
5.2.F-1: Potential to conflict with, or obstruct implementation of, applicable air quality plans	--	--	LTS	LTS	LTS	LTS	LTS	LTS	LTS	LTS
5.2.F-2: Potential to violate an air quality standard or contribute substantially to an existing or projected air quality violation	--	--	PS	PS	PS	PS	PS	PS	PS	PS
5.2.F-3: Potential for a cumulatively considerable net increase of criteria pollutants for which the region is in nonattainment under an applicable national or State ambient air quality standard	--	--	PS	PS	PS	PS	PS	PS	PS	PS

Table 1-1: Summary of Potential Impacts Resulting from the WSMP 2040 Preferred Portfolio (continued)

IMPACT	RATIONING	CONSERVATION	RECYCLED WATER	NORTHERN CALIFORNIA WATER TRANSFERS	BAYSIDE GROUNDWATER PROJECT PHASE 2	SACRAMENTO BASIN GROUNDWATER BANKING / EXCHANGE	REGIONAL DESALINATION	ENLARGE PARDEE RESERVOIR	ENLARGE LOWER BEAR RESERVOIR	IRCUP/ SAN JOAQUIN GROUNDWATER BANKING / EXCHANGE
5.2.F-4: Potential exposure of sensitive receptors to substantial pollutant concentrations	--	--	PS	PS	PS	PS	PS	PS	PS	PS
5.2.F-5: Potential exposure of sensitive receptors to substantial CO concentrations	--	--	LTS	LTS	LTS	LTS	LTS	LTS	LTS	LTS
5.2.F-6: Potential creation of objectionable odors affecting a substantial number of people	--	--	LTS	LTS	LTS	LTS	LTS	LTS	LTS	LTS
NOISE										
5.2.G-1: Potential exposure of sensitive receptors to noise levels in excess of the applicable noise standards and/or result in a noticeable increase in ambient noise levels from short-term construction activities	--	--	PS	LTS	PS	PS	PS	PS	PS	PS
5.2.G-2: Potential exposure of noise-sensitive receptors to noise levels in excess of the applicable noise standards and/or result in a noticeable increase in ambient noise levels from long-term operational activities	--	--	PS	LTS	PS	PS	PS	PS	PS	PS

Table 1-1: Summary of Potential Impacts Resulting from the WSMP 2040 Preferred Portfolio (continued)

IMPACT	RATIONING	CONSERVATION	RECYCLED WATER	NORTHERN CALIFORNIA WATER TRANSFERS	BAYSIDE GROUNDWATER PROJECT PHASE 2	SACRAMENTO BASIN GROUNDWATER BANKING / EXCHANGE	REGIONAL DESALINATION	ENLARGE PARDEE RESERVOIR	ENLARGE LOWER BEAR RESERVOIR	IRCUP/ SAN JOAQUIN GROUNDWATER BANKING / EXCHANGE
5.2.G-3: Potential for noticeable increase in traffic noise (3 dB or greater) along roadways designated for hauling construction materials	--	--	LTS	LTS	LTS	LTS	LTS	LTS	LTS	LTS
5.2.G-4: Potential exposure of sensitive receptors to excessive ground-borne noise and vibration levels (e.g., exceed FTA, Caltrans, and local guidelines)	--	--	PS	PS	PS	PS	PS	PS	PS	PS
CULTURAL RESOURCES										
5.2.H-1: Potential to alter or damage known or unrecorded cultural resources, including human remains, during construction	--	--	LTSM	LTSM	LTSM	LTSM	LTSM	LTSM	LTSM	LTSM
VISUAL RESOURCES										
5.2.I-1: Potential to adversely affect the existing visual character and scenic vistas or resources	LTS	LTS	LTSM	PS	LTSM	LTSM	LTSM	PS	PS	LTSM
5.2.I-2: Potential to increase light and glare	--	--	LTSM	LTSM	LTSM	LTSM	LTSM	LTSM	LTSM	LTSM

Table 1-1: Summary of Potential Impacts Resulting from the WSMP 2040 Preferred Portfolio (continued)

IMPACT	RATIONING	CONSERVATION	RECYCLED WATER	NORTHERN CALIFORNIA WATER TRANSFERS	BAYSIDE GROUNDWATER PROJECT PHASE 2	SACRAMENTO BASIN GROUNDWATER BANKING / EXCHANGE	REGIONAL DESALINATION	ENLARGE PARDEE RESERVOIR	ENLARGE LOWER BEAR RESERVOIR	IRCUP/ SAN JOAQUIN GROUNDWATER BANKING / EXCHANGE
HAZARDS										
5.2.J-1: Potential exposure to uncontrolled releases of hazardous materials	--	--	LTSM	LTSM	LTSM	LTSM	LTSM	LTSM	LTSM	LTSM
5.2.J-2: Potential exposure of construction workers to contaminated soil and water	--	--	LTSM	LTSM	LTSM	LTSM	LTSM	LTSM	LTSM	LTSM
5.2.J-3: Potential exposure to risk of wildland fires	--	--	LTSM	LTSM	--	--	LTSM	LTSM	LTSM	LTSM
PUBLIC SERVICES, UTILITIES AND ENERGY										
5.2.K-1: Potential temporary damage to or disruption of existing regional and local public utilities and impacts related to the relocation of utilities	--	--	LTSM	LTSM	LTSM	LTSM	LTSM	LTSM	LTSM	LTSM
5.2.K-2: Potential to increase short-term demand for police and fire protection services	--	--	LTS	LTSM	LTS	LTS	LTS	LTS	LTS	LTS
5.2.K-3: Potential temporary adverse effect on solid waste landfill capacity	--	--	LTSM	LTSM	LTSM	LTSM	LTSM	LTSM	LTSM	LTSM

Table 1-1: Summary of Potential Impacts Resulting from the WSMP 2040 Preferred Portfolio (continued)

IMPACT	RATIONING	CONSERVATION	RECYCLED WATER	NORTHERN CALIFORNIA WATER TRANSFERS	BAYSIDE GROUNDWATER PROJECT PHASE 2	SACRAMENTO BASIN GROUNDWATER BANKING / EXCHANGE	REGIONAL DESALINATION	ENLARGE PARDEE RESERVOIR	ENLARGE LOWER BEAR RESERVOIR	IRCUP/ SAN JOAQUIN GROUNDWATER BANKING / EXCHANGE
5.2.K-4: Potential for construction-related energy use and potential to increase long-term energy use during operation.	--	--	LTSM	LTSM	LTSM	LTSM	LTSM	LTSM	LTSM	LTSM
ENVIRONMENTAL JUSTICE										
5.2.L-1: Potential disproportionate impact to densely populated minority and low income communities	--	--	PS	--	PS	PS	PS	--	--	PS

Table 1-2: Summary of Mitigation Measures Identified in the Program EIR

IMPACT	MITIGATION MEASURE
5.2.A HYDROLOGY, GROUNDWATER, AND WATER QUALITY	
Impact 5.2.A-1: Potential to degrade water quality from construction.	***Mitigation Measure 5.2.A-1a. Comply with State NPDES general construction permit.*** Any project with a combined disturbance area of one acre or more must obtain a National Pollutant Discharge Elimination System (NPDES) Construction Activity Stormwater Permit. As part of the NPDES permit, a Stormwater Pollution Prevention Plan (SWPPP) must be developed. EBMUD shall require its contractors to file a Notice of Intent with the appropriate local Regional Water Quality Control Board (RWQCB) indicating compliance with the NPDES General Permit for Discharges of Stormwater Runoff Associated with Construction Activity (General Permit) and to prepare and implement a SWPPP outlining Best Management Practices (BMPs) for construction/post-construction activities (ABAG, 1995; California Stormwater Quality Association, 2004). BMPs include measures guiding the management and operation of construction sites to control the contribution of pollutants to storm water runoff from construction areas. These measures address procedures for controlling erosion and sedimentation, and managing the construction process to control potential water pollution sources. Erosion and sedimentation control practices typically include, but are not limited to, the following: • Restricting construction to dry-weather months; • Installing temporary erosion control devices (e.g., silt fences, straw wattles, silt/sedimentation basins or traps, temporary revegetation) to control erosion from disturbed areas; • Stabilizing soil; • Replanting graded and fill areas; • Installing runoff control devices (e.g., straw bales, silt fences, drainage swales, geofabrics, check dams, and sand bag dikes) to limit sediment in stormwater runoff; • Performing equipment maintenance to be performed at least 100 feet from water bodies and wetlands, with measures in place to contain and control spills of petroleum products. • Directing drainage from work sites away from water bodies or wetlands where feasible; • Preventing erosion of uplands and sedimentation of creeks, tributaries, and ponds; • Minimizing creek bank instability;

Table 1-2: Summary of Mitigation Measures Identified in the Program EIR

IMPACT	MITIGATION MEASURE

Table 1-2: Summary of Mitigation Measures Identified in the Program EIR (continued)

IMPACT	MITIGATION MEASURE
	• Preventing flooding; and • Restoring post-construction grades to preconstruction contours. EBMUD shall perform routine inspections of the construction areas to verify that the BMPs specified in the SWPPP are properly implemented and maintained. EBMUD shall notify its contractors immediately if there is a noncompliance issue that will require compliance.
	Mitigation Measure 5.2.A-1b: Use proper well installation methodologies. Prior to and following any well installation activities (including borehole drilling), EBMUD and/or its contractors shall thoroughly decontaminate all drilling and well development equipment and soil/water quality sampling equipment. In situations where surface and/or shallow soil contamination is expected, conductor casing shall be used to prevent the downward migration of contaminants. EBMUD and/or its contractors shall install all wells with sanitary seals to prevent the possibility of cross-contamination via the direct introduction of contaminants.
Impact 5.2.A-2 Potential to degrade water quality from waste discharge.	***Mitigation Measure 5.2.A-2: Conduct modeling and incorporate the results into the design for the Regional Desalination component.*** This mitigation measure applies to the Regional Desalination component. EBMUD and its partners shall conduct numerical hydrodynamic modeling to evaluate the variables affecting salinity and to provide input to a plant outfall design that minimizes impacts to receiving waters. Proper design and construction of the facility outfall will mitigate impacts from brine discharge by maximizing the rapid dispersion and mixing of saline effluent such that the changes to the salinity of waters in the outfall vicinity are minimized.
Impact 5.2.A-3: Potential to violate water quality standards and waste discharge requirements for the land application of recycled water.	***Recommended Mitigation Measure 5.2.A-3: Implement EBMUD-required BMPs for recycled water users.*** This mitigation measure applies to components incorporating the use of recycled water. EBMUD customers using recycled water are issued a water reuse permit and must designate a Site Supervisor to undergo training on BMPs and the safe and efficient use requirements for recycled water. Additionally, EBMUD will perform yearly site evaluations to ensure that customers are applying recycled water correcting and are following the

Table 1-2: Summary of Mitigation Measures Identified in the Program EIR

IMPACT	MITIGATION MEASURE
	permit requirements.
Impact 5.2.A-4: Potential to degrade groundwater and drinking water quality from the direct introduction of non-local water into native groundwater basins.	***Mitigation Measure 5.2.A-4: Implement a groundwater monitoring program.*** EBMUD and its project partners shall establish project-specific groundwater monitoring well networks and implement comprehensive groundwater monitoring programs to establish the pre-project conditions of groundwater basins and to monitor the impact of operations on groundwater levels and water quality and respond accordingly. The groundwater monitoring programs will specify monitoring and water quality sampling frequency, parameters, and protocols and response actions. The monitoring programs will be developed and conducted in accordance with State and Federal regulatory requirements such as those under the jurisdiction of DPH and the RWQCB.
Impact 5.2.A-5: Potential for saltwater intrusion from the operation of groundwater wells.	***Mitigation Measure 5.2.A-5: Use numerical modeling to properly design the groundwater storage and extraction project such that saltwater intrusion is minimized during project operations.*** In addition, implement Mitigation Measure 5.2.A-4 above.
Impact 5.2.A-6: Potential effects on groundwater supplies and production of existing wells from recharge and/or extraction operations.	***Mitigation Measure 5.2.A-6a: Inventory existing wells.*** EBMUD and its project partners shall inventory existing wells within the areas of the affected basins where studies indicate that drawdown effects could be observed and/or where water levels could rise above the ground surface in response to injections. The inventory shall include collection of information regarding existing use, screened intervals, total depth and depth of pump. The information collected shall be used to predict drawdown and drawup (mounding) at each well location and identify wells that could be affected by groundwater recharge and extraction operations.
	Mitigation Measure 5.2.A-6b: Monitor wells and modify groundwater operations. EBMUD and its project partners shall regularly monitor water levels in key zones that could experience flowing (artesian) conditions or be rendered inoperable as a result of changes in water levels resulting from EBMUD and its partner's proposed groundwater operations as part of the Preferred Portfolio components. Information from the monitoring shall be used to modify groundwater operations (e.g., decrease or cease injection/extraction as needed) and/or modify the affected wells in coordination with the existing well owner (e.g., install pressure-resistant well caps, reset pumps). Groundwater operations shall be modified until adverse effects to existing wells have been addressed.

Table 1-2: Summary of Mitigation Measures Identified in the Program EIR

IMPACT	MITIGATION MEASURE
	Mitigation Measure 5.2.A-6c: Destroy abandoned or inactive wells. For abandoned or inactive wells located in areas where predicted water levels may rise above the ground surface or where a potential conduit for contamination migration could occur as a result of the proposed groundwater operations, EBMUD and its project partners shall work with the property owners to destroy their wells in accordance with State and County standards.
Impact 5.2.A-7: Potential alteration of the existing drainage pattern or contribution to existing local or regional flooding.	***Mitigation Measure 5.2.A-7: Comply with NPDES general construction permit requirements.*** EBMUD or its contractors shall comply with NPDES general construction permit requirements, including preparation and implementation of an SWPPP with Best Practices for control of storm water runoff.
Impact 5.2.A-8: Potential permanent land subsidence from groundwater withdrawals.	***Mitigation Measure 5.2.A-8a: Monitor for permanent land subsidence and implement corrective actions as necessary.*** This mitigation measure applies to the Bayside Groundwater Phase 2. The land subsidence monitoring program for the Bayside Groundwater Phase 1 shall extend to include Phase 2 of the project. If inelastic subsidence is detected through monitoring, EBMUD shall implement corrective actions, such as reducing pumping rates or ceasing extractions until the adverse effects have been fully evaluated and modifications made to groundwater operations to minimize further subsidence.
	Mitigation Measure 5.2.A-8b: Monitor for permanent land subsidence and implement corrective actions as necessary. This mitigation measure applies to the following affected components: Northern California Water Transfers, Sacramento Basin Groundwater Banking / Exchange and IRCUP / San Joaquin Groundwater Banking / Exchange Project. Monitoring shall be coordinated with statewide monitoring programs for land subsidence. Monitoring shall be implemented incrementally to allow observations of the response of the groundwater system and surrounding soils to project operations. If any inelastic or permanent land subsidence is detected through monitoring, EBMUD and its project partners shall implement corrective actions, such as reducing pumping rates or ceasing extractions.

Table 1-2: Summary of Mitigation Measures Identified in the Program EIR

IMPACT	MITIGATION MEASURE
Impact 5.2.A-10: Potential effects on other intakes and outfalls from operation of the Regional Desalination intake.	***Mitigation Measure 5.2.A-10: Conduct modeling and incorporate the results into the design for the Regional Desalination component.*** EBMUD and its partners shall conduct numerical modeling as part of the desalination facility design. Modeling shall take into account local intakes and outfalls within a certain distance from the facility that may affect the project or, in turn, be affected by the project, in terms of both hydraulics and water quality. (The specific distance would be defined during the project's environmental review stage.) The results of the numerical modeling shall be used in the design to minimize both impacts from the project on existing intakes/outfalls, and from these sources on the project's intake structure. In addition, implement Mitigation Measure 5.2.A-2 above.
Impact 5.2.A-11: Potential changes in Mokelumne River basin hydrologic conditions from enlarged reservoirs.	***Mitigation Measure 5.2.A-11: Modify reservoir operations.*** EBMUD (and in the case of the Enlarge Lower Bear Reservoir component, EBMUD and its project partners) shall modify and manage the future operations of the reservoirs both during and following construction to meet flow requirements as established by the Joint Settlement Agreement (JSA) and as needed to meet all environmental and downstream appropriator and riparian rights obligations.
5.2.B GEOLOGY, SOILS, AND SEISMICITY	
Impact 5.2.B-1: Potential exposure of people or structures to geologic and seismic hazards.	***Mitigation Measure 5.2.B-1a: Complete project-specific geologic and geotechnical studies and implement recommendations.*** EBMUD shall retain California-licensed geologists and geotechnical engineers to conduct engineering geologic and geotechnical studies for proposed facilities. These studies shall identify the presence of the hazards or conditions, as appropriate, including fault rupture hazard, soft-ground conditions, slope stability and landslides, strong seismic shaking, liquefaction and lateral spreading, settlement, and corrosive or expansive soil to affect concrete and steel. These studies shall identify corrective actions to avoid the hazard or support the design of engineering control measures. EBMUD shall document compliance with this measure prior to the final project design. The report shall document the investigations and detail the specific design support alternatives and protection measures that will be implemented.

Table 1-2: Summary of Mitigation Measures Identified in the Program EIR

IMPACT	MITIGATION MEASURE
	Mitigation Measure 5.2.B-1b: Update the EBMUD earthquake preparedness and emergency response program. EBMUD shall update its earthquake preparedness and emergency response program to include new facilities.
Impact 5.2.B-2: Potential erosion and loss of topsoil during construction.	***Mitigation Measure 5.2.B-2: Implement Stormwater Pollution Prevention Plan (SWPPP).*** Implement Mitigation Measure 5.2.A-1a above.
5.2.C BIOLOGICAL RESOURCES	
Impact 5.2.C-1: Potential temporary and permanent impacts to sensitive natural communities or wetlands or waters falling under the jurisdiction of the Corps and the State of California	***Mitigation Measure 5.2.C-1a: Conduct wetlands determination.*** Prior to implementation of any project where wetlands and/or waters of the U.S. may be present, a formal jurisdictional determination conducted according to Corps guidelines (Environmental Laboratory 1987) shall be completed by a qualified biologist and submitted to the Corps for verification and to assess potential impacts. The extent of waters of the State as defined under CDFG Code and the RWQCB under the Porter Cologne Act and Section 401 of the Clean Water Act shall also be delineated. To the extent feasible, implementation of any specific project shall be designed and constructed to avoid and minimize adverse effects to waters of the United States or jurisdictional waters of the State of California within the project area. Local plans and policies regarding wetland buffers shall be reviewed for each project and incorporated into the project design to the extent feasible.
	Mitigation Measure 5.2.C-1b: Acquire permits and implement all permit conditions. For impacts to jurisdictional wetlands and waters that cannot be avoided, a Section 404 permit and Section 401 certification of waste discharge requirements for fill of jurisdictional wetlands shall be sought from the Corps and the RWQCB, respectively. In addition, a Section 1600 Streambed Alteration Agreement shall be obtained from the CDFG. Mitigation shall conform with the Corps "no-net-loss" policy and the Corps Regulatory Guidance Letter No. 02-2 establishing policies and guidance on appropriate mitigation for impacts to jurisdictional waters. Mitigation for impacts to both federal and state jurisdictional waters shall be addressed using these guidelines.

Table 1-2: Summary of Mitigation Measures Identified in the Program EIR

IMPACT	MITIGATION MEASURE
Impact 5.2.C-2: Potential temporary disturbance to or permanent loss of special-status plant species, sensitive plant communities, or protected trees.	***Mitigation Measure 5.2.C-2a: Conduct habitat assessment.*** Prior to the implementation of any project where special-status plants may be present, a habitat assessment shall be conducted by a qualified botanist to determine potential for special-status plants species to occur. If suitable habitat is found within the project area, surveys for special-status plants shall be conducted during the appropriate blooming period for each target species by a qualified biologist. At least one season of surveys shall be conducted for all areas supporting potential habitat when the target species are detectable in the field. If special-status plant species are not found, no further mitigation is required.
	Mitigation Measure 5.2.C-2b: Delineate special-status plant species and sensitive plant communities. Prior to the implementation of any project where sensitive natural communities may be present, a habitat assessment shall be conducted by a qualified botanist to determine potential for sensitive natural communities to occur. Any sensitive natural communities identified within the project area shall be delineated.
	Mitigation Measure 5.2.C-2c: Conduct tree survey. Prior to the implementation of any project where protected and/or heritage trees may be present, a certified arborist shall conduct a tree survey to determine if protected and/or heritage trees are present within the project area.
	Mitigation Measure 5.2.C-2d: Design and construct facilities to avoid and/or minimize impacts. Avoidance of any special-status plant species, sensitive plant communities, and protected and/or heritage trees present shall be exercised to the extent feasible.
	Mitigation Measure 5.2.C-2e: Consult regulatory agencies and comply with their requirements. If avoidance is not feasible, additional mitigation measures may include: • Revegetation with native and/or special-status plant species by means of harvesting and relocation of plants or seed, which shall be permanently preserved either in the project area, or at an equivalent off site location that may be permanently preserved through a conservation easement or other similar method; • Preparation of a Mitigation and Monitoring Plan (MMP) that provides a detailed plan for habitat creation/enhancement and guidance on managing and monitoring the mitigation habitat; • Habitat compensation with respective ratios of vegetation replacement determined based on habitat function and

Table 1-2: Summary of Mitigation Measures Identified in the Program EIR

IMPACT	MITIGATION MEASURE
	value and coordinated with the appropriate agencies; • Participation in an in-lieu fee program, purchase of the required acreage in an approved mitigation bank, or implementation of an approved HCP; and • Prevention of noxious/exotic weed proliferation.
Impact 5.2.C-3: Potential disturbance to or loss of special status invertebrates or their habitats.	***Mitigation Measure 5.2.C-3a: Conduct habitat assessment.*** Prior to the implementation of any project where special-status invertebrates may be present, a habitat assessment shall be conducted by a qualified biologist to determine potential for special-status invertebrate species to occur.
	Mitigation Measure 5.2.C-3b: Conduct focused surveys for special-status invertebrates. If suitable habitat for special-status invertebrates is found within the project area, focused surveys shall be conducted by a qualified biologist, to determine presence of any special-status invertebrates. Wherever applicable, focused surveys shall be conducted according to USFWS or CDFG protocols.
	Mitigation Measure 5.2.C-3c: Avoid occupied habitat for special-status invertebrates or implement measures to minimize impacts. To the extent feasible, implementation of the project shall be designed and constructed to avoid adverse effects to special-status invertebrates and their habitat. If avoidance of occupied or potential habitat is not feasible, additional mitigation measures shall be implemented, and may include the following: • Replacement of habitat at a location approved by the appropriate jurisdictional agency which may include the CEQA lead agency, CDFG, and/or USFWS depending on the species. The habitat in the amount specified above shall be acquired, permanently protected, and enhanced through management for the benefit of the species, to compensate for the loss of habitat; • An MMP describing the mitigation and monitoring requirements and performance standards if habitat is preserved or acquired for special-status invertebrates; and • Participation in an in-lieu fee program, purchase of the required acreage in an approved mitigation bank, or implementation of an HCP.

Table 1-2: Summary of Mitigation Measures Identified in the Program EIR

IMPACT	MITIGATION MEASURE
Impact 5.2.C-4: Potential disturbance to or loss of special-status reptiles and amphibians, and their habitat or critical habitat.	***Mitigation Measure 5.2.C-4a: Conduct habitat assessment.*** Prior to the implementation of any project where special-status reptiles and/or amphibians may be present, a habitat assessment shall be conducted by a qualified biologist to determine potential for special-status reptiles and/or amphibians to occur.
	Mitigation Measure 5.2.C-4b: Conduct pre-construction surveys. If suitable habitat is present, a qualified biologist shall conduct pre-construction surveys for special-status reptiles and amphibians prior to initiation of construction activities.
	Mitigation Measure 5.2.C-4c: Avoid critical habitat and areas with special-status reptiles and amphibians, or implement measures to minimize impacts. If special-status reptiles and/or amphibians are found within the project area, or the project area is within designated critical habitat, these areas shall be avoided. If avoidance of occupied habitat or designated critical habitat is not feasible, consultation with the USFWS and CDFG under the federal Endangered Species Act (FESA) and California Endangered Species Act (CESA), respectively, shall occur to determine mitigation measures. Measures that may be required as mitigation actions by the USFWS and/or CDFG include, but are not limited to, the following: • Focused surveys, including trapping surveys; • Development and implementation of a protection and mitigation and monitoring plan, that is approved by the CEQA lead agency, USFWS, and CDFG; • Relocation of special-status reptiles and amphibians; • Limitation of construction activities within or adjacent to potential habitat; • Develop and implement a protection, mitigation, and monitoring plan including a detailed plan for habitat mitigation, preconstruction surveys and/or trapping surveys, as well as a construction monitoring program to prevent harm to special-status reptiles and amphibians that may be present during construction; • Exclusion fencing installation around the project area to prevent special-status reptiles and amphibians from entering the project sites; • Construction monitoring for special-status reptiles and amphibians by a qualified biologist; • Contractor education program implementation;

Table 1-2: Summary of Mitigation Measures Identified in the Program EIR

IMPACT	MITIGATION MEASURE
	• Prevention of exotic species proliferation; and • Revegetation of the project site based upon with guidelines for restoration, monitoring, and employment of criteria evaluations for success.
Impact 5.2.C-5: Potential disturbance to or loss of nesting birds.	***Mitigation Measure 5.2.C-5a: Conduct habitat assessment and surveys.*** Prior to the implementation of any project where nesting birds may be present, a qualified biologist shall do the following: • Conduct a habitat assessment for birds protected under the FESA including California clapper rail, California least tern, and western snowy plover. If potential habitat is present, consultation with the USFWS shall be completed;. • Conduct a habitat assessment and focused surveys for western burrowing owl, according to CDFG and the California Burrowing Owl Consortium, to determine if burrowing owls are present. If potential burrowing owl habitat or burrowing owls are detected by sign or direct observation, mitigation measures shall be developed as per CDFG guidelines and the California Burrowing Owl Consortium and in coordination with CDFG; and. • Conduct a nesting bird survey prior to any construction related activities that will occur during the potential nesting season (December 15 through August 31).
	Mitigation Measure 5.2.C-5b: Avoid construction during nesting season or conduct additional surveys. The removal of any buildings, trees, emergent aquatic vegetation, or shrubs shall occur outside of the nesting season. If removal of buildings, trees, emergent aquatic vegetation, or shrubs occurs, or construction begins between February 1 and August 31 (nesting season for passerine or non-passerine land birds) or December 15 and August 31 (nesting season for raptors), a nesting bird survey shall be performed by a qualified biologist within 14 days prior to the removal or disturbance of a potential nesting structure, trees, emergent aquatic vegetation, grassland, or shrubs, or the initiation of other construction activities. The survey shall be repeated if construction is phased or if construction activities lapse more than 14 days. During this survey, a qualified biologist shall inspect all potential nesting habitat (trees, shrubs, structures, grasslands, pastures, emergent aquatic vegetation, etc.) within 250 feet of the impact areas for nests, to the extent feasible.

Table 1-2: Summary of Mitigation Measures Identified in the Program EIR

IMPACT	MITIGATION MEASURE
	Mitigation Measure 5.2.C-5c: Establish a buffer zone around nests during construction. All vegetation and structures with active nests shall be flagged, and an appropriate non-disturbance buffer zone shall be established around the nest site. The size of the buffer zone shall be determined by a qualified biologist, in consultation with CDFG, and will depend on the species involved, site conditions, and type of work to be conducted in the area. Construction education shall be completed to ensure that nest sites and non-disturbance buffers are avoided.
	Mitigation Measure 5.2.C-5d: Monitor active nests for bird activity. A qualified biologist shall monitor any active nests to determine when the young have fledged and are feeding on their own. The project biologist and CDFG shall be consulted for clearance before construction activities resume in the vicinity of active nests.
Impact 5.2.C-6: Potential disturbance to or loss of special-status bat species and roosting habitat.	***Mitigation Measure 5.2.C-6a: Conduct pre-construction surveys.*** A pre-construction survey for roosting bats shall be performed by a qualified biologist within 30 days prior to any removal of trees or structures on the site. If the roost has a history of bat use, an exclusion device should be installed to prevent bats from occupying the site during the post survey period. If no active roosts are found, then no further action would be warranted. If either a maternity roost or hibernacula (structures used by bats for hibernation) is present, the following mitigation measures shall be implemented.
	Mitigation Measure 5.2.C-6b: Avoid active maternity roosts. If active maternity roosts or hibernacula are found in trees or structures which will be removed as a result of implementation of a component, EMBUD shall, to the extent feasible, redesign the component to avoid the loss of the tree or structure occupied by the roost. If an active maternity roost is located and the project cannot be redesigned to avoid removal of the occupied tree or structure, demolition may commence before maternity colonies form (i.e., prior to March 1) or after young are volant (flying) (i.e., after July 31). Disturbance-free buffer zones as determined by a qualified biologist in coordination with CDFG shall be observed during the maternity roost season (March 1 - July 31).
	Mitigation Measure 5.2.C-6c: Evict bats prior to demolition activities. If a non-breeding bat hibernacula is found in a tree or structure scheduled for removal, the individuals shall be safely evicted, under the direction of a qualified biologist (as determined by a Memorandum of Understanding with CDFG),

Table 1-2: Summary of Mitigation Measures Identified in the Program EIR

IMPACT	MITIGATION MEASURE
	by opening the roosting area to allow airflow through the cavity. Demolition can then follow at least one night after initial disturbance of airflow. This action should allow bats to leave during darkness, thus increasing their chance of finding new roosts with a minimum of potential predation during daylight. Trees or structures with roosts that must be removed shall first be disturbed at dusk, just prior to removal that same evening, to allow bats to escape during the darker hours.
	Mitigation Measure 5.2.C-6d: Create replacement roosts. If special-status bats are found roosting within trees or structures on site that require removal, EBMUD shall create appropriate replacement roosts at a suitable location on or off-site, in coordination with a qualified biologist and CDFG.
Impact 5.2.C-7: Potential disturbance to or loss of other special-status mammals.	***Mitigation Measure 5.2.C-7a: Conduct a habitat assessment.*** Prior to the implementation of any project where special-status mammals may be present, a habitat assessment shall be conducted by a qualified biologist to determine potential for special-status mammals to occur.
	Mitigation Measure 5.2.C-7b: Conduct pre-construction surveys. If suitable habitat for special-status mammals is identified in the Preferred Portfolio Study Area, a qualified biologist shall conduct pre-construction surveys, or focused surveys as applicable according to USFWS or CDFG protocols, prior to initiation of construction activities.
	Mitigation Measure 5.2.C-7c: Avoid special-status mammal habitat; if avoidance is not feasible, then consult with USFWS and CDFG to determine mitigation measures. If special-status mammals are found within the project area, or the project area is within designated critical habitat, these areas shall be avoided. If avoidance of occupied habitat or designated critical habitat is not feasible, consultation with the USFWS and CDFG under the FESA and CESA, respectively, shall occur to determine mitigation measures. Measures that may be required as mitigation actions by the USFWS and/or CDFG include, but are not limited to, the following: • Focused surveys, including trapping surveys, if appropriate; • Development and implementation of a protection and mitigation and monitoring plan, that is approved by the CEQA lead agency, USFWS, and CDFG; • Relocation of special-status mammals;

Table 1-2: Summary of Mitigation Measures Identified in the Program EIR

IMPACT	MITIGATION MEASURE
	• Limitation of construction activities within or adjacent to potential habitat; • Develop and implement an MMP.; • Exclusion fencing installation around the project area to prevent special-status mammals from entering the project sites; • Construction monitoring for special-status mammals by a qualified biologist; and • Contractor education program implementation.
Impact 5.2.C-8: Potential loss of or impacts to fish and aquatic habitats.	***Mitigation Measure 5.2.C-8a: Comply with State NPDES general construction permit.*** Prior to the implementation of any project where fish species and aquatic habitats could be adversely affected, a Stormwater Pollution Prevention Plan (SWPPP) shall be prepared and implemented to minimize the potential contamination of surface waters, and comply with applicable federal regulations concerning construction activities (see Mitigation Measure 5.2.A-1a [Comply with State National Pollutant Discharge Elimination System [NPDES] General Construction Permit] in Section 5.2.A, Hydrology, Groundwater, and Water Quality).
	Mitigation Measure 5.2.C-8b: Implement a spill prevention and control plan. Prior to the implementation of any project where fish species and aquatic habitats could be impacted, a spill prevention control and countermeasures plan shall be prepared and implemented (see Mitigation Measure 5.2.J-1 [Enforce On-site Hazardous Materials Handling Rules] in Section 5.2.J, Hazards).
Impact 5.2.C-9: Potential entrainment of special-status fish into pumps/intake pipes.	***Mitigation Measure 5.2.C-9: Install fish screens.*** Fish screens shall be designed and installed over any potential new diversion intake(s). The fish screen shall be designed consistent with CDFG and the National Marine Fisheries Service (NMFS) criteria for screen mesh size, water velocity approach, etc.
Impact 5.2.C-10: Potential reduction of surface water quality.	***Mitigation Measure 5.2.C-10: Implement a groundwater monitoring plan.*** A groundwater monitoring plan shall be implemented by EBMUD as part of the Bayside Groundwater Phase 2 to monitor the impact of operations on groundwater levels and water quality. For a full discussion, see Mitigation Measure 5.2.A-4 in Section 5.2.A, Hydrology, Groundwater, and Water Quality.

Table 1-2: Summary of Mitigation Measures Identified in the Program EIR

IMPACT	MITIGATION MEASURE
Impact 5.2.C-11: Disruption of downstream flow releases.	***Mitigation Measure 5.2.C-11: Develop and implement a reoperation plan.*** Prior to the onset of construction, a reoperation plan will be developed to ensure that adequate water is available in Camanche Reservoir to maintain required downstream releases to the lower Mokelumne River during construction. The reoperation plan shall note specifically those seasonal restrictions on construction-related outages that cannot be accommodated due to inadequate capacity in Camanche Reservoir to maintain habitat-sensitive flow and temperature regimes.
5.2.D LAND USE	
Impact 5.2.D-2: Potential impairment of recreation facilities and activities.	***Mitigation Measure 5.2.D-2a: Repair and reopen affected recreational facilities.*** EBMUD or its contractors shall implement the following measures for the Enlarge Pardee and Lower Bear Reservoirs components: • Replace recreational features displaced by enlargement of reservoirs; and • Implement an operations plan for the enlarged Pardee Reservoir that preserves the Electra whitewater run during the summer months.
5.2.E TRANSPORTATION	
Impact 5.2.E-1: Potential reduction of the number or available width of travel lanes on roads from construction, resulting in temporary disruption of traffic flows, increases in traffic congestion, and access to adjacent land uses for both general and emergency access.	***Mitigation Measure 5.2.E-1: Prepare and implement a traffic control plan.*** EBMUD shall prepare a detailed traffic control plan for the affected roadways and intersections for the selected pipeline alignments. The traffic control plan shall be prepared in accordance with professional traffic engineering standards and in compliance with the requirements of the affected jurisdiction's encroachment permit requirements. The traffic control plan shall include, but be limited to, the following: • Identify specific methods for maintaining traffic flows for affected streets. This shall include identifying roadway locations where special trenching techniques (e.g., trenchless construction) would be used to minimize impacts to traffic flow and operations; • Identify areas where construction would be limited to non-peak hours to reduce traffic flow restrictions, in compliance with the encroachment permit; • Maintain the maximum amount of travel lane capacity during non-construction periods and provide flagger control at sensitive construction sites to manage traffic control and flows;

Table 1-2: Summary of Mitigation Measures Identified in the Program EIR

IMPACT	MITIGATION MEASURE
	• To the extent feasible, limit the construction work zone to a width that, at a minimum, maintains alternate one-way traffic flow past the construction zone; • Coordinate construction activities (time of year and duration) to minimize traffic disturbances adjacent to schools and commercial areas; • Post advanced warning of construction activities to allow motorists to select alternative routes in advance; • Require appropriate warning signage and lighting for construction zones; • Identify appropriate and safe detour routes if closure of a roadway is required, and install signage warning of road closure and detour routes; and • Maintain steel trench plates at construction sites to restore access across open trenches to minimize disruption of access to driveways and adjacent land uses. Construction trenches in street shall not be left open after work hours. The traffic control plan shall be reviewed for appropriateness and approved by the governing public works department.
Impact 5.2.E-2: Potential short-term increases in vehicle trips during construction.	***Mitigation Measure 5.2.E-2: Schedule construction truck trips to avoid peak traffic hours.*** EBMUD shall include in construction plans and specifications a requirement that contractors schedule construction-related truck trips, specifically deliveries of fill and equipment, outside of weekday AM and PM peak commute traffic hours and peak recreational periods such as holiday weekends.
Impact 5.2.E-4: Potential increase in wear and tear on designated haul routes from construction vehicles.	***Mitigation Measure 5.2.E-4: Conduct pre-construction survey of road conditions.*** EBMUD shall incorporate into contract specifications a requirement to conduct pre-construction surveys of road conditions on key access routes to project sites. The pavement conditions of local streets and designated roads judged to be in good condition for use by heavy truck traffic shall be monitored. Any roads damaged by construction shall be repaired to a condition equal to or better than that which existed prior to construction activity.
Impact 5.2.E-5: Potential to temporarily disrupt bus service along proposed pipeline corridors during construction.	***Mitigation Measure 5.2.E-5: Relocate bus stops or detour bus routes.*** If pipeline installation would require closure of a lane where a bus stop is located, EBMUD shall, in coordination with the local transit service, temporarily relocate the bus stop. EBMUD shall determine the necessity of roadway closure once pipeline alignments are selected. If complete closure is necessary where a bus line traverses, then EBMUD shall coordinate with the local transit service to identify detour bus routes.

Table 1-2: Summary of Mitigation Measures Identified in the Program EIR

IMPACT	MITIGATION MEASURE
Impact 5.2.E-6: Potential to affect rail operations.	***Mitigation Measure 5.2.E-6a: Implement trenchless construction techniques.*** EBMUD shall implement trenchless construction techniques for the crossing of rail tracks.
	Mitigation Measure 5.2.E-6b: Coordinate with the railroad entity. If pipelines were to be installed along a railroad corridor, EBMUD shall coordinate with the railroad entity to determine the necessary setback from the railroad tracks for placement of the pipeline along the railroad easement.
5.2.F AIR QUALITY	
Impact 5.2.F-2: Potential to violate an air quality standard or contribute substantially to an existing or projected air quality violation.	***Mitigation Measure 5.2.F-2a: Implement control measures to reduce fugitive PM_{10} dust emissions during site preparation, grading, material hauling, and other construction activities.*** Mitigation measures shall include all dust control practices required by the rules and regulations of the applicable air district. Project-specific analysis would be required for each Preferred Portfolio component to estimate the associated mass emissions of PM_{10} fugitive dust and to identify the specific dust abatement requirements required by the applicable air district at the time the construction is performed and determine the need for additional measures. These measures may include, but are not limited to, the following: • Water all active construction areas at least twice daily. Watering shall be sufficient to prevent airborne dust from leaving the site. Increased watering frequency may be necessary whenever wind speeds exceed 15 miles per hour (mph). Reclaimed water shall be used whenever possible; • Cover all trucks hauling soil, sand, and other loose materials or require all trucks to maintain at least two feet of freeboard (i.e., the minimum required space between the top of the load and the top of the trailer); • Pave, apply water three times daily (or as sufficient to prevent dust from leaving the site), or apply (non-toxic) soil stabilizers on all unpaved access roads, parking areas, and staging areas at construction sites; • Sweep daily or as appropriate (with water sweepers using reclaimed water if possible) all paved access roads, parking areas, and staging areas at construction sites. Also sweep all visible soil and material that is carried onto adjacent public streets; • Hydroseed or apply (non-toxic) soil stabilizers to inactive construction areas (previously graded areas inactive for ten days or more); • Limit traffic speeds on unpaved roads to 15 mph;

Table 1-2: Summary of Mitigation Measures Identified in the Program EIR

IMPACT	MITIGATION MEASURE
	• Install sandbags or other erosion control measures to prevent silt runoff to public roadways; • Replant vegetation in disturbed areas as quickly as possible; • Install wheel washers for all exiting trucks, or wash off the tires or tracks of all trucks and equipment leaving the site; • Limit the area subject to excavation, grading and other construction activity at any one time; • Submit a dust control plan to the local air district and obtain approval of the plan prior to issuance of the grading permit. The dust control plan shall specifically identify measures that will demonstrate that earthmoving activities in areas of the site will comply with all of the requirements of local air district; and • Require the contractor to ensure that all demolished material, soil piles, or disturbed ground surface be wetted at an adequate frequency during demolition and during any subsequent disturbance of material sufficient to prevent visible dust emissions from leaving the project site.
	Mitigation Measure 5.2.F-2b: Implement measures to reduce exhaust emissions of ozone precursors (ROG, NO_x, and PM_{10}) from heavy-duty off-road construction equipment and on-road mobile sources associated with material delivery and worker commute trips. Project-specific analysis would be required for each Preferred Portfolio component to estimate the associated mass emissions of ozone precursors and to identify the specific emission control requirements for reducing those emissions pursuant to the requirements of the applicable air district at the time the construction is performed. This may include participation in an Indirect Source Review and Fee Program which allows new projects to offset their emissions by paying an in-lieu fee that is used to implement emission reductions in another part of the applicable air basin. Other measures may include, but are not limited to, the following: • Use construction equipment that complies with the requirements and compliance schedule of the adopted California Air Resources Board (ARB) Regulation for In-Use Off-Road Diesel Vehicles in effect at the time of use; • Develop a Construction Traffic Emission Management Plan to minimize emissions from vehicles; and • Comply with all applicable air district requirements to reduce emissions of ozone precursors.

Table 1-2: Summary of Mitigation Measures Identified in the Program EIR

IMPACT	MITIGATION MEASURE
	Mitigation Measure 5.2.F-2c: Implement measures to reduce emissions of CAPs and ozone precursors if such emissions would otherwise exceed the significance thresholds established by the local air district. Project-specific analysis shall be required for each component to estimate the associated operational emissions of CAPs and to identify the specific reduction measures pursuant to the requirements of the applicable air district at the time the component is designed and permitted. These reduction measures may include, but are not limited to, use of electrically powered generators, landscape maintenance equipment, and operational equipment; and measures to increase energy efficiency of proposed buildings. As part of the project-level environmental review for each component, EBMUD shall estimate the long-term operational emissions of CAPs and ozone precursors. This analysis shall determine whether the operational emissions would exceed the applicable mass emission thresholds of the applicable local air district. If these operational emissions are less than the applicable thresholds of the local air district or are reduced to levels below these thresholds with implementation of project-specific mitigation measures, then project operations would not result in a significant impact to air quality.
Impact 5.2.F-3: Potential for a cumulatively considerable net increase of criteria pollutants for which the region is in nonattainment under an applicable national or State ambient air quality standard.	***Mitigation Measure 5.2.F-3: Implement Mitigation Measures 5.2.F-2a, 5.2.F-2b, and 5.2.F-2c.*** As part of the project-level environmental review for each Preferred Portfolio component, EBMUD shall estimate the emission levels of CAPs associated with the construction and operation of the associated facilities. This analysis shall determine whether the construction and operational emissions would result in a cumulatively considerable contribution to the nonattainment status of the region. If these emissions do not represent a cumulatively considerable net increase of any CAP for which the region is nonattainment, then the Preferred Portfolio components would not result in significant impacts to air quality. However, if these emissions do represent a cumulatively considerable net increase of any CAP for which the region is nonattainment, then the construction-generated emissions would be considered significant and unavoidable.

Table 1-2: Summary of Mitigation Measures Identified in the Program EIR

IMPACT	MITIGATION MEASURE
Impact 5.2.F-4: Potential exposure of sensitive receptors to substantial pollutant concentrations.	***Mitigation Measure 5.2.F-4a: Implement Mitigation Measure 5.2.F-2a.*** The different local air districts recommend various methodologies for determining whether sensitive receptors would be exposed to concentrations of PM_{10} and $PM_{2.5}$ that exceed State and national ambient air quality standards. As part of the project-level environmental review for each component, EBMUD shall employ the methodology recommended by the applicable local air district. If these analyses determine that sensitive receptors would not be exposed to concentrations of PM_{10} and $PM_{2.5}$ that exceed State and national ambient air quality standards with implementation of project-specific mitigation measures, then the project would not result in a significant impact to air qualityof project-specific mitigation measures, then the project would not result in a significant impact to air quality. However, if a project-level analysis determines that PM_{10} and $PM_{2.5}$ concentrations at sensitive receptors could not be reduced to levels below State and national ambient air quality standards through mitigation, then the construction-generated PM_{10} and $PM_{2.5}$ emissions would be ***potentially significant***. This outcome would be most likely when substantial levels of earth movement would occur over short periods of time.
	Mitigation Measure 5.2.F-4b: Implement measures to reduce construction-related emissions of diesel PM exhaust from heavy-duty off-road construction equipment. Project-specific analysis would be required for each Preferred Portfolio component to estimate the associated exposure of nearby receptors to diesel PM emissions and, as necessary, to identify the specific emission control requirements for reducing exposure levels pursuant to the requirements of the applicable air district at the time the analysis is performed. These requirements may include, but are not limited to, the following: • Construction equipment shall be staged as far as possible from any sensitive receptors to the extent feasible; • Haul truck routes shall be designated so as not to pass by sensitive receptors to the extent feasible; and • Before construction contracts are issued, EBMUD shall perform a review of new technology, as it relates to heavy-duty equipment, to determine what (if any) advances in emissions reductions are available for use and are economically feasible. Construction contract and bid specifications shall require contractors to utilize the available and economically feasible technology on an established percentage of the equipment fleet. It is anticipated that in the near future that PM_{10} control equipment will be available (as well as NO_x controls); the applicable local air district shall be consulted. As part of the project-level environmental review for each component in accordance with the recommended methodologies of the applicable local air district, EBMUD shall estimate the diesel PM exposure levels at affected

Table 1-2: Summary of Mitigation Measures Identified in the Program EIR

IMPACT	MITIGATION MEASURE
	receptors. This analysis shall determine whether the diesel PM exposure level would exceed the applicable threshold of the local air district. If the estimated exposure levels are less than the applicable threshold of the local air district or are reduced to levels below these thresholds with implementation of project-specific mitigation measures, then the project would not result in a significant impact to air quality. The effectiveness of project-specific mitigation measures will vary for each component according to factors such as the spatial layout of the project site relative to nearby receptors, equipment types, emission rates, number hours of construction work each day, and meteorological conditions. However, if short-term construction-generated exposure to diesel PM emissions cannot be reduced to levels below the applicable thresholds of the local air district through mitigation, then the construction-generated emissions would be considered significant and unavoidable.
	Mitigation Measure 5.2.F-4c: Implement measures to prevent exposure to airborne asbestos pursuant to the requirements of the local air district and/or other local jurisdictions. As part of the project-level environmental review for each Preferred Portfolio component, in accordance with the recommended methodologies of the applicable local air district, EBMUD shall determine the likelihood of exposure to airborne asbestos. If all required and necessary precautionary measures are implemented to prevent exposure to airborne asbestos, then the Preferred Portfolio component would not result in a significant impact to air quality. If the local air district or local jurisdiction does not have rules and regulations pertaining to ground disturbance in areas likely to contain NOA or the demolition of structures that may contain asbestos materials, then project-specific precautionary measures for preventing exposure to asbestos shall be developed and implemented.
5.2.G NOISE	
Impact 5.2.G-1: Potential exposure of sensitive receptors to noise levels in excess of the applicable noise standards and/or result in a noticeable increase in ambient noise levels from short-term construction activities.	***Mitigation Measure 5.2.G-1a: Avoid siting proposed construction activities in close proximity to noise-sensitive land uses.*** EBMUD shall avoid siting construction activities in close proximity to noise-sensitive land uses. If avoidance is not possible, EBMUD shall site these construction activities as far from noise-sensitive land uses as possible.

Table 1-2: Summary of Mitigation Measures Identified in the Program EIR

IMPACT	MITIGATION MEASURE
	Mitigation Measure 5.2.G-1b: Implement measures to reduce short-term construction noise levels. If locating short-term construction activities in close proximity to noise-sensitive land uses cannot be avoided, then the District shall implement the following actions, to the extent feasible, to reduce noise levels at noise-sensitive land uses: • Construction equipment shall be properly maintained per manufacturers' specifications and fitted with the best available noise suppression devices (e.g., mufflers, silencers, wraps). All impact tools shall be shrouded or shielded, and all intake and exhaust ports on power equipment shall be muffled or shielded; • Construction operations and related activities associated with the Preferred Portfolio shall comply with the operational hours outlined in local plans and ordinances where construction activities occur; • Construction equipment shall not idle for extended periods of time near noise-sensitive receptors; and • Fixed/stationary equipment shall be located as far as possible from noise-sensitive receptors. Additional mitigation measures may be needed to reduce construction noise to acceptable levels (e.g., installation of temporary sound barriers, predrilling of pile holes, a noise disturbance coordinator to manage complaints, etc.). The need for additional mitigation measures will be determined as part of the project-level environmental review for each Preferred Portfolio component. The majority of the jurisdictions where construction activities could take place have noise ordinance exemptions. For jurisdictions that do not enforce noise ordinances (Amador, Calaveras, Colusa, Contra Costa, and Plumas counties), noise due to construction is generally exempt from codified exterior noise level standards defined in general plan noise elements during the daytime hours. Implementation of the above mitigation measures would reduce the exposure of sensitive receptors to project-generated construction source noise levels, but would still result in a substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project, thus impacts would be potentially significant and unavoidable.
Impact 5.2.G-2: Potential exposure of noise-sensitive receptors to noise levels in excess of the applicable noise standards and/or result in a noticeable increase in ambient noise levels from long-term operational activities.	***Mitigation Measure 5.2.G-2a: Avoid siting proposed facilities in close proximity to noise-sensitive land uses.*** EBMUD shall avoid siting proposed facilities in close proximity to noise-sensitive land uses. If avoidance is not possible, EBMUD shall site these facilities as far from noise-sensitive land uses as possible.

Table 1-2: Summary of Mitigation Measures Identified in the Program EIR

IMPACT	MITIGATION MEASURE
	Mitigation Measure 5.2.G-2b: Implement measures to reduce long-term operational related noise levels. The majority of the jurisdictions where proposed facilities could be placed have noise standards for non-transportation (stationary) noise sources. For jurisdictions that do not have performance standards for non-transportation noise sources (Amador, Calaveras, Colusa, Contra Costa, and Plumas counties), noise due to proposed facility operations would be evaluated using codified exterior noise level standards. Implementation of the measures listed below would reduce the exposure of sensitive receptors to project-generated operational source noise levels, but would still result in a substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project. Therefore, impacts would be potentially significant and unavoidable. • During individual portfolio component review, EBMUD shall determine if the proposed use would likely generate noise levels adversely affecting the adjacent noise-sensitive uses. If a Preferred Portfolio component has the potential to generate or expose noise-sensitive uses to noise levels exceeding the local exterior noise standards or result in a substantial (3 dB or greater) permanent increase in ambient noise levels, EBMUD shall prepare a site-specific acoustical analysis. The acoustical analysis shall be conducted in accordance with local general plan requirements. • All long-term operational machinery shall be located in mechanical equipment rooms, wherever possible; and • Localized noise barriers or rooftop parapets shall be constructed around the HVAC, cooling towers, and mechanical equipment to block line-of-site to the noise source from the property line of the noise-sensitive receptors.
Impact 5.2.G-3: Potential for noticeable increase in traffic noise (3 dB or greater) along roadways designated for hauling construction materials.	***Mitigation Measure 5.2.G-3a: Avoid designating construction haul routes on local roadways with adjacent noise-sensitive land uses.*** EBMUD shall avoid designating construction haul routes on local roadways with adjacent noise-sensitive land uses. If avoidance is not possible, EBMUD shall designate construction haul routes with the fewest possible adjacent noise-sensitive land uses.
	Mitigation Measure 5.2.G-3b: Implement measures to reduce construction-generated traffic noise levels at existing noise-sensitive receptors. As discussed previously, urban areas are not expected to be exposed to a substantial increase in traffic noise levels due to construction-related traffic. However, for rural areas, further site-specific analysis would be required to determine the potential effects of increased traffic noise at noise-sensitive land uses adjacent to proposed construction haul

Table 1-2: Summary of Mitigation Measures Identified in the Program EIR

IMPACT	MITIGATION MEASURE
	routes. Implementation of the measures listed below would reduce the exposure of sensitive receptors to increased project-generated traffic source noise levels; therefore, potential impacts would be ***less than significant***. • Operating speeds of construction-related traffic shall be reduced; and • Where construction-related traffic increases result in an increase of existing traffic noise levels exceeding 3 dBA, temporary barriers shall be installed.
Impact 5.2.G-4: Potential exposure of sensitive receptors to excessive ground-borne noise and vibration levels (e.g., exceed FTA, Caltrans, and local guidelines).	***Mitigation Measure 5.2.G-4a: Avoid siting proposed construction activities in close proximity to vibration-sensitive land uses.*** EBMUD shall avoid siting construction activities in close proximity to vibration-sensitive land uses. If avoidance is not possible, EBMUD shall site these construction activities as far from vibration-sensitive land uses as possible.
	Mitigation Measure 5.2.G-4b: Implement measures to reduce construction-generated vibration levels from construction activities at existing vibration-sensitive receptors. The amount and duration of vibration-induced construction activities have not been determined. However, it is expected that construction activities would expose people to or generate excessive ground-borne vibration or noise levels at vibration-sensitive receptors in close proximity to proposed construction areas. Implementation of reduction measures (which may include, but are not limited to, designating a preservation director to manage complaints; recording the pre-existing condition of all buildings in close proximity to construction activities; conducting vibration monitoring during pile-driving operations; providing protective coverings for nearby historic features; and using alternative pile-driving methods) would reduce the exposure of sensitive receptors to project-generated vibration levels; however, potential impacts would be ***potentially significant***.
5.2.H CULTURAL RESOURCES	
Impact 5.2.H-1: Potential to alter or damage known or unrecorded cultural resources, including human remains, during construction.	***Mitigation Measure 5.2.H-1a: Perform a record search at the appropriate information center and cultural and architectural resource surveys, and document results.*** Prior to construction, EBMUD shall retain a qualified professional archaeologist to perform a cultural resources record search at the appropriate information center or other repositories, such as local historical societies. The archaeologist shall use the results of the record search to design and complete an appropriate cultural resources inventory and preliminary assessment program for the applicable components. As necessary, a qualified professional architectural historian shall also be retained to assess impacts to the built environment.

Table 1-2: Summary of Mitigation Measures Identified in the Program EIR

IMPACT	MITIGATION MEASURE
	The inventory efforts shall be documented and shall include appropriate treatment measures for identified resources, as well as a plan for dealing with unanticipated finds during construction. Treatment of known sites shall be completed prior to construction whenever feasible. A copy of the inventory report and any new or updated site records shall be sent to the information center.
	Mitigation Measure 5.2.H-1b: Develop a plan to manage the discovery of as-yet unknown cultural resources. EBMUD shall develop a plan to manage the discovery of as-yet unknown cultural resources. If cultural resources—such as chipped or ground stone, historic debris, building foundations, or human bone—are inadvertently discovered during construction activities, the construction contractor should adhere to the following: • Stop work immediately within 100 feet of the find; • Notify relevant agencies; and • Retain a qualified archaeologist to assess the significance of the find and, if necessary, to develop appropriate treatment measures in consultation with the Most Likely Descendant (see Mitigation Measure 5.2.H-1c in the event human remains are discovered).
	Mitigation Measure 5.2.H-1c: Avoid disturbance to human remains. The archaeologist retained shall use the results of the record search to identify known burial sites in construction areas. To the greatest extent possible, this information should be used to design project elements in such a way as to avoid impacts to known cemeteries. The inventory efforts shall be documented and shall include appropriate treatment measures for identified burial sites. In accordance with the California Health and Safety Code, if human remains are uncovered during ground-disturbing activities, the contractor and/or EBMUD shall immediately halt potentially damaging excavation in the area of the burial and shall notify the County Coroner and a professional archaeologist to determine the nature of the remains. The coroner is required to examine all discoveries of human remains within 48 hours of receiving notice of a discovery on private or State lands (Health and Safety Code Section 7050.5[b]). If the coroner determines that the remains are those of a Native American, he or she must contact the Native American Heritage Commission (NAHC) by phone within 24 hours of making that determination (Health and Safety Code Section 7050[c]). Following the coroner's findings, the property owner, contractor or EBMUD, an archaeologist, and the NAHC-designated Most Likely Descendant (MLD) shall determine the ultimate treatment and disposition of the remains and take appropriate steps to ensure that additional human interments are not disturbed. The responsibilities for acting upon notification of

Table 1-2: Summary of Mitigation Measures Identified in the Program EIR

IMPACT	MITIGATION MEASURE
	a discovery of Native American human remains are identified in California Public Resources Code (PRC) Section 5097.9. Upon the discovery of Native American remains, the landowner shall ensure that the immediate vicinity (according to generally accepted cultural or archaeological standards and practices) is not damaged or disturbed by further development activity until consultation with the MLD has taken place. The MLD shall have 48 hours to complete a site inspection and make recommendations after being granted access to the site. A range of possible treatments for the remains, including nondestructive removal and analysis, preservation in place, relinquishment of the remains and associated items to the descendants, or other culturally appropriate treatment may be discussed. PRC Section 5097.9 suggests that the concerned parties may extend discussions beyond the initial 48 hours to allow for the discovery of additional remains. The following is a list of site protection measures that the landowner shall employ: • Record the site with the NAHC or the appropriate information center; and • Use an open space or conservation zoning designation or easement. If the NAHC is unable to identify a MLD, or if the MLD fails to make a recommendation within 48 hours of being granted access to the site, the landowner or landowner's authorized representative shall rebury the Native American human remains and associated grave goods with appropriate dignity on the property in a location not subject to further subsurface disturbance. The landowner or authorized representative may also reinter the remains in a location not subject to further disturbance if he or she rejects the recommendation of the MLD and mediation by the NAHC fails to provide measures acceptable to the landowner. Adherence to these procedures and other provisions of the California Health and Safety Code will reduce potential impacts on human remains to a less-than-significant level. EBMUD shall be required to implement any mitigation for the protection of the burial remains. If burials are identified during construction, construction work in the vicinity of the burials shall not resume until the mitigation is completed. This measure shall be included in all grading and improvement plans for all phases of implementation.
	Mitigation Measure 5.2.H-1d: Prepare a Data Recovery Plan. This mitigation measure applies to the following components: Enlarge Pardee and Lower Bear Reservoirs and IRCUP / San Joaquin Groundwater Banking / Exchange Project. EBMUD shall develop and implement a Data Recovery Plan and prepare Historic American Engineering Record Documentation on Pardee Dam, Middle Bar Bridge. Where avoidance to structures is impossible, typical mitigation to reduce the impact would be to develop and implement a data recovery plan including preparation of Historic

Table 1-2: Summary of Mitigation Measures Identified in the Program EIR

IMPACT	MITIGATION MEASURE
	American Engineering Record (HAER) documentation. Pardee Dam was previously documented (HAER Survey Number CA-168, CA-168-A, CA-168-B, CA-168-C, CA-168-D). Prior to any potential impact to Pardee Dam, an update to the original HAER documentation may be needed. Additional elements of the data recovery plan may include an interpretive display at the site with historic photos of the original dam, along with textual displays on the history and significance of the site. Also, significant architectural features of the new dam could reflect the original dam. The name of a new dam should be differentiated from Pardee Dam. Mitigation for removing Middle Bar Bridge would also include development and implementation of a data recovery plan including HAER documentation. Middle Bar Bridge has not been previously HAER-documented. An interpretive display in the vicinity of the bridge may also be a component of the data recovery plan to reduce the impact to this resource. This mitigation would apply for both CEQA and NHPA compliance, reducing these impacts to a less-than-significant level and resolving the potential adverse effects to this historic property. In addition, in the event that other historic resources are located at other proposed sites, EBMUD shall develop and implement a Data Recovery Plan and prepare HAER documentation on any other resources where appropriate. Copies of all documentation shall be sent to the appropriate repositories.
5.2.I VISUAL RESOURCES	
Impact 5.2.I-1: Potential to adversely affect the existing visual character and scenic vistas or resources.	***Mitigation Measure 5.2.I-1: Integrate above-ground structures with the surrounding landscape.*** EBMUD shall use design elements to enhance visual integration of above-ground facilities with their surroundings. These elements may include but are not limited to the painting of structural façades to blend with the surrounding land uses, or installing berms and/or landscaping around the facility.
Impact 5.2.I-2: Potential to increase light and glare.	***Mitigation Measure 5.2.I-2: Incorporate design elements to reduce light and glare*** EBMUD shall provide project specifications for construction of facilities to reduce lighting intrusion and glare on surrounding uses. Highly reflective building materials and/or finishes shall not be used in the design of proposed structures. Landscaping shall be maintained to minimize off-site light and glare.

Table 1-2: Summary of Mitigation Measures Identified in the Program EIR

IMPACT	MITIGATION MEASURE
5.2.J HAZARDS	
Impact 5.2.J-1: Potential exposure to uncontrolled releases of hazardous materials	***Mitigation Measure 5.2.J-1: Enforce on-site hazardous materials handling rules.*** As described in Section 4.2.J.3, a comprehensive array of regulations is in place to ensure that risks associated with hazardous substances are carefully managed. Specific design features of chemical storage containment that increase the safe handling of hazardous substances would be determined at the project level and may include the following, as examples: • Separate secondary containment for each chemical storage system • Proper separation of incompatible chemicals • Design of all chemical handling facilities to minimize or eliminate the risk of damage from earthquakes or other natural disasters Use and storage of hazardous materials in quantities that exceed certain regulatory thresholds will require a hazardous material business plan, which would include an inventory of chemicals and amounts, as well as emergency response plans in the event of an uncontrolled release, to ensure adequate response to an accidental chemical release. EBMUD shall incorporate into contract specifications the requirement that the contractor(s) enforce strict on-site handling rules to prevent exposure of workers and the public to hazardous material releases and degradation of receiving water quality. These rules may include the following: • A construction site plan, including delineation of hazardous materials and hazardous waste storage areas, access and egress routes, drainage paths, emergency assemble areas, and temporary hazardous waste storage areas; • Materials Safety Data Sheets for all chemicals used and stored at the construction sites; • Spill prevention procedures, including employee spill prevention/response training; • An inventory list of emergency equipment; • Off-loading, safety, and handling procedures for each chemical; • Notification and documentation procedure; • Refueling of equipment only within designated areas of the construction staging area; and • Regular inspection of all construction vehicles for releases.

Table 1-2: Summary of Mitigation Measures Identified in the Program EIR

IMPACT	MITIGATION MEASURE
Impact 5.2.J-2: Potential exposure of construction workers to contaminated soil and water.	***Mitigation Measure 5.2.J-2: Conduct environmental site assessments and remediation.*** Upon finalization of proposed locations, EBMUD shall conduct due diligence reviews of the selected sites, as needed, to ensure that known hazardous materials contamination will be avoided. This shall include performance of a Phase 1 Hazardous Materials Site Assessment by a qualified professional (e.g., a California Registered Environmental Assessor) in conformance with American Society for Testing and Materials standards. If the Phase I Environmental Site Assessment indicates that a release of hazardous materials could have affected soil or groundwater quality at the site, then EBMUD shall retain a qualified environmental professional to conduct a Phase II Environmental Site Assessment to determine the presence and extent of contamination at the site, in conformance with State and local guidelines and regulations. If the results of a Phase II assessment indicate the presence of hazardous materials, alteration of facility design or site remediation shall be included in project specifications. EBMUD shall require that its contractors comply with the requirements of its Trench Spoils Field Management Practices Program for worker safety during excavation and trenching activities in the presence of contaminated soils. Compliance with required laws and regulations through the project design and construction specifications would ensure that potential impacts associated with contaminated soils or dewatering effluent would be reduced to less-than-significant levels
Impact 5.2.J-3: Potential exposure to risk of wildland fires.	***Mitigation Measure 5.2.J-3a: Implement fire control plans.*** Prior to the start of construction, EBMUD and/or its contractors shall develop and implement fire control plans containing fire management procedures. These plans shall be consistent with EBMUD's FMP. The fire control plans would require consultation with the affected jurisdictions and appropriate agencies responsible for fire protection at proposed project sites. The plans shall include fire precaution, presuppression, and suppression measures consistent with the policies and standards in the affected jurisdictions and in compliance with all fire regulations (e.g., fire code and special State wildland safety regulations). EBMUD shall coordinate fire protection needs during project construction with local fire protection agencies.
	Mitigation Measure 5.2.J-3b: Implement EBMUD's Fire Management Plan. EBMUD shall include in project construction specifications the requirement to comply with EBMUD's Fire Management Plan, where it applies, and coordinate fire prevention actions with fire protection agencies.

Table 1-2: Summary of Mitigation Measures Identified in the Program EIR

IMPACT	MITIGATION MEASURE
5.2.K PUBLIC SERVICES, UTILITIES AND ENERGY	
Impact 5.2.K-1: Potential temporary damage to or disruption of existing regional and local public utilities and impacts related to the relocation of utilities.	***Mitigation Measure 5.2.K-1a: Notify neighbors of potential utility service disruption.*** As part of the neighborhood notice, the EBMUD shall notify residents and businesses in areas of potential utility service disruption two to four days in advance of construction.
	Mitigation Measure 5.2.K-1b: Locate utility lines and confirm utility line information prior to excavation and reconnect utilities promptly. Prior to excavation, EBMUD or its contractors shall locate overhead and underground utility lines, such as natural gas, electricity, sewer, telephone, fuel, and water lines, that may be encountered during excavation work prior to opening an excavation. EBMUD or its contractors shall find the exact location of underground utilities by safe and acceptable means. Information regarding the size, color, and location of existing utilities must be confirmed before construction activities commence. EBMUD or its contractors shall promptly reconnect any disconnected utility lines.
	Mitigation Measure 5.2.K-1c: Safeguard employees from potential accidents related to underground utilities. While any excavation is open, EBMUD or its contractors shall protect, support, or remove underground utilities as necessary to safeguard employees.
	Mitigation Measure 5.2.K-1d: Prepare and implement an emergency response plan. EBMUD or its contractors shall develop an emergency response plan in the event of a leak or explosion prior to commencing construction activities. EBMUD or its contractors shall notify local fire departments any time damage to a gas utility results in a leak or suspected leak, or whenever damage to a utility results in a threat to public safety.
	Mitigation Measure 5.2.K-1e: Coordinate final construction plans with affected utilities. EBMUD or its contractors shall coordinate final construction plans and specifications with affected utilities.

Table 1-2: Summary of Mitigation Measures Identified in the Program EIR

IMPACT	MITIGATION MEASURE
Impact 5.2.K-3: Potential temporary adverse effect on solid waste landfill capacity.	***Mitigation Measure 5.4.K-3: Waste Reduction Measures.*** The following requirements shall be incorporated into contract specifications for each of the proposed components: The contractor(s) shall obtain any necessary waste management permits prior to construction and shall comply with conditions of approval attached to project implementation. As part of the waste management permit process, the contractor(s) shall submit a solid waste recycling plan to the affected agencies. Elements of the plan will likely include, but are not necessarily limited to, the following: • Identification of the types of debris that would be generated by the project and identify how all waste streams would be handled. • Actions to reuse or recycle construction debris and clean excavated soil to the extent possible. • Actions to divert at least 50 percent of inert solids (asphalt, brick, concrete, dirt, fines, rock, sand, soil, and stone) from disposal in a landfill.
Impact 5.2.K-4: Potential for construction-related energy use and potential to increase long-term energy use during operation.	***Mitigation Measure 5.4.K-4: Incorporate Energy Efficiency Measures.*** EBMUD shall include energy efficient processes and equipment in the design specifications for the proposed facilities developed as part of the Preferred Portfolio. The potential for use of renewable energy resources (such as solar power) at facility sites shall be evaluated during project-specific design.
5.2.L ENVIRONMENTAL JUSTICE	
Impact 5.2.L-1: Potential disproportionate impact to densely populated minority and low income communities.	***Mitigation Measure 5.2.L-1a: Implement mitigation measures regarding transportation, air quality, noise and hazards.*** Mitigation Measures identified in Sections 5.2.E, Transportation; 5.2.F, Air Quality; 5.2.G, Noise; and 5.2.J, Hazards shall be implemented as needed within EJSAs to reduce impacts on minority and low-income communities to less than significant levels.
	Mitigation Measure 5.2.L-1b: Conduct environmental justice screening analysis. As part of the project-level environmental review for each component, EBMUD shall conduct an environmental justice screening analysis. This analysis will determine whether proposed facilities would be within an EJSA, and if so, whether any significant impacts would occur within an EJSA. If proposed facilities are within an EJSA or would cause effects within an EJSA, and significant impacts (e.g.,

Table 1-2: Summary of Mitigation Measures Identified in the Program EIR

IMPACT	MITIGATION MEASURE
	transportation, air quality, noise, hazards) can be reduced to less-than-significant levels with implementation of mitigation measures, then the project would not result in a disproportionately effect on minority and/or low-income communities, and no further action would be required. However, if significant impacts within an EJSA cannot be reduced to less than significant levels, then EBMUD shall identify alternative locations to avoid causing adverse impacts within an EJSA. If alternative locations that avoid impacts within an EJSA cannot be identified, then potential effects would be potentially significant and unavoidable.

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2 BACKGROUND

2. Background

2.1 Purpose of and Need for WSMP 2040

EBMUD proposes to adopt and implement the Water Supply Management Program (WSMP) 2040. WSMP 2040 estimates water supply needs to the year 2040, and proposes a program of policy and project initiatives to meet those needs. EBMUD's water supplies are estimated to be sufficient during the planning period (2010-2040) in normal and wet years. The primary purpose of WSMP 2040 is to identify and recommend solutions to meet dry-year water needs through 2040.

In normal and above normal water years, sufficient precipitation occurs in the Mokelumne River basin to provide EBMUD with an adequate supply of water under its existing water rights. In drier years, there is inadequate Mokelumne River basin precipitation and resulting river flow to meet EBMUD's water needs, even after accounting for demand reductions from EBMUD's aggressive conservation and recycling programs. Therefore, it is essential for EBMUD to develop dry-year water supplies (termed "supplemental" supplies) to meet customer water needs during those times. By definition, these supplies would supplement – but not replace – EBMUD's existing water rights and supply from the Mokelumne River.

Increased water demand through 2040 by the other water agencies that rely on the Mokelumne Basin for their supply, expected growth within EBMUD's own service area, and the potential impact(s) climate change could have on river flow and customer demand means that EBMUD cannot completely rely in the future upon stored water in its reservoirs under drought conditions. Thus, WSMP 2040 was developed to counteract future dry-year water supply shortages that are likely to occur more frequently.

WSMP 2040 advocates performance objectives for EBMUD's water planning, to the benefit of its customers and the environment. These objectives, presented in Table 2-1, provide the basis for the policies and facility development/improvement projects included in WSMP 2040.

2.1.1 1993 WSMP

WSMP 2040 is a continuation of EBMUD's current WSMP adopted in 1993 (herein referred to as the 1993 WSMP). The 1993 WSMP evaluated the District's water needs through 2020 and identified a preferred program to meet those needs. Components of the preferred program included:

- Aqueduct Security: EBMUD would secure an approximately 10-mile-long section of the Mokelumne Aqueducts through the Sacramento-San Joaquin Delta against prolonged outages resulting from earthquake-induced failures.

Table 2-1: WSMP Planning Objectives

OBJECTIVE CATEGORY	OBJECTIVES
Operations, Engineering, Legal & Institutional	Provide water supply reliability. Rely upon current water right entitlements. Promote District involvement in regional solutions.
Economic	Minimize cost to District customers. Minimize drought impact to District customers. Maximize positive impact to local economy.
Public Health, Safety & Community	Ensure the high quality of the District's water supply. Minimize adverse sociocultural impacts (including environmental justice). Minimize risks to public health and safety. Maximize security of infrastructure and water supply.
Environmental	Preserve and protect the environment for future generations. Preserve and protect biological resources. Minimize carbon footprint. Promote recreational opportunities.

- Lower Mokelumne River Management Plan (LMRMP): The LMRMP specifies flow regimes, reservoir operations, and hatchery operations that would enhance benefits to fishery resources in the Mokelumne River while maximizing flexibility in managing a variable water supply, uncertain future demands, and uncertain linkages between fish populations and fishery management activities.
- Groundwater Storage/Conjunctive Use: EBMUD would develop a joint project with San Joaquin County to pursue storage of water in an underground basin (San Joaquin County basin) when excess surface water supplies were available and could be withdrawn during drier years when surface supplies were below normal.
- Conservation and Recycled Water: These components would reduce the District's projected 2020 demand for water from 277 million gallons per day (MGD) to 229 MGD. Recycled water would equal 14 MGD (9.3 MGD on-line by 2010; additional 4.7 MGD developed by 2020; Conservation would equal 35 MGD (22.5 MGD realized by 2008; 7.5 MGD realized through natural replacement; additional 5 MGD realized through funded programs).

EBMUD is on schedule to achieve the 1993 WSMP water supply goals for 2020. The District completed the aqueduct security improvements, implemented the LMRMP as modified and superseded by the Joint Settlement Agreement (JSA) between EBMUD and regulatory agencies (see Section 2.4.5), and is carrying out conservation and recycled water development.

In order to move potential groundwater storage and conjunctive use opportunities forward, EBMUD established an internal division within the District, the Water Supply Improvements Division (WSID), to identify and implement supplemental supply projects.

Through WSID, the District implemented two such projects. First, the Freeport Regional Water Project (FRWP) is a joint water supply project undertaken in partnership with the Sacramento County Water Agency (SCWA) (see Section 2.4.3). It will enable the District to take Central Valley Project (CVP) contracted water during times of drought. Its existence gave the District the added assurance needed to go forward with a decision to renew a long-term CVP contract with the U.S. Bureau of Reclamation. The second project implemented by WSID is the Bayside Groundwater Project Phase 1, which established a local conjunctive use supply element within the EBMUD service area (see Section 2.4.3). WSID continues to conduct additional studies related to groundwater storage/conjunctive use.

WSMP 2040 builds upon the foundation of programs and activities created in the process of implementing the 1993 WSMP, in order to meet water supply needs for the next 20 year planning horizon.

2.2 Purpose of the Program EIR

Section 15168 of the CEQA Guidelines defines a Program EIR (PEIR) as a type of EIR that analyzes a plan with multiple components that are related:

- Geographically;
- As a logical part in the chain of contemplated actions;
- In connection with issuance of rules, regulations, plans, or other general criteria to govern the conduct of a continuing program; or
- As individual activities carried out under the same authorizing statutory or regulatory authority and having generally similar environmental effects which can be mitigated in similar ways.

The WSMP 2040 Preferred Portfolio and its alternatives are the subject of this PEIR. The portfolios consist of a series of related actions in the form of discrete components that would be implemented over time to meet the Need for Water within the EBMUD service area.

The document takes a programmatic approach to the analysis of the Preferred Portfolio's environmental impacts. The value of the material developed for the PEIR is both immediate and long term. In the near term, EBMUD will consider the information in the PEIR as early indicators of adverse effects upon resources affected by its preferred water supply development components, the magnitude of those impacts, and the general approach that will be necessary to avoid or mitigate those impacts as future projects are planned and developed. Over the long term, the PEIR will be incorporated by reference into project-level CEQA analyses of projects proposed subsequent to adoption of WSMP 2040.

2.3 Portfolios Development Process

The development of the Preferred and Alternative water supply portfolios required detailed evaluation of a wide range of potential dry-year water supply solutions. The evaluation process ultimately yielded six portfolios (the Preferred and five alternatives) organized according to themes that are reflected in the titles of the alternatives, and are more fully described in Chapter 3.

The Preferred Portfolio

Portfolio A: Groundwater/Conjunctive Use and Water Transfers

Portfolio B: Regional Partnerships

Portfolio C: Local System Reliance

Portfolio D: Lower Carbon Footprint

Portfolio E: Recycled Water and Water Transfers

The building blocks of the proposed WSMP 2040 Preferred and Alternative Portfolios are “components” consisting of various rationing policies, conservation levels (and conservation elements/programs that reside in the particular levels), recycled water program levels (and project components that reside in particular levels), and a range of supplemental supply options.

Over 25 potential components were initially identified. EBMUD considered many of the components that appeared on the initial list developed for the 1993 WSMP, and revisited several that were previously dismissed as technologically or economically infeasible.

A two-step evaluation process resulted in the preparation of a final list of components that were brought forward into the portfolio development stage. These components include:

- Rationing at various levels;
- Conservation at various levels;
- Recycled water development;
- Northern California Water Transfers;
- Bayside Groundwater Project Phase 2;
- Sacramento Basin Groundwater Banking/Exchange;
- Regional Desalination;
- Enlarge Pardee Reservoir;
- Enlarge Lower Bear Reservoir; and

- The Mokelumne Inter-Regional Conjunctive Use Project (IRCUP) / San Joaquin Groundwater Banking.

The components were then assembled into 10 distinct water supply portfolios. A thematic approach was used to develop the portfolios to emphasize one or more of the planning objectives in Table 2-1. Portfolio themes that were considered included:

- Low customer impact;
- Flexibility to respond to future extended drought or climate change;
- Upcountry (Mokelumne Basin) surface storage;
- Groundwater storage emphasis;
- Regional partnership emphasis;
- Reliability in case of emergency (emergencies such as a Delta levee failure);
- A diversified array of components;
- A conservation and recycled water emphasis;
- Low carbon footprint; and
- Low capital cost (which implied a low structural solution).

These preliminary portfolios were presented to the EBMUD Board of Directors and the WSMP 2040 Community Liaison Committee (CLC). Following the introduction of the themes that would be considered, both the Board and the CLC provided comments that resulted in refinements to proposed portfolios as well as the creation of 4 additional portfolios (that while not having a specific theme, were themselves distinct from the 10 created):

- A variation on the reliability portfolio that includes Bayside Groundwater Project Phase 2 and Regional Desalination component instead of Buckhorn Reservoir;
- Highest recycled water level and reliance on groundwater and transfers and a small desalination component;
- 20 percent rationing and highest recycled water level; and
- 25 percent rationing and highest recycled water level.

Hence 14 portfolios were considered for the first iteration of the ensuing analysis process.

The 14 portfolios were tested using a water supply model to:

- Ascertain operational feasibility, the volume of water delivered during the worst-case drought;

- Determine the frequency and severity of required rationing, and the potential cost of such rationing to customers in the EBMUD service area; and
- Calculate the capital, operating and maintenance costs to the District.

Next, two exclusionary "Need for Water" screening criteria, *Meet projected water demands through 2040,* and *Meet demand during the District's Drought Planning Sequence*, were applied. Two of the portfolios – low customer impact and flexibility to respond to future extended drought or climate change -- failed to meet the Need for Water criteria, and thus failed to satisfy the project objectives. In addition, these two portfolios were not able to meet the capacity limitations as present in EBMUD's Mokelumne Aqueducts and the District's East Bay water treatment plants.

The remaining twelve portfolios were then subject to more detailed evaluation criteria to compare and array each for their relative satisfaction of the criterion related to the WSMP 2040 planning objectives. Following this evaluation, it was found that while distinct themes were established, several of the portfolios included primarily the same components. These portfolios were consolidated and the water supply model and the evaluation criteria re-applied to these newly-constructed portfolios. From this subgroup, five portfolios were shown to be of most promise. These five Alternative Portfolios were identified as A, B, C, D and E and carried forward for analysis in this PEIR.

Through this process, the advantages and disadvantages of the five Alternative Portfolios were identified. For example, Portfolio B scored high on reliability and maximizing partnerships, but low on minimizing institutional and legal complexities. Portfolio C performed well in terms of reliability, but low on public health, safety, and community, and environmental criteria. None of the Alternative Portfolios was clearly ideal or optimum and all had advantages and disadvantages. Further information regarding the five Alternative Portfolios is presented in Chapter 3 of this PEIR.

The EBMUD Board of Directors, at their June 24, 2008 workshop, guided development of the Preferred Portfolio based on what was learned during the evaluation of the five Alternative Portfolios. More specifically, the Board recommended elements from particular alternatives that were viewed as most appropriate for inclusion in the Preferred Portfolio. As a result, the Preferred Portfolio consists of the following:

- A rationing level of 10 percent;
- Conservation Level D (39 MGD);
- Recycling Level 3 (11 MGD); and
- Several supplemental supply components to meet the required dry-year yield. These components would be pursued simultaneously until the most promising ones gained traction and moved to implementation.

The Preferred and Alternative Portfolios are described in Chapter 3.

2.3.1 Rationing in the Context of the Preferred Portfolio

Rationing is a key element of WSMP 2040. EBMUD adopted a policy that seeks to ration its customers' water use in times of shortage up to a certain level. Notwithstanding that policy, if EBMUD does not actually have sufficient water supply in a dry year, it may have to ration its customers' water use at a much higher level.

As explained further in Section 2.4.7 below, EBMUD's current policy is to limit customer rationing to 25 percent. This approach is unusual among water agencies; many others do not assume any rationing in their water planning. EBMUD has taken an aggressive step by making rationing an integral part of its policies and water supply planning. The WSMP 2040 Preferred Portfolio proposes to reduce the rationing level to 10 percent. EBMUD will be unable to do this until it develops additional dry-year supplemental water supplies. As new supplemental supplies are secured, EBMUD will be able to gradually reduce the level of rationing it imposes on its customers. Until supplemental supplies are secured, higher rationing restrictions may be imposed in a specific drought event. The benefit of targeting a 10 percent rationing level in the WSMP 2040 is that it preserves the flexibility to increase rationing above 10 percent as one of several responses to dry-year conditions that may occur before supplemental supplies are made adequate.

2.4 East Bay Municipal Utility District

2.4.1 EBMUD Responsibility and Service Area

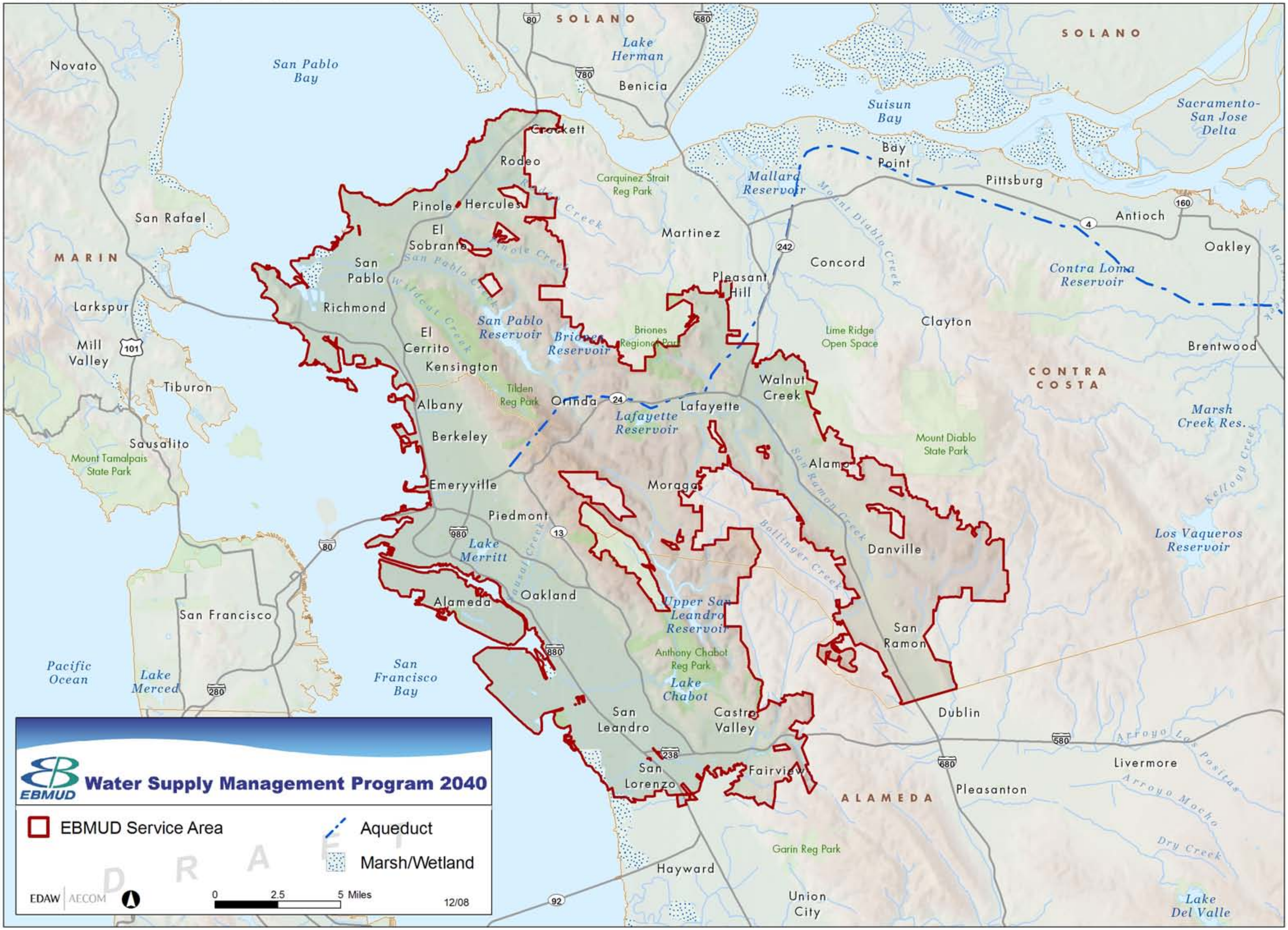
EBMUD is a publicly owned utility formed under the Municipal Utility District (MUD) Act passed by the California Legislature in 1921. EBMUD provides domestic water service to 1.3 million customers in the East Bay region of the San Francisco Bay Area. EBMUD also provides approximately 600,000 customers west of the Oakland/Berkeley hills with wastewater services.

EBMUD's 331-square-mile service area is shown on Figure 2-1. The EBMUD water system serves 20 incorporated cities and 15 unincorporated communities in Alameda and Contra Costa counties. The cities within the EBMUD service area include Alameda, Albany, Berkeley, Danville, El Cerrito, Emeryville, part of Hayward, Hercules, Lafayette, Moraga, Oakland, Orinda, Piedmont, Pinole, part of Pleasant Hill, Richmond, San Leandro, San Pablo, San Ramon, and part of Walnut Creek. The unincorporated communities within the service area include Alamo, Ashland, Blackhawk, Castro Valley, Cherryland, Crockett, Diablo, El Sobrante, Fairview, Kensington, North Richmond, Oleum, Rodeo, San Lorenzo, and Selby.

EBMUD's Board of Directors established the Ultimate Service Boundary (USB) to define the limit of future annexation for extension of water service. In addition, the Local Agency Formation Commissions (LAFCOs) of Alameda and Contra Costa counties established a Sphere of Influence (SOI) for EBMUD. The SOI defines, for LAFCO purposes, the probable and ultimate extent of the area to be served by EBMUD.

Figure 2-1

EBMUD Service Area



2.4.2 Mokelumne River Watershed and Hydrology

The Mokelumne River watershed lies on the western slope of the Sierra Nevada Mountains in Alpine, Amador, Calaveras, and San Joaquin counties. The watershed covers an area of 627 square miles and extends from Highland Peak (elevation 10,934 feet) near the crest of the Sierra Nevada Mountains to Camanche Reservoir (elevation 235 feet) located in the lower western foothills near Clements. Most of the watershed is forested land within the El Dorado and Stanislaus National Forests.

Over the long term (multiple year perspective), about 90 percent of the water delivered to EBMUD's customers originates from the Mokelumne River watershed. The remaining 10 percent originates as runoff from the protected watershed lands in the East Bay.[1] Following the completion of the FRWP in 2009, this proportion is predicted to shift somewhat, since during dry years approximately 22 percent of water would be sourced from the Sacramento River (via the FRWP).

Annual precipitation and streamflow in the Mokelumne River watershed are highly variable from year to year. Fourteen years out of the last two decades were considered Below Normal to Critically Dry water years[2] for the Mokelumne River (see Figure 2-2 which depicts flow by water year).

2.4.3 EBMUD's Water Supply and System

The EBMUD water supply system collects, treats, and distributes raw water from its primary water source in the Sierra Nevada to its customers in Alameda and Contra Costa counties. The water supply system consists of a network of raw water reservoirs, aqueducts, water treatment plants, pumping plants, and distribution pipelines. Major EBMUD water storage and conveyance facilities are identified in Figure 2-3 and described below.

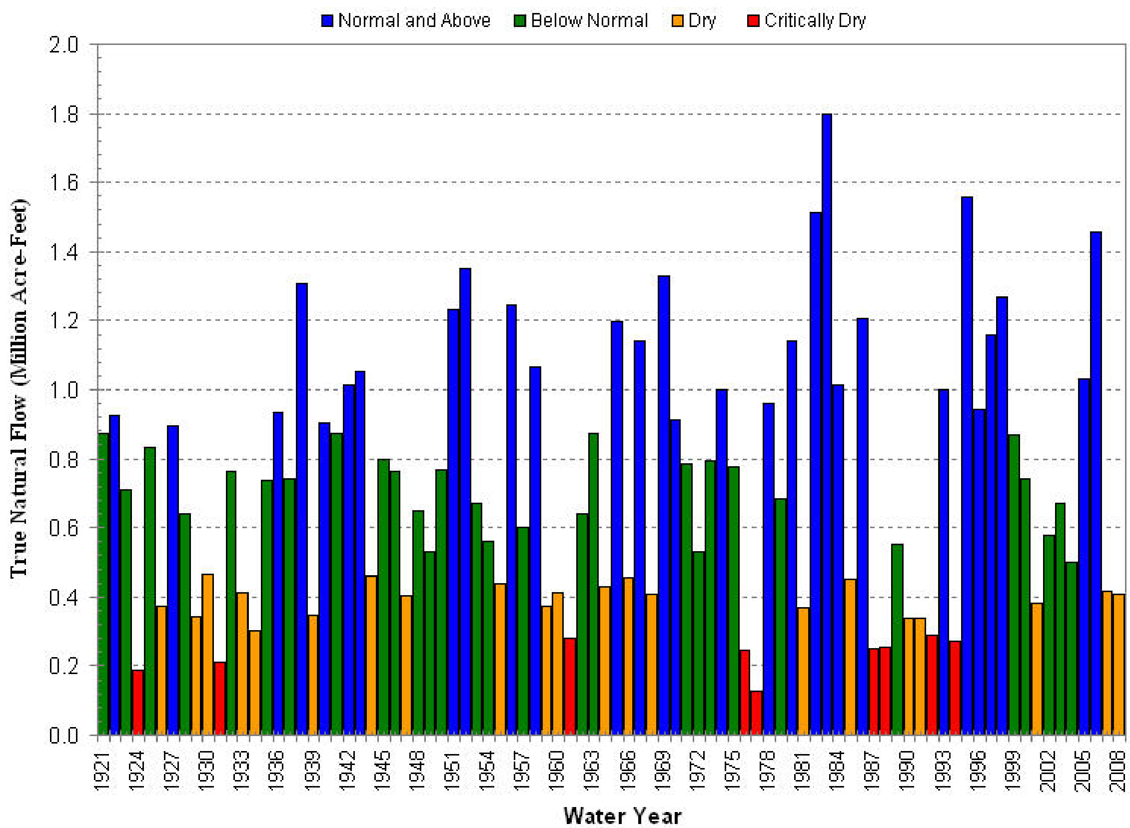
Pardee Reservoir and Camanche Reservoir

Pardee Reservoir is located 38 miles northeast of Stockton near the Town of Jackson. The reservoir has a licensed capacity of 209,950 acre-feet (AF). Camanche Reservoir is located immediately downstream of Pardee Reservoir. Under its existing Camanche water right, EBMUD can divert up to 125 million gallons per day (MGD) from the Mokelumne River to direct use from December 1 to July 1, and can divert up to 353,000 acre-feet per year (AFY) of water to storage between December 1 and July 1 for municipal use in its East Bay service area. EBMUD operates Camanche Reservoir in tandem with Pardee Reservoir.

[1] During dry years, local runoff essentially matches evaporation, so that there is no net contribution from local runoff.

[2] Five water year types have been established for the Mokelumne basin, using the flow records (total annual runoff) as kept for the River system. A mathematic approach was originally used to establish the range / limits of the particular year type. The five types present on the Mokelumne are as follows: Wet, Above Normal, Below Normal, Dry and Critically Dry.

Figure 2-2 Mokelumne River Runoff by Year



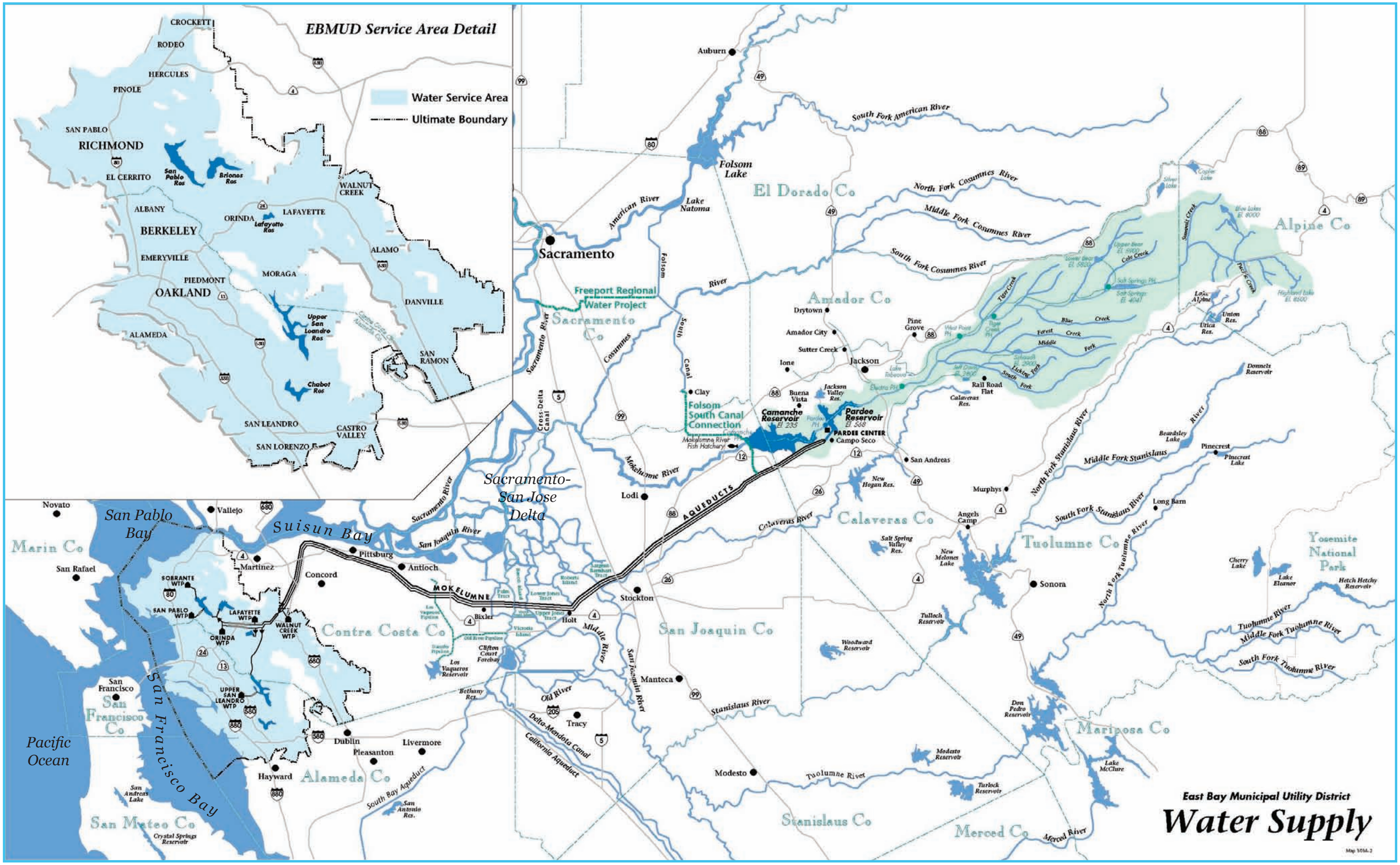
EBMUD's Pardee water right allows EBMUD to divert up to 200 MGD from the Mokelumne River. Together, the Camanche Permit and the Pardee License allow delivery of a maximum of 325 MGD from the Mokelumne River, or 364,000 AFY, subject to the availability of Mokelumne River runoff and EBMUD's meeting obligations to senior water rights, downstream fishery flow requirements, and other Mokelumne River water uses.

Mokelumne Aqueduct System

EBMUD's Mokelumne Aqueduct system is connected to Pardee Reservoir via the 2.2-mile-long Pardee Tunnel. The aqueduct system consists of three steel pipelines that transport water approximately 91 miles from the Pardee Tunnel at Campo Seco to Walnut Creek at the east end of the two Lafayette Aqueducts. The aqueducts have a total capacity of approximately 200 MGD as conveyed by gravity flow and up to 325 MGD as conveyed with pumping (via pumps located at the Walnut Creek pumping plants).

Water Supply Management Program 2040

Figure 2-3: EBMUD Systems



Terminal Reservoirs

EBMUD operates five terminal reservoirs within the East Bay service area: Briones, Chabot, Lafayette, San Pablo, and Upper San Leandro reservoirs. Briones, San Pablo, and Upper San Leandro reservoirs can supply water to EBMUD throughout the year, whereas Chabot and Lafayette reservoirs serve as emergency sources of supply. The maximum capacity of the terminal reservoirs is 155,550 AF. The terminal reservoirs serve multiple functions, including regulating EBMUD's Mokelumne River supply in winter and spring, augmenting EBMUD's Mokelumne water supply with local runoff, providing emergency sources of supply during extended drought or in the event of water supply facility outage, providing environmental and recreational benefits to East Bay communities, and minimizing flooding.

Freeport Regional Water Project

EBMUD has undertaken the FRWP in partnership with the SCWA. The project, when completed in 2010, will enable EBMUD to take delivery of CVP water under contract with the U.S. Bureau of Reclamation to meet a portion of its drought year water demands. The project's intake facilities are sited along the Sacramento River near the unincorporated town of Freeport. Conveyance facilities transport the water from the Sacramento River intake via pipeline to EBMUD's Mokelumne Aqueducts, where it then flows to the EBMUD service area for treatment and distribution. Through the FRWP, up to 100 MGD of water may be delivered to EBMUD customers in dry years. Under its CVP contract, EBMUD is limited to a total delivery of 165,000 AF over any consecutive three-year period.

The Final Environmental Impact Report / Environmental Impact Statement (EIR/EIS) for the FRWP was certified and the project approved in March 2004. This PEIR assumes that deliveries of CVP water after 2010 will be made according to the project description presented in the FRWP EIR/EIS.

Bayside Groundwater Project - Phase 1

The Bayside Groundwater Project Phase 1 involves the injection of potable drinking water into the South East Bay Plain Basin (SEBPB)[3] during wet years for storage and later recovery and use during a drought. Phase 1 will use an existing 18 inch diameter well located at 2600 Grant Avenue in San Lorenzo for both injection and extraction operation, together with water treatment facilities (used to treat the water extracted) which were under development at 2540 Grant Avenue when this Draft PEIR was released. Treated water from EBMUD's distribution system will be injected through the single well into the deep aquifers of the SEBPB in normal and above-normal water years for later recovery during a drought. Phase 1 provides for an annual 1 MGD injection into

[3] The South East Bay Plain Basin extends along the East Bay foothills to the Bay, approximately from Richmond to the Hayward Fault.

the deep aquifers and a maximum annual 1 MGD extraction capacity, although it may be operated, over the short (partial / portion of a given year) term, at an extraction rate of up to 2 MGD during a particular drought year. The recovered water will be treated to meet Federal and State drinking water standards before it is distributed to EBMUD customers. The Phase 1 project is scheduled to be in-service by August 2009.

2.4.4 EBMUD'S Right to Divert Mokelumne River Water

EBMUD has the water rights and the capacity to divert up to 325 MGD from the Mokelumne River for municipal and industrial use within its service area in Alameda and Contra Costa counties. EBMUD's ability to garner this amount of water, however, is controlled by the interrelationship between its water rights and the rights of other users of Mokelumne River water, its ability to store water, and the amount of Mokelumne River runoff. The extent of these water rights was defined by several lawsuits, negotiated settlements, and decisions of the State Water Resources Control Board (SWRCB). EBMUD also possesses other state water rights related to hydroelectric power generation and the appropriation of runoff into the East Bay terminal reservoirs in the District service area. A summary of EBMUD's Mokelumne River water rights is shown in Table 2-2.

Table 2-2: EBMUD's Mokelumne River Water Rights

WATER RIGHT	MAXIMUM ANNUAL DIRECT DIVERSION TO SERVICE AREA (MGD)	MAXIMUM ANNUAL DIVERSION TO STORAGE (AF/YEAR)	MAXIMUM ANNUAL DIRECT DIVERSION AND DIVERSION FROM STORAGE FOR USE WITHIN EBMUD SERVICE AREA
Pardee Reservoir 1924 Application 4228 1981 License 111091	200	209,950[a]	200 MGD (224,037 AF)
Camanche Reservoir 1949 Application 13156 1956 Permit 10478	125	353,000	125 MGD[b] (140,000 AF)
Total	325	562,950	325 MGD (364,037 AF)

Notes:
[a] Total amount to be taken from the source (the river) under License 11109 shall not exceed 316,250 AF per year.
[b] Total amount to be taken from the watershed by direct diversion or diversion from storage under Permit 10478 (and any subsequent license), as restricted by the 1959 Release of Priority, shall not exceed 194 cubic feet per second (cfs) (125 MGD).

Source: EBMUD, 1992, p. 3-13

2.4.5 Other Mokelumne River Water Entitlements, Users, Facilities, and Resources

The Mokelumne River serves a variety of uses, including agriculture, fisheries, hydropower, recreation, and municipal and industrial use. Before water can be put to use or diverted to storage under EBMUD's water rights, the needs of senior users (persons with the oldest water use priority) and fishery release requirements must be met. Riparian landowners, who have rights that are tied to the river's natural flow, and other individuals and agencies with appropriative water rights that predate EBMUD's rights, have claims on the river that are senior to EBMUD's rights. Figure 2-4 shows how the river's flow is typically divided among the various users.

EBMUD has also negotiated water right agreements with certain Mokelumne River water users to clarify how these users may exercise state-granted rights consistent with EBMUD's water right priorities.

In addition, terms in EBMUD's water right permit for its Camanche project required EBMUD to reach agreement with the California Department of Fish and Game (CDFG) regarding releases for the protection of fish in the lower Mokelumne River and to provide the opportunity for local or federal participation in a flood control feature of the then-proposed project.

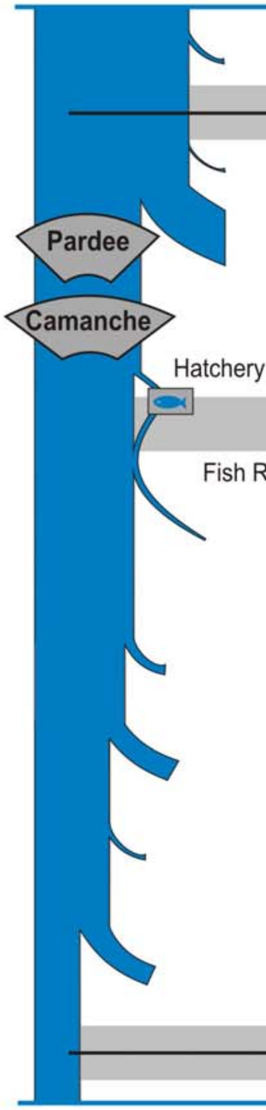
Accordingly, in 1961, EBMUD entered into an agreement with CDFG that required EBMUD to build a fish hatchery at Camanche Dam and to release 13 thousand acre-feet (TAF) annually from Camanche Reservoir for fishery production, in addition to the releases for the Woodbridge Irrigation District, riparian and senior appropriators, and accounting for channel losses. EBMUD also reached agreement, in 1962, with the U.S. Army Corps of Engineers (the Corps) for the operation of the then-proposed Camanche Reservoir to accommodate the reservation of up to 200 TAF of flood control space for the protection of downstream areas in San Joaquin County.

Pursuant to the 1998 JSA between EBMUD, CDFG, and the U.S. Fish and Wildlife Service (USFWS), a revised schedule of fishery releases from Camanche Dam was developed. The Federal Energy Regulatory Commission (FERC) issued its "Order Approving Settlement Agreement and Amending License" on November 27, 1998. The California State Water Resources Control Board (SWRCB) incorporated the flow provisions of the JSA into EBMUD's Mokelumne River water rights in 2000 through the SWRCB's Decision 1641. The JSA replaces the 1961 agreement with DFG regarding flows in the lower Mokelumne River and provides additional in-stream flows, funding for non-flow enhancement measures, and monitoring requirements and new reporting objectives over the remainder of the FERC License period, which expires in 2031.

2.4.6 System Operation

Snowmelt from Alpine, Amador, and Calaveras counties enters the upper reaches of the Mokelumne River, which flows into reservoirs owned by Pacific Gas and Electric (PG&E) (also located within the upper portion of the Mokelumne River watershed). Those on-line reservoirs release flows back into the River, and progressing downstream the flows enter Pardee Reservoir. As discussed above, Camanche Dam and Reservoir, located immediately below Pardee Reservoir, are operated in conjunction with Pardee Reservoir to meet the needs of downstream water rights holders for flood control and irrigation, and

Figure 2-4 EBMUD Flow Commitments



Basin Runoff / Diversions and Losses	*Maximum* (*TAF/CY*)	*Dry Year Maximum* (*TAF/CY*)
Amador & Calaveras Counties	47.0	13.1
Mokelumne Hill Gage	Average [1] 728	
Jackson Valley Irrigation District [2] (Amador County)	3.85	0
EBMUD Aqueduct Draft	364 (325 *MGD*)	see footnote 3
EBMUD Diversions to Storage	562.9	see footnote 3
Total Camanche Release	Average [1] 484	
Fish Release per Joint Settlement Agreement (JSA)	165.9 [4]	65[5]
North San Joaquin Water Conservation District [6]	20	0
Riparian and Senior Appropriators (Above WID)	14.4	11.2
Woodbridge Irrigation District [7]	60	39
Riparian and Senior Appropriators (Below WID)	6.2	4.8
Net Channel Losses	120	56
Woodbridge Gage [8]	Average [1] 415	

Notes:

(1) Average data provided for the period of historical record.
(2) May be "0" if no water is available under JVID priority or Pardee elevation is below 550 ft.
(3) Varies with runoff and storage conditions.
(4) Water releases committed by EBMUD to protect fishery per "Normal and Above" water year type under JSA criteria.
(5) Water releases committed by EBMUD to protect fishery per "Dry" water year type under JSA criteria. In critically dry years, the minimum flow could be as low as 22.5 TAF.
(6) May be "0" if no water is available, surplus to EBMUD needs.
(7) EBMUD's obligation to release water to the Woodbridge Irriation District is governed by a series of water rights settlement agreements to a maximum of 60 TAF/yr when inflow to Pardee is greater than 375 TAF.
(8) Includes local runoff between Camanche and WID.

to meet fisheries requirements. Raw water from Pardee Reservoir is transported approximately 90 miles to the EBMUD service area through the Mokelumne Aqueducts via gravity and/or pumping.

2.4.7 Water Supply Availability and Deficiency Policy

EBMUD evaluates the adequacy of its water supply each year in accordance with its Water Supply Availability and Deficiency Policy (Policy 9.03). As discussed above, this policy establishes a drought demand reduction limit of no more than 25 percent of total customer demand. Based on total water year (October 1 through September 30 of the next year), runoff as predicted during the month of April of that current water year, EBMUD estimates its total system storage available at the end of the water year (September 30). If total system storage is projected to be less than 500,000 AF, the Drought Committee will convene and prepare a Drought Management Program (DMP). EBMUD developed guidelines (Table 2-3) that call for rationing levels as the projected total system storage decreases. By imposing varying levels of rationing in the early years of potentially prolonged drought periods, the need for more severe rationing in subsequent years is reduced.

Table 2-3: Drought Management Program Rationing Guidelines

STAGE	APRIL PROJECTION OF STORAGE ON SEPTEMBER 30	REDUCTION GOAL	VOLUNTARY / MANDATORY
	500 TAF or more	None	
Moderate	500 – 450 TAF	0 to 15%	Voluntary/Mandatory
Severe	450 – 300 TAF	15 to 25%	Mandatory
Critical	Less than 300 TAF	25%	Mandatory

Note: TAF: Thousand Acre Feet

Source: EBMUD, 2005

Table 2-4 shows the typical EBMUD actions at each stage of a drought. Required reductions in water use vary across customer categories to achieve the targeted reduction of total customer demand, according to the example in Table 2-5.

Drought Sequencing

Historically, there have been several drought periods with multiple dry years since the early 1900s. Of the three driest periods on record (1929 to 1934, 1976 to 1977 and 1987 to 1992), the 1976 to 1977 drought, although the shortest, was the most severe event and resulted in the worst case for water supply (as measured by total system storage) for the EBMUD system. This data indicates that the EBMUD water supply system (without the FRWP) is possibly more sensitive to the depth of a drought (e.g., severity of the impact of the drought on river flow within a drought cycle) than to the length of a drought (e.g., number of years a particular drought cycle extends). Therefore, the worst-case drought scenario for WSMP 2040 assumes a replication of the 1976 to 1977 conditions.

Table 2-4: Drought Management Program Elements

DROUGHT STAGE	AGENCY ACTIONS
Moderate 0 to 15% Shortage	• Initiate public information campaign to address the drought situation. Explain other stages and forecast future actions. • Institute mandatory or voluntary water use goals and use restrictions (depending on available supplies for future years). • Institute rate changes to elicit conservation, if mandatory rationing is imposed. Explain new rate schedules to customers. Explain further reductions planned for succeeding rationing stages. • Increase advertising of water-saving devices provided free to customers and other free conservation programs. • Increase efficiency of system water supplies (e.g., intensify enforcement of hydrant-opening regulations; increase meter-reading efficiency and meter maintenance; and intensify leak detection and repair program). • Prepare and disseminate educational brochures, bill inserts, etc., addressing the drought situation and ways in which customers can save water. Disseminate technical information to specific customer types on ways to save water. • Intensify and target media outreach program. Issue news releases to the media. Intensify advertising campaign to remind consumers of the need to save water.
Severe 15 to 25% Shortage	• Intensify actions taken during the moderate drought stage. Institute mandatory water use reductions. • Declare a water shortage emergency (depending on available supplies for future years). • Seek and procure a supplemental water supply (depending on available supplies for future years). • Implement rate and water use restriction changes appropriate to shortage.
Critical Shortage 25% or more	• Intensify all of the severe drought stage steps.
Source: EBMUD, 2005	

Table 2-5: Example of Customer Water Use Reduction Goals – 25 Percent District-wide Rationing

CUSTOMER CATEGORY	REDUCTION GOAL (%)[a]
Single-Family Residential	31
Multi-Family Residential	19
Commercial / Institutional	20
Industrial	9
Irrigation	50
Total Customer Demand Rationing Goal	25

Note:
[a] Reduction goals are based on the projected average minimum monthly demand for year 2020

Source: EBMUD, 2008

To alleviate the uncertainty in assuming that the historical record has captured all possible drought conditions, a third year of drought (taken as the average runoff in 1976 and 1977) replaced the actual wet year of 1978 to form a three-year drought scenario. This resulting drought planning sequence is less conservative than one that assumes that driest year-of-record conditions would follow a two-year drought. However, the sequence provides a reasonable basis for planning against dry conditions continuing for a third year.

EBMUD's current worst-case drought scenario assumes that a severe drought would not continue beyond the third year of the sequence, and that all of EBMUD's accessible water in storage would be depleted at the end of the third drought year. Alternatives to EBMUD's current worst-case drought scenario were explored through WSMP 2040.

Design droughts are normally determined through an individual agency's experience: hence, the District uses its current worst-case drought scenario because it is reliable (based on an actual event), and prudent (because it is more severe than the actual worst historical drought event). Please refer to the Drought Planning Sequence for WSMP 2040 Technical Memorandum (June 28, 2007) for details on how the drought planning assumptions were determined.

Demand Study

EBMUD projected water demands through 2040 by using a land use-based approach. A database of existing land uses was developed for the EBMUD service area. Then, using actual water usage data for 2005, calculations were performed to determine a water use factor for each of the land use categories defined within the database (dividing consolidated acreages of each land use by the consolidated water use data for each land use type). These water use factors were then applied to the updated land use categories (updated categories as compiled by reviewing and interpreting information as found in existing general plans and/or as developed through one-on-one meetings with county / city planning department staff) to develop projected water demands through 2040. All demands were refined to account for weather patterns, geography and land-use trends (e.g., changes in density, etc.). Please refer to the 2040 Demand Study (February 2009) for an expanded description of the methodology and study results.

Need for Water

The Need for Water is the additional water required to support projected levels of development in the service area through the year 2040, under the worst-case drought scenario. Future water need is the difference between the available supply and projected water demand during a worst-case drought.

EBMUD estimates a year 2040 gross annual average customer demand of 312 MGD. This figure is reduced to 280 MGD through the realization of 22.5 MGD in conservation savings and 9.3 MGD in recycled water development attained under the 1993 WSMP. Figure 2-5 demonstrates that the Need for Water by 2040 depends on the level of rationing that would be implemented, with yields as derived from the Mokelumne River basin, from Conservation Programs and Water Recycling Projects, and as sourced from FRWP and local groundwater storage held constant.

2.5 Public Outreach

As WSMP 2040 is implemented and the projects and programs are put into operation, it will affect EBMUD's customers; therefore, public representation in the planning process and communications were viewed as not only a necessity but moreover as an integral component of the Plan development.

2.5.1 Community Liaison Committee

Each of the seven members of EBMUD Board of Directors were asked to identify members of the public to serve as representatives on the WSMP 2040 CLC. From those recommendations, the CLC was assembled and held their first meeting in spring 2007. The CLC's purpose was to facilitate the exchange of information and the sharing of opinions. That sharing was extended beyond simply the CLC participants and EBMUD staff, as the CLC members themselves were tasked with holding side discussions with key stakeholder interest groups and/or the community counterparts that they represent (as a means to inform the broader public as to the WSMP 2040 development throughout all stages of the portfolio and/or policy development effort). CLC members included representatives of elected officials, industry, environmental interests and community advocacy groups. The CLC was presented with a broad overview of the various elements of the WSMP 2040, as well as the policy decisions of the Board of Directors. Consultants and EBMUD staff prepared presentations for the CLC meetings, which were held following the Board of Directors workshops. All comments were made available to a Steering Committee comprised of senior EBMUD management, as well as to EBMUD's Board of Directors.

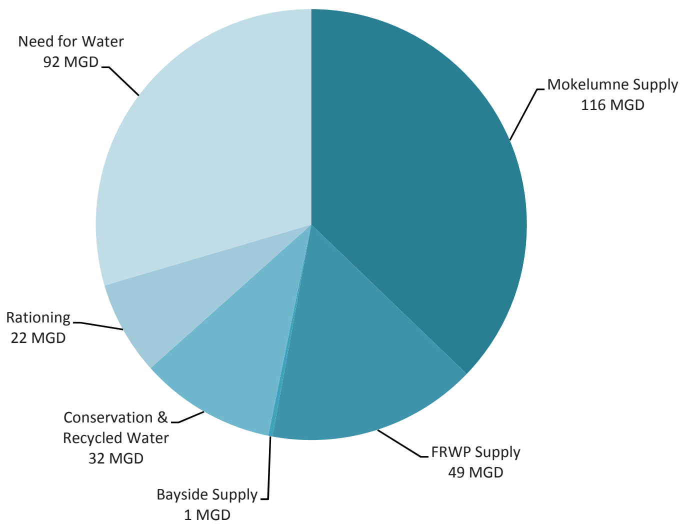
The side discussions as conducted by CLC representatives between meetings (and as noted above) enabled the CLC to not only convey information regarding the District's WSMP 2040 progress to the community, it also enabled the CLC to report feedback as received from their constituents to the Board. CLC meetings were open to the public, and their proceedings were recorded in presentations, newsletters and meeting notes that were posted on EBMUD's website. Seven CLC meetings were held between May 2007 (at the beginning of the WSMP 2040 development process) and the release of the Draft PEIR for public review.

Figure 2-5

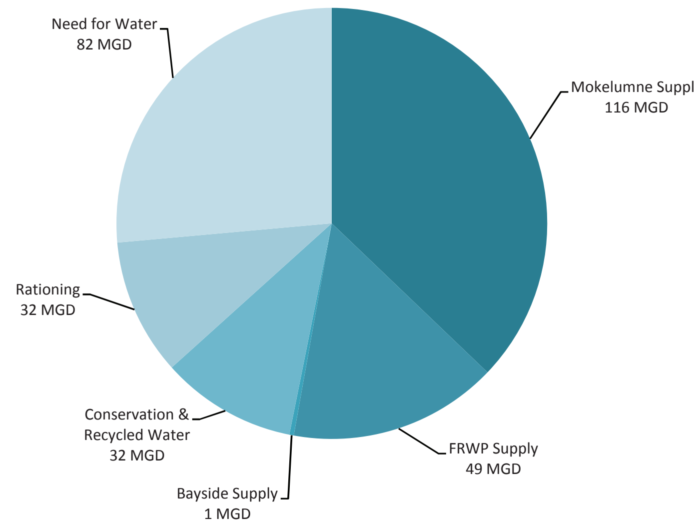
2040 Water Supply - Average During the 3-year Drought Planning Sequence (10%, 15% and 20% Rationing Levels)

312 MGD Average Demand

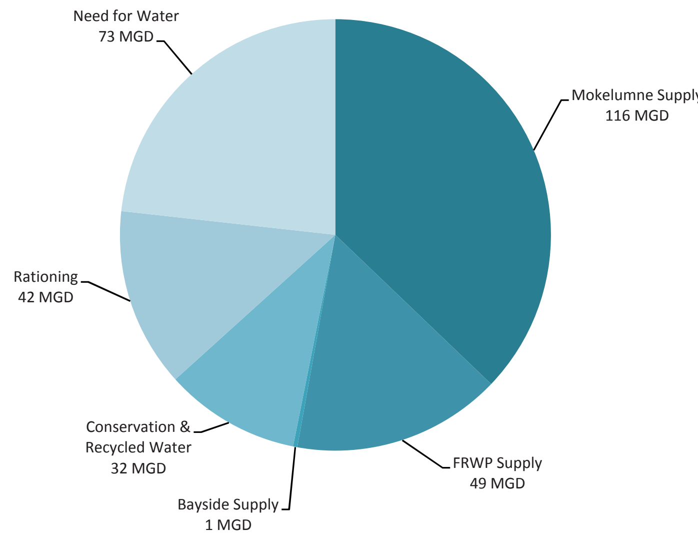
10% maximum rationing



15% maximum rationing



20% maximum rationing



Note:
- All values are in MGD
- Model accuracy/rounding accounts for discrepancy in totals

2.5.2 Regular Board Workshops - WSMP 2040 Development

EBMUD's Board of Directors held regular WSMP 2040 Development Workshops, beginning in the Spring of 2007 and continuing into 2009, as part of a stepwise approach to the planning and screening of the Preferred and Alternative Portfolios described in Section 2.3 above. Workshops took place at EBMUD's Oakland administration building. Most ran approximately 2 hours in length, and included presentations by EBMUD staff and the consultant team assisting the WSMP 2040 work effort. Each workshop included time for public comment. Public comments were most often centered on a particular topic that was on the agenda for discussion on a given day. As an example, the Board obtained comments regarding the study undertaken to estimate the Need for Water. The Board also gathered comments from citizens regarding projects that they were interested in seeing move forward for consideration as part of the WSMP 2040 portfolio development process.

Ten regular WSMP 2040 workshops were held. Earlier workshops provided a historic perspective regarding the 1993 WSMP and the District's accomplishments since its adoption. The scope of the WSMP 2040 was also summarized at these early workshops. As the work effort advanced, workshops were used to seek Board guidance and recommendations regarding what projects and/or programs were worthy of carrying forward into one or more portfolio options. Toward the end of the WSMP 2040 development effort, the workshops focused on water supply portfolio preferences and the portfolio screening process.

2.5.3 Special Board Workshops – Public Input

The EBMUD Board of Directors sponsored public information workshops on June 16 and 17, 2008 in Walnut Creek and Oakland, respectively. The Board scheduled these workshops to ensure timely consideration of public comments at their meeting on June 24, 2008, at which they provided guidance to staff and consultants regarding a recommended Preferred Portfolio. These workshops were specifically organized to present the public with the water supply options that had been advanced for Board consideration, the five portfolios that would be reviewed by the Board, and to hear comments about the portfolio options and the projects and programs that were components of one of more of the options. Both workshops were publicized in advance via media announcements (newspaper advertisements and emails to CLC members).

2.5.4 Upcountry Presentations

To inform representatives of those communities that lie beyond EBMUD's service area (called the 'upcountry' regions of San Joaquin County, Amador County, and Calaveras County) about the WSMP 2040 effort, EBMUD staff spoke at various non-District-sponsored events:

- At the May 14, 2008 meeting of the Northeast San Joaquin County Groundwater Banking Authority (GBA) in Stockton, an EBMUD representative described the WSMP 2040 water supply projects under consideration as part of water supply portfolios that are analyzed in this PEIR.
- At the July 25, 2008 meeting of the Upper Mokelumne River Watershed Authority (UMRWA) in Amador County, an EBMUD representative described the WSMP 2040's objectives and recommended programs to attendees of the UMRWA governing board meeting.

It should be noted that at both the UMRWA and GBA meetings, EBMUD representatives obtained valuable information regarding the preferences, concerns, and views of both representatives of those organizations, and from the members of the public also present at said events. That information was relayed to the WSMP 2040 project team and to EBMUD's Board of Directors.

2.6 CEQA Process

2.6.1 Environmental Review Process

Notice of Preparation

The Notice of Preparation (NOP) for the PEIR was sent to responsible and trustee agencies and to the State Clearinghouse on May 1, 2008, in accordance with Section 15082 of the CEQA Guidelines. EBMUD determined that WSMP 2040 is a project of statewide, regional, or area-wide significance as defined in CEQA Guidelines Section 15206, and held three public scoping meetings in accordance with Section 15083(c)(1). Comments received on the NOP and at the scoping meetings are presented in Appendix A.

As provided in CEQA Guidelines Section 15060(d), EBMUD, as lead agency, determined that an EIR is required for this Plan, eliminated development of an Initial Study, and began work directly on the EIR process laid out in the CEQA Guidelines. EBMUD has fulfilled the Public Consultation process recommended in CEQA Guidelines Section 15083 by considering comments received at the scoping meetings or in response to the NOP.

Distribution of the Draft PEIR

A Notice of Availability (NOA) of the Draft PEIR was published in local newspapers in the Bay Area and in potential Upcountry component locations. Multiple copies of the Draft PEIR, along with a Notice of Completion, were provided to the State Clearinghouse for distribution to state agencies.

Printed copies of the Draft PEIR are available for public review at the following locations:

EBMUD Administrative Center
Office of the District Secretary
375 11th Street, 8th Floor
Oakland, CA 94607

Oakland Public Library
125 14th Street
Oakland, CA 94612

San Leandro Main Library
300 Estudillo Avenue
San Leandro, CA 94577

Danville Public Library
400 Front Street
Danville, CA 94541

Orinda Public Library
26 Orinda Way
Orinda, CA 94563

Albany Public Library
1247 Marin Ave
Albany, CA 94706

Walnut Creek Public Library
1395 Civic Drive
Walnut Creek, CA 94596

Berkeley Public Library
2090 Kittredge
Berkeley, CA 94704

Sacramento Public Library
828 I Street
Sacramento, CA 95814

Lodi Public Library
212 W. Pine Street
Lodi, CA 95240

Amador County Public Library
530 Sutter Street
Jackson, CA 95642

San Andreas Central Library
1299 Gold Hunter Road
San Andreas, CA 95249

Stockton-San Joaquin Public Library
2370 E. Main Street
Stockton, CA 95205

Tehama County Public Library
645 Madison Street
Red Bluff, CA 96080

Shasta County Public Library
1100 Parkview Avenue
Redding, CA 96001

Yolo County Public Library
Davis Branch
315 E. 14th Street
Davis, CA 95616

Butte County Public Library
Oroville Branch Library
1820 Mitchell Avenue
Oroville, CA 95966

Fairfield Cordelia Library
5050 Business Center Drive
Fairfield, CA 94534

Yuba County Library
303 2nd Street
Marysville, CA 95901

Santa Clara County Library
14600 Winchester Blvd.
Los Gatos, CA 95032

Sutter County Library
2147 California Street
Sutter, CA 95982

Colusa County Library
738 Market Street
Colusa, CA 95932

Orland Free Library
333 Mill Street
Orland, CA 95963

Plumas County Library
455 Jackson Street
Quincy, CA 95971

San Francisco Public Library
100 Larkin Street
San Francisco, CA 94102

Additionally, the Draft PEIR is available for public review on EBMUD's website at www.ebmud.com.

The Draft PEIR will be circulated for a 45-day public and agency review period that commenced upon receipt of the Draft PEIR by the State Clearinghouse. Printed copies of the Draft PEIR were mailed to responsible agencies. The NOA was sent to other local, state, and federal agencies, and to interested organizations and individuals encouraging them to review the Draft PEIR online at www.ebmud.com, or to request the material on a CD-ROM by return mail. Distribution of print copies is limited to reduce demand for paper, and to minimize the use of environmentally-harmful printing chemicals.

Distribution of the Final PEIR

EBMUD will respond to written and oral comments received in response to the Draft PEIR in the Final PEIR. The Final PEIR may incorporate changes to the Draft PEIR suggested in the comments, and will include the lead agency's responses to comments on the Draft PEIR. EBMUD may use master responses to reply to a set of related comments. All commenters on the Draft PEIR will be notified of the date, time and location of the EBMUD Board of Directors meeting at which certification of the PEIR and approval of the WSMP 2040 planning document are scheduled. An electronic version of the Final PEIR will be available on the EBMUD website prior to the certification hearing. Printed copies of the Final PEIR will be mailed at least ten days prior to the certification hearing to those public agencies that commented on the Draft PEIR, in accordance with CEQA Guidelines Section 15088(b). Copies will also be available for public review at the locations listed above and on EBMUD's website at www.ebmud.com.

PEIR Certification

The final step in the CEQA process is certification of the PEIR, which includes preparation of a Mitigation Monitoring and Reporting Plan and adoption of findings. A certified PEIR indicates the following:

- The document complies with CEQA;
- The decision-making body of the lead agency reviewed and considered the Final PEIR prior to approving WSMP 2040; and
- The PEIR reflects the lead agency's independent judgment and analysis.

Upon certification of the PEIR and approval of the WSMP 2040, EBMUD will file a Notice of Determination with the State Clearinghouse and with the county clerks in whose jurisdictions one or more WSMP 2040 activities may occur.

3 PREFERRED PORTFOLIO AND ALTERNATIVE PORTFOLIOS

3. Preferred Portfolio and Alternative Portfolios

3.1 Introduction

This chapter describes the Preferred Portfolio and five Alternative Portfolios assembled as part of WSMP 2040, and their respective components. The intent of each portfolio, including the Preferred Portfolio, is to give EBMUD the ability to respond flexibly to an uncertain water future. These uncertainties include changes in water supply and/or demand, the effects of global climate change, project and program funding availability, legal and institutional barriers, and changing technology. Each component in each portfolio would come online in a stepwise fashion to meet the Need for Water in all years. The decisions regarding how and when to phase in specific components would be made based on many considerations including funding availability, political will and success, and resolution of technical issues. A probable scenario for implementation of the Preferred Portfolio is described in Section 3.3.

This chapter also provides a discussion of each Alternative Portfolio and the reasoning as to why it was not selected as the Preferred Portfolio. The Preferred and Alternative Portfolio development and decision-making process was supported by the results of water supply modeling, which tested each portfolio's operational feasibility, calculated the volume of water delivered over the Program planning period (2010 – 2040), and estimated the frequency and severity of rationing. Each portfolio's consistency with WSMP 2040 Program Objectives is summarized in Table 3-16 and discussed further in Chapter 6, Comparison of Preferred and Alternative Portfolios. In addition, this chapter includes a short discussion regarding other alternative portfolios (beyond the five finalists) that were considered but eliminated in the planning process. Finally, this chapter identifies the permits and permit approvals that may be required for implementation of the projects and programs that comprise WSMP 2040.

3.2 Preferred Portfolio

The Preferred Portfolio is designed to respond with the most flexibility to an uncertain water future. This flexibility is particularly important, given the mix of supplemental supply and recycled water projects proposed in WSMP 2040 (see Table 3-1). Such projects take considerable time to develop (plan, design, permit and construct). The broad mix of projects, the inherent scalability present in several of the elements, and the ability to adjust implementation schedules for a particular project or program included in WSMP 2040 help to minimize the risks associated with the uncertainties and development time issues identified above.

3.2.1 Components of the Preferred Portfolio

The components described in this section are all part of the Preferred Portfolio (as identified above in Table 3-1). Additional components that are part of one or more of the

Table 3-1: Preferred Portfolio Components

<table>
<tr><th>COMPONENT CATEGORY</th><th colspan="2">LEVEL/PROJECTS</th><th>COMPONENT YIELD (MGD)</th></tr>
<tr><td>Rationing</td><td colspan="2">10%[a]</td><td>22</td></tr>
<tr><td>Conservation</td><td colspan="2">Level D</td><td>39</td></tr>
<tr><td>Recycled Water</td><td colspan="2">Level 3</td><td>11</td></tr>
<tr><td rowspan="7">Supplemental Supply</td><td colspan="2">Northern California Water Transfers</td><td>13[b]</td></tr>
<tr><td colspan="2">Bayside Groundwater Project Phase 2</td><td>Up to 9</td></tr>
<tr><td colspan="2">Sacramento Basin Groundwater Banking / Exchange</td><td>Up to 4.2</td></tr>
<tr><td colspan="2">Regional Desalination</td><td>Up to 20</td></tr>
<tr><td rowspan="3">Regional Upcountry Project</td><td>Enlarge Lower Bear Reservoir</td><td>Up to 2.2</td></tr>
<tr><td>Enlarge Pardee Reservoir</td><td>Up to 51.2</td></tr>
<tr><td>IRCUP / San Joaquin Groundwater Banking / Exchange</td><td>Up to 17.4</td></tr>
</table>

[a] As explained in Section 2.3 of this PEIR, the Preferred Portfolio establishes a 10 percent drought rationing policy. As a practical matter, however, EBMUD will be unable to reduce rationing to 10 percent until it develops additional dry-year supplemental water supplies.
[b] The modeling assumed 13 MGD, but the range could be 4.5 to 28.5 MGD.

final five Alternative Portfolios (also referred to in this document as the five Primary Portfolios) are described in Sections 3.3.2 through 3.3.6. With the exception of the Rationing and Conservation components, all other portfolio components will require new construction, or will require the expansion of existing facilities and infrastructure. The general locations of the components that require new or expanded facilities are shown in Figure 3-1.

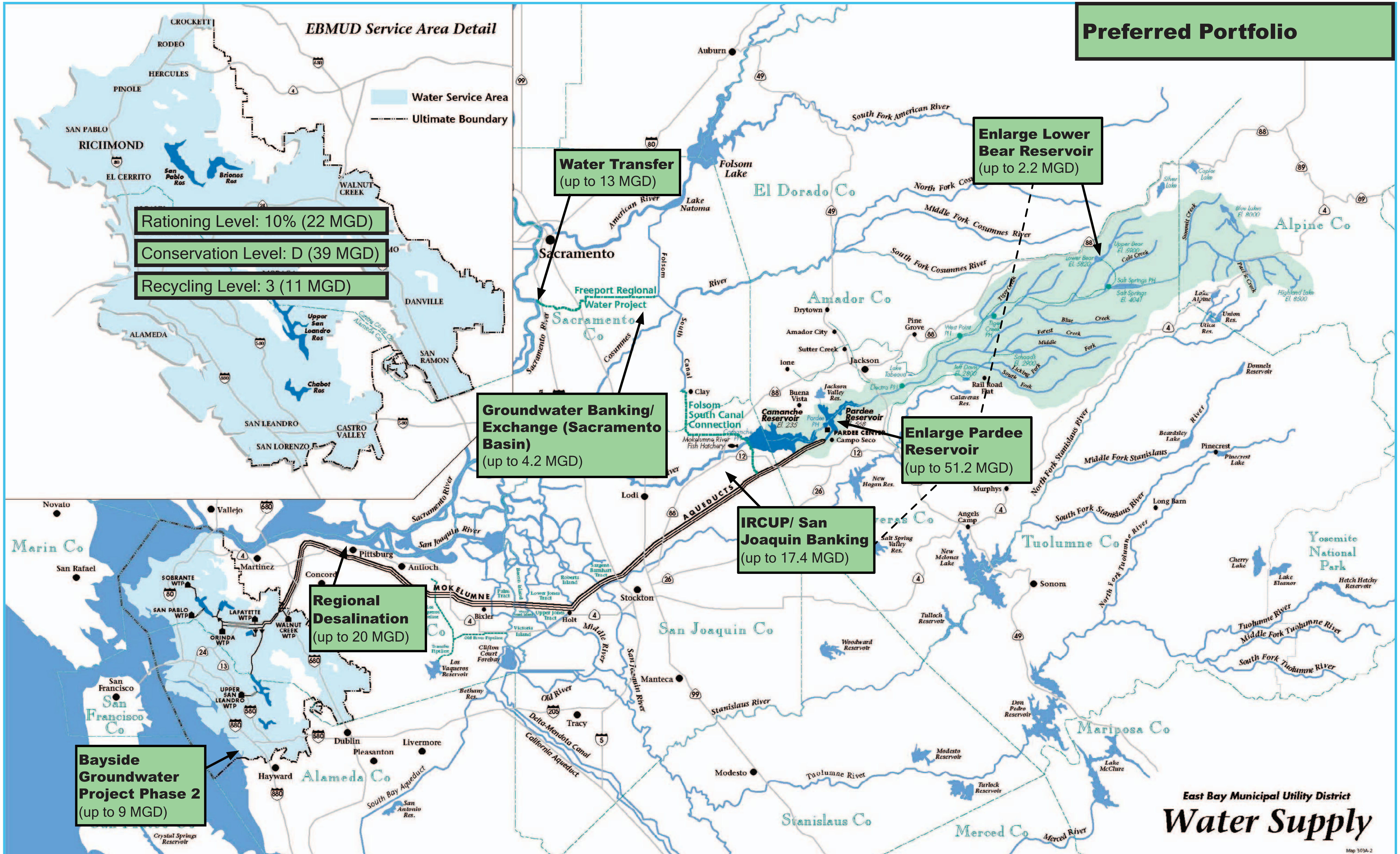
Proposed components would be located both within and outside of the EBMUD service area. More specifically, some would occur in the western foothills of the Sierra Nevada within or near the Mokelumne River basin (referred to as “Upcountry” area in this document); others would be located within California’s “Central Valley” (in this document, the Central Valley region is limited to those lands within the vicinity of EBMUD’s Freeport Regional Water Project [FRWP], which includes portions of Sacramento County as well as the Sacramento and American River watersheds); and still others would be located within the San Francisco Bay Area (including lands within or near the EBMUD service area). Collectively, these three areas are considered the WSMP 2040 PEIR Preferred Portfolio Study Area.

3.2.2 Rationing

The WSMP 2040 Preferred Portfolio proposes a maximum 10 percent rationing policy be enacted (as part of the designated Drought Planning Sequence) and assumes that EBMUD will successfully carry out a number of the water conservation, recycled water, and supplemental supply initiatives (that are also part of the Preferred Portfolio) within

Figure 3-1

Preferred Portfolio Map



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the WSMP 2040 planning horizon. If uncertainties such as the adverse effects of global climate change and decreased availability of water in the Mokelumne River and Sacramento systems impede attainment of these supplies, higher rationing restrictions may be imposed in a specific drought event. The amount of water needed by 2040 to meet projected demands based on a rationing level of 10 percent, as well as for the other rationing levels that were considered in the WSMP 2040 planning process, is shown in Table 3-2 below.

Table 3-2: Year 2040 Need for Water for Rationing Levels from 0 to 25 Percent

ANNUAL SYSTEM-WIDE AVERAGE RATIONING (%)	GROSS ANNUAL AVERAGE CUSTOMER DEMAND (MGD)A	NEED FOR WATER OVER 3 YEARS (MGD, TAF)	AVERAGE ANNUAL NEED FOR WATER (MGD)
0	312	344 (386)	115
10[b]	**312**	**277 (310)**	**92**
15	312	247 (277)	82
20	312	218 (244)	73
25	312	187 (210)	62

[a] Includes water savings from ongoing conservation and recycled water. When reduced by conservation and recycled water programs, the annual average customer demand is 280 MGD.
[b] Rationing Level for the Preferred Portfolio
MGD – million gallons per day; TAF – thousand acre feet

As explained in Section 2.3 of this PEIR, the Preferred Portfolio establishes a 10 percent drought rationing policy. As a practical matter, however, EBMUD will be unable to reduce rationing to 10 percent until it develops additional dry-year supplemental water supplies. The triggers to determine when rationing would be initiated would follow the Drought Management Program (DMP) discussed in Section 2.4.7. These triggers may need to be adjusted in the future based on operational needs. The adjustments that may be needed can only be determined based on supplies, demands, and operational constraints that exist in the future when the triggers are reviewed.

Achieving a targeted 10 percent reduction of total customer demand on an annual basis would require reducing water use, which would vary across customer categories (see Figure 3-2). The basis of these variations depends on the proportion of demand and the percent of indoor and outdoor water use for each customer class. Additionally, the distribution of rationing for a particular customer category over an annual period may vary seasonally, as shown in Figure 3-3. For example, to achieve an annual average rationing level of 12 percent within the single-family residential category, the greatest cutback in water use (17 percent) would occur during the peak water use months for that category (e.g., in July and August). The lowest cutback (10 percent) for the single-family residential category would occur during the months of lower water use (e.g., from November through March). The actual determination of level of rationing will be made by the EBMUD Board based on specific conditions at the time of the drought.

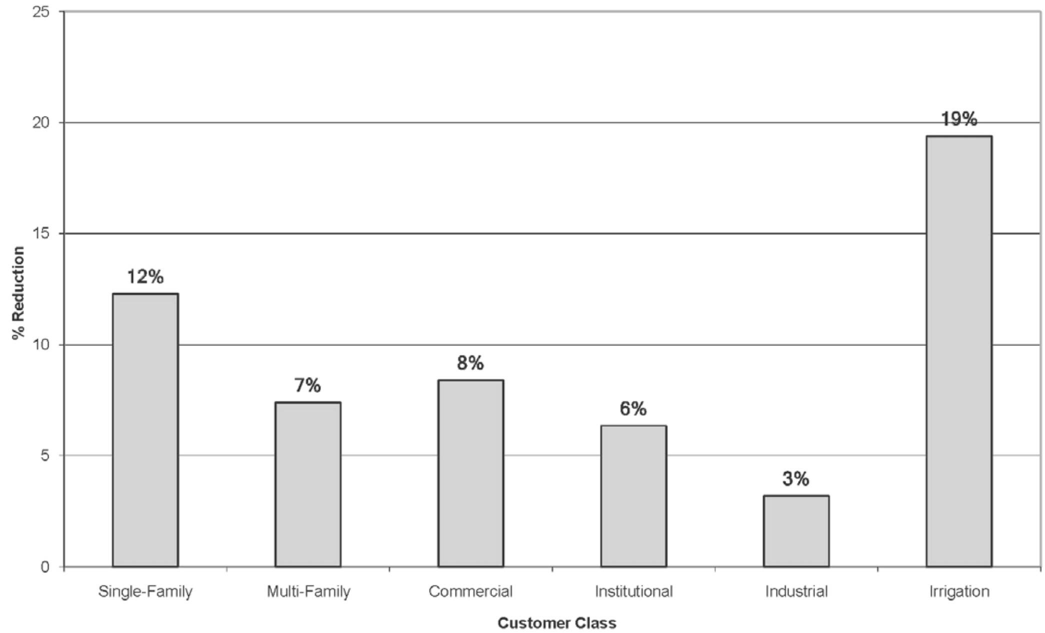


Figure 3-2 System-Wide Rationing of 10 Percent

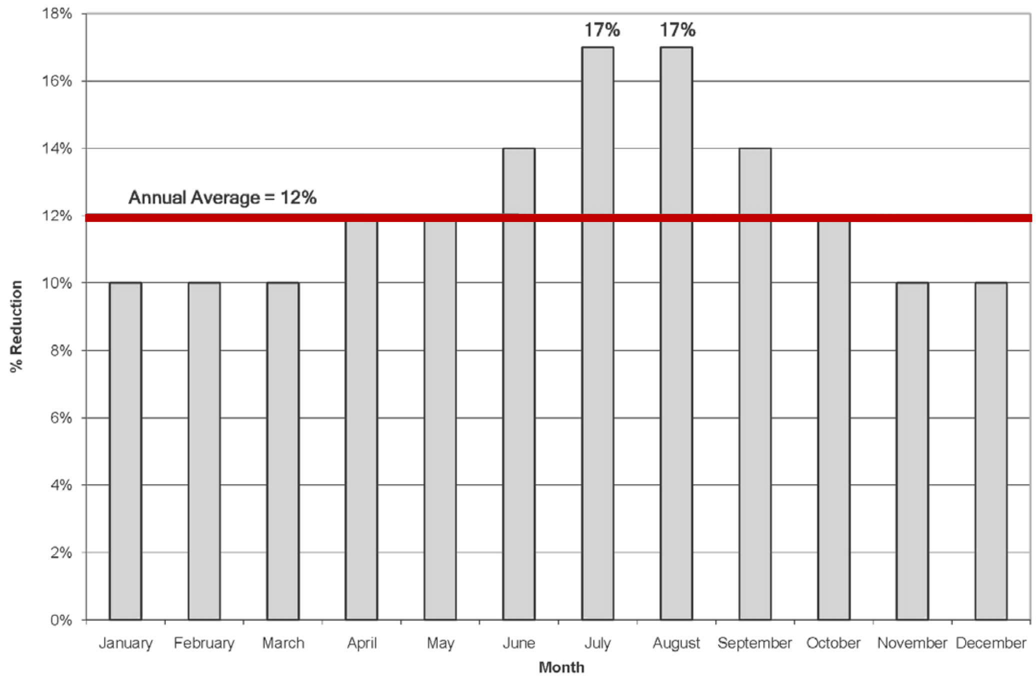


Figure 3-3 Example of Single-Family Residential Monthly Rationing Targets

Facilities Required

Rationing is a policy matter that, when implemented, results in the reduction of water use by District customers. No infrastructure or facilities would be required for its implementation.

3.2.3 Conservation

EBMUD currently implements water conservation programs that encourage voluntary reductions in long-term water use by customers. Supply-side programs improve water use efficiency through actions such as distribution system leak detection and repair. Demand-side water conservation programs include incentives given to residential and non-residential customers (that are applied toward the purchase and/or installation of water saving devices or landscape elements), education and outreach activities, and support activities such as water-use surveys. In addition, and to set an example, EBMUD follows a water-wise approach in managing its own facilities. The District works to avoid and/or correct practices that are seen as wasteful (i.e., permanently turn off water-wasting landscape features such as outdoor fountains, replace grassed lawn with drought-resistant plantings, perform facility surveys aimed at identifying means by which to cut back the District's water use, etc.).

Additional water savings are gained from natural replacement that occurs without customer participation in a formal EBMUD program. As an example of "natural replacement", when regulations are enacted that require the installation of efficient hardware (e.g., toilets, showerheads, and faucets), while it is beyond EBMUD's authority to require homeowners to install the equipment (as part of a house remodeling project), it is within the authority of the regulatory body issuing the building permit. Hence the regulation produces a water saving benefit (termed a "natural replacement" benefit) to EBMUD and the community. Other "natural replacement" savings include customer-initiated water savings actions (i.e., actions that are triggered by EBMUD water conservation customer awareness / education / outreach, without an accompanying direct EBMUD incentive for the actions).

The water use reduction from EBMUD's existing conservation programs, as implemented since the adoption of the 1993 WSMP, is projected to reach 22.5 million gallons per day (MGD) by the year 2010. Under the WSMP 2040 Preferred Portfolio, EBMUD would achieve an additional conservation water savings of 39 MGD between 2010 and 2040, for a projected year 2040 conservation savings of 62 MGD (1993 – 2040).

The Preferred Portfolio level of 39 MGD targets residential, commercial, and industrial customers, as these customer classes provide the greatest water savings potential through conservation measures. Conservation goals are stated as total water savings without adjustments for savings depreciation, which occurs over time due to product wear and change in customer behavior.

To determine the potential water savings that EBMUD could achieve through future water conservation programs, over 50 potential conservation measures were evaluated. The evaluation included an estimate of the water savings and cost-effectiveness of each of the conservation measures as well as an assessment of implementation barriers, such as customer acceptance, cost, and market saturation (market saturation is defined as the degree to which a particular measure will become distributed/used within the service area). Those measures that could be feasibly implemented by EBMUD to reduce future water demand were moved forward for WSMP 2040 conservation component consideration.

Next, conservation components were grouped together for further evaluation. Grouping A included a subset that together resulted in 19 MGD in savings, Grouping B included the Grouping A subset plus a few additional measures. Grouping C included the Grouping B subset plus even more additional measures, etc.

The evaluation determined that the potential water savings ranged from an additional 19 MGD (Grouping A) to a maximum of 41 MGD (Grouping E), with the Preferred Portfolio conservation level target of 39 MGD (Grouping D) identified as being at and/or closest to the pivot point of cost-effectiveness.

The Preferred Portfolio conservation level target includes conservation measures similar to the existing EBMUD program and best management practices (BMPs) as recommended by the California Urban Water Conservation Council. Such BMPs include providing rebates for purchasing water saving hardware, and persuading customers to use water more efficiently through educational outreach. Long-term hardware changes that could achieve additional water savings for EBMUD customers include installation of high-efficiency toilets, efficient showerheads and faucets, water-efficient appliances, efficient outdoor irrigation systems, as well as enhanced commercial and industrial water audits where customers learn more about opportunities to save additional water.
In addition, the conservation level target includes more advanced technological measures such as automated metering systems. These types of systems allow customers to individually monitor water use and take corrective action.

Facilities Required

Conservation programs rely on behavioral actions and replacement of fixtures, appliances, and equipment on a localized basis. Therefore, infrastructure and facilities are not required for program implementation.

3.2.4 Recycled Water

Recycled water is used in place of potable water to reduce demand for applications such as irrigation and industrial processes. Recycled water use reduces demand for potable water and potentially reduces the need for rationing during droughts. By definition, recycled water projects use treated wastewater. However, EBMUD also has some project options that use untreated (raw) water from local runoff. These projects are included in the recycled water category for the purposes of the WSMP 2040. Typical recipients of recycled water include oil refineries, golf courses, cemeteries, and public landscaping such as roadway medians. EBMUD's existing and committed inventory of recycled water projects (in total and as implemented since the 1993 WSMP) are estimated to generate 9.3 MGD of recycled water by the year 2010. The WSMP 2040 Preferred Portfolio proposes to increase the amount of recycled water available for non-potable use by an additional 11 MGD (between the year 2010 and 2040).

The Preferred Portfolio emphasizes a commitment to reach the goal of implementing an additional 11 MGD of recycled water projects, rather than the implementation of specific individual projects. However, for illustrative purposes (and in order to best estimate the level of additional recycled water production possible), the following potential projects that could contribute to meeting this level of water savings from recycled water include:

- ConocoPhillips Recycled Water Project;
- Franklin Canyon Recycled Water Project;
- North Richmond Water Reclamation Plant Expansion Project;
- Reliez Valley Recycled Water Project;
- San Leandro Water Reclamation Facility Expansion Project; and/or
- Satellite Recycled Water Projects (Retrofits).

The criteria by which potential recycled water projects were identified included water use (e.g., large irrigation users, industrial customers), proximity to existing recycled water pipelines and wastewater treatment plants, whether there would be adequate recycled water volume for particular projects, topography and the cost of pumping recycled water, water quality requirements, and existing and future land uses where recycled water could be a future option.

Facilities Required

Recycled water facility requirements are project and site-specific. In some instances, only distribution pipelines would be required (if recycled water generated at a remote facility was purchased by a particular customer). In other cases, treatment facilities would be expanded or created anew and would typically involve the expansion of existing facilities and/or construction of new facilities (e.g., treatment plants, pipelines, pumping stations, and other ancillary facilities). Where new treatment facilities would be required, they would likely be co-located with existing wastewater treatment facilities to the extent possible. Further, these facilities are more readily located in areas already urbanized and considered disturbed.

New pipelines would extend from the treatment plants to the areas where recycled water would be needed and would most likely traverse urban areas. New pipelines would be installed along existing roadways and easements to the maximum extent possible.

For the purposes of conducting the environmental impact assessment, a typical recycled water project construction scenario (as described in the introduction to Chapter 5) is evaluated in this PEIR.

Operation

Operation of recycled facilities would require treating wastewater to tertiary standards (consistent with California Code of Regulations Title 22 requirements for unrestricted reuse), typically using membrane technology. Figure 3-4 below shows how the tertiary treatment could occur.

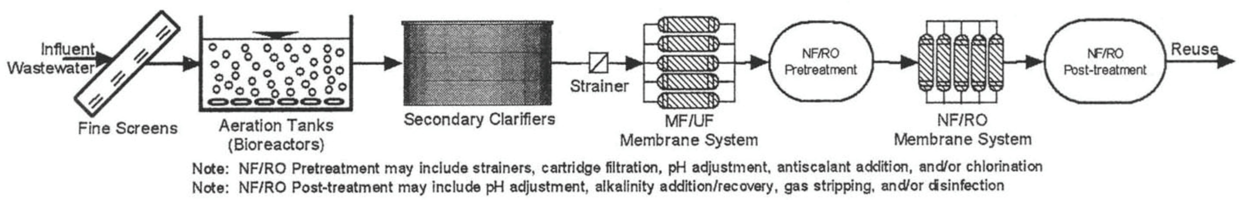


Figure 3-4 Tertiary Treatment Process for Recycled Water Projects

Once treated, the water is distributed via dedicated pipelines designed and installed for recycled water only. Proposed recipients of recycled water include oil refineries, golf courses, cemeteries and municipal landscaping.

3.2.5 Supplemental Water Supply

Under the WSMP 2040 Preferred Portfolio, rationing, conservation, and recycled water use combined would provide sufficient water to meet normal demands through the year 2040. However, those programs alone would not be sufficient to meet year 2040 service area demands during a prolonged drought. Supplemental water sources, beyond those already planned or constructed under EBMUD's 1993 WSMP, must be developed to ensure reliability during a multiple-year drought event.

Supplemental supply components include water transfers, groundwater banking/exchanges, cooperative development of a regional desalination plant, and enlarging existing reservoirs (see Figure 3-1 for locations). Each of the supplemental supply components is described below.

For the purposes of conducting the environmental impact assessment, typical construction scenarios for the supplemental supply projects (as described in the introduction to Chapter 5) are evaluated in this PEIR.

Northern California Water Transfers

At its most basic level, a water transfer can be viewed as a change in the way that a given quantity of water is allocated. Water transfers have been used by local, state and federal agencies in California for many years as a means to balance supply and demand. As a consequence, the mechanics of water transfers are well supported by legislative policy, in order to best ensure that water use can be sustained (i.e., regional shortfalls avoided) and that transfers can be performed in an environmentally sound yet economical manner. The primary mechanisms for accomplishing a water transfer are:

- Reduction in use of surface water through actions such as crop-idling, fallowing or water conservation. The water yielded from these surface water “saving” activities bypasses the particular land application and is conveyed for subsequent delivery and treatment to the entity on the receiving end of the transfer;
- Storage of excess diverted surface water (via groundwater banking) for later use by the entity on the receiving end of the transfer; and
- In-lieu use or exchange in which the “giving” end opts to use groundwater instead of a quantity of surface water and the “receiving” end gets the “saved” portion of surface water that was not used by the transfer party.

Water transfers may be temporary, in which case the duration of the transfer usually lasts for one year or less. Long-term transfers are more reliable than short-term transfers, but almost always entail a much more complex agreement structure between participants and also typically require that transfer parties undertake a more extensive environmental review process. In addition to short-term and long-term transfers, there are permanent water right acquisitions. Acquisition of a permanent water right offers the most reliability, but an acquisition also has complex contractual and environmental burdens, and they may also involve extensive regulatory proceedings before the State Water Resources Control Board (SWRCB).

State law contains three primary principles applicable to all water transfers:

- No injury to any legal user of water (Water Code 1702, 1706, 1727, 1736, 1810);
- No unreasonable effects to fish or wildlife (Water Code 1727, 1736, 1810); and
- No unreasonable economic effects to the overall economy of the county from which the water is transferred (Water Code 1810).

These principles are important for the purposes of this PEIR because the basis for most water transfer-related mitigation measures is the need to comply with state law.

Also for the purposes of this PEIR, it is assumed that conveyance (by EBMUD) of transferred water would be accomplished through the completed FRWP. It is further assumed that EBMUD would seek water transfers with partners in the Sacramento Valley, or with partners who have supplies that originate north of the Delta.

Given these conveyance and partner assumptions, analysis of the water transfer component in the PEIR is limited to the Sacramento Valley, where the "place of origin" for such transfers would be found. It should be noted that the water transfer partners have not been identified, so the sources of water are not known. Five counties within the Sacramento Valley are considered in this PEIR; these counties are illustrative of those where a transfer may occur.

While these assumptions are necessary to perform the CEQA environmental review, EBMUD does not preclude negotiation of other water transfers.

Facilities Required

A pre-treatment plant may be needed to prepare transferred water for blending in the Mokelumne Aqueducts (that treatment plant in and of itself may, however, be needed independent of a water transfer) (see Figure 3-5). This facility was evaluated in the FRWP EIR/EIS (2003). Future studies will determine if the facility is necessary, and will evaluate alternative treatment opportunities such as expanded local conventional treatment, and use of District filter plants.

Transferring Partner

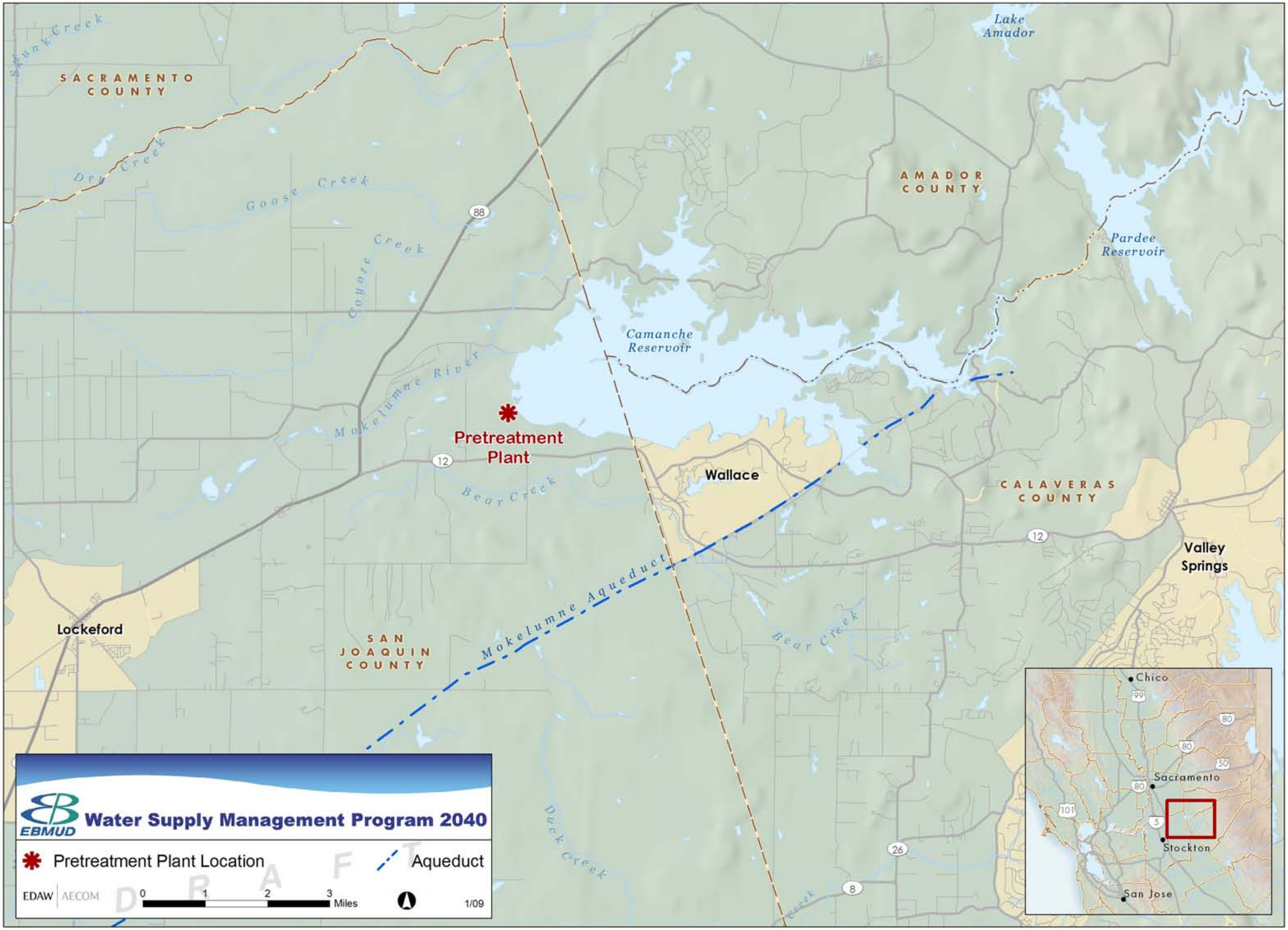
Operations by the transferring entity may change depending on the source of the water transfer (i.e., reservoir re-operation or groundwater substitution). New facilities may be needed to make water available for transfer. For example, a groundwater substitution transfer could involve EBMUD helping to fund additional wells for the selling agency's conjunctive use program. Likewise, a partner's water efficiency project could involve EBMUD helping to fund the lining of a canal or construction of a new pipeline. At this programmatic level, the need for and characteristics of such facilities have not been determined.

Bayside Groundwater Project Phase 2

Phase 1 of the Bayside Groundwater Project (described in Section 2.4.3) was under construction when the Draft PEIR was released for review. Phase 1 involves the use of an existing well in the deep portion of the South East Bay Plain Basin (SEBPB) with an annual capacity of 1 MGD and the construction of associated conveyance and treatment facilities. Phase 1 was developed for the purpose of injecting surface water from the EBMUD distribution system into the aquifer, and then recovering and treating the groundwater for use during dry years. The Phase 1 treatment facility is located on a 6-acre site owned by EBMUD in San Lorenzo.

Figure 3-5

Potential Pretreatment Plant Location



The WSMP 2040 Preferred Portfolio would build upon successful operation of the Bayside Groundwater Project Phase 1 by expanding its extraction and storage capacity by as much as an additional 9 MGD. In the Phase 1 project's certified EIR (November 2005), EBMUD sought to assure the local community and other East Bay water interests that the District would proceed with a Phase 2 initiative after gathering operating data on water quality and groundwater level effects that demonstrate that a larger capacity groundwater project could be safely developed in the basin. EBMUD remains committed to that obligation.

In the certified EIR, EBMUD also stated that a tangible project configuration for Phase 2 of the Bayside Groundwater Project was not known at the time. There is still no definitive Phase 2 project configuration (see Figure 3-6). However, for the purposes of environmental impact evaluation, EBMUD has made a number of assumptions based on what are seen as probable project elements and/or likely components of a 10 MGD combined Phase 1/Phase 2 Groundwater Project.

Facilities Required

The following facilities would be required for Bayside Groundwater Project Phase 2:

- The existing Phase 1 injection/extraction well located on leased property (Oro Loma Sanitation District – see Figure 3-7) would be replaced with a new well on the Phase 1 treatment plant site. That new well would have the same injection/extraction capacity as the one it replaced. A second well of equal size would also be installed on the property. Further, the Phase 1 treatment plant would be expanded to treat the combined volume of water as derived from the two wells;
- Two new sites within the SEBPB, with two wells at each site, and a new treatment plant would be constructed at each location;
- An expanded network of monitoring wells would be installed; and
- Inlet/outlet pipelines would be installed to connect the two new Phase 2 sites to the existing EBMUD distribution system for injection water and transmission of recovered groundwater.

Operation

Bayside Groundwater Project Phase 2 facilities would be designed to inject treated water into the aquifer during years when water is available, and to recover stored groundwater during a drought. The extracted water would be treated prior to distribution to customers.

Figure 3-6

South East Bay Plain Groundwater Basin and Proposed Bayside Groundwater Project Phase 2

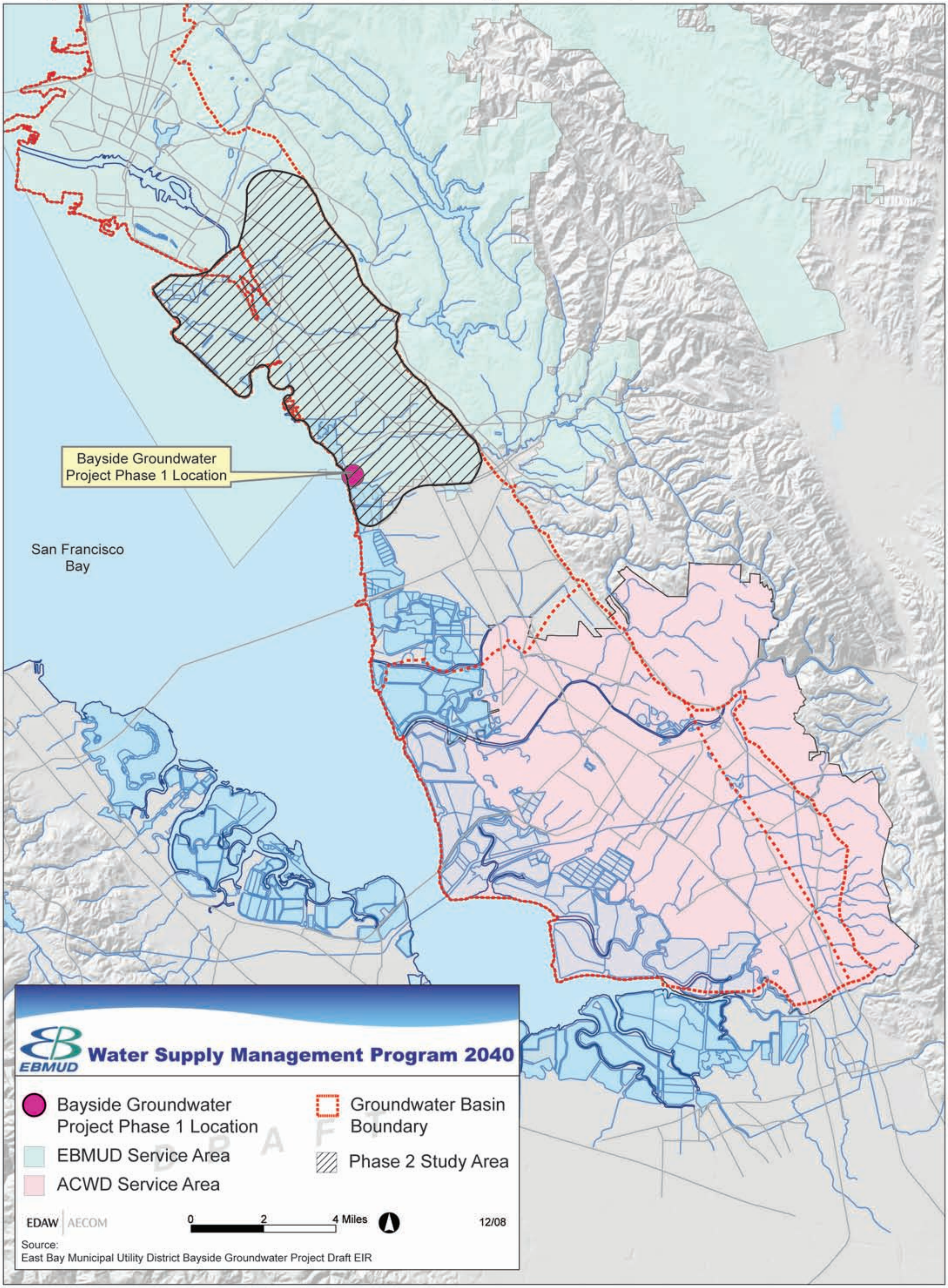


Figure 3-7

Bayside Groundwater Project Phase 2

The certified EIR for the Bayside Groundwater Project Phase 1 described a number of commitments for EBMUD that are intended to reduce the risk of harm to other basin users and to the community from groundwater operations. These actions include the following:

- Install sentinel wells to provide early detection of contaminant plume migration in areas where leaking underground fuel tanks are known or suspected;
- Expand the network of monitoring wells, screened in the shallow, intermediate and deep aquifers, to collect and analyze water quality data. This data would be shared periodically with users of the SEBPB and adjacent basins; and
- Modify or terminate extraction operation if inelastic subsidence conditions are detected.

Similar to Bayside Groundwater Project Phase 1, EBMUD would divert water for aquifer recharge from any of several sources, including local watershed runoff and conserved Mokelumne River water. The Phase 2 project would not reduce Mokelumne Project storage levels or river flows during times of low runoff, and therefore, Mokelumne River water temperatures, fish habitat availability, reservoir recreation, and water availability for consumptive use would not be adversely affected by the project.

Sacramento Basin Groundwater Banking / Exchange

The purpose of this component is to develop in-lieu or artificial groundwater recharge and recovery in cooperation / partnership with Sacramento area interests such as Sacramento County Water Agency (SCWA) and/or the Sacramento County Groundwater Authority. As conceptualized, EBMUD would support development of facilities to recharge the Sacramento groundwater basin, and would receive either groundwater extracted from the basin or surface water in exchange for a portion of the water stored, as a dry-year supply.

Three options are considered in this PEIR:

- Option 1 would involve operating a groundwater storage and recovery program in Sacramento County's Central (groundwater) Basin. Transfer water purchased by EBMUD via an undefined transfer agreement would be diverted from the Sacramento River and transported to the recharge facilities using FRWP conveyance facilities, for storage in the groundwater basin via recharge ponds, or in-lieu recharge via exchange with area water users. During dry years (which are predicted to take place approximately 3 out of 10 years), a portion of the water stored would be extracted from the Basin for EBMUD's use, conveyed via FRWP facilities, or provided in-lieu (surface water as sourced via an exchange for the groundwater banked).

- Under Option 2, water district members of the Sacramento County Groundwater Authority would provide in-lieu surface water supplies. In wet years, additional surface water available under SCWA water rights would be provided to these districts. In dry years, these districts would forgo some or all of their typical diversions from the Lower American River and would rely more heavily on groundwater. Thus, they would allow their surface entitlements to flow downstream to SCWA's point of diversion at the FRWP. EBMUD would be provided a portion of the surface water entitlement via diversion at FRWP.
- Under Option 3, EBMUD would support Sacramento Regional County Sanitation District development of recycled water production in the Central Basin. This recycled water would be provided to local agricultural irrigators currently using groundwater as their source of water. Unused groundwater would be banked for dry-year use by both Sacramento water interests and EBMUD.

Facilities Required

The maximum facilities (as predicted based on the concept options reviewed) required for this component are based on Option 1, which includes:

- 39 acres of recharge ponds;
- Three extraction wells, including one backup well, each capable of pumping 2,000 gallons per minute for 24 hours per day for a period of 12 months;
- Five miles of pipeline from the FRWP pipeline to the well field / recharge area;
- Intertie at the FRWP pipeline;
- Pump station for the new pipeline;
- Granular activated carbon (GAC) treatment system either at the well field or at the intertie with the FRWP pipeline; and
- The pre-treatment plant identified for the Northern California Water Transfers component may also be needed.

Operation

For the purpose of the PEIR, the yield of the Sacramento Basin Groundwater Banking / Exchange Project is assumed to be 4.2 MGD. Actual operational details, including specific yield for a project sited in this basin, would be determined at the project planning and development stage. EBMUD intends to operate the facilities such that it would provide a dry-year supply. Other potential partners would have their own specific operational objectives.

Regional Desalination

EBMUD, in partnership with Contra Costa Water District (CCWD), the San Francisco Public Utilities Commission, and the Santa Clara Valley Water District, are jointly exploring development of the Bay Area Regional Desalination Project, which could consist of one or more desalination facilities. Under the Preferred Portfolio, the presumed capacity of the completed project is 71 MGD, of which EBMUD's share would be 20 MGD.

Three desalination plant locations are being considered by the project partners: an Oceanside site in San Francisco, a Near Bay Bridge site in Oakland, and an East Contra Costa site in the west Delta in the vicinity of the south shore of Suisun Bay. The Pittsburg site at CCWD's Mallard Slough Pump Station is currently hosting a pilot test of desalination technology to collect data on technical feasibility (pre-treatment options, membrane performance, design parameters) and to determine environmental impacts (brine disposal, marine life screening systems). The pilot study is scheduled to be completed in June 2009. This PEIR assumes the East Contra Costa site would be selected (see Figure 3-8).

While a location must be used for evaluating impacts as part of the WSMP 2040 PEIR effort, the project location for a permanent regional desalination facility has not been selected. It could be one of the other sites considered as detailed above, or it could be an entirely different location. As the project moves forward, project-level environmental documentation will be prepared for the selected site.

Facilities Required

Facilities required for the Regional Desalination component include:

- Desalination plant;
- Transmission and distribution pipelines;
- Water intake; and
- Outfall and brine disposal mechanism.

Operation

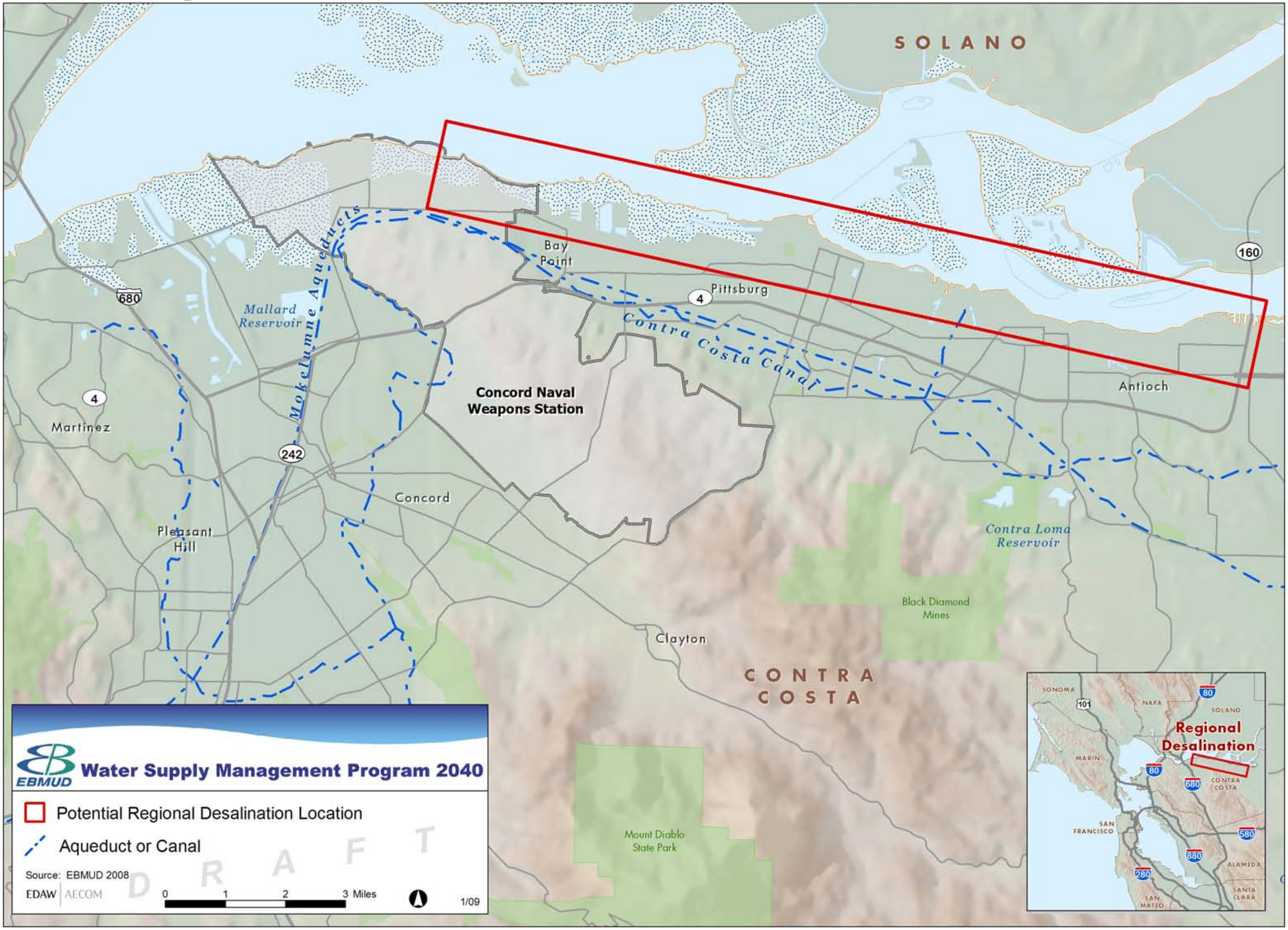
The desalination plant would be operated intermittently as a dry-year supplemental supply, subject to specific agreements between the partner agencies.

Enlarge Pardee Reservoir (Component of Regional Upcountry Project)

The existing Pardee Reservoir has a licensed capacity of 209,950 acre-feet (AF) behind a 345-foot-high concrete dam on the Mokelumne River. Enlargement of the reservoir would increase the existing maximum reservoir level by 33 feet, and the maximum flood control elevation would be raised about 46 feet, thereby increasing storage capacity to

Figure 3-8

Potential Regional Desalination Location



370,000 AF. The total surface area of the reservoir would increase from 2,200 acres to 3,480 acres. Figure 3-9 shows the increase in inundation area resulting from enlargement of the reservoir.

The majority of the land surrounding the existing reservoir between 568 feet mean sea level (msl) and 614 feet msl is owned by EBMUD (3,316 acres). Other landowners in the area include the Jackson Valley Irrigation District (JVID) (33 acres), as well as several private parties (134 acres). EBMUD anticipates purchasing or securing easements on non-EBMUD lands that would be needed for the project.

Facilities Required

A number of new facilities would be required for the Enlarge Pardee Reservoir component (see Figure 3-10). These include:

- Concrete dam and spillway, powerhouse, and saddle dams. The replacement dam would be constructed of 1.5 million cubic yards of roller-compacted concrete in a conventional trapezoidal cross section;
- Two replacement dam spillways -- a gated service spillway that would be used routinely for frequent small-scale spills and a gated auxiliary spillway to accommodate larger spills;
- A new 30-megawatt (MW) powerhouse facility constructed at the downstream toe of the replacement dam;
- New Saddle Dam No. 1 would be required to close a low draw located approximately 1,000 feet to the north of the right abutment of the replacement dam;
- New Saddle Dam No. 2 would be located approximately 1,500 feet north of Saddle Dam No. 1;
- Modified intake tower with several sets of gates at different water levels to regulate temperature and turbidity of outflow from the reservoir;
- Pardee Tunnel would be modified to accommodate higher water pressure associated with higher water levels in the enlarged reservoir. Most of the tunnel, where rock cover is adequate, would not be modified;
- New pressure reduction facility;
- Relocated roads and bridges;
- Relocated utilities. Several power transmission lines cross the upper part of the reservoir and the new inundation area between the existing and replacement dams, and would need to be relocated or raised; and
- Replaced recreational facilities above the new shoreline of the reservoir.

Figure 3-9

Enlarge Pardee Reservoir Component: Increase in Inundation Area

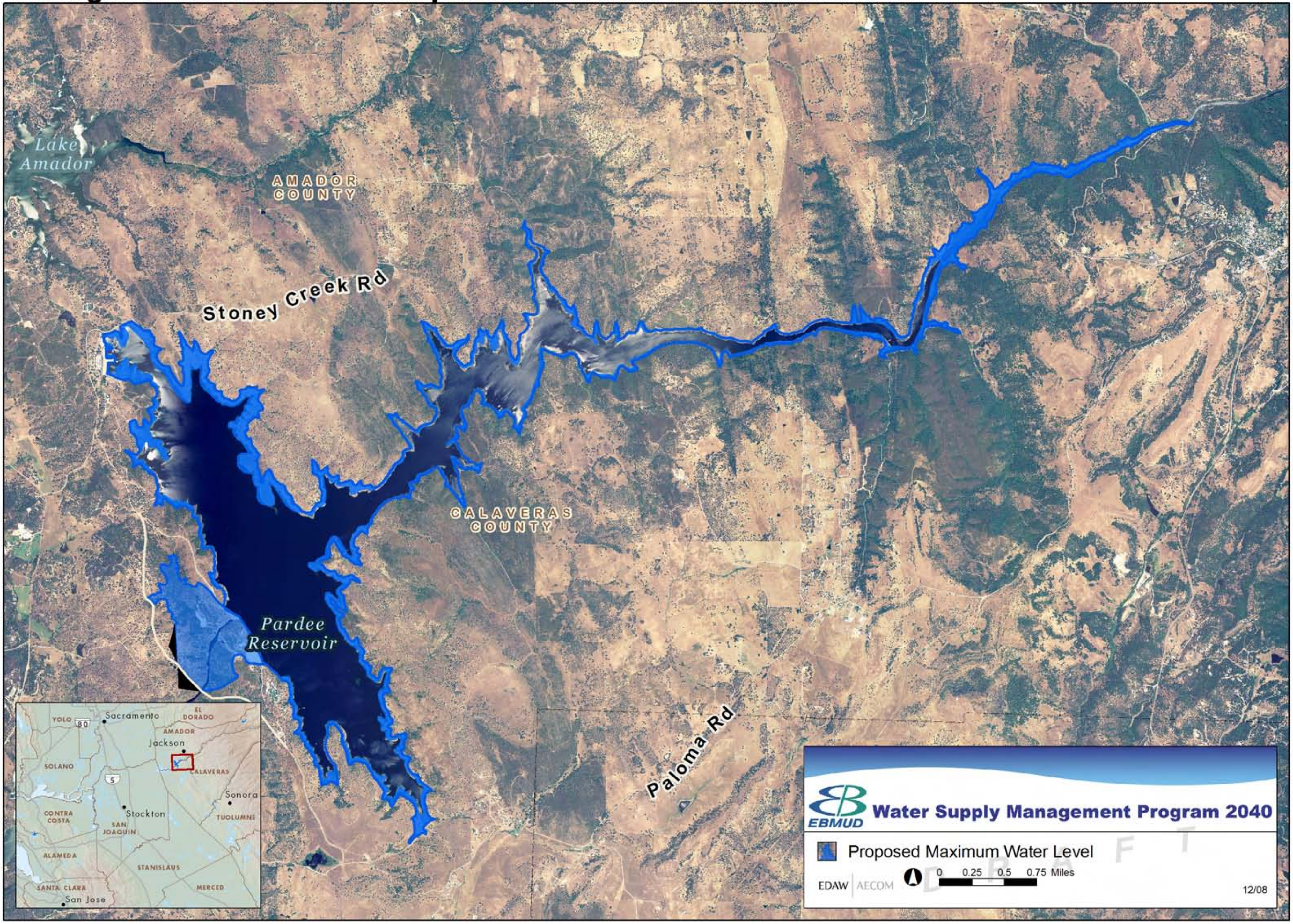
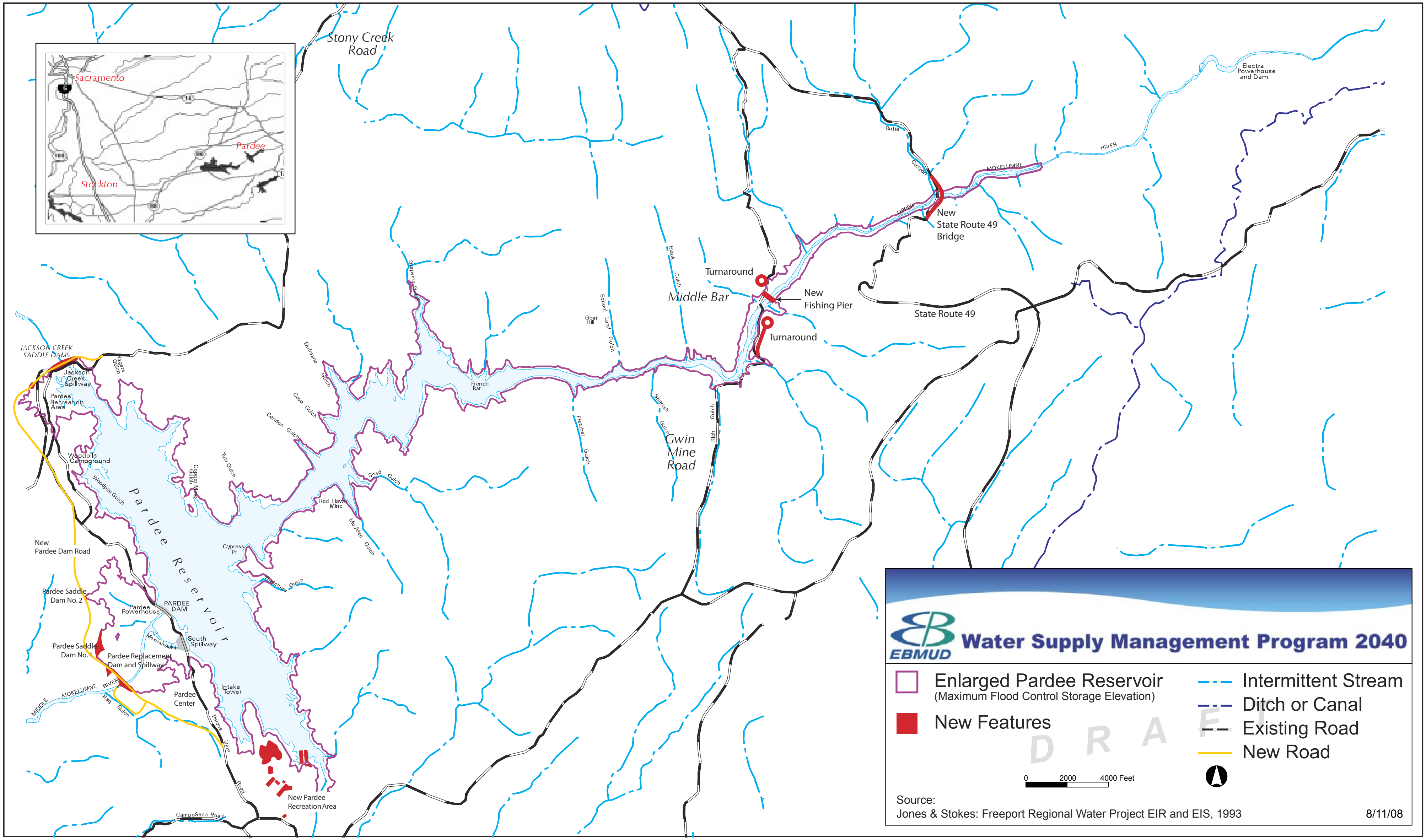


Figure 3-10

Enlarge Pardee Reservoir Component: Location of Proposed Facilities



Operation

During dry years, this component would create an additional 172,000 AF of storage (at flood pool level), or about 51 MGD of water supply in each dry year for up to three dry years in a row. The operation scheme for the enlarged reservoir has not yet been determined and would depend on the engineering design and the participants involved. Figures 3-9 and 3-10 depict inundation above SR 49 which results in a high water level above the Electra Whitewater Run. Operationally, that space would only flood during winter storms, and water levels would be lowered to expose the Electra run in time for rafting. This approach provides interim regulating storage that can be used for regional benefit such as flood control during the wet weather season.

Enlarge Lower Bear Reservoir (Component of Regional Upcountry Project)

The existing Lower Bear Reservoir, owned by PG&E, is located approximately 35 miles northeast of Jackson (see Figure 3-11). In conjunction with Upper Bear Reservoir, the two facilities provide water to water agencies and private users in five counties.

A possibility for enlarging Lower Bear Reservoir involves raising the dam by 32 feet to increase surface water storage capacity within the upper Mokelumne watershed. Figure 3-11 shows the increase in inundation area from enlargement of the reservoir. Previous studies by Amador Water Agency suggest that Lower Bear Reservoir would provide 18,300 AF of additional yield (Willard, 2005). For the purposes of this PEIR and the WSMP 2040, it is assumed that EBMUD, as a project partner, might receive approximately 4,500 AF during a wet or normal year and 2,500 AF during a dry year.

When this PEIR was published, EBMUD had entered into a partnering agreement with Amador Water Agency, Calaveras County Water Agency, and San Joaquin County on a feasibility study to review the option of enlarging Lower Bear Reservoir. As part of that effort, more information will be developed regarding potential yield and the possible sharing of yield by project partners. The yield assumed for the WSMP 2040 effort may therefore differ from pending study estimates.

Facilities Required

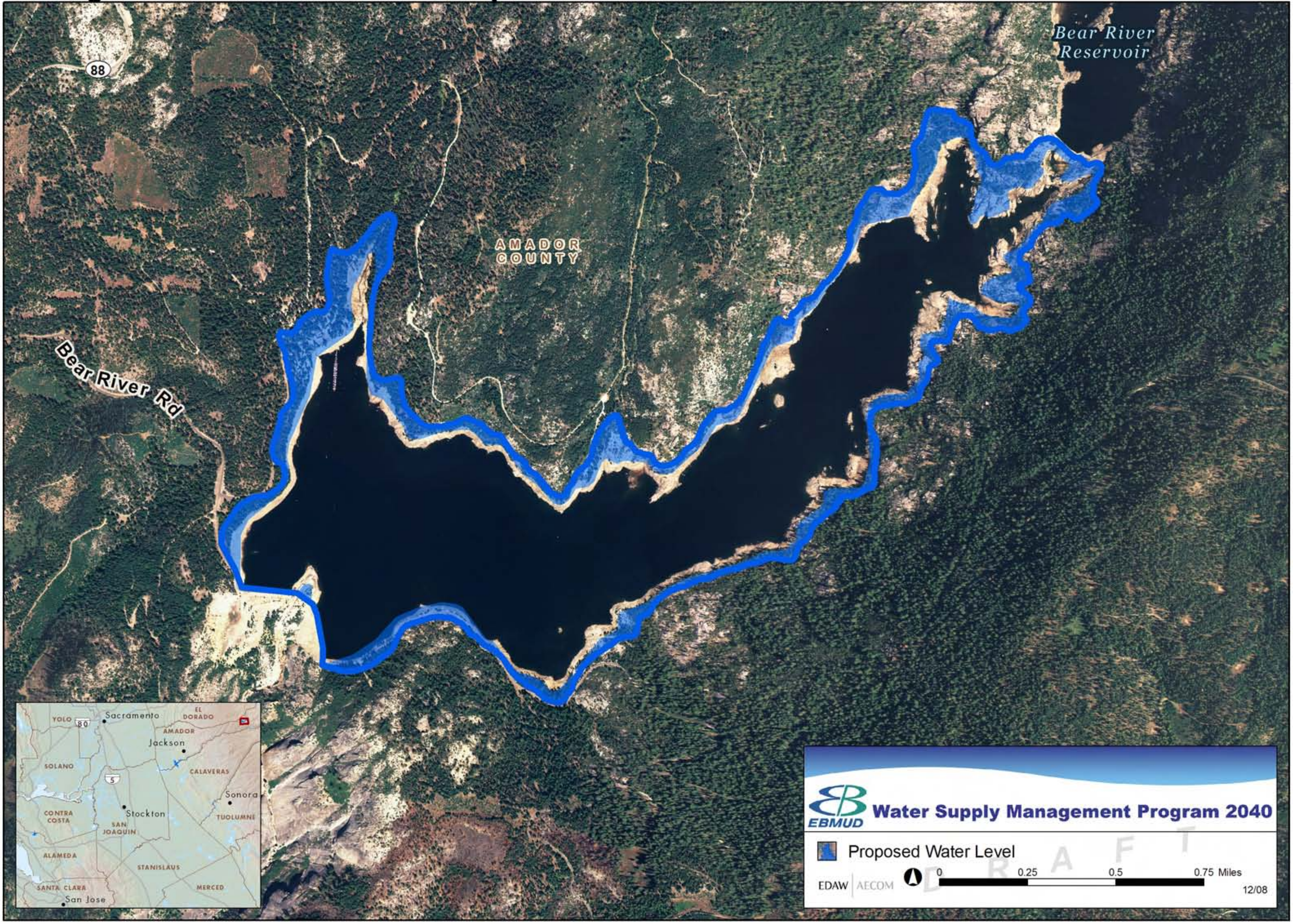
In addition to the modified dam, other facilities to be refurbished or constructed include an upgraded intake structure and spillways, roads and relocation of existing recreation facilities.

Operation

The operation scheme for the enlarged reservoir has not yet been determined and would depend on the engineering design and the participants involved.

Figure 3-11

Enlarge Lower Bear Reservoir Component: Increase in Inundation Area



Mokelumne Inter-Regional Conjunctive Use Project (IRCUP) / San Joaquin Groundwater Banking / Exchange (Component of Regional Upcountry Project)

In late 2006, Mokelumne River Forum[1] (Forum) members began reviewing an option to develop an Inter-Regional Conjunctive Use Project (IRCUP) (see Figure 3-12). The project as conceptualized utilizes the foothill counties' (Amador and Calaveras) Mokelumne River water rights as a source, EBMUD's Mokelumne River facilities as a conveyance mechanism, and San Joaquin County's groundwater basin for storage. At the time that this PEIR was published, Forum members were working to move the IRCUP concept forward so that studies (e.g., feasibility studies, water rights agreements, etc.) could be developed, resulting in a more definitive project configuration.

Surface Water Supply

One or more IRCUP partners would either obtain a new water right, or modify an existing water right, to enable surface water to be diverted from the Mokelumne River and banked in the Eastern San Joaquin Groundwater Basin for later use by one or more of the parties to the IRCUP.

Facilities Required

Under an envisioned use of existing facilities, and through agreements to be established among the parties, existing EBMUD facilities or other facilities would be used to convey Mokelumne River surface water to proposed San Joaquin County groundwater banking facilities.

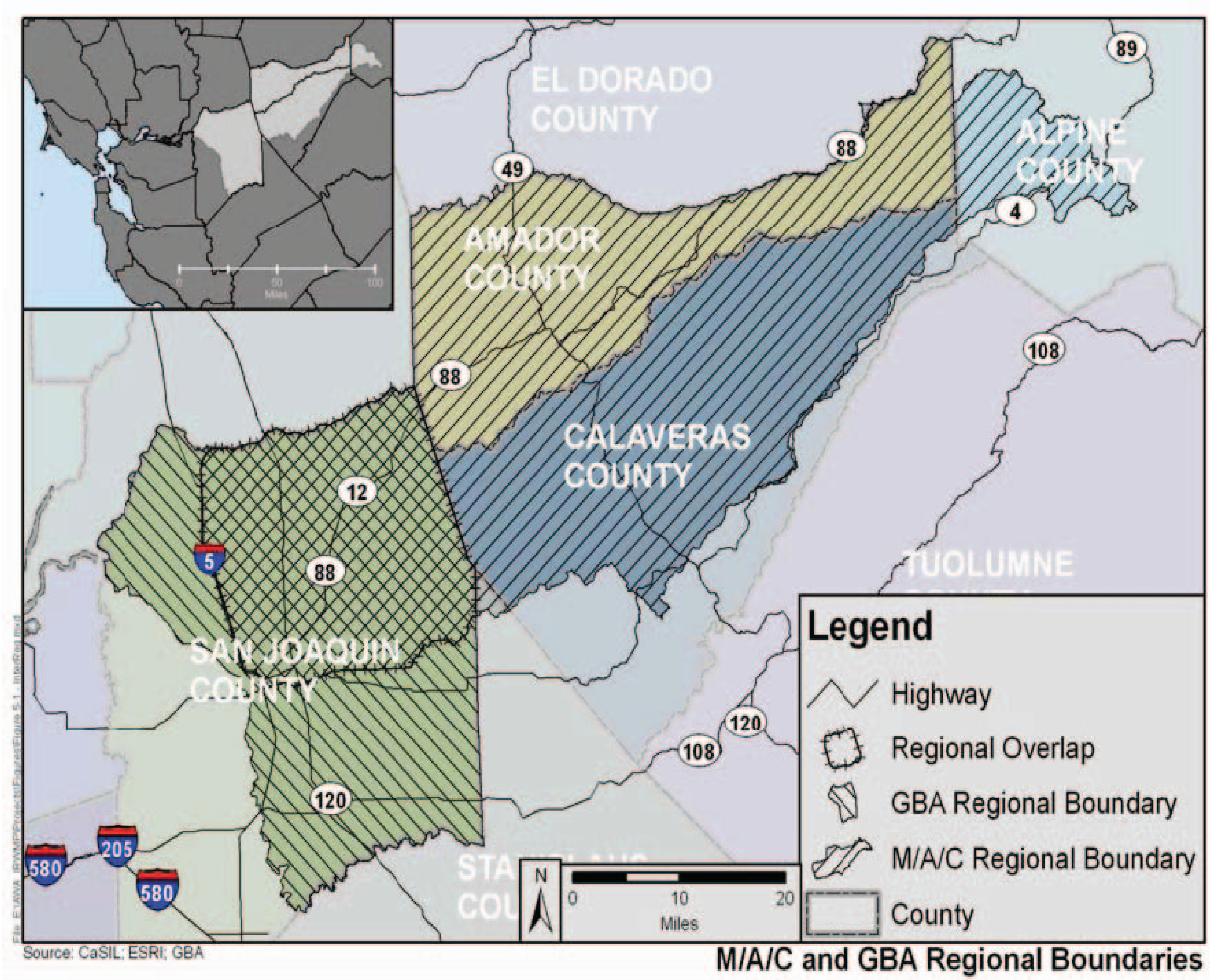
While the project partners could initially rely on EBMUD's existing facilities to exchange the banked water to Amador and Calaveras counties, the following new facilities are assumed to be required for the project:

- A new Intertie with EBMUD's Mokelumne Aqueduct;
- A new pump station and pipeline from EBMUD's Mokelumne Aqueducts to the new well fields and/or recharge ponds; and
- Upcountry pre-treatment (assumed for PEIR purposes to be located west of Camanche Reservoir (see Figure 3-5)) to treat recovered groundwater for blending with Mokelumne raw water.

[1] EBMUD, along with twelve other public agencies interested in Mokelumne River water resources, signed a Memorandum of Understanding with the California Department of Water Resources in June 2005 to work cooperatively to improve regional water supplies. The other signatories to the Mokelumne River Forum are Alpine County, Amador Water Agency, Amador County, Calaveras County Water District, Calaveras Public Utility District, City of Lodi, City of Stockton, Jackson Valley Irrigation District, North San Joaquin Water Conservation District, San Joaquin County Flood Control & Water Conservation District, Stockton East Water District, and Woodbridge Irrigation District.

Figure 3-12

IRCUP & San Joaquin Groundwater Banking / Exchange Location Map



Operation

Groundwater Recharge and Storage. Under one IRCUP scenario as described above, a portion of the Mokelumne River supply would be conveyed through the facilities for storage and regional use in the Eastern San Joaquin Groundwater Basin. Various in-lieu and direct recharge projects could be used to recharge water in wet years for use in dry years. For conceptual project sizing purposes, it is assumed that groundwater recharge would occur via recharge basin(s) with a total surface area of 137 acres.

Groundwater Extraction. Water stored in the Eastern San Joaquin Groundwater Basin would be extracted for use in dry years via up to 15 extraction wells. Extracted water would be divided for use in the Eastern San Joaquin Groundwater Basin, by foothill agencies in Amador and Calaveras Counties (most likely through in-lieu exchanges), and within the EBMUD service area, via EBMUD's Mokelumne Aqueduct.

3.2.6 Preferred Portfolio Implementation

Figure 3-1 presents the locations of the components under the Preferred Portfolio. The Preferred Portfolio includes rationing, conservation, and recycled water levels and includes certain supplemental supply components listed in Table 3-3 in the "Preferred Portfolio" row.

EBMUD's approach to carrying out the Preferred Portfolio is to develop the supplemental water supply components that are most feasible and environmentally responsible according to the circumstances that arise during the 2010-2040 planning period. As noted previously, many of these circumstances—funding availability, political will and success, legal and institutional hurdles, and resolution of technical issues—cannot be predicted with certainty. The success of one project could result in delaying the need for an additional supplemental supply project over the course of the planning period. Conversely, were a project to encounter a development hurdle that prevents its advancement, an alternative would need to be found. The District's supplemental water project planning response must remain flexible.

For the purposes of this PEIR, EBMUD developed a probable scenario for implementation of the Preferred Portfolio. Table 3-4 summarizes this example scenario and the order that components would be pursued throughout the planning period. Figure 3-13 provides an illustrative diagram of the sequencing. By referencing this one possible scenario, it allows for meaningful comparison of the environmental impacts associated with the Preferred Portfolio to those of the Alternative Portfolios described later in this chapter.

Table 3-3: WSMP 2040 Primary Portfolios

PORTFOLIO DESIGNATION	PORTFOLIO THEMES / EMPHASIS	PORTFOLIO DESCRIPTION	COMPONENTS													
			RATIONING		CONSERVATION		RECYCLED WATER		SUPPLEMENTAL SUPPLY							
			10%	15%	Current Program Equivalent (C)	Current Program Equivalent +2 (D)	Recycled Water Level 2	Recycled Water Level 3	Northern California Water Transfers	Bayside Groundwater Project Phase 2	Sacramento Basin Groundwater Banking / Exchange [a]	Regional Desalination	Enlarge Pardee Reservoir	Enlarge Lower Bear Reservoir	IRCUP / San Joaquin Groundwater Banking / Exchange [b]	Buckhorn Canyon Reservoir
			22 MGD	32 MGD	UP TO 37 MGD	UP TO 39 MGD	UP TO 5 MGD	UP TO 11 MGD	UP TO 4.5-28.5 MGD	UP TO 9 MGD	UP TO 4.2 MGD	UP TO 20 MGD	UP TO 51.2 MGD	UP TO 2.2 MGD	UP TO 17.4 MGD	UP TO 42 MGD
Preferred Portfolio		Maximum Flexibility	●			●		●	●	●	●	●	●	●	●	
A	Groundwater/ Conjunctive Use & Water Transfers	Groundwater storage / recharge in multiple locations	●			●	●		●	●	●				●	
B	Regional Partnerships	All partnership projects & conservation	●		●		●		●		●	●		●	●	
C	Local System Reliance	West of delta surface storage		●	●		●									●
D	Lower Carbon Footprint	Pardee Reservoir enlargement & conservation		●	●		●						●			
E	Recycled Water & Water Transfers	Highest recycled water level	●		●			●	●	●	●					

Notes: [a] Sacramento Basin Groundwater Banking / Exchange component must be coupled with a transfer water component.
[b] IRCUP includes San Joaquin Groundwater Banking / Exchange.

Table 3-4: Preferred Portfolio Component Sequencing

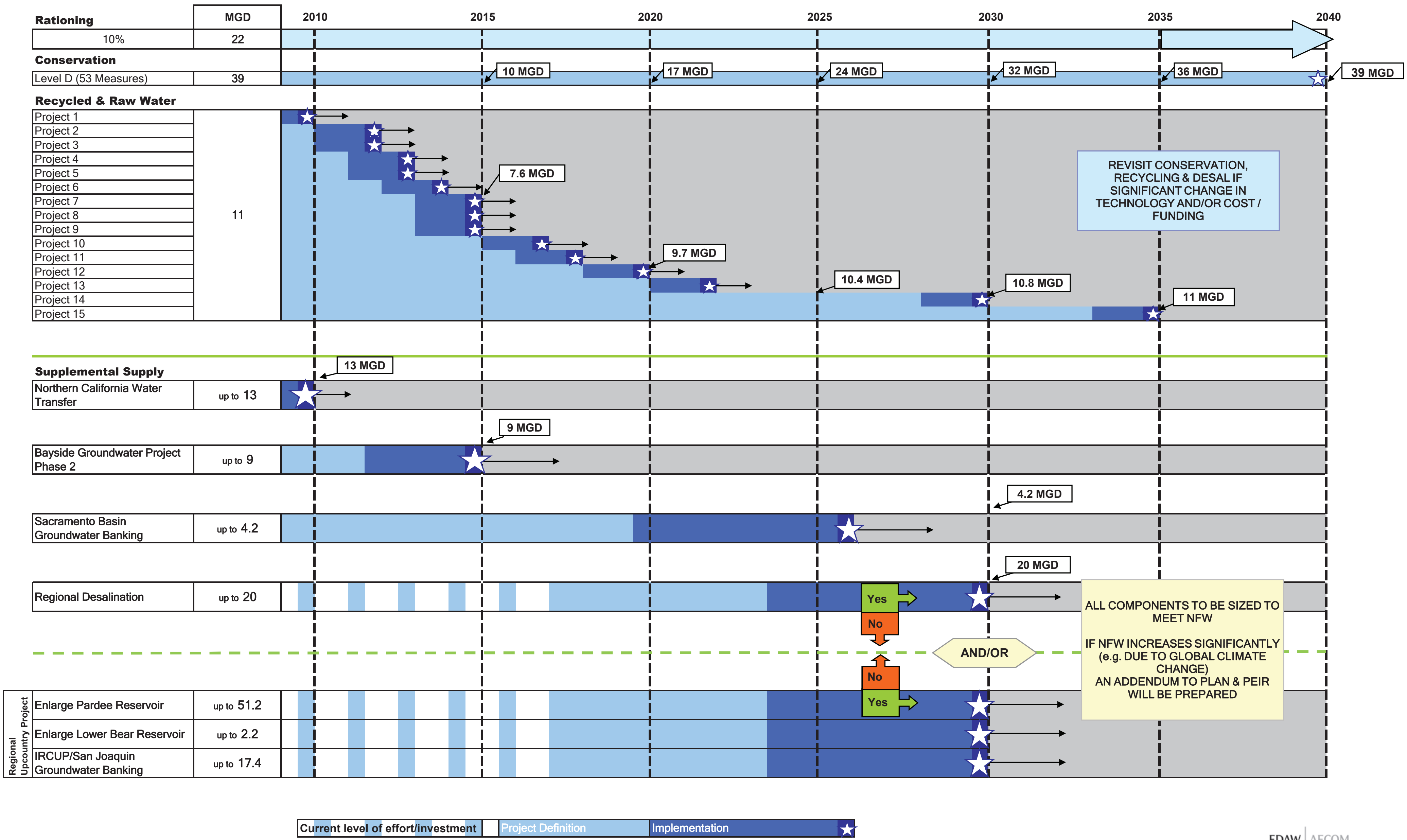
COMPONENT	SEQUENCING COMMENTS
10% Rationing	Impose as needed throughout the planning period.[a]
Conservation Level D (39 MGD)	Pursue throughout the planning period beginning in 2010.
Recycled Water Level 3 (11 MGD)	Pursue throughout the planning period.
Northern California Water Transfers	Pursue beginning in 2010. Used as needed to meet the Need for Water as other supplemental supply projects are being developed.
Bayside Groundwater Project Phase 2	Pursue simultaneously with Sacramento Basin Groundwater Banking / Exchange beginning in 2010.
Sacramento Basin Groundwater Banking / Exchange	Pursue simultaneously with Bayside Groundwater Project Phase 2 beginning in 2010.
Regional Desalination	Pursue simultaneously with regional Upcountry supplemental supply components beginning in 2015.[b]
Enlarge Pardee Reservoir	Pursued simultaneously with Regional Desalination beginning in 2015.[b]
Enlarge Lower Bear Reservoir	
IRCUP / San Joaquin Groundwater Banking / Exchange	

[a] As explained in Section 2.3 of this PEIR, the Preferred Portfolio establishes a 10 percent drought rationing policy. As a practical matter, however, EBMUD will be unable to reduce rationing to 10 percent until it develops additional dry-year supplemental water supplies.
[b] Note that only Regional Desalination <u>or</u> a combination of Upcountry projects would be implemented.

Under the example implementation scenario, EBMUD would secure short-term Northern California Water Transfers early in the planning period to allow adequate time for conservation, recycled water, and other supplemental supply components to be developed. The example scenario assumes that Bayside Groundwater Project Phase 2 would be completed by 2015 and the Sacramento Basin Groundwater Banking / Exchange project would be completed by 2026. The focus would also shift from a need to secure short-term water transfers to one aimed at securing long-term transfers (transfers that would either serve to meet acute needs as based on water year as well as transfers aimed at supplying water for storage in the Sacramento Basin). By 2030, <u>either</u> Regional Desalination <u>or</u> a combination of Upcountry projects (Enlarge Pardee Reservoir, Enlarge Lower Bear Reservoir, and IRCUP / San Joaquin Groundwater Banking / Exchange) would then be required to meet the projected Need for Water. If the Need for Water changes substantially from the 2040 demand portrayed in this document, <u>both</u> Regional Desalination <u>and</u> a combination of Upcountry projects might be required to meet the Need for Water, and additional environmental documentation would be prepared.

Overall, at any given time between now and 2040, the current and future water demands (as projected by WSMP 2040) and as influenced by conditions occurring at the time (if, for example, the District were to begin to feel the impacts of long term climate change) would weigh into the scenario implementation strategy.

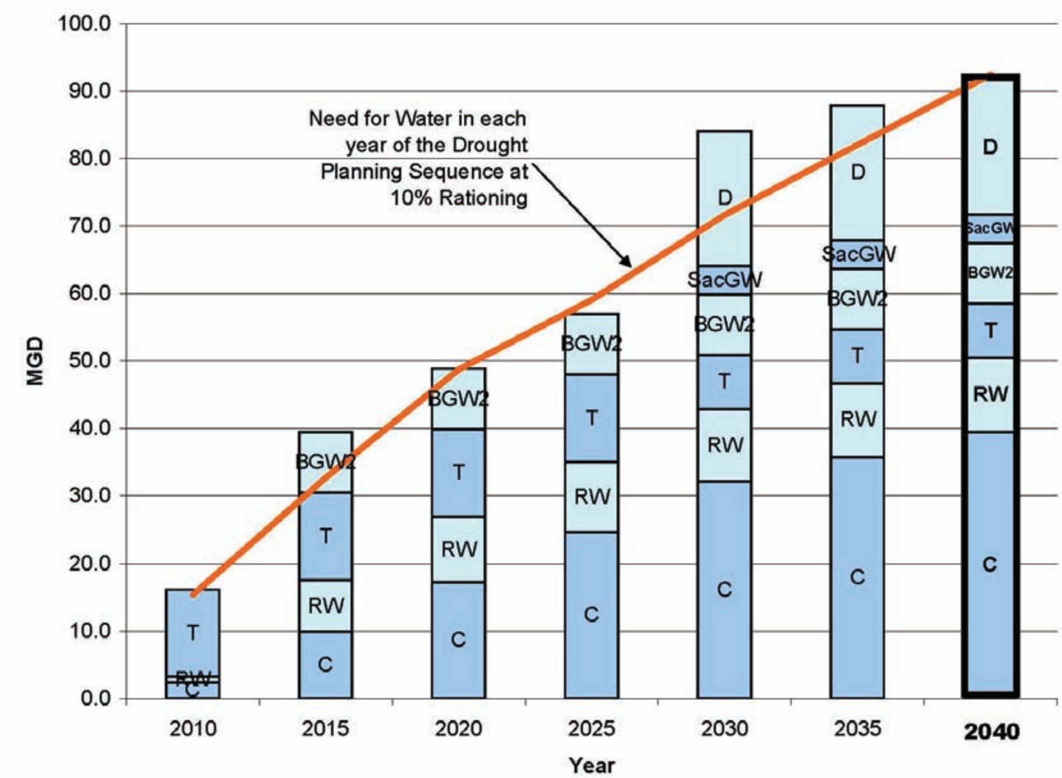
Figure 3-13
Preferred Porfolio: Example Scenario



3.2.7 Modeling of the Preferred Portfolio

As part of the WSMP 2040 planning process, each portfolio was tested using a water supply model to determine operational feasibility, whether the portfolio delivered the needed volume of water over the Program planning period (2010-2040), the frequency and severity of required rationing, and the length of standby storage provided.

The Preferred Portfolio would meet the Need for Water in all years, with necessary components coming online in a stepwise fashion, similar to that as described in the example implementation scenario. Figure 3-14 depicts the year that each component would start operating; however, the first year that each project would actually deliver water to EBMUD may occur later for some components. For example, groundwater banking and exchange projects located in certain basins may require several wet years to fill before they can be used as a water supply source.



Key: C = Conservation RW = Recycled Water T = Transfer Sac GW = Sacramento Groundwater BGW2 = Bayside Groundwater Project Phase 2 D = Regional Desalination

Figure 3-14 The Preferred Portfolio Meets the Need for Water over the Planning Period

As stated earlier in this section, EBMUD's approach to implementation of the Preferred Portfolio is to make decisions regarding how and when to phase in certain projects (such as an Upcountry suite of projects that include Enlarge Pardee and Lower Bear Reservoirs, and IRCUP / San Joaquin Groundwater Banking / Exchange) in concert with decisions based on the "phasing" of other projects (such as Regional Desalination). Phasing decisions would be based on a number of considerations including funding availability, political will and success, legal and institutional hurdles, and resolution of technical issues.

Based on the 2040 demand projection, the Preferred Portfolio would provide approximately 202 days (6.7 months) of standby storage from May through October and 209 days (7.0 months) of standby storage from November through April. This portfolio would also provide several opportunities for EBMUD to partner with other local and Upcountry water districts.

3.3 No Project Alternative and Alternative Portfolios

3.3.1 No Project Alternative

CEQA Guidelines Section 15126.6(e)(2) requires that the No Project Alternative represent existing conditions at the time the Notice of Preparation (NOP) is published as well as represent 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. Consistent with CEQA, the No Project Alternative includes reasonably foreseeable projects that have been approved and for which funding has been secured, and that have undergone environmental review or received project approvals.

The No Project Alternative assumes that the current 1993 WSMP continues through the end of its planning period (2020). The 1993 WSMP consists of achieving the water supply specified below:

- Rationing: 25 percent Districtwide;
- Conservation: 35 MGD (22.5 MGD realized by 2008 plus 7.5 MGD realized through natural replacement activity; additional 5 MGD realized through 2020 through funded programs);
- Recycled Water: 14 MGD (9.3 MGD on-line by 2010; additional 4.7 MGD developed by 2020); and
- Supplemental Supply: 55.1 MGD (50.1 MGD on line by 2010 including FRWP and Bayside Groundwater Project Phase 1; 5 MGD additional capacity completed by 2020).

Under the No Project Alternative, neither the Preferred Portfolio nor any of the Alternative Portfolios would be implemented. During drought or emergency conditions, EBMUD would not have the use of supplemental water supplies beyond those programs already in progress under the 1993 WSMP. If future-year demand projections as described in this PEIR are realized, and if a multiple-year drought occurs, then the risk of mandatory water rationing would be high. Were droughts to mimic (or be worse than) those historically seen in the 1970s and early 1990s, then the need to ration at a greater than 25 percent level would be likely.

As illustrated in Figure 3-14, which displays customer rationing limited to 10 percent, EBMUD would be short of water as early as 2010, as shown by the need for a water transfer. Under EBMUD's current policy of limiting customer rationing to 25 percent, there would not be a Need for Water until 2015. If future demand is higher than projected, or if the District's current water supply is reduced by one or more factors, EBMUD would face water reliability concerns.

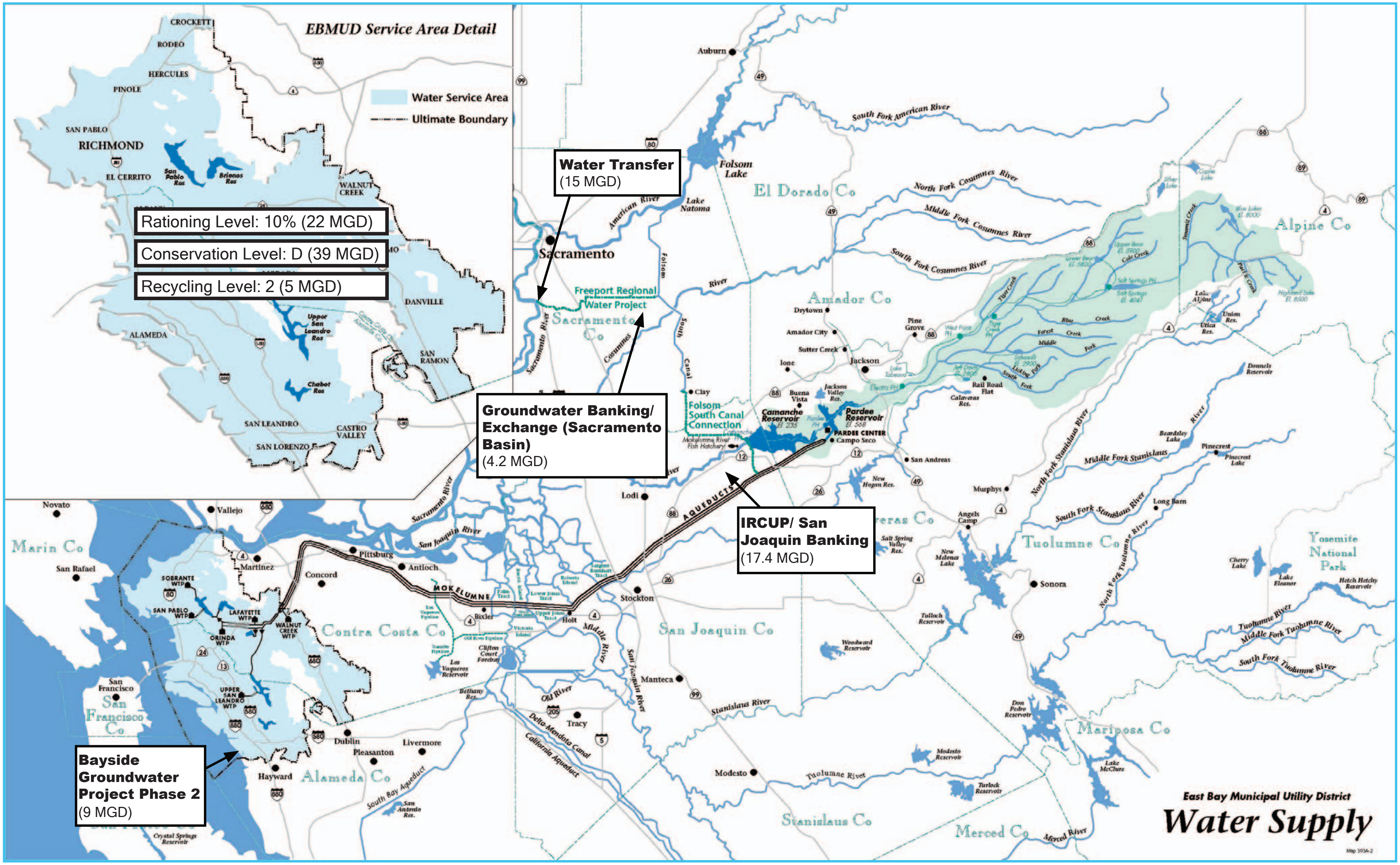
3.3.2 Portfolio A: Groundwater/Conjunctive Use and Water Transfers

This portfolio emphasizes water production through water transfers and conjunctive use (groundwater) projects (Figure 3-15). Specifically, three groundwater projects would be combined with 15 MGD of water transfers, 39 MGD of conservation savings, and 5 MGD of recycled water projects. Also, a 10 percent rationing level would be established (see Table 3-5).

Table 3-5: Portfolio A Components

COMPONENT CATEGORY	LEVEL/PROJECTS	COMPONENT YIELD (MGD)
Rationing	10%	22
Conservation	Level D	39
Recycled Water	Level 2	5
Supplemental Supply	Northern California Water Transfers	15
	Bayside Groundwater Project Phase 2	9
	Sacramento Basin Groundwater Banking / Exchange	4.2
	IRCUP / San Joaquin Groundwater Banking / Exchange	17.4

Figure 3-15: Alternative Portfolio A (Groundwater/Conjunctive Use & Water Transfers)



The estimated dates for when the components would be online are shown in Table 3-6. As with the Preferred Portfolio, while it appears on paper that excess water production capacity could be available in some years before it is needed to meet the Need for Water (Figure 3-16), this may not turn out to be the case. For example, the long lead time necessary to develop the Sacramento Basin Groundwater Banking / Exchange component (needed at the very end of the 2040 planning horizon) requires bringing the facility online 10 years earlier. Yet during the bulk of those years the project may be operated more in a storage mode rather than a withdrawal / extraction mode. Likewise, full utilization of San Joaquin area groundwater resources in 2040 requires initiation of that project in 2025 (and the operation of that project as well would be used for storage in some years, extraction in others).

Table 3-6: Project Online Dates for Portfolio A to Meet the Need for Water

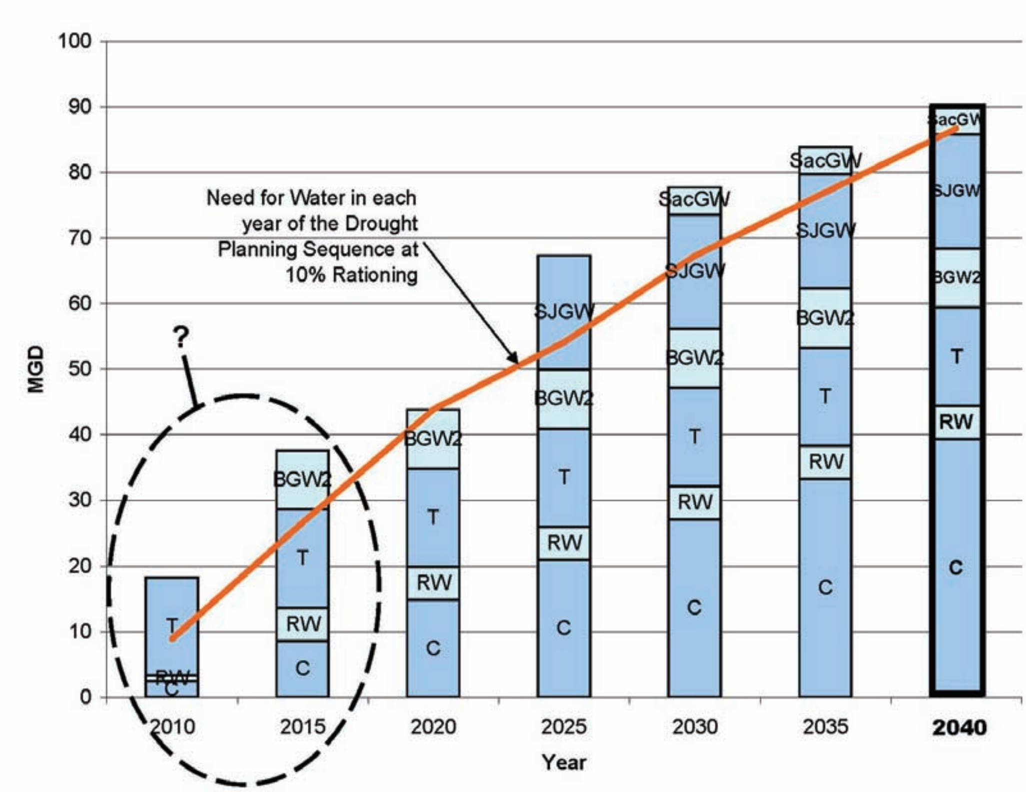
COMPONENT	YEAR ONLINE
10% Rationing	2010[a]
Conservation Level D (39 MGD)	Comes online throughout the 2010-2040 planning period with the full 39 MGD being achieved in 2040
Recycled Water Level 2 (5 MGD)	Achieved by 2015
Northern California Water Transfers	2010
Bayside Groundwater Project Phase 2	2013
Sacramento Basin Groundwater Banking / Exchange	2027
IRCUP / San Joaquin Groundwater Banking / Exchange	2022

[a] As explained in Section 2.3 of this PEIR, the Preferred Portfolio establishes a 10 percent drought rationing policy. As a practical matter, however, EBMUD will be unable to reduce rationing to 10 percent until it develops additional dry-year supplemental water supplies.

Portfolio A places heavy reliance on overcoming all obstacles to implement groundwater storage and recovery and repeated success in securing water transfers. Transfers need to be in place as early as 2010 (see the “question mark” indicator as provided in Figure 3-16). While this is the same risk as for the Preferred Portfolio, Portfolio A does not include any other supplemental supplies upon which to draw.

3.3.3 Portfolio B: Regional Partnerships

Portfolio B consists of 37 MGD of conservation, 5 MGD of recycled water, a small water transfer, 10 percent rationing, and is uniquely characterized by its use of available partnership projects: a mix of groundwater projects, regional desalination, and enlargement of Lower Bear Reservoir (see Figure 3-17 and Table 3-7). The emphasis on regional partnerships increases the chance of success for large projects (such as regional desalination) that could otherwise prove to be difficult for any one agency to develop / permit.



Key: C = Conservation RW = Recycled Water T = Transfer SJGW = San Joaquin Groundwater
SacGW = Sacramento Groundwater BGW2 = Bayside Groundwater Project Phase 2

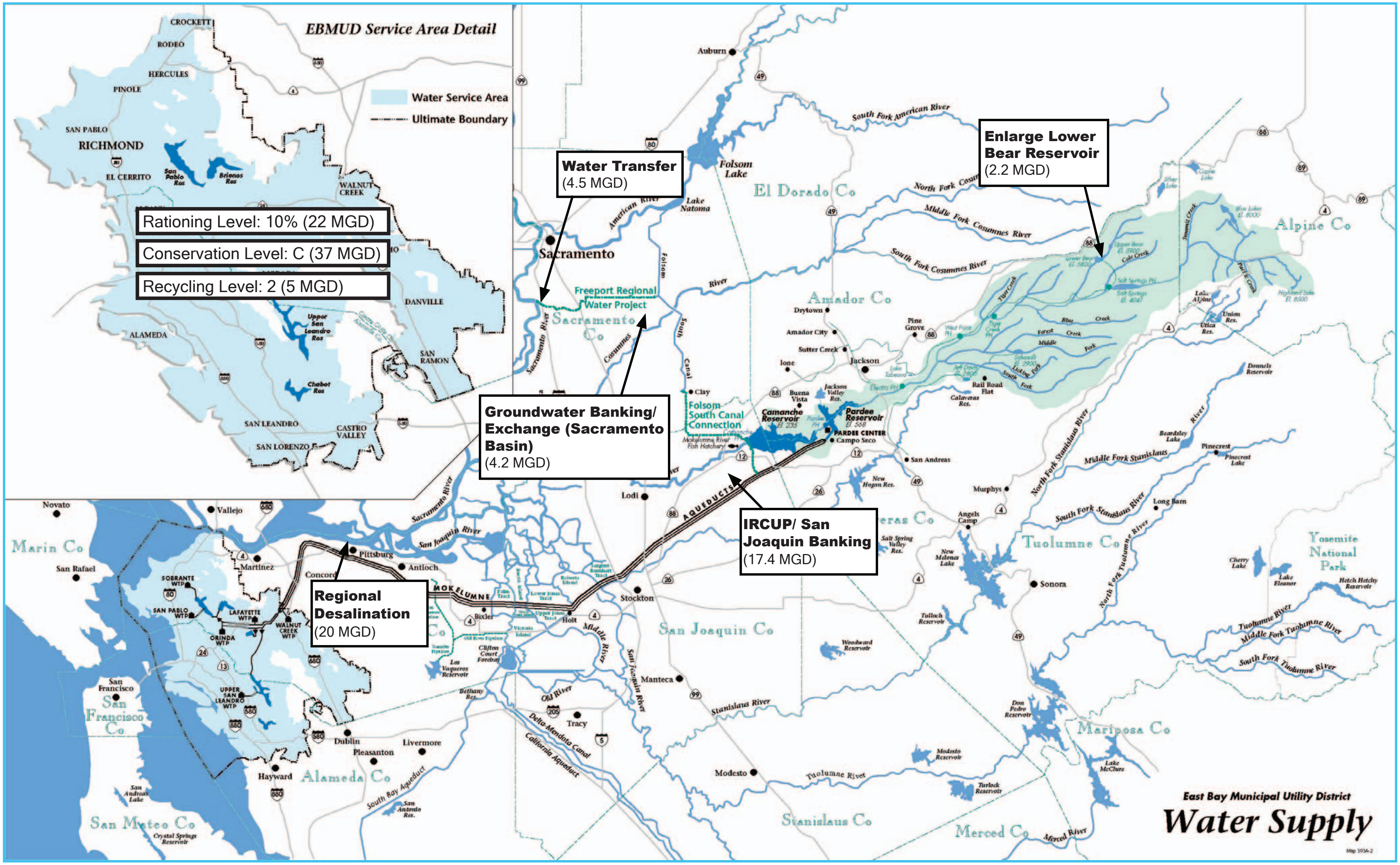
Figure 3-16 Portfolio A – Implementation Scenario

Table 3-7: Portfolio B Components

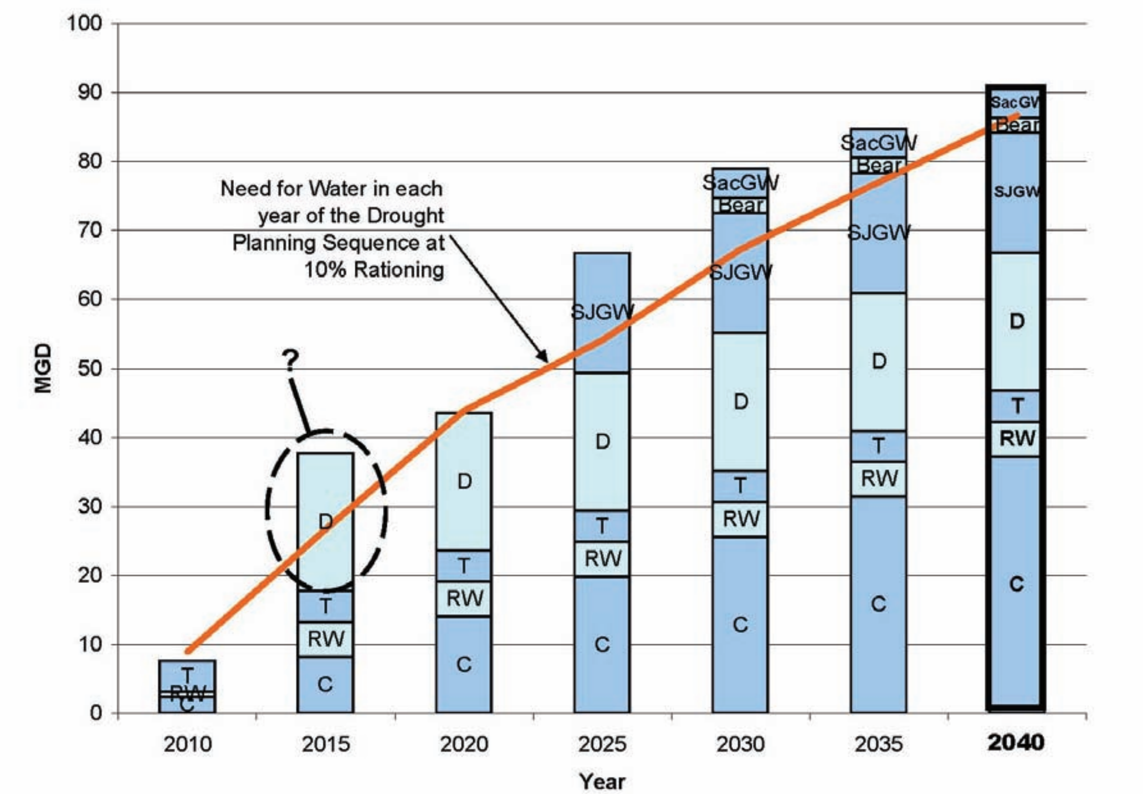
COMPONENT CATEGORY	LEVEL/PROJECTS	COMPONENT YIELD (MGD)
Rationing	10%	22
Conservation	Level C	37
Recycled Water	Level 2	5
Supplemental Supply	Northern California Water Transfers	4.5
	Sacramento Basin Groundwater Banking / Exchange	4.2
	Regional Desalination	20
	Enlarge Lower Bear Reservoir	2.2
	IRCUP / San Joaquin Groundwater Banking / Exchange	17.4

Water Supply Management Program 2040

Figure 3-17: Alternative Portfolio B (Regional Partnerships)



In Figure 3-18, it may appear that more water would be available in later years than is needed to meet the Need for Water, and that the Sacramento Basin Groundwater Banking / Exchange component is not needed to meet the Need for Water in all years. However, as with the Preferred Portfolio, the approach is necessary to account for long project lead time coupled with the operational characteristics of the conjunctive use elements.



Key: T = Transfer C = Conservation RW = Recycled Water SJGW = San Joaquin Groundwater SacGW = Sacramento Groundwater D = Regional Desalination Bear = Enlarge Lower Bear Reservoir

Figure 3-18 Portfolio B - Implementation Scenario

Again, the approach is to develop the supplemental water supply components that are most feasible according to the circumstances that arise during the 2010-2040 planning period. As an implementation scheduling example (beyond the conjunctive use elements discussed previously), note that although the Regional Desalination component has the capacity to provide excess water for about 5 years (until it is needed in full to meet the Need for Water in 2020), at least 10 MGD needs to be online by 2015 to avoid a shortfall in that given water year. In that particular case, to guard against potential growth-inducing effects of short-term surplus water supply, EBMUD would match the use of Regional Desalination to the Need for Water in a given year.

In a similar manner, the Enlarge Lower Bear Reservoir component is needed to meet the 2040 level of demand, but modeling indicates it is required by year 2027 to meet a short-term need for water until conservation can be fully implemented and the IRCUP / San Joaquin Groundwater Banking / Exchange component is functional (Table 3-8). As a fall-back option, a short-term water transfer in 2027 could be used to provide an equivalent amount of water in place of the Enlarge Lower Bear Reservoir component.

Table 3-8: Project Online Dates for Portfolio B to Meet the Need for Water

COMPONENT	YEAR ONLINE
10% Rationing	2010[a]
Conservation Level C (37 MGD)	Comes online throughout the 2010-2040 planning period with the full 37 MGD being achieved in 2040
Recycled Water Level 2 (5 MGD)	Achieved by 2015
Northern California Water Transfers	2010
Sacramento Basin Groundwater Banking / Exchange	2029
Regional Desalination	2012
Enlarge Lower Bear Reservoir	2027
IRCUP / San Joaquin Groundwater Banking / Exchange	2022

[a] As explained in Section 2.3 of this PEIR, the Preferred Portfolio establishes a 10 percent drought rationing policy. As a practical matter, however, EBMUD will be unable to reduce rationing to 10 percent until it develops additional dry-year supplemental water supplies.

Portfolio B would provide additional dry-year water availability on the west side of the Delta through use of the Regional Desalination component. Although the Regional Desalination component would use the Mokelumne Aqueducts to transport water to the East Bay Terminal Reservoirs and treatment plants, it would connect with the aqueducts west of the Delta and is therefore less likely to be affected by Delta failure. This component would contribute to the District's ability to meet the 6-month local storage criterion.

A major weakness of Portfolio B is that heavy reliance is placed on a Regional Desalination project being permitted, built and online by 2015 (see question mark in Figure 3-18). There are currently significant challenges to successfully implementing a large regional desalination project in California, particularly one that could potentially be sited in the Delta. EBMUD views that a more realistic timeframe for implementation may be 2030. This is assumed in the Preferred Portfolio.

3.3.4 Portfolio C: Local System Reliance

Portfolio C emphasizes reliance upon a new increment of water storage in the EBMUD service area. By locating new storage capacity west of the Delta, EBMUD would strive to lessen the impact of a prolonged interruption of its Sierra supply that would result from damage to the aqueduct system from floods, levee failures or earthquakes. This portfolio consists of a 15 percent rationing level, 37 MGD of conservation, 5 MGD of recycled water, and a single supplemental supply project: development of Buckhorn Canyon Reservoir (see Table 3-9).

Table 3-9: Portfolio C Components

COMPONENT CATEGORY	LEVEL/PROJECTS	COMPONENT YIELD (MGD)
Rationing	15%	32
Conservation	Level C	37
Recycled Water	Level 2	5
Supplemental Supply	Buckhorn Canyon Reservoir	42

This component would involve constructing an earth fill dam, creating what EBMUD refers to as a “terminal” reservoir at Buckhorn Canyon, north of the Castro Valley community, about one-eighth mile up the eastern arm of EBMUD’s Upper San Leandro (USL) Reservoir (see Figure 3-19). The capacity of a new reservoir in Buckhorn Canyon (similar in layout and concept to a project as originally conceived in the 1980s) is 143,000 AF. Figure 3-20 shows the inundation area of the new reservoir. In addition to the new dam, facilities needed would include a 5,100 horsepower pumping plant, a 6,200-foot tunnel and 23,000-foot pipeline.

The reservoir would be filled with water pumped through the Moraga Aqueduct during times when aqueduct capacity is available. Raw water stored in Buckhorn Canyon Reservoir would flow via gravity either to the Sobrante Water Treatment Plant (WTP) or the Upper San Leandro WTP. The reservoir would be operated continuously during times of drought, and would provide up to 43 MGD in each dry year, for up to three consecutive dry years.

The estimated dates when the components would be online are shown in Table 3-10. If drought conditions were to occur between years 2011 and 2019, before the projected in-service date for Buckhorn Canyon Reservoir, a temporary shortfall would be met by rationing at a maximum of 25 percent Districtwide.

Table 3-10: Project Online Dates for Portfolio C to Meet the Need for Water

COMPONENT	YEAR ONLINE
15% Rationing	2010[a]
Conservation Level C (37 MGD)	Comes online throughout the 2010-2040 planning period with the full 37 MGD being achieved in 2040
Recycled Water Level 2 (5 MGD)	Achieved by 2015
Buckhorn Canyon Reservoir	2020

[a] As a practical matter, EBMUD will be unable to reduce rationing to 15 percent until it develops additional dry-year supplemental water supplies.

Figure 3-19: Alternative Portfolio C (Local System Reliance)

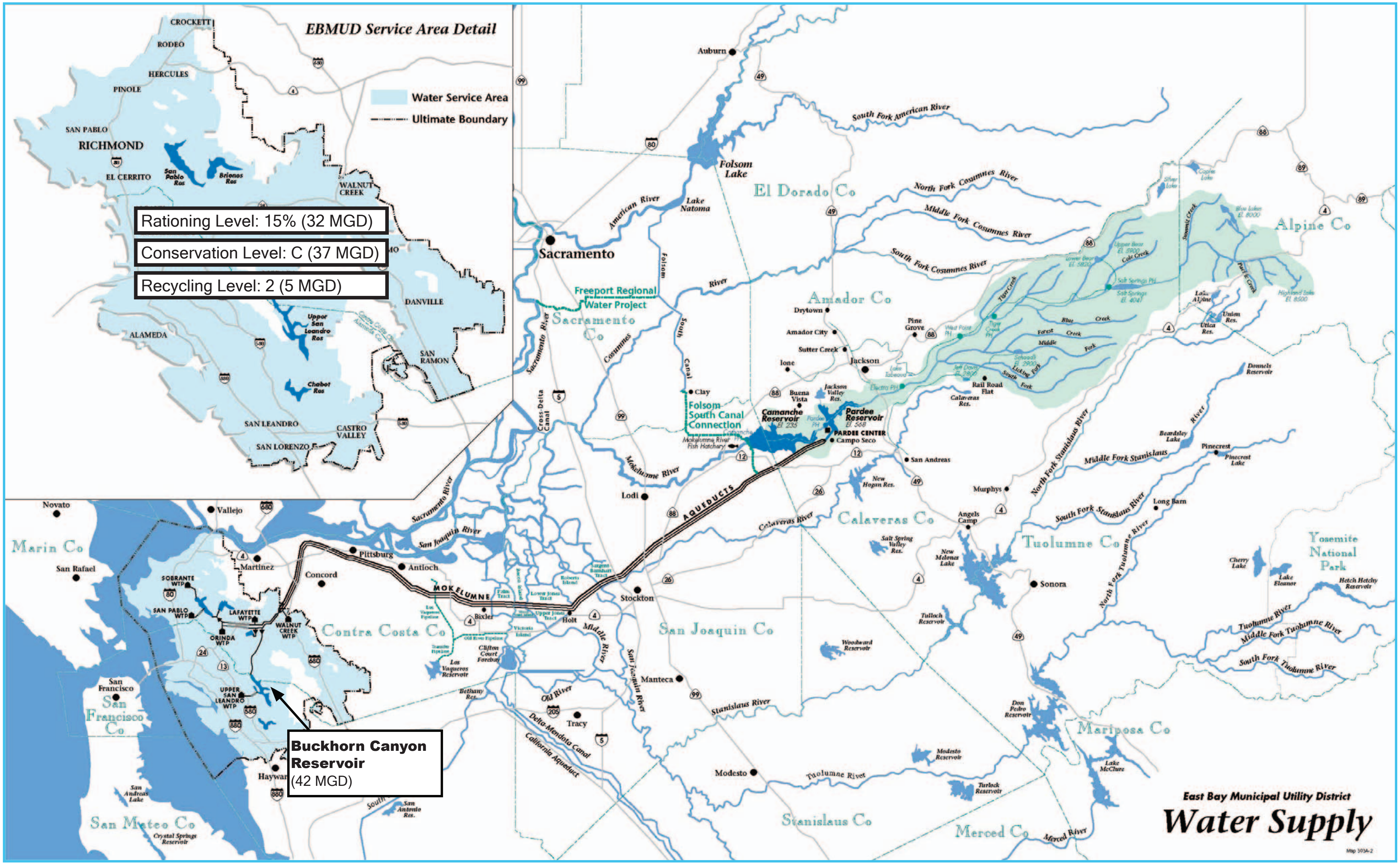


Figure 3-20

Buckhorn Canyon Reservoir Component Location: Inundation Area

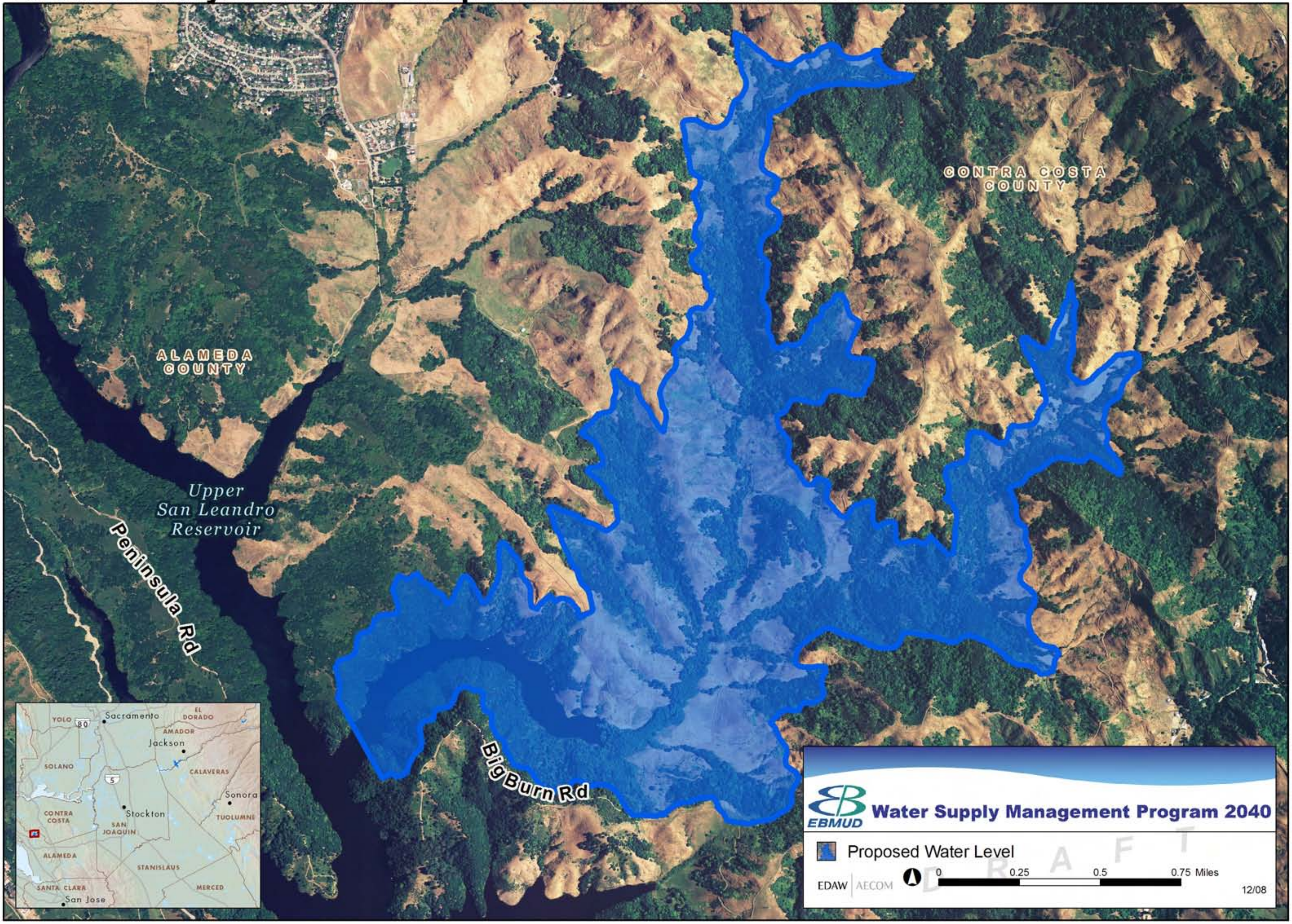
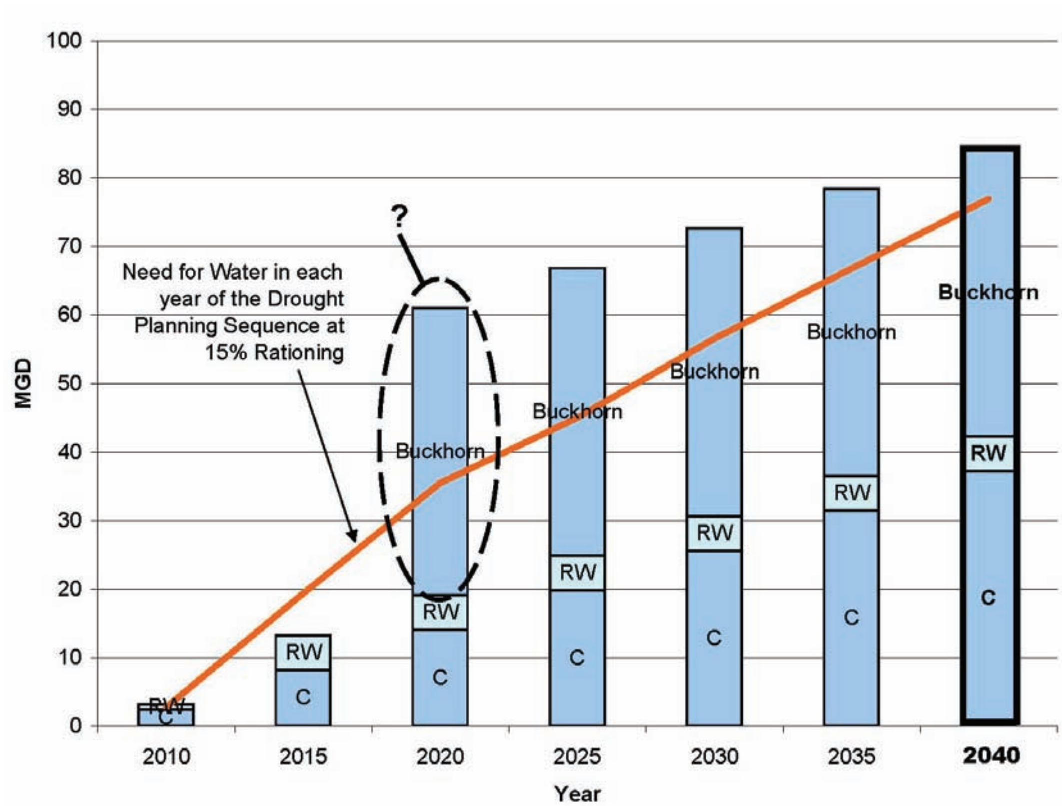


Figure 3-21 shows that with Buckhorn Canyon Reservoir in place, surplus water exceeds the Need for Water. However, the graphic depicts a best-case condition. Depending on the hydrologic circumstances, it may take several years to fill the new reservoir. Until it is filled, it could not be fully operational. The capacity of Buckhorn Canyon Reservoir is defined in large measure by the geologic formation of the canyon and engineering considerations that restrict the dam's location. Moreover, the Buckhorn Canyon Reservoir component cannot be phased. Portfolio C would extend EBMUD's standby storage capacity to about one year, and would locate a significant portion of that storage away from the vulnerabilities of the Delta.



Key: C = Conservation RW = Recycled Water Buckhorn = Buckhorn Canyon Reservoir

Figure 3-21 Portfolio C - Implementation Scenario

As noted earlier, the original planning for Buckhorn Canyon Reservoir began in the 1980s, as one of a number of responses to the drought of 1976-1977. EBMUD staff present during that time recall public opposition to the Buckhorn proposal, with environmentalists citing concerns about the potential to harm the habitat / species located within and adjacent to the proposed site. Others viewed that were it to be constructed, it may serve to encourage growth in the San Ramon Valley. "The Buckhorn project [became] a rallying point for environmentalists during the 1990 EBMUD board elections."[2] Although the project was narrowly approved in an advisory ballot measure, the EBMUD Board declined to pursue the project.[3]

It should be noted that Portfolio C scored very high from an operations and economic viewpoint, primarily related to the inclusion of the Buckhorn Canyon Reservoir component (see Table 3-16 at the end of this chapter). Previous efforts by EBMUD to permit Buckhorn Canyon Reservoir were defeated in a referendum election in the early 1990s. Community and environmental interest groups also expressed opposition to Buckhorn Canyon Reservoir development during the WSMP 2040 PEIR scoping process. While this project is discussed in more detail in Chapter 6, it was acknowledged during the Preferred Portfolio development process that even if community concerns about the project could be satisfied, a long and complex process would likely be needed to obtain the necessary permits.

A potential shortfall with this portfolio as compared with others is that it would be hard to find means by which other agencies beyond EBMUD could partner in its operation. Portfolio C places total reliance on getting Buckhorn Canyon Reservoir permitted, constructed, and filled by 2020 (see question mark on Figure 3-21).

3.3.5 Portfolio D: Lower Carbon Footprint

Portfolio D seeks to reduce energy consumption and greenhouse gas emissions by increasing the hydroelectricity generation capacity at Pardee Powerhouse. In addition, Portfolio D would substantially reduce dry-year water demand by setting a 15 percent (32 MGD) Districtwide rationing level. This portfolio would include 37 MGD of conservation, 5 MGD of recycled water, enlargement of Pardee Reservoir, and implementation of Bayside Groundwater Project Phase 2 (see Figure 3-22 and Table 3-11). The estimated dates for when the components would be online are shown in Table 3-12.

Table 3-11: Portfolio D Components

COMPONENT CATEGORY	LEVEL/PROJECTS	COMPONENT YIELD (MGD)
Rationing	15%	32
Conservation	Level C	37
Recycled Water	Level 2	5
Supplemental Supply	Bayside Groundwater Project Phase 2	9
	Enlarge Pardee Reservoir	51.2

[2] *Its Name was M.U.D. A Story of Water.* John Wesley Noble, ed., East Bay Municipal Utility District, 1999. p. 239.
[3] *Ibid.,* p. 245.

EBMUD Water Supply Management Program 2040

3-22: Alternative Portfolio D (Lower Carbon Footprint)

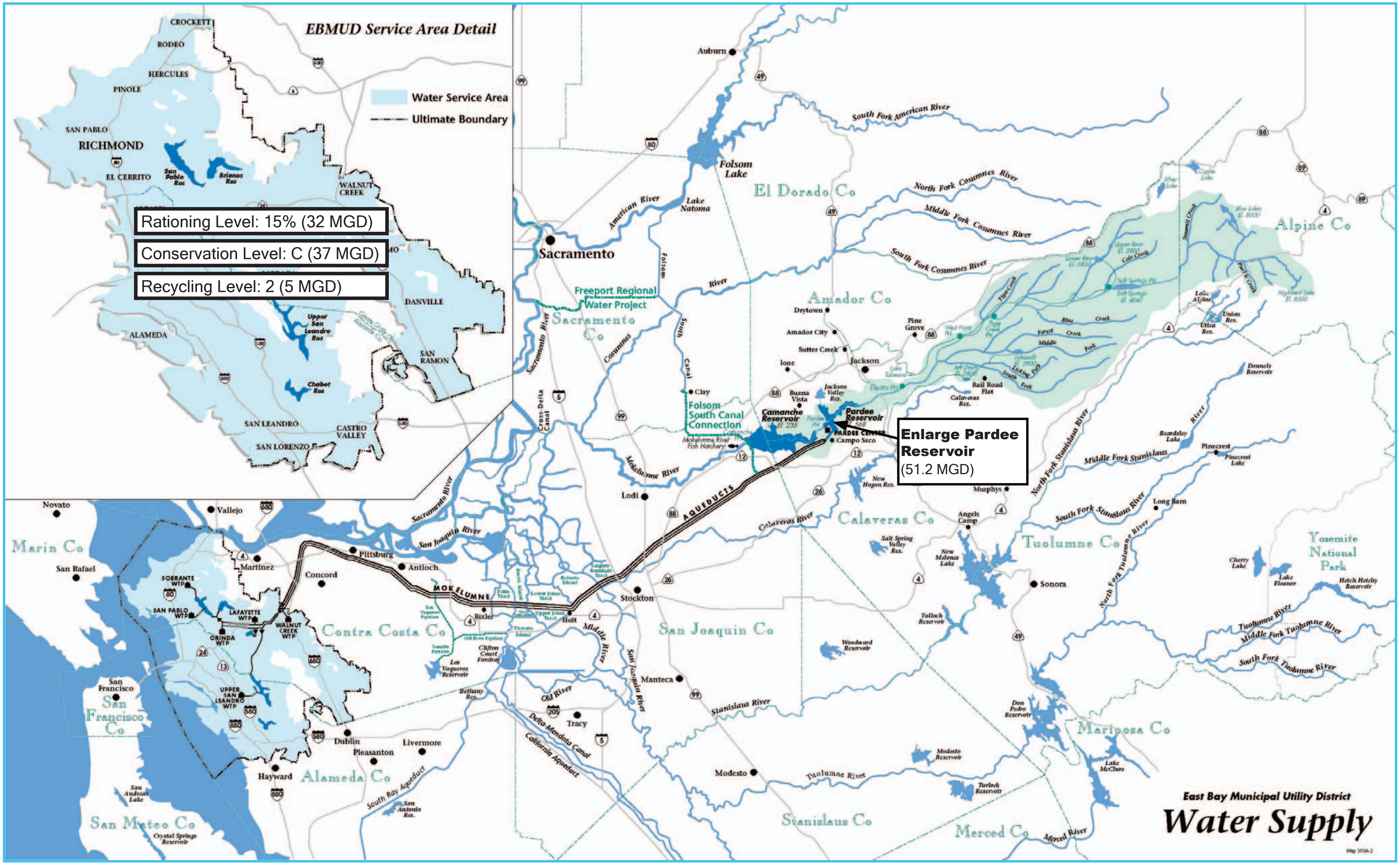


Table 3-12: Project Online Dates for Portfolio D to Meet the Need for Water

COMPONENT	YEAR ONLINE
15% Rationing	2010[a]
Conservation Level C (37 MGD)	Comes online throughout the 2010-2040 planning period with the full 37 MGD being achieved in 2040
Recycled Water Level 2 (5 MGD)	Achieved by 2015
Bayside Groundwater Project Phase 2	2014
Enlarge Pardee Reservoir	2020

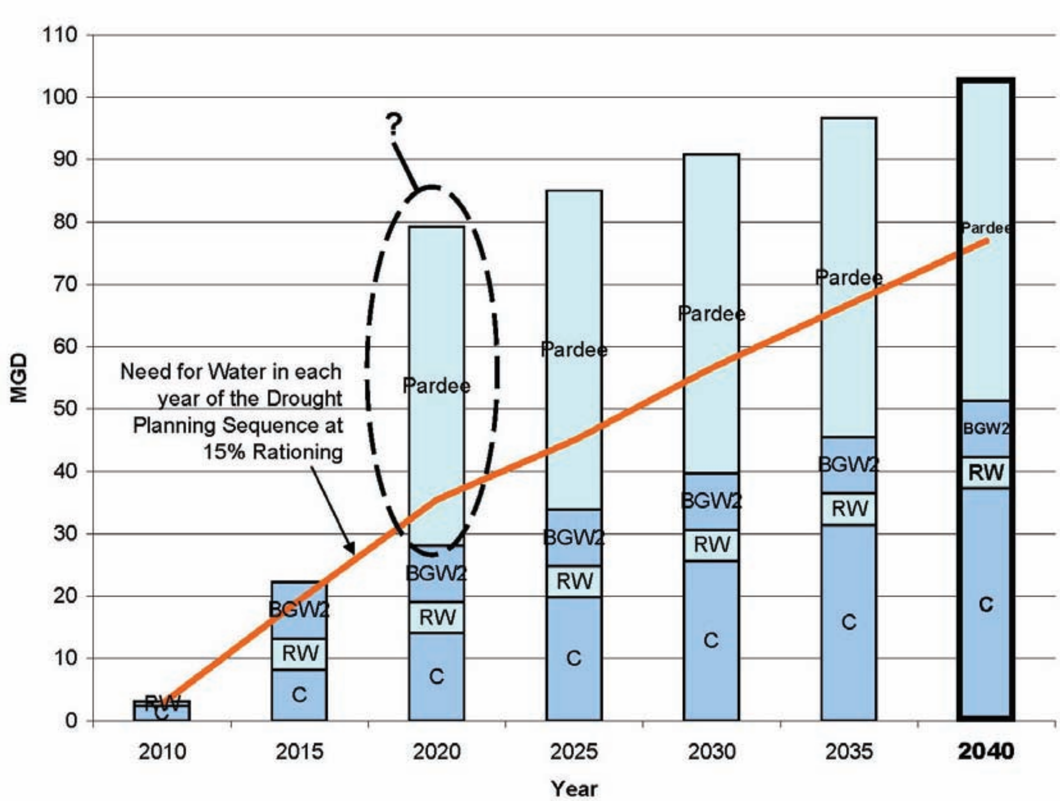
[a] As a practical matter, EBMUD will be unable to reduce rationing to 15 percent until it develops additional dry-year supplemental water supplies.

Portfolio D includes only a Mokelumne River source of supplemental supply. It should be noted that the FRWP pre-treatment facility would be required for this portfolio to address water quality issues. Under this scenario, the FRWP is not activated in the first year of the Drought Planning Sequence if the existing 500 thousand acre-foot (TAF) trigger is utilized and therefore, a large amount of Sacramento River water would be used in the last two years of the drought instead of being spread out over three years. This increase in blended-water volume would likely require pre-treatment.

The supplemental supply component included in Portfolio D (Enlarge Pardee Reservoir) is of relatively large scale, and cannot be phased. Bayside Groundwater Project Phase 2 is needed in 2015 to meet a short-term need for water until the Enlarge Pardee Reservoir component can come online. Even with implementation of Bayside Groundwater Project Phase 2, Portfolio D may still have a shortfall before the enlarged Pardee Reservoir is filled and online. If EBMUD were to enter into beneficial partnerships with Upcountry water interests, the full yield of the Enlarge Pardee Reservoir component may be shared (partnering and yield sharing as would be determined during the project development stage). Aside from the service-area storage created as part of Bayside Groundwater Project Phase 2, the bulk of storage provided by Portfolio D would be east of the Delta and would therefore not contribute to meeting EBMUD's 6-month local storage criterion. Portfolio D places heavy reliance on permitting, constructing, and filling an enlarged Pardee Reservoir by 2020 (see question mark on Figure 3-23).

3.3.6 Portfolio E: Recycled Water and Water Transfers

Portfolio E (Table 3-13 and Figure 3-24) includes a number of recycled water projects and a greater reliance on water transfers as compared with other portfolios. It includes no surface water projects. As is the case with those portfolios that include non-Mokelumne sources (i.e., all alternatives save Portfolio C), FRWP pre-treatment facilities would likely be needed to introduce such sources to the EBMUD raw water conveyance system (i.e., to address water quality / water treatment requirements, blending of



Key: C = Conservation RW = Recycled Water BGW2 = Bayside Groundwater Project Phase 2
Pardee = Enlarge Pardee Reservoir

Figure 3-23 Portfolio D - Implementation Scenario

Table 3-13: Portfolio E Components

COMPONENT CATEGORY	LEVEL/PROJECTS	COMPONENT YIELD (MGD)
Rationing	10%	22
Conservation	Level C	37
Recycled Water	Level 3	11
Supplemental Supply	Northern California Water Transfers	28.5
	Bayside Groundwater Project Phase 2	9
	Sacramento Basin Groundwater Banking / Exchange	4.2

supplies with Mokelumne water would not suffice). Beyond the proposed FRWP pre-treatment plant, certain components of this portfolio would require the use of the constructed FRWP facilities as well as the use of the Mokelumne Aqueducts. The estimated dates for Portfolio E components to be online are shown in Table 3-14. Challenges to implementation of Portfolio E are much the same as they are for those alternatives that rely on non-service-area sources of supply. For example, finding and

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Water Supply Management Program 2040

Figure 3-24: Alternative Portfolio E (Recycled Water & Water Transfers)

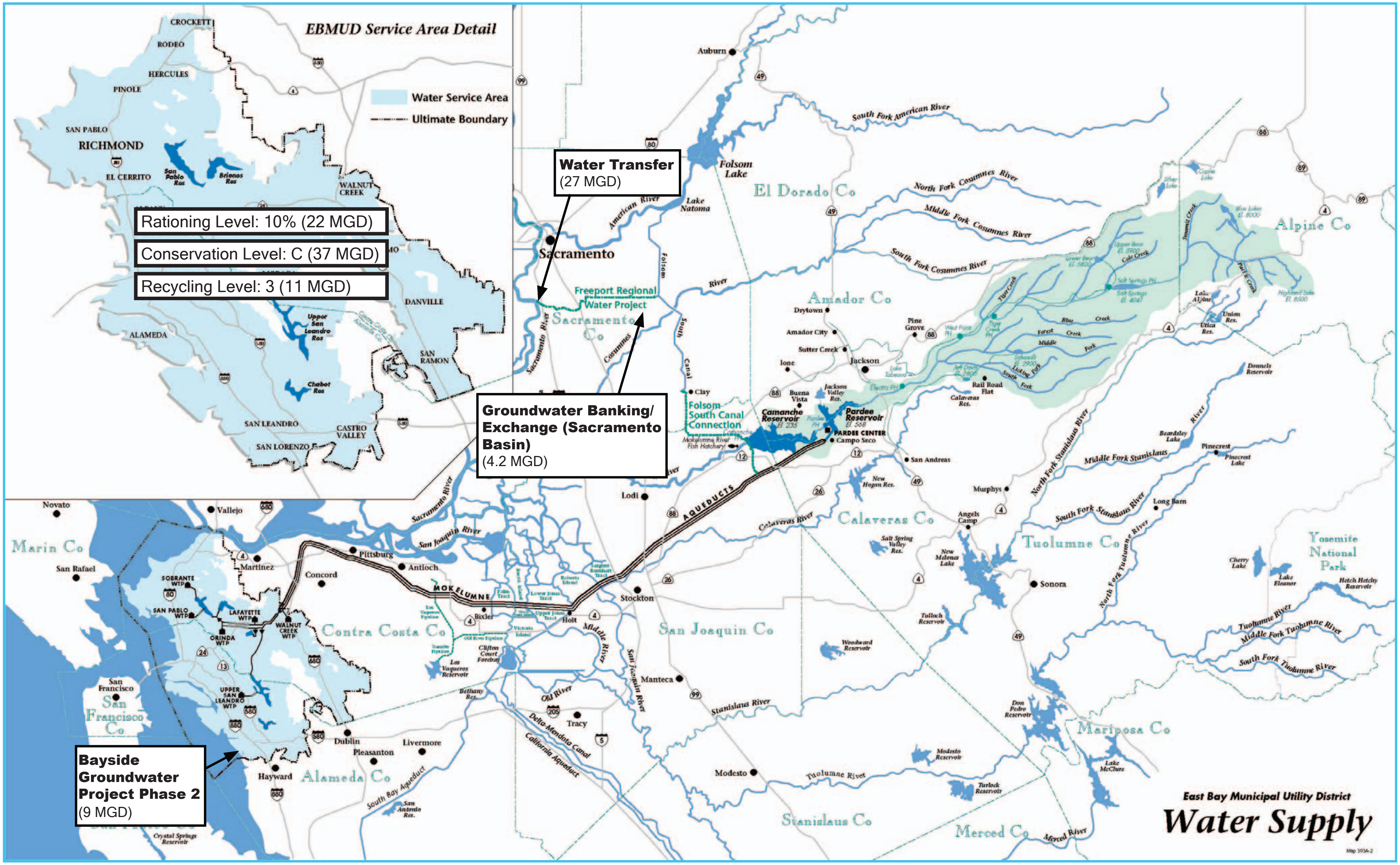


Table 3-14: Project Online Dates for Portfolio E to Meet the Need for Water

COMPONENT	YEAR ONLINE
10% Rationing	2010[a]
Conservation Level C (37 MGD)	Comes online throughout the 2010-2040 planning period with the full 37 MGD being achieved in 2040
Recycled Water Level 3 (11 MGD)	Achieved by 2020
Northern California Water Transfers	2010
Bayside Groundwater Project Phase 2	2030
Sacramento Basin Groundwater Banking / Exchange	2035

[a] As explained in Section 2.3 of this PEIR, the Preferred Portfolio establishes a 10 percent drought rationing policy. As a practical matter, however, EBMUD will be unable to reduce rationing to 10 percent until it develops additional dry-year supplemental water supplies.

securing one or multiple water transfers up to 28.5 MGD may be challenging and is dependent not simply on EBMUD, as it requires willing transfer partners (Figure 3-25).

Portfolio E would provide additional dry-year storage west of the Delta through the Bayside Groundwater Project Phase 2. This portfolio would also provide several opportunities for EBMUD to partner with other water districts. As in Portfolio A, a sizable water transfer would need to be in place by 2010 (see "question mark" shown in Figure 3-25).

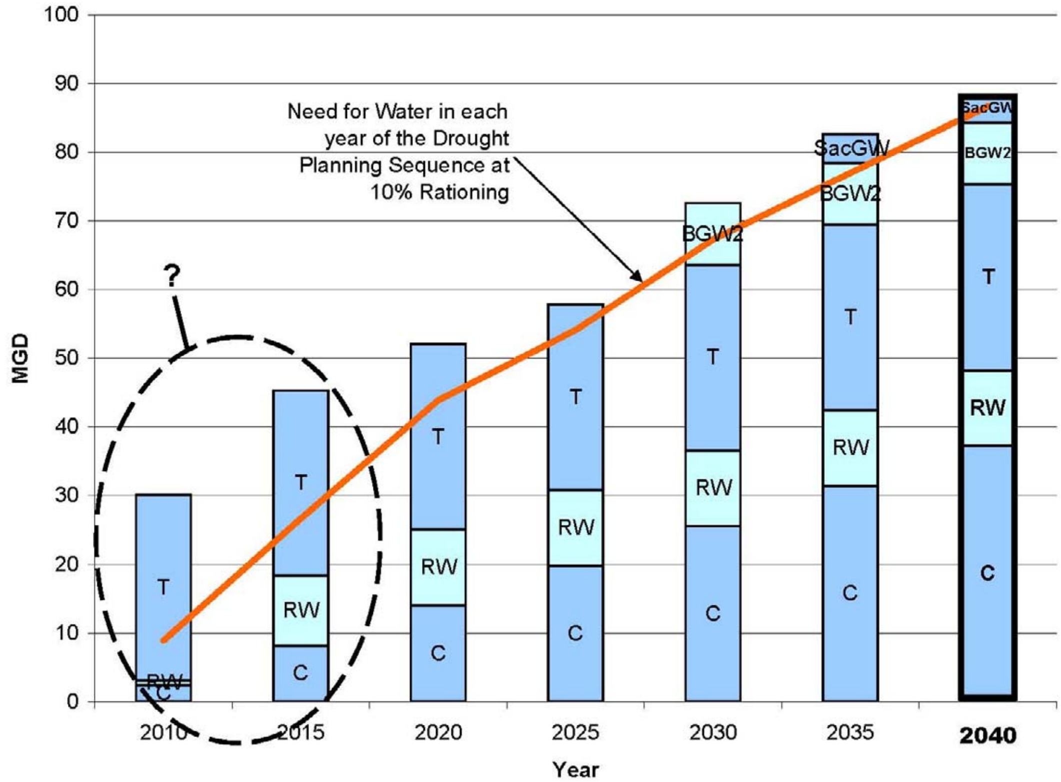
3.3.7 Consistency with Program Objectives

Each portfolio and the No Project Alternative were reviewed and rated against the WSMP 2040 Program Objectives as outlined in Table 3-15.

3.4 Alternatives Considered but Eliminated

Section 2.3 of the PEIR describes the WSMP 2040 Portfolio Development Process. The portfolios were built by assembling components. Over 50 individual components were identified and screened. A number of components were dropped before being assembled into portfolios, including such components as Raise Los Vaqueros Reservoir, Sites Reservoir and Temperance Flat. These components were eliminated due to lack of definition of partners, benefits, and timeline for implementation.

As Section 2.3 indicates, a number of alternative portfolios were examined and subsequently eliminated (see Table 3-16 at the end of this chapter). CEQA Guidelines Section 15126.6 requires the lead agency to identify the alternatives that were considered but rejected, and to briefly explain the reasons why the lead agency found them to be infeasible.



Key: C = Conservation RW = Recycled Water T = Transfer
BGW2 = Bayside Groundwater Project Phase 2 SacGW = Sacramento Groundwater

Figure 3-25 Portfolio E – Implementation Scenario

- Portfolio 1 – Low Carbon Footprint and Portfolio 2 – Flexibility for Future Extended Drought or Climate Change were eliminated because they failed to meet the Need for Water (PEIR Section 2.4.7).
- Portfolio 3 – Upcountry Surface Storage was eliminated because it too closely mimicked Portfolio D and the Raise Pardee Reservoir level could be tested in that Portfolio. In addition, Recycling Level 1 (0 MGD) was eliminated from inclusion in the Primary Portfolios.
- Portfolio 7 – Emergency Reliability B and Portfolio 8 – Diversified were both eliminated because of their heavy reliance on desalination above and beyond other elements, leading to a conclusions that other portfolios offered a more “diversified” approach.
- Portfolio 9 – Conservation & Recycled Water Emphasis was eliminated because while it contained the very highest level of conservation (Level E at 41 MGD), financial review indicated that it was not as cost-effective as the alternative

Table 3-15

Ability of Alternatives to Meet Program Objectives

Portfolio Number	Portfolio	Portfolio Theme	Operations, Engineering, Legal & Institutional				Economic		Public Health, Safety & Community		Environmental		Portfolio
			• Minimize the vulnerability & risk of disruptions (i.e., **reliability**).	• Maximize the system's **operational flexibility** .	• Minimize **institutional & legal complexities** & barriers.	• Maximize **partnerships** & regional solutions.	• Minimize the financial **cost** to the **District** of meeting customer demands for given level of system reliability.	• Minimize **customer** water shortage **costs** .	• Minimize potential adverse impacts to the **public health** of District customers. • Maximize use of water from the **best** available **source** .	• Minimize long-term adverse **community impacts** • Minimize adverse **social effects** . • Minimize conflicts with existing & planned facilities, utilities & transportation facilities.	• Minimize adverse **impacts** on the **environment** . • Minimize construction & operation effects on environmentally **sensitive resources** .	• Minimize short term & long term **greenhouse gas emissions** from construction. • Maximize **energy efficiency** associated with operations & maintenance. • Maximize contributions to **AB 32 goals.**	
		No Action	L-	L-	L	M	L	L	M	M	M	L	No Action
4	A	Groundwater / Conjunctive Use & Water Transfers	L	H	L	H	L	H	M	M	H	M	A
5	B	Regional Partnerships	H	M	L	H	M	H	L	M	M	L	B
6	C	Local System Reliance	H+	H+	M	L	H	L	M	L	L	M	C
10	D	Lower Carbon Footprint	L	H	M	M	M	M	H+	M	M	H	D
12	E	Recycled Water & Water Transfers	L	H	L	H	L	H	M	M	H	M	E

H = High Response to Evaluation Criteria; L = Low Response to Evaluation Criteria

- moved forward that included Conservation Level D (39 MGD) (i.e., the last 2 MGD of conservation included in Level E would cost $19,000 per acre-foot[4]).
- Portfolio 11 – Low Capital Cost contained the highest rationing level of 25 percent. The cost of this rationing level was found to be prohibitive and thus the portfolio was eliminated.
- Portfolio 13 was eliminated because it too closely mimicked Portfolio A and the 20 percent rationing level could be tested in that portfolio.
- Portfolio 14 was eliminated because of the high cost of the 25 percent rationing level.

3.5 Required Approvals

This section describes the actions necessary for adoption and approval of WSMP 2040, and subsequent approval of the component projects and policy initiatives described in this chapter.

The EBMUD Board of Directors will first certify the WSMP 2040 PEIR, and then adopt CEQA findings and a Mitigation Monitoring and Reporting Program.

Each WSMP 2040 component, if selected for implementation, either individually or in combination with other components, will undergo project-level CEQA review. CEQA documents will identify more specifically the approvals needed from local, state, and federal jurisdictions.

Agencies with responsibility for permit approval may include the following:

- US Army Corps of Engineers (Corps), under Section 404 of the Clean Water Act;
- US Fish and Wildlife Service and National Oceanic and Atmospheric Administration (NOAA) for Section 7 consultation pursuant to the federal Endangered Species Act regarding “take” of federally listed threatened or endangered species, and for Essential Fish Habitat consultation under the Magnuson-Stevens Fishery Conservation and Management Act;
- California Department of Fish and Game (CDFG) for a Streambed Alteration Agreement pursuant to Section 1600 of the state Fish and Game Code;
- Regional Water Quality Control Board (RWQCB) for Water Quality Certification under Section 401 of the Clean Water Act;
- RWQCB for a general construction activity stormwater National Pollutant Discharge Elimination System (NPDES) permit requiring preparation of a Stormwater Pollution Prevention Plan;

[4] Average incremental dry-year unit cost per acre-foot.

- San Francisco Bay Conservation and Development Commission (BCDC) determination of conformity with the California Coastal Act, the McAteer-Petris Act, Coastal Zone Management Act of 1972, and the San Francisco Bay Plan;
- Individual Air Quality Management Districts (e.g., Bay Area Air Quality Management District (BAAQMD)) may require compliance with construction-related air emissions, and issue specific permits to operate portable pumps;
- Counties for well drilling permits;
- RWQCB approval under General Order 96-011, pursuant to an Engineer's Report to RWQCB and Department of Public Health (DPH) for individual projects; and
- SWRCB and U.S. Bureau of Reclamation (USBR) approvals for water transfers.

Other permits/approvals include encroachment permits from the California Department of Transportation, cities and counties, railroad companies, PG&E, for constructing within public and private right-of-ways, easements or modifications to existing easements from nearby landowners and grading permits.

Table 3-16

WSMP 2040 Portfolios

Portfolio Number	Portfolio Themes	Portfolio Description	Rationing: 0%	Rationing: 10%	Rationing: 15%	Rationing: 25%	Conservation: Natural Savings + 10 (B) 29 MGD	Conservation: Current Program Equivalent (C) 37 MGD	Conservation: Current Program Equivalent + 2 (D) 39 MGD	Conservation: Maximum Voluntary Program (E)[1] 41 MGD	Recycling: Recycling Level 1 0 MGD	Recycling: Recycling Level 2 5 MGD	Recycling: Recycling Level 3 11 MGD	Supplemental Supply: Groundwater Banking/Exchange (Sacramento Basin)[2] 4.2 MGD	Supplemental Supply: Northern California Water Transfers 4.5-44.6 MGD	Supplemental Supply: Bayside Groundwater Project Phase 2 9 MGD	Supplemental Supply: Buckhorn Canyon Reservoir 42 MGD	Supplemental Supply: LEAD at C&H Sugar 1.5 MGD	Supplemental Supply: Regional Desalination 20 MGD	Supplemental Supply: IRCUP/San Joaquin Banking[3] 17.4 MGD	Supplemental Supply: Enlarge Lower Bear Reservoir 2.2 MGD	Supplemental Supply: Enlarge Pardee Reservoir 51.2 MGD
1	Low Customer Impact	Balance of low rationing, low cost, high water quality.	●				29					5			20						2.2	51.2
2	Flexibility for Future Extended Drought or Climate Change	Keep rationing/conservation & transfers available as short-term response.	●				29					5							20		2.2	51.2
3	Upcountry Surface Storage Emphasis	Portfolio 2 with increased rationing & conservation & no recycling or desal.		●				37			0											51.2
4	Groundwater Storage	Portfolio 3, but replace surface storage with groundwater, & increase conservation, recycling, & transfers.		●					39			5		4.2	15	9				17.4		
5	Regional Partnerships	All partnership projects & conservation.		●				37				5		4.2	4.5				20	17.4	2.2	
6	Emergency Reliability - A	West of delta surface storage.			●			37				5					42					
7	Emergency Reliability - B	West of delta production - desal, recycle, conservation.			●				39				11			9			20			
8	Diversified / Implementable	Balanced levels of conservation & recycling, non-Mokelumne sources - transfers, desal, Bayside.			●			37				5			10	9			20			
9	Conservation & Recycling Emphasis	High conservation & recycling with LEAD. Transfers & Bayside to satisfy need for water.			●					41			11		15	9		1.5				
10	Low Carbon Footprint	Pardee plus conservation.			●			37				5										51.2
11	Low Capital Cost / Low Structural	25% rationing, conservation, & transfers.				●	29				0				30							
12	Coleman Alternative 1			●				37					11	4.2	27	9		1.5				
13	Katz Alternative 1				●				39				11		8	9						
14	Katz Alternative 2					●		37					11			9						

Notes:

[1] If Conservation Level E is chosen for a portfolio, rationing is capped at 15%.

[2] Groundwater Banking/Exchange (Sacramento Basin) component must be coupled with a transfer water component.

[3] IRCUP includes San Joaquin Basin Groundwater Banking/Exchange.

*** CEQA No Action assumes current programs continue through 2020: Recycling = 14MGD, Conservation = 35 MGD, Supplemental Supply = 50.1 MGD + 5 MGD.

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Table 3-16: WSMP 2040 Portfolios

(11x17 table)

4 ENVIRONMENTAL SETTING

4. Environmental Setting

4.1 Introduction

CEQA Guidelines Section 15125(a) states that "an EIR must include a description of the physical environmental conditions in the vicinity of the project, as they exist at the time the notice of preparation is published…" The environmental setting presented in this chapter also constitutes the baseline conditions in the WSMP 2040 Preferred Portfolio Study Area and vicinity that existed in May 2008, when the NOP for the WSMP 2040 PEIR was published. These baseline conditions include full implementation of two EBMUD projects that were under construction at the time the PEIR was released for public comment: the Freeport Regional Water Project (FRWP) and Bayside Groundwater Project Phase 1. Both projects are described in Chapter 2, Background. The modeling work conducted for the WSMP 2040 assumes inclusion of the additional water supply from these projects at the start of the planning period.

The environmental setting information and baseline presented in Chapter 4 provides a basis for determining potential program-level impacts that may result from implementation of the WSMP 2040 Preferred Portfolio, which are presented in Chapter 5. Additional project-level CEQA analysis will be prepared prior to implementation of select Preferred Portfolio components.

4.1.1 Chapter Organization

Topics addressed in this chapter are organized into three categories: Physical Environment, Biological Environment, and Social and Cultural Environment, as shown below. Subsection identifiers (e.g., A, B, C) precede each environmental topic.

Physical Environment

- A. Hydrology, Groundwater, and Water Quality
- B. Geology, Soils, and Seismicity

Biological Environment

- C. Biological Resources

Social and Cultural Environment

- D. Land Use and Recreation
- E. Transportation
- F. Air Quality
- G. Noise

H. Cultural Resources

I. Visual Resources

J. Hazards

K. Public Services, Utilities, and Energy

L. Environmental Justice

Each of the above sections in Chapter 4 (Sections 4.2.A through 4.2.L) is divided into two parts: Environmental Setting and Regulatory Setting. These are described in further detail below.

Environmental Setting

The Environmental Setting includes the regional setting, which generally describes the entire WSMP 2040 Preferred Portfolio Study Area (including the EBMUD service area, Central Valley and Upcountry), as well as the local setting, which presents the existing conditions of the individual component sites, where known.

In some cases, the local setting is described generally because precise locations of the components are not known (e.g., for the Northern California Water Transfers, a general description of the counties where such transfers could occur is provided since the actual sources of water are not yet known). More information is presented for certain components, such as Pardee Reservoir, which was evaluated in the FRWP EIR/EIS (2003). Similarly, the Bayside Groundwater Project Phase 2 is described programmatically in the EIR for the Bayside Groundwater Project (2005). Where applicable, information from these certified EIRs is noted in the environmental setting of this PEIR.

The geographic locations of the WSMP 2040 Preferred Portfolio components are shown in Table 4-1.

Regulatory Setting

The regulatory setting sections describe the laws, regulations and policies of Federal, State and local regulatory agencies that may be applicable to the WSMP 2040 Preferred Portfolio for each environmental topic. For certain topics, the regulations establish in whole or in part the significance criteria (presented in Chapter 5) by which potential impacts are evaluated (e.g., air quality emissions standards).

Terminology Used in the PEIR

The WSMP 2040 Preferred Portfolio Study Area is defined as the collective area of all of the Preferred Portfolio components combined. The terms "project area" and "project site" are used in the context of the area of the individual components (e.g., Pardee Reservoir project area).

Table 4-1: WSMP 2040 Preferred Portfolio Component Locations

COMPONENT	GEOGRAPHIC LOCATION	CITY (IES)	COUNTY (IES)
Recycled Water	EBMUD Service Area	Various	Alameda / Contra Costa
Northern California Water Transfers	Northern California	Various	Yuba, Colusa, Glenn, and Plumas, Sacramento[a]
Bayside Groundwater Project Phase 2	EBMUD Service Area	Various	Alameda
Sacramento Basin Groundwater Banking / Exchange	Central Valley	Various	Sacramento
Regional Desalination[b]	San Francisco Bay Area (outside of the EBMUD Service Area)	South shoreline of Suisun Bay	Contra Costa
Enlarge Lower Bear Reservoir	Upcountry	35 miles northeast of Jackson	Amador
Enlarge Pardee Reservoir	Upcountry	Near the Town of Jackson	Amador / Calaveras
IRCUP / San Joaquin Groundwater Banking / Exchange	Central Valley / Upcountry	Various	San Joaquin, Amador, Calaveras, and Alpine

Notes:

[a] Although the WSMP 2040 PEIR evaluates the Northern California Water Transfers component within the counties identified above, EBMUD does not preclude future negotiation of other water transfers. Water transfers in these counties are evaluated in this PEIR for illustrative purposes.

[b] Although three sites have been considered for the Regional Desalination component, only the East Contra Costa County site is evaluated in this PEIR.

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4.2.A Hydrology, Groundwater, and Water Quality

4.2.A.1 Regional Setting

Surface Water

The California Department of Water Resources (DWR) has divided the State into ten hydrologic regions that correspond to the State's major water drainage basins. The WSMP 2040 Preferred Portfolio includes areas within the following hydrologic regions (Figure 2-3 in Chapter 2, Background):

- San Francisco Bay, including basins draining into San Francisco, San Pablo, and Suisun Bays, and into the Sacramento River downstream of Collinsville; western Contra Costa County; and basins directly tributary to the Pacific Ocean below the Russian River watershed to the southern boundary of the Pescadero Creek Basin. San Francisco Bay itself is an estuary with a deep central channel, broad mudflats, and fringing marsh. Suisun Bay is a shallow tidal estuary that forms the entrance to the Sacramento-San Joaquin River Delta;
- Sacramento River, including basins draining into the Sacramento River system in the Central Valley from the Oregon border through the American River basin; and
- San Joaquin River, including basins draining into the San Joaquin River system from the Cosumnes basin on the north through the southern boundary of the San Joaquin River watershed.

Additionally, there are some areas in the State with common water issues that cross the boundaries between hydrologic regions. One of these overlays includes the Sacramento-San Joaquin River Delta (Delta) region. While the Delta itself occupies portions of the Sacramento, San Joaquin, and a small portion of the San Francisco Bay hydrologic regions, it is described as an overlay area because of its common characteristics, environmental significance and important role in the State's water supply.

EBMUD Service Area

The EBMUD service area and surrounding region, shown in Figure 2-1 in Chapter 2, is within the San Francisco Bay hydrologic region. Most surface water bodies in the EBMUD service area are used for navigation and recreation and/or regional water management. The Berkeley-Oakland hills act as a hydrologic divide for the service area, with streams west of the hills ultimately directed toward San Francisco Bay, and streams east of the hills draining to Suisun Bay.

Central Valley

The drainage basins of the Sacramento, American, San Joaquin, Tuolumne, Mokelumne, Stanislaus, and Merced Rivers form the Sacramento River-San Joaquin

River Delta. The Delta is defined by the approximate extent of tidal action within the contributing river channels. Deliveries from the U.S. Bureau of Reclamation's (USBR's) Central Valley Project (CVP) and from the State Water Project (SWP) are conveyed through the Delta for export to the San Joaquin Valley and Southern California.

Sacramento Valley

The American River drainage basin encompasses approximately 1,900 square miles and includes several operating reservoirs. Folsom Reservoir is the principal reservoir in the basin, with several smaller reservoirs upstream. Nimbus Dam impounds Lake Natoma downstream of Folsom Dam, and regulates releases from Folsom Reservoir to the Lower American River.

The Sacramento River drainage basin upstream of the American River confluence with the San Joaquin River encompasses approximately 23,500 square miles. Principal reservoirs controlling flows in the lower Sacramento River include Lake Shasta on the Sacramento River upstream of Redding and Trinity Lakes. The Feather River is also a major tributary to the Sacramento River, and Lake Oroville (on the Feather River) is a component of the SWP system.

EBMUD's Freeport Regional Water Project (FRWP) intake structure is on the Sacramento River, about ten miles downstream of its confluence with the American River. The Sacramento River at the intake facility is confined within levees maintained by the U.S. Army Corps of Engineers (Corps).

San Joaquin Valley

The San Joaquin River flows northward into the Delta and discharges into San Francisco Bay. The San Joaquin River basin encompasses approximately 13,500 square miles (at the Vernalis gage) and is controlled by several reservoirs on the Stanislaus, Tuolumne, Merced, and upper San Joaquin rivers.

Upcountry

The Mokelumne River watershed, which is described in Section 2.4.2, is located immediately south of the Cosumnes River and American River basins. EBMUD's Pardee and Camanche Reservoirs on the Mokelumne River are described in Section 2.4.3. The upper Mokelumne River watershed (upstream of Pardee Reservoir) measures 570 square miles and is drained by numerous creeks feeding into the Mokelumne River. Creeks in the upper Mokelumne River watershed include Jackson Creek, Bear River, Tiger Creek and Sutter Creek.

Pardee Reservoir is EBMUD's primary water supply reservoir and is the second to last reservoir on the Mokelumne River before it enters the Central Valley (Camanche Reservoir is the most downstream reservoir on the Mokelumne). Water stored in Pardee

Reservoir is diverted into the 91-mile-long Mokelumne Aqueduct system that delivers water to the EBMUD service area. The aqueducts are described in Section 2.4.3.

From 2000 through 2007, EBMUD's annual demand averaged 214 MGD, ranging from 205 MGD to 224 MGD. Generally, about 90 percent of the water delivered to EBMUD's customers originates in the Mokelumne River watershed, and 10 percent originates as runoff from the protected watershed lands surrounding the terminal reservoirs in the East Bay. EBMUD operates Camanche Reservoir together with Pardee Reservoir as part of an integrated system, allowing it to provide water supply benefits while meeting numerous downstream obligations, including streamflow regulation, fishery/public trust interests, flood control, and obligations to downstream diverters and hydropower generation.

Upstream of Pardee Reservoir, PG&E operates the Mokelumne River Hydrogeneration Project, a hydropower project that includes seven reservoirs, four powerhouses and numerous diversions with an overall power generation capacity of approximately 215 MW. Lower Bear Reservoir is among these PG&E facilities. The Enlarge Lower Bear Reservoir component is described in Section 3.2.5.

Mokelumne River entitlements for EBMUD and other entities are summarized in Table 4.2.A-1. The 1998 Joint Settlement Agreement (JSA), described in Section 2.4.5 of this PEIR, sets forth year-round minimum release requirements from Camanche Reservoir based on fish life-stage protection and water year type, as well as non-flow-related measures for the Mokelumne River ecosystem.

JSA required releases from Camanche Reservoir range from 100 to 325 cfs during normal and above-normal runoff water year types (with an additional release of up to 200 cfs required depending on combined Pardee and Camanche storage during certain months). JSA required releases range from 100 to 250 cfs in below-normal years (with an additional release of up to 200 cfs required depending on Pardee and Camanche storage during certain months); 100 to 220 cfs in dry years; and 100 to 130 cfs in critically dry years (FRWA, 2003). The JSA also includes a gainsharing provision requiring EBMUD to release up to 20,000 AF of additional water for use during a dry period, should a new water supply be developed.

The lower Mokelumne River flows through Lodi Lake on its way to the Delta. Lodi Lake is a seasonal impoundment created by a Woodbridge Irrigation District (WID)-owned dam near Lodi. EBMUD is obligated to release to WID a minimum of 39,000 AF in dry years and up to 60,000 AF in normal and wet years. North San Joaquin Water Conservation District (NSJWCD) has a water right to 20,000 AFY of Mokelumne River water, though it has historically used far less. EBMUD is obligated to make additional downstream deliveries to the lower Mokelumne River of about 20,000 AF for riparian and senior appropriative rights. Finally, EBMUD also releases "carriage" water from

Table 4.2.A-1: Mokelumne River Appropriations

DIVERSIONS AND LOSSES	APPROPRIATIONS (IN TAF/CY)	
	MAXIMUM	DRY YEAR MAXIMUM
Amador & Calaveras County	47	13.1
Jackson Valley Irrigation District[a]	3.85	0
EBMUD Aqueduct Draft	364	see footnote b
EBMUD Diversions to Storage	562.9	see footnote b
Fish Release per Joint Settlement Agreement	165.9 [c]	65 [d]
North San Joaquin Water Conservation District[e]	20	0
Riparian and Senior Appropriators (above WID)	14.4	11.2
Woodbridge Irrigation District[f]	60	39
Riparian and Senior Appropriators (below WID)	6.2	4.8
Net Channel Losses	120	56

Notes:

TAF/CY = thousand acre-feet per calendar year; WID = Woodbridge Irrigation District; JVID = Jackson Valley Irrigation District; JSA = Joint Settlement Agreement.

[a] May be “0” if no water is available under JVID priority or Pardee elevation is below 550 feet.

[b] Varies with runoff and storage conditions.

[c] Water released committed by EBMUD to protect fishery per “Normal and Above” water year type under JSA criteria.

[d] Water released committed by EBMUD to protect fishery per “Dry” water year type under JSA criteria. In critically dry years, the minimum flow could be as low as 22.5 TAF.

[e] May be “0” if no water is available, surplus to EBMUD needs.

[f] EBMUD’s obligation to release water to the Woodbridge Irrigation District is governed by a series of water rights settlement agreements to a maximum of 60 TAF/year when inflow to Pardee is greater than 375 TAF.

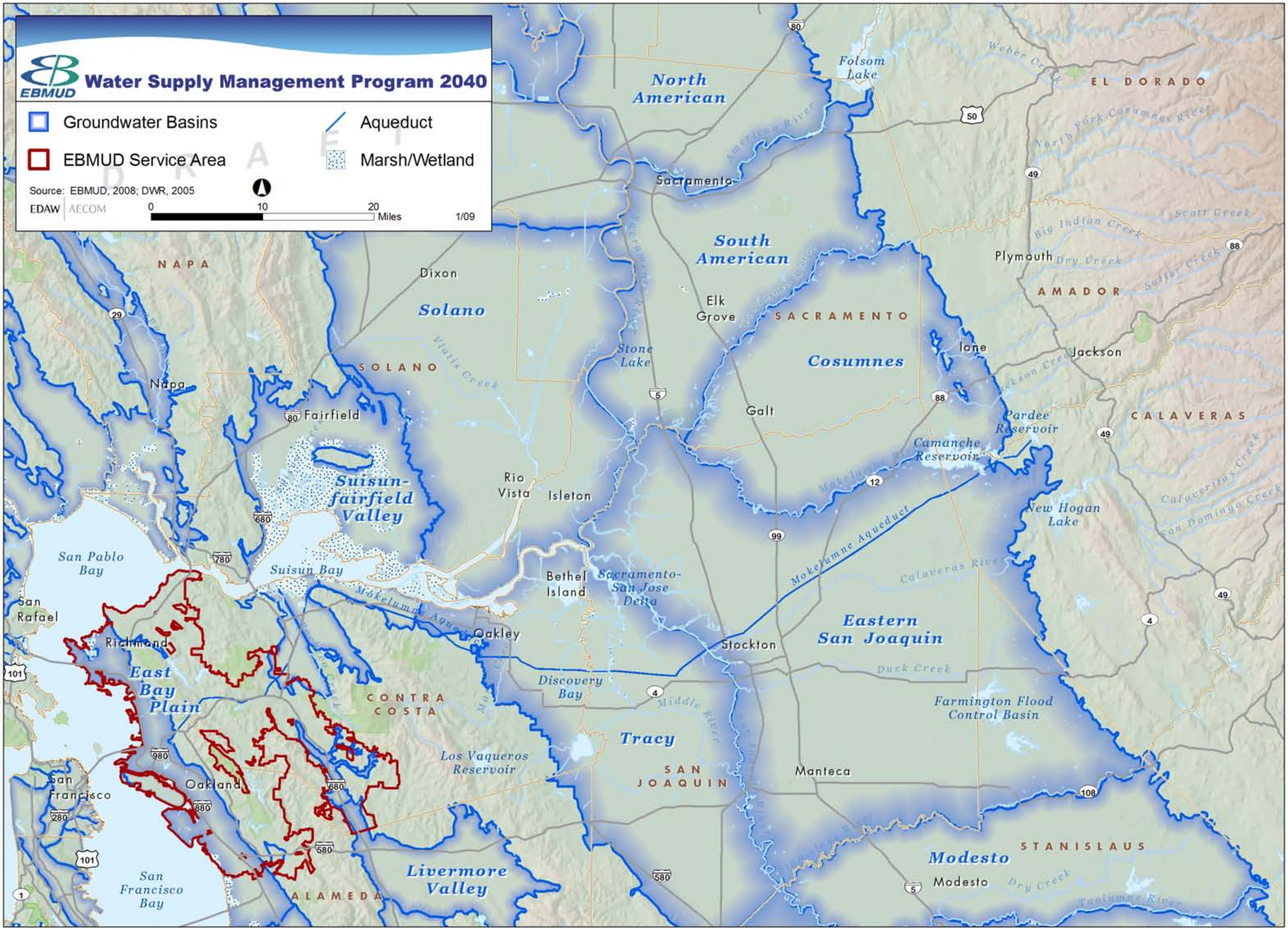
Camanche Reservoir – additional water that ensures sufficient flows reach the downstream users. Channel losses on the lower Mokelumne River range from about 56,000 to 120,000 AFY, with most losses occurring in the 21-mile reach between Camanche Dam and Lake Lodi.

Groundwater

DWR delineated and described the larger groundwater basins and subbasins in the State in *California’s Groundwater, Bulletin 118* (2003). Figure 4.2.A-1 depicts the location of those groundwater basins that could be affected by the components of the Preferred Portfolio, including those within the EBMUD service area.

Figure 4.2.A-1

Groundwater Basins



EBMUD Service Area

The EBMUD service area is within the San Francisco Hydrologic Region and overlies the San Ramon Valley groundwater basin, Castro Valley groundwater basin, and the East Bay Plain sub-basin of the Santa Clara Valley groundwater basin.

The South East Bay Plain sub-basin (SEBPB) of the Santa Clara Valley Groundwater Basin is located along the Berkeley-Oakland hills, from about Richmond to Hayward. This sub-basin extends beneath San Francisco Bay (Bay) to the west, and the exact location of the western boundary is unknown. Water-bearing formations in the SEBPB consist of four main aquifer systems: the Newark Aquifer equivalent, the Centerville Aquifer equivalent, the Fremont Aquifer equivalent, and the Deep Aquifer. The components included in Preferred Portfolio only use the Deep Aquifer, which is believed to be the highest yielding and most continuous aquifer unit (CH2M HILL, 2005).

The Deep Aquifer is present at depths of greater than 400 feet below ground surface (bgs) in the SEBPB. It appears to be thickest in the south, thinning and feathering out to the north near Berkeley; available information indicates that the unit is not substantially productive north of San Leandro. In general, water levels for the Deep Aquifer in the SEBPB are sparse, but available data indicate a horizontal groundwater gradient of about 0.001. Deep water levels also indicate a more northerly component of flow than in shallower aquifers (EBMUD, 2005).

East of the Berkeley-Oakland Hills, the District's service area overlies the Bishop and Dublin subbasins of the San Ramon Valley Groundwater Basin. This basin is bounded by Stone Valley on the north, Las Trampas Ridge on the west, the foothills of Mt. Diablo on the east and the Livermore Valley Groundwater Basin on the south. Groundwater-bearing alluvial fan and stream-deposited materials comprise the entire floor of the San Ramon Valley basin and portions of the upland areas on all sides of the valley. Unlike the SEBPB, faults are a major structural feature in the San Ramon Valley Groundwater Basin and have been known to have a marked effect on groundwater movement (DERWA, 1996).

On the south side of the District, the EBMUD service area overlies the Castro Valley Groundwater Basin. This small basin is bounded on the east by San Lorenzo Creek, and by the Hayward Fault on the west. This basin extends from Lake Chabot on the north to Highway 238 on the south. The principal water-bearing formations in the Castro Valley Groundwater Basin are alluvium overlying non-water-bearing rock with a maximum thickness of 80 feet.

Central Valley

Sacramento Valley

Aquifers underlying Sacramento Valley are within the North American subbasin, the South American sub-basin, and the Solano sub-basin of the Sacramento Valley Groundwater Basin. The North American subbasin lies in the eastern central portion of the Sacramento Groundwater Basin and is bounded by the Bear River to the north, the Feather River to the west, and the Sacramento River to the south. Water-bearing materials of the subbasin are dominated by volcanics, older alluvium, and younger alluvium (DWR, 2003). The South American subbasin is bounded on the east by Sierra Nevada, on the west by the Sacramento River, on the north by the American River, and on the south by the Cosumnes and Mokelumne rivers. Similar to the North American subbasin, this subbasin is comprised of younger alluvium, older alluvium, and volcanics.

The Solano sub-basin lies in the southwestern portion of the Sacramento Basin and the northern portion of the Delta. The boundaries include Putah Creek to the north, Sacramento River to the east, North Mokelumne River to the southeast, and the San Joaquin River to the south. The Solano sub-basin has similar water-bearing formations to the North American and South American subbasins.

For purposes of groundwater management, the aquifers underlying Sacramento County have been further subdivided into three zones called the North, Central and South Basins (see Figure 4.2.A-1). The Central Basin extends from the American River on the north to the Cosumnes River on the south. Groundwater in the Central Basin is found in the shallow aquifer zone or in an underlying deep aquifer zone. Within the Central Basin, the shallow aquifer extends approximately 200 to 300 feet below the ground surface. Groundwater in the Central Basin is managed by the Sacramento Central Groundwater Authority (SCGA), a Joint Powers Authority (JPA) of 16 member agencies overlying the Central Basin formed in 2006 to cooperatively manage the groundwater basin.

San Joaquin Valley

The San Joaquin Valley Groundwater Basin is divided into nine subbasins within the San Joaquin hydrologic unit. Aquifers in the basin are generally thick with groundwater wells extending to depths of up to 800 feet or more. Aquifers include unconsolidated alluvium and consolidated rocks with unconfined and confined groundwater conditions. Groundwater in the basin has been used conjunctively with surface water to meet users' needs (DWR, 2003).

The Preferred Portfolio components that fall within the San Joaquin Groundwater Basin overlie one sub-basin in particular: the Eastern San Joaquin sub-basin. This sub-basin is bounded on the south, southwest and west by the Modesto, Delta-Mendota, and Tracy sub-basins, respectively, and on the northwest and north by the Solano, South American and Cosumnes sub-basins. The Eastern San Joaquin sub-basin is recharged by the San Joaquin River and its primary tributaries, the Stanislaus, Calaveras, and Mokelumne rivers.

Significant water bearing formations in the Eastern San Joaquin subbasin include the Alluvium and Modesto/Riverbank Formations, Flood Basin Deposits, Laguna Formation, and Mehrten Formation (DWR, 2003). Groundwater levels have been decreasing in the sub-basin, resulting in significant groundwater depressions with relatively steep groundwater gradients eastward from the Delta towards the cones of depression, affecting groundwater quality.

Currently, groundwater in the sub-basin is managed through Northeastern San Joaquin County Groundwater Banking Authority, a JPA formed in 2001.

Upcountry

The southwestern corners of Amador and Calaveras counties overlie the Cosumnes subbasin of the San Joaquin Valley Groundwater Basin. While a portion of the counties overlying the Cosumnes sub-basin are fairly productive areas, most of the counties do not overlie a defined groundwater basin, and limited groundwater can be found in fractured bedrock and small patches of alluvium.

Water Quality

EBMUD Service Area

EBMUD's terminal storage reservoirs have good water quality for beneficial uses. Water in the terminal reservoirs comes from the Mokelumne River watershed via the Mokelumne Aqueducts, and local watershed runoff. Local watershed runoff provides, on average, up to 10 percent of EBMUD's supply, although the percentage can vary by several percent from year to year.

The drainage areas that feed into EBMUD's terminal reservoirs (San Pablo, Briones, Upper San Leandro, Chabot and Lafayette Reservoirs) are located within protected lands. In addition, direct contact with water in these reservoirs is limited. As a result, neither the stored Mokelumne River water nor the local runoff is significantly exposed to common sources of contaminants such as pesticides, agricultural or urban runoff, municipal sewage discharges or industrial toxics.

Water supply projects proposed by the District would use the Deep Aquifer of the SEBPB for storage and recovery. Analytical sampling and analyses of native groundwater in this aquifer indicate that said groundwater meets all current primary (health-based) drinking water standards, and with the exception of manganese, meets all secondary (aesthetic) drinking water standards (EBMUD, 2005). High manganese concentrations are common in groundwater and are typically managed through standard treatment technologies.

Sacramento Valley Region of the Central Valley

The upper regions of the Sacramento and American River basins generally produce high-quality water suitable for all beneficial uses. The upper watersheds' source waters generally have excellent mineral and nutrient quality with low total dissolved content (FRWA, 2003). As water flows from the upper watersheds into the Central Valley, water quality typically changes as a result of urban development and runoff, water diversions and return flows. Sources of degradation include waste discharges such as treated municipal wastewater, stormwater runoff, and agricultural return flows. Natural water quality changes also occur in the valley, including temperature increases in warmer months, natural erosion and suspended sediment transport of organic material and minerals (FRWA, 2003).

Water quality in the Delta is controlled by complex circulation patterns that are affected by inflow, pumping for Delta agricultural operations and exports, operation of flow control structures and tidal action. Over the long-term average of hydrological conditions, approximately 30 percent of Delta inflow is used for CVP and SWP exports, 10 percent is used locally, 20 percent is required for salinity control and the remaining 40 percent is Delta outflow that results largely from winter consumptions (FRWA, 2003).

The Delta waterways within the Central Valley Regional Water Quality Control Board (RWQCB) are listed as impaired for dissolved oxygen, electrical conductivity, mercury, Group A pesticides, organophosphorus pesticides (diazinon and chlorpyrifos) and unknown toxicity (FRWA, 2003). The western Delta is under jurisdiction of the San Francisco RWQCB and is listed as impaired on EPA's 303(d) list for copper, mercury, nickel, selenium, dibenzo dioxin compounds, dibenzo furan compounds, polychlorinated biphenyl compounds (PCBs), Group A pesticides, diazinon and unknown toxicity. Constituents of concern in the Delta include potentially harmful disinfection by-products (DBPs) that can be formed during certain disinfection treatment operations. Bromate and trihalomethanes (THM) compounds and their precursors (dissolved organic carbon and bromide) are of the greatest concern for DBP formation.

High-salinity waters from Suisun Bay intrude into the Delta during periods of low Delta outflow and can adversely affect agricultural and municipal uses. Salinity standards at the Contra Costa Canal intake (municipal objective) and at Jersey Point (agricultural objective) on the San Joaquin River are often controlling variables that determine required releases by upstream SWP and CVP reservoirs to maintain adequate Delta outflow. Agricultural drainage in the Delta contains high levels of nutrients, suspended solids, organic carbon, minerals (salinity) and trace chemicals such as organophosphate, carbamate and organochlorine pesticides (FRWA, 2003). Synthetic organic chemicals, particularly chlorinated pesticides and heavy metals, accumulate in Delta fish in quantities that occasionally exceed the acceptable standards for human consumption (San Francisco Bay-Delta Aquatic Habitat Institute, 1991).

Groundwater quality in the Central Basin of Sacramento County is generally of high quality with water in the upper aquifer system of higher quality than that found in the lower aquifer system. This predominantly occurs because the lower aquifer system (specifically the Mehrten Formation) contains higher concentrations of iron and manganese (MWH, 2006). The lower aquifer system also has higher concentrations of total dissolved solids (TDS), although water from this aquifer zone typically meets potable water quality standards (MWH, 2006). Groundwater from the Central Basin, especially the upper aquifer system containing the Laguna Formation, generally does not require treatment other than disinfection prior to potable use, unless high arsenic values are encountered (which can occur locally) (MWH, 2006). Several large groundwater contaminant plumes currently exist in the central Sacramento area from sources such as Mather and McClellan Air Force Bases, Aerojet, the former Southern Pacific and Union Pacific rail yards, and the former Army Depot. Groundwater remediation is occurring in these areas to counter the contaminant plumes; however, some purveyor wells have been impacted as a result of the plumes.

Groundwater in the San Joaquin Valley Groundwater Basin has historically, like the Sacramento-area groundwater, met drinking water standards without treatment, except perhaps for iron, manganese and possible arsenic. And similar to Sacramento-area groundwater, shallow groundwater zones have been affected by surface contamination for sources such as leaking underground fuel tanks, most of which are undergoing remediation.

In addition, portions of the San Joaquin Valley Groundwater Basin bordering the Delta have been affected by the eastward migration of high-salinity Delta water, as a result of groundwater depressions underlying southern Central Valley towns. Increased lateral flow has created poorer water quality conditions, especially near the Stockton area, with a projected rate of eastward migration of the saline front occurring at approximately 150 to 250 feet per year (NESJCBGA, 2004).

Upcountry

Water from the Mokelumne River watershed requires only minimal treatment to meet health standards, as it comes from a remote, mostly undeveloped watershed, and is suitable for all beneficial uses. EBMUD further protects water quality at Pardee Reservoir through reservoir use limitations (i.e., prohibition of body contact recreation) and the purchase of conservation easements in areas with significant potential for residential development adjacent to Pardee Reservoir. As a result, the raw water is not exposed to common sources of contaminants such as pesticides, agricultural or urban runoff, municipal sewage discharges or industrial toxics (EBMUD, 2005).

Water supplies in Pardee Reservoir occasionally are affected by short term events that may increase reservoir turbidity. For example, heavy winter storms and/or landslides into Pardee Reservoir can create poor water quality events that briefly limit the supply available for use. In these cases, EBMUD either reduces flow from Pardee Reservoir and/or shifts to terminal reservoir supplies until the water quality improves. Long-term factors affecting lower Mokelumne River water quality includes acid mine drainage from the Penn Mine and runoff impacts from increasing urbanization. Restoration activities have been conducted at Penn Mine, however, to remediate mine drainages, and post-monitoring is currently underway to maintain the water quality of the lower river.

EBMUD operates Camanche Reservoir and Pardee Reservoir in an integrated manner to maintain low temperatures for fish migration and spawning. Typically, the temperature of water released from Camanche Reservoir during the winter months is about 50°F. Temperatures gradually increase through the spring and summer months, and reach a maximum of about 60°F at the end of September. Release temperatures have been higher when Camanche Reservoir storage levels are low during dry water year types. Summer water temperature patterns downstream of Camanche Dam are influenced by direct solar radiation and air temperatures. Temperatures downstream of the Woodbridge Dam are generally 10 °F to 15 °F higher than Camanche Reservoir release temperatures (FRWA, 2003).

Groundwater quality and quantity in the Upcountry region vary considerably with location due to the small and unpredictable yields of the fractured rock system that typifies the foothill geology. Outside of the San Joaquin area, total groundwater use is approximately 200 AFY and is withdrawn predominantly from the Cosumnes Subbasin portion of the San Joaquin Valley Groundwater Basin (RMC, 2006) that overlies the foothills. In general, groundwater quality meets the requirements for all beneficial uses, but is susceptible to impacts from land uses (such as agriculture) due to the nature of the formations (fractured bedrock) and the depth to groundwater (which is typically relatively shallow). Additionally, groundwater extracted from the fractured rock formation may require treatment for mineral constituents such as arsenic, iron or manganese; but again, groundwater quality varies considerably with location.

4.2.A.2 Setting for Preferred Portfolio Components

Rationing and Conservation

The Rationing and Conservation components would be implemented within the EBMUD service area. Water resources within the EBMUD service area are described in the regional setting above.

Recycled Water

The precise locations of the recycled water projects to be implemented have not yet been determined, but would most likely be constructed within the EBMUD service area. Water resources within the EBMUD service area are described in the Regional Setting above.

Northern California Water Transfers

Specific sources of water transfers have not yet been identified, but for the purposes of this PEIR they are presumed to originate in the Sacramento Valley. The surface water features most likely to be affected by this component are the American and Sacramento Rivers, as transfers would most likely occur through releases in the watersheds contributing to the rivers. Section 3.4.4 of the PEIR further describes this component.

Water transfers from the Sacramento Valley would likely be diverted at the FRWP intake on the Sacramento River. The water would be conveyed to the Mokelumne Aqueducts through 36 miles of pipeline (the recently constructed FRWP pipeline) and 14 miles of the existing Folsom South Canal.

While the conveyance capacity of the FRWP can deliver up to 112 TAF of water annually to EBMUD, treatment of this water exclusively at EBMUD's conventional plants would limit the volume of water that could be received from the Sacramento River. In the first year (March 1 – February 28) of operation during a drought, it is expected that Freeport Project deliveries would be constrained to approximately 60 TAF. In each subsequent year, up to 80 TAF of Freeport Project water could be treated and distributed to District customers.

Given these constraints, deliveries via the FRWP would be limited to approximately 220 TAF (60+80+80) over a three-year period. Since the District's CVP contract provides for up to 165 TAF over three consecutive years, 55 TAF of FRWP capacity would remain available for other water supplies. While modeling of the FRWP has assumed that the District would take delivery of its CVP water as soon as possible, water from this source could be taken at a lower rate, although it is still assumed that 165 TAF would be received within three years. This would allow water transfers to be conveyed via the Freeport project in every year, up to an average of 18 TAF/yr without requiring pretreatment.

Eventually, a pretreatment plant or improvements at the inline treatment plants could either be required to meet overall system needs and/or may be implemented by EBMUD. Assuming that is the case, FRWP water could be routed to any of the District's treatment plants. This would be necessary in the future if District demand increases such that full use of the capacity of the Mokelumne Aqueducts and the District's treatment plants is required.

Segregation of FRWP water and Mokelumne River water, as described above, would limit the useful capacity of the Mokelumne Aqueducts and the amount of water that could be delivered to the inline treatment plants. For this reason, it has been assumed in this WSMP 2040 PEIR that by 2040 all FRWP deliveries, including water transfers, would receive pretreatment.

In eligible years, the District's CVP contract does not constrain the delivery schedule during the contract year (March 1 – February 28), and to date there are no delivery schedule constraints imposed by USBR environmental requirements. However, yearly allocations may be reduced when CVP water supplies are below normal. Upon completion of a pretreatment plant, water transfers could be taken whenever necessary (up to EBMUD's 100 MGD capacity), based on current environmental conditions and operational constraints.

Water resources within the Central Valley and Upcountry areas are described in the regional setting above.

Bayside Groundwater Project Phase 2

Phase 2 facilities would most likely be located at the Bayside Groundwater Project Phase 1 site in San Lorenzo, and at two other locations overlying the SEBPB, most likely in San Lorenzo, San Leandro, or the southern portion of Oakland, in the EBMUD service area (see Figure 3-7 in Chapter 3). Water resources within the EBMUD service area are described in the regional setting above.

Sacramento Basin Groundwater Banking / Exchange

Facilities in support of the Sacramento Basin Groundwater Banking / Exchange component would most likely be located in Sacramento County's Central Basin, as stated in Section 3.2.5. Water resources within the Central Basin are described in the regional setting above.

Regional Desalination

As stated in Section 3.2.5, while three locations are being considered for the Regional Desalination facility, this PEIR assumes it would most likely be constructed along the south shore of Suisun Bay in East Contra Costa County (see Figure 3-8 in Chapter 3). Suisun Bay is a shallow tidal estuary forming the entrance to the Delta. Characteristics of the Delta are described in the regional setting discussions for the EBMUD service area and the Central Valley.

Enlarge Pardee Reservoir

Pardee Reservoir is 38 miles northeast of Stockton on the Mokelumne River, near Sutter Creek in Amador County (see Figures 3-9 and 3-10 in Chapter 3). The southwestern edge of Pardee Reservoir is considered the downstream boundary of the upper Mokelumne watershed. The basin upstream of Pardee Reservoir (i.e., the upper Mokelumne I.C. watershed) is the principal water supply for the EBMUD service area. Please refer to the Upcountry area in the regional setting, above, for a discussion of Pardee Reservoir.

Downstream of Pardee and Camanche Reservoirs, the lower Mokelumne River flows west through Lodi Lake (a WID-owned seasonal impoundment) on its way to the Delta. Downstream of the Lodi area and the city of Thornton, the lower Mokelumne River splits into the North and South Fork channels with the Delta Cross Channel (DCC) delivering water from the Sacramento River to the North Fork channel.

Enlarge Lower Bear Reservoir

Lower Bear Reservoir is upstream of Pardee Reservoir on the Mokelumne River, approximately 35 miles northeast of Jackson (see Figure 3-11 in Chapter 3). Please refer to the Upcountry area in the regional setting, above, for a discussion of the Lower Bear Reservoir setting.

IRCUP / San Joaquin Groundwater Banking / Exchange

The IRCUP/San Joaquin Groundwater Banking/Exchange component would generally overlie the Eastern San Joaquin Groundwater subbasin, most likely in the eastern portion of the groundwater basin and in relatively close proximity to the Mokelumne River (see Figure 3-12 in Chapter 3). Water resources within the Central Valley and the Upcountry area are described in the regional setting above.

4.2.A.3 Regulatory Setting

Federal Regulations

Clean Water Act

The Federal Clean Water Act (CWA) of 1972 requires the United States Environmental Protection Agency (EPA) to develop, publish, and periodically update ambient water quality criteria for the protection of human health. The CWA establishes the authority of the SWRCB and nine regional boards to carry out the Federal act’s provisions. Other provisions of the CWA that affect the WSMP 2040 Preferred Portfolio and its components include the following:

- Section 401 requires an applicant for a Federal permit to conduct an activity that may result in a discharge to navigable waters to provide a certificate from the State indicating that the discharge will not violate State water quality standards;
- Section 402 restricts discharge of pollutants to waters of the U.S. in compliance with an NPDES permit, or listed exceptions; and
- Section 404 regulates discharge of dredged or fill material into waters of the U.S., including certain wetlands, with permit oversight by the EPA.

Permits derived from the CWA would be required to construct and operate many of the component projects described in the Preferred Portfolio and its alternatives.

Rivers and Harbors Act

The Rivers and Harbors Act (RHA) of 1899 prohibits the unauthorized alteration or obstruction of any navigable waters of the United States. The RHA specifically regulates the following:

- Construction of structures in, under, or over navigable waters;
- Deposition or excavation of material in navigable waters; and
- Work affecting the location, condition, course, or capacity of navigable waters.

If a proposed activity falls under the authority of RHA Section 10 and CWA Section 404, the Corps issues a single permit.

Federal Water Quality Regulations

Safe Drinking Water Act

For those components that include groundwater storage and recharge, the EPA would require EBMUD to obtain an underground injection permit under the Safe Drinking Water Act, Section 1421. This permit addresses quality of the injected water and flow rates.

Radionuclide Rule

This rule specifies Maximum Contaminant Levels (MCLs) for radioactive substances in drinking water and established monitoring requirements for these substances.

Groundwater Rule

The Groundwater Rule specifies disinfection of groundwater for protection against microbial pathogens in public water systems that use groundwater sources.

Radon Regulation

Radon can be found dissolved in groundwater. The EPA has proposed a regulation for radon in drinking water, but the final standard has not yet been specified.

Drinking Water Candidate Contaminant List

In 1998, the EPA published a list of 50 chemical and ten microbiological contaminants being considered for future regulation. In 2004, the EPA announced its decision to carry over 51 of these candidate contaminants for further research and data collection activities. Presumably, some of these substances will be regulated under newly-established MCLs during the WSMP 2040 planning period. The introduction of new source water from one or more of the WSMP 2040 Preferred Portfolio components could require EBMUD to monitor and treat for compounds that are not found at all or are currently below detectable levels in its current water supply.

State Regulations

California Water Code

The California Water Code ensures that the water resources of the State are put to beneficial use. Among its many provisions, the following three areas listed below are most directly germane to long-range water supply planning and will affect implementation of the Preferred Portfolio and its alternatives.

Water Rights Permits

The water code empowers the SWRCB to issue permits for new appropriations of water. SWRCB also oversees certain changes to existing water rights permits and licenses to ensure that other water code requirements are met.

Flood Control

Division 5 of the water code regulates local and State flood management and flood protection. It contains guidelines for the protection and restoration of watersheds, levees or check dams to prevent overflow or flooding and to conserve floodwaters.

Water Quality: Division 7, Section 13000 et seq. of the water code codifies the Porter-Cologne Water Quality Control Act

This act directs the SWRCB to formulate and adopt State policies for controlling water quality and designates the SWRCB as the State water pollution control agency for all purposes stated in the CWA. The Preferred Portfolio Study Area is in the jurisdiction of the San Francisco RWQCB and the Central Valley RWQCB. Individual regional boards implement Water Quality Control Plans (Basin Plans) that detail water quality objectives and implementation measures for water quality parameters.

Fish and Game Code

The California Department of Fish and Game (CDFG) regulates public agencies and private individuals and requires them to enter into a streambed or lake alteration agreement before beginning construction that would change, divert, or obstruct the natural flow or the bed, bank, or channel of any river, lake, or stream; use materials from a streambed; or deposit debris, waste, or other material containing flaked, crumbled, or ground pavement where it can pass into any river, lake, or stream. Lake or streambed alteration agreements may impose conditions to protect water quality during construction.

Domestic Water Supply Permit

The California Department of Public Health (DPH) has issued a domestic water supply permit to EBMUD that defines the conditions under which EBMUD must operate its water supply system. This permit specifies MCLs, monitoring and reporting requirements, acceptable treatment processes, and allowable water supply sources. DPH will update the District's permit to address water quality conditions associated with adding new water supply sources.

Title 22

Division 4, Chapter 15 (Domestic Water Quality and Monitoring) stipulates MCLs for chemicals and microorganisms in drinking water supplied to the public. Primary MCLs are health based. Secondary MCLs are related to the aesthetic qualities of water, such as taste and appearance.

Drinking Water Source Assessment and Protection (DWSAP) Program

DWSAP evaluates existing and potential threats to the quality of the public drinking water, and are required before DPH will grant a permit for a new supply source.

Water Recycling Requirements

EBMUD's recycled water program is permitted under General Order 96-011 issued by the San Francisco RWQCB. This permit sets forth requirements related to water quality, permitting customers, and allowed uses of recycled water. For each new project under the General Order, EBMUD submits an Engineer's Report that is approved by the RWQCB and DPH before the project is implemented.

Waste Discharge Requirements

Consistent with the Water Code, the RWQCB may issue waste discharge requirements (WDRs) for actions concerning injection permits for groundwater recharged using treated drinking water. WDRs may also be required to implement the Regional Desalination Project.

Regional/Local Regulations

San Francisco Bay Plan

The McAteer-Petris Act of 1965 established the Bay Conservation and Development Commission (BCDC) and charged the Commission with preparing the Bay Plan. The plan was submitted to the Legislature in 1969 and has been amended several times since then. One of the principal objectives of the Bay Plan is to prevent filling of the bay for development and preserving the shoreline for 'priority uses.' BCDC grants region-wide, administrative, or major permits, depending on the nature and scope of a proposed project and the relationship of the project to agency guidelines. BCDC regulations would be relevant to the Regional Desalination component, and would perhaps apply to other Preferred Portfolio components (such as Bayside Groundwater Project Phase 2) if developed in proximity to the shoreline.

Sanitary Sewer Discharge Permit

Local sanitary systems are designed to treat specific waste streams and operate under a series of permits that control their operations and discharges. As a result, most sanitary system operators require special discharge permits for temporary, non-standard wastewater discharges to the sewer system, such as dewatering operations at construction sites. Special discharge permits may be required for any component where construction will be occurring.

County and City General Plans

A summary of relevant goals and policies from local general plans related to hydrology, groundwater, and water quality is presented in Appendix B.

4.2.B Geology, Soils and Seismicity

4.2.B.1 Regional Setting

Regional Seismicity

The San Francisco Bay Area and surrounding areas are characterized by numerous geologically young faults. These faults can be classified as historically active, active, sufficiently active, or inactive (CGS, 2007), as defined below:

- Faults that have generated earthquakes accompanied by surface rupture during historic time (approximately the last 200 years) and faults that exhibit aseismic fault creep (movement along a fault that does not entail earthquake activity) are defined as **historically active**;
- Faults that show geologic evidence of movement within Holocene time (approximately the last 11,000 years) are defined as **active**;
- Faults that show geologic evidence of movement during the Holocene along one or more of its segments or branches and whose trace may be identified by direct or indirect methods are defined as **sufficiently active** and well-defined; and
- Faults that show direct geologic evidence of inactivity during all of Quaternary time or longer are classified as **inactive**.

Although it is difficult to quantify the probability that an earthquake will occur on a specific fault, this classification is based on the assumption that if a fault has moved during the last 11,000 years, it is likely to produce earthquakes in the future. Figure 4.2.B-1 shows known faults in California.

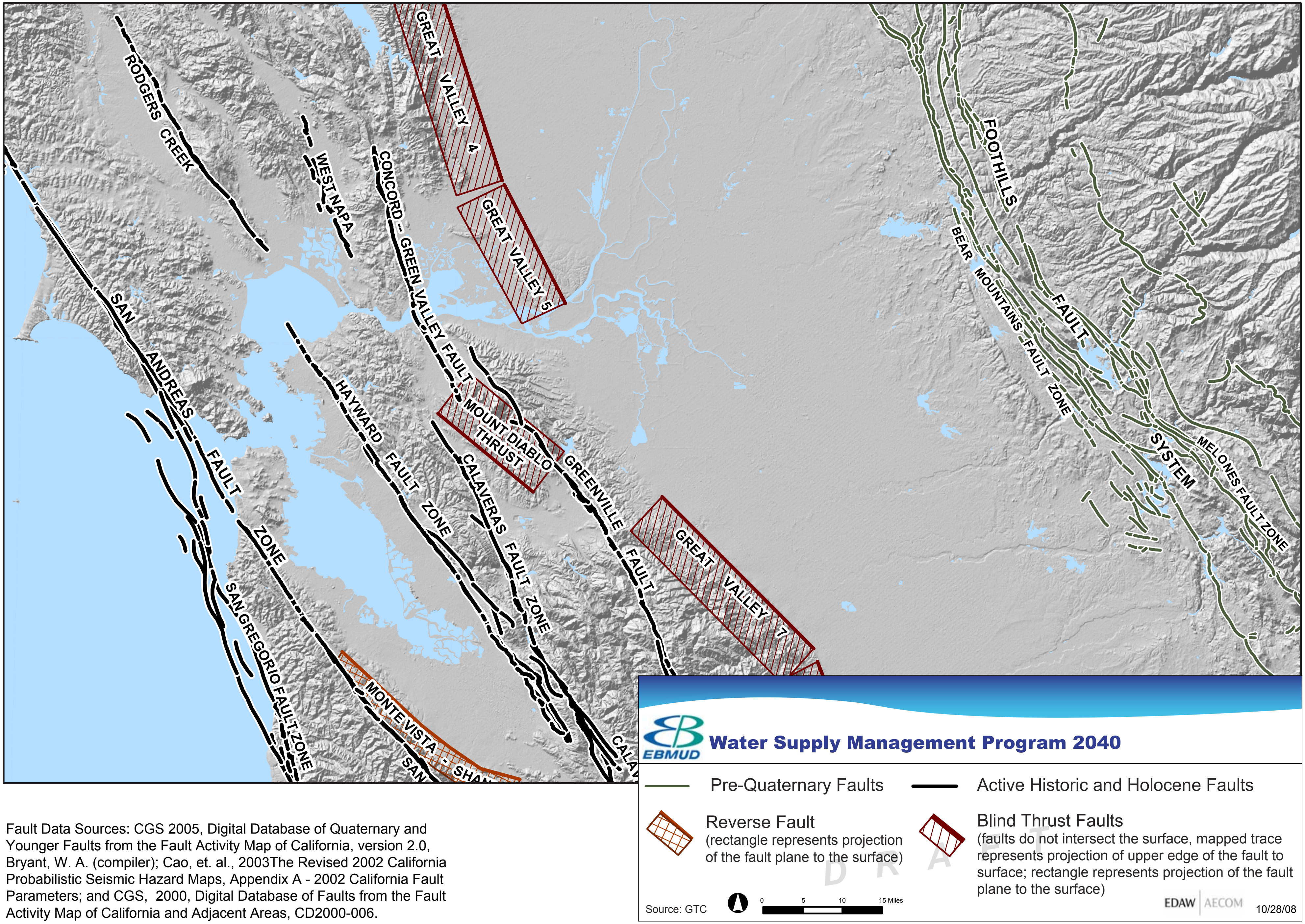
Groundshaking

An earthquake is classified by the amount of energy released, which traditionally has been quantified using the Richter scale. Recently, seismologists have begun using a moment magnitude (M) scale because it provides a more accurate measurement of the size of major and great earthquakes. For earthquakes of less than M 7.0, the moment magnitude and Richter magnitude scales are nearly identical. For earthquake magnitudes greater than M 7.0, readings on the moment magnitude scale are slightly greater than a corresponding Richter magnitude.

The intensity of the seismic shaking, or strong ground motion, during an earthquake is dependent on the distance between a particular area and the epicenter of the earthquake, the magnitude of the earthquake, and the geologic conditions underlying and surrounding that area. Earthquakes occurring on faults closest to the Preferred Portfolio study area would most likely generate the largest ground motions.

Figure 4.2.B-1

Known Faults in the Study Area and Vicinity



Fault Data Sources: CGS 2005, Digital Database of Quaternary and Younger Faults from the Fault Activity Map of California, version 2.0, Bryant, W. A. (compiler); Cao, et. al., 2003The Revised 2002 California Probabilistic Seismic Hazard Maps, Appendix A - 2002 California Fault Parameters; and CGS, 2000, Digital Database of Faults from the Fault Activity Map of California and Adjacent Areas, CD2000-006.

Another commonly used measure of earthquake intensity is the Modified Mercalli Scale, which is a subjective measure of the strength of an earthquake at a particular place as determined by its effects on persons, structures, and earth materials. The Modified Mercalli Scale for Earthquake Intensity is presented Table 4.2.B-1, along with approximate earthquake magnitudes and average peak accelerations associated with each intensity value.

Table 4.2.B-1: Modified Mercalli Scale for Earthquake Intensity

<table>
<tr><th>INTENSITY VALUE</th><th>INTENSITY DESCRIPTION</th><th>APPROXIMATE EARTHQUAKE MAGNITUDE (RICHTER)</th><th>AVERAGE PEAK ACCELERATION</th></tr>
<tr><td>I</td><td>Not felt except by a very few persons under especially favorable circumstances.</td><td>1.0–3.0</td><td rowspan="3"><0.015 g</td></tr>
<tr><td>II</td><td>Felt only by a few persons at rest, especially on upper floors of buildings. Delicately suspended objects may swing.</td><td rowspan="2">3.0–3.9</td></tr>
<tr><td>III</td><td>Felt noticeably indoors, especially on upper floors of buildings, but many people do not recognize it as an earthquake. Standing motor cars may rock slightly, vibration similar to a passing truck. Duration estimated.</td></tr>
<tr><td>IV</td><td>During the day felt indoors by many, outdoors by few. At night, some awakened. Dishes, windows, doors disturbed; walls make cracking sound. Sensation like heavy truck striking building. Standing motor cars rocked noticeably.</td><td rowspan="2">4.0–4.9</td><td>0.015–0.03 g</td></tr>
<tr><td>V</td><td>Felt by nearly everyone, many awakened. Some dishes and windows broken; a few instances of cracked plaster; unstable objects overturned. Disturbances of trees, poles may be noticed. Pendulum clocks may stop.</td><td>0.03–0.08 g</td></tr>
<tr><td>VI</td><td>Felt by all, many frightened and run outdoors. Some heavy furniture moved; and fallen plaster or damaged chimneys. Damage slight.</td><td rowspan="2">5.0–5.9</td><td>0.08–0.15 g</td></tr>
<tr><td>VII</td><td>Everybody runs outdoors. Damage negligible in buildings of good design and construction; slight to moderate in well-built ordinary structures; considerable in poorly built or badly designed structures; some chimneys broken. Noticed by persons driving motor cars.</td><td>0.15–0.25 g</td></tr>
<tr><td>VIII</td><td>Damage slight in specially designed structures; considerable in ordinary substantial buildings, with partial collapse; great in poorly built structures. Panel walls thrown out of frame structures. Fall of chimneys, factory stacks, columns, monuments, walls. Heavy furniture overturned. Sand and mud ejected in small amounts. Changes in well water. Persons driving motor cars disturbed.</td><td>6.0–6.9</td><td>0.25–0.45 g</td></tr>
</table>

Table 4.2.B-1: Modified Mercalli Scale for Earthquake Intensity (continued)

INTENSITY VALUE	INTENSITY DESCRIPTION	APPROXIMATE EARTHQUAKE MAGNITUDE (RICHTER)	AVERAGE PEAK ACCELERATION
IX	Damage considerable in specially designed structures; well-designed frame structures thrown out of plumb; great in substantial buildings, with partial collapse. Buildings shifted off foundations. Ground cracked conspicuously. Underground pipes broken.		0.45–0.60 g
X	Some well-built wooden structures destroyed; most masonry and frame structures destroyed with foundations; ground badly cracked. Rails bent. Landslides considerable from riverbanks and steep slopes. Shifted sand and mud. Water splashed (slopped) over banks.	7.0 and higher	0.60–0.80 g
XI	Few, if any, masonry structures remain standing. Bridges destroyed. Broad fissures in ground. Underground pipelines completely out of service. Earth slumps and land slips in soft ground. Rails bent greatly.		0.80–0.90 g
XII	Damage total. Practically all works of construction are damaged greatly or destroyed. Waves seen on ground surface. Lines of sight and level are distorted. Objects are thrown upward into the air.		>0.90 g
Source: Bolt, 1988			

Fault Rupture

Faults are geologic zones of weakness. Surface rupture occurs when movement on a fault deep within the earth breaks through to the surface. Surface ruptures associated with the 1906 San Francisco earthquake extended for more than 260 miles with displacements of up to 21 feet. However, not all earthquakes result in surface rupture. The Loma Prieta earthquake of 1989 caused major damage in the San Francisco Bay Area, but the fault did not break the ground surface.

Fault rupture almost always follows preexisting faults, which are zones of weakness. Rupture may occur suddenly during an earthquake or slowly in the form of fault creep (fault creep is the slow rupture of the earth's crust). Sudden displacements are more damaging to structures because they are accompanied by shaking.

Liquefaction

Liquefaction is a phenomenon in which saturated granular sediments temporarily lose their shear strength during periods of earthquake-induced, strong groundshaking. The susceptibility of a site to liquefaction is a function of the depth, density, and water content of the granular sediments and the magnitude of earthquakes likely to affect the site. Saturated, unconsolidated silts, sands, silty sands, and gravels within 40 feet of the ground surface are most susceptible to liquefaction (CGS, 2000). Liquefaction-related phenomena include vertical settlement from densification, lateral spreading, ground oscillation, flow failures, loss of bearing strength, subsidence, and buoyancy effects.

Lateral Spreading

Of the liquefaction hazards, lateral spreading generally causes the most damage. This is a phenomenon where large blocks of intact, non-liquefied soil move downslope on a liquefied substrate of large areal extent (Youd et al., 1978; Tinsley et al., 1985). The mass moves toward an unconfined area, such as a descending slope or stream cut bluff, and can occur on slope gradients as gentle as one degree.

Earthquake Induced Settlement

Settlement of the ground surface can be accelerated and accentuated by earthquakes. During an earthquake, settlement can occur as a result of the relatively rapid rearrangement, compaction, and settling of subsurface materials (particularly loose, uncompacted, and variable sandy sediments). Settlement can occur both uniformly and differentially (i.e., where adjoining areas settle at different rates).

Reservoir-Induced Seismicity

In 1945, a relationship was recognized between the level of water impounded at Hoover Dam and the frequency of earthquakes at Lake Mead. The relationship between reservoirs and earthquakes is referred to as reservoir-induced seismicity (RIS). Since 1945, approximately 120 cases of RIS have been reported from the approximately 30,000 reservoirs worldwide. A sequence of earthquakes in August 1975, including foreshock, main shock and numerous aftershocks, occurred 7 miles south of Lake Oroville with several lines of evidence indicating the earthquake timing and location were caused by rapid reservoir level fluctuations at Lake Oroville (Toppozada and Morrison, 1982).

RIS can be influenced by many factors, including reservoir size, reservoir, operation and filling characteristics, and preexisting tectonic stresses (stresses in the surface of the earth's crust). Seasonal water-level fluctuations and reservoir filling rates are two factors that influence tectonic stress changes beneath a reservoir, but reservoir-induced stresses alone are not sufficient to cause earthquakes. Under certain conditions, however, the stress changes caused by reservoir loading could trigger a seismic event in regions where stress conditions are already close to causing an earthquake. The majority of significant cases of RIS are associated with reservoirs that are very large or deep.

In addition most RIS events are of small magnitude and often occur unnoticed. Reservoirs modify the tectonic stress regime by increasing elastic stress during reservoir filling and increasing subsurface pore pressures. For any particular site, the interaction between a reservoir and the geologic environment depends on local geologic and hydrologic conditions.

Tsunami and Seiche

A tsunami is a series of waves of extremely long length created when a body of water, such as an ocean, is rapidly displaced by an earthquake or subsea landslide. Seiche is an oscillation of the surface of a land-locked body of water, mostly due to atmospheric or seismic disturbances. Earthquakes can induce such events. Damage to structures above and below the ground surface can occur due to inundation and erosion.

4.2.B.2 Geologic Hazards

Slope Stability

Slope failures include many phenomena that involve the downslope displacement and movement of material, either triggered by static (i.e., gravity) or dynamic (i.e., earthquake) forces, such as landslides, rock-fall, debris slides, and soil creep. Slope stability depends on a number of complex variables, including the geology, structure, and amount of groundwater, as well as external processes such as climate, topography, slope geometry, and human activity. Landslides and other slope failures may occur on slopes of 15 percent or less; however, the probability is greater on steeper slopes that exhibit old landslide features such as scarps, slanted vegetation, and offset surfaces.

Expansive or Corrosive Soils

Problematic soils, including corrosive and expansive soils, and corrosive saline groundwater, can cause damage to structures, foundations and buried utilities and can also increase required maintenance. Depending on the degree of corrosivity of subsurface soils, concrete and reinforcing steel in concrete structures and bare metal structures exposed to these soils can deteriorate, eventually leading to structural failure. Expansion and contraction of expansive soils in response to changes in moisture content can cause differential and cyclical movements that can cause damage and/or distress to structures and equipment.

Erosion

Construction activities such as grading and excavation can remove stabilizing vegetation and expose areas of loose soil that, if not properly stabilized, can be subject to soil loss and erosion by wind and stormwater runoff. Newly constructed and compacted engineered slopes can also undergo substantial erosion through dispersed sheet flow runoff, and more concentrated runoff can result in the formation of erosional channels and larger gullies, each compromising the integrity of the slope and resulting in significant soil loss.

EBMUD Service Area

Geology

The EBMUD service area is located in the Coast Ranges geomorphic province that extends from Santa Barbara County to the Oregon border. The major geographic features in the San Francisco-East Bay area include the Diablo Range, Santa Cruz Mountains, San Francisco Peninsula, and San Francisco Bay. The region consists of northwest trending mountain ranges, broad basins, and elongated valleys generally parallel to the San Andreas Fault system. In the Coast Ranges, older, consolidated rocks are exposed in the mountains but are buried beneath younger, unconsolidated alluvial fans, fluvial sediments, and bay/estuarine deposits in the valleys and lowlands.

This region is characterized by low-lying terrain extending west to the shoreline, with hilly regions east of the Hayward fault.

Soils

Soils vary in the EBMUD service area depending on location and include clays, silty clays, loams, and muck.

Seismicity

The EBMUD service area is located within the northern portion of the Hayward fault zone (see Figure 4.2.B-1). The fault runs southeast through the cities of San Pablo, El Cerrito and Berkeley (within the service area) and continues to as far southeast as Fremont (outside the service area). The Hayward fault is part of the system collectively known as the San Andreas fault system. The San Andreas fault is the primary component in a complex system of right-lateral, strike-slip faults,[1] including the San Andreas, San Gregorio-Seal Cove, Hayward, and Calaveras faults. The San Andreas, San Gregorio-Seal Cove, Hayward, and Calaveras faults have produced measurable historic ground motion and movement.

The service area is located within Seismic Zone 4,[2] as defined by the California Building Code. The EBMUD service area, like all of the San Francisco Bay area, is situated in a seismically active region near the boundary between two major tectonic plates, the Pacific Plate to the southwest and the North American Plate to the northeast. Since approximately 23 million years ago, about 200 miles of right-lateral slip has occurred

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1 A “right-lateral strike-slip” fault is one in which the block on the opposite fault plane from a fixed spot moves horizontally to the right of that spot.

2 There are four seismic zones within the United States (1 - 4), with 1 being the least susceptible and 4 being the most susceptible to earthquake hazards. All of California lies within either Seismic Zone 3 or 4.

along the San Andreas Fault Zone to accommodate the relative movement between these two plates. The relative movement between the Pacific Plate and the North American Plate generally occurs across a 50 mile zone extending from the San Gregorio fault in the southwest to the Great Valley Thrust Belt[3] to the northeast. In addition to the right lateral slip movement between tectonic plates, a compressional component of relative movement has developed between the Pacific Plate and a smaller segment of the North American Plate at the latitude of San Francisco Bay during the last 3.5 million years (Fenton and Hitchcock, 2001). Strain produced by the relative motions of these plates is relieved by right lateral strike slip faulting on the San Andreas and related faults, and by vertical reverse slip displacement on the Great Valley and other thrust faults in the central California area.

A review of historic earthquake activity from 1800 to 2005 indicates that 13 earthquakes of magnitude M 6.0 or greater have occurred within the San Francisco Bay Area within this time frame. A summary of significant and/or damaging earthquakes is presented in Table 4.2.B-2 below.

Table 4.2.B-2: Significant Historic Earthquakes in Northern California

DATE	EARTHQUAKE MAGNITUDE[A]	NAME, LOCATION, OR REGION AFFECTED	ASSOCIATED FAULT	COMMENTS[B]
June 1838	Assumed between 6.8 and 7.4	San Francisco Area	San Andreas	This earthquake is associated with probable rupture of the San Andreas fault from Santa Clara to San Francisco (approximately 37 miles). Walls were cracked at Mission Dolores and in Monterey.
October 8, 1865	6.5	Santa Cruz Mountains	San Andreas	Caused severe damage in New Almaden, Petaluma, San Francisco, San Jose, Santa Clara, and Santa Cruz resulting in $500,000 in property damage. Ground cracks, heaving, and subsidence were noted in several areas.
October 21, 1868	6.8	Hayward	Hayward	Felt throughout northern California and Nevada. Resulted in 30 deaths and $300,000 in property damage. Occurred on the Hayward fault with rupture from Berkeley to Fremont. Caused severe damage in the East Bay and San Francisco, destroyed Mission San Jose. USGS estimates M7.0.

3 A "thrust belt" is a linear region of the earth's surface that has been subjected to severe thrust faulting, which is a reverse fault with a fault plane inclined at an angle of ≤ 45°.

Table 4.2.B-2: Significant Historic Earthquakes in Northern California (continued)

DATE	EARTHQUAKE MAGNITUDE [a]	NAME, LOCATION, OR REGION AFFECTED	ASSOCIATED FAULT	COMMENTS [b]
June 20, 1897	6.2	Gilroy	Calaveras	Felt from Woodland to San Luis Obispo. Resulted in building collapse in the Santa Clara Valley. Fissures were noted on the Calaveras fault southeast of Gilroy.
April 18, 1906	7.8	San Francisco Earthquake, San Francisco	San Andreas	This earthquake and the resulting fires caused approximately 3,000 deaths and $524 million in damage ($24 million from the earthquake alone). Destruction from this earthquake occurred at distances of up to 350 miles from the epicenter.
July 1, 1911	6.4	Morgan Hill	Calaveras	Located on the Calaveras fault, caused substantial damage in Gilroy and the Santa Clara Valley. Felt as far away as Reno, Nevada.
January 24, 1980	5.8	North of Livermore Valley	Greenville	Occurred on the Greenville fault with surface rupture of approximately nine miles. Resulted in numerous injuries and $11.5 million in property damage (primarily at Lawrence Livermore Laboratory).
April 24, 1984	6.2	Morgan Hill Earthquake, Morgan Hill	Calaveras	Earthquake was felt from San Francisco to Bakersfield and was located near the epicenter of the 1911 earthquake in Morgan Hill. Resulted in injuries and approximately $8 million in property damage.
October 17, 1989	6.9	Loma Prieta Earthquake, Santa Cruz Mountains	San Andreas	Largest earthquake to occur on the San Andreas fault since 1906. Resulted in 63 deaths, more than 3,000 injuries, and an estimated $6 billion in property damage. Severe damage occurred from San Francisco to Monterey and in the East Bay, and included damage and destruction of buildings, roads, bridges, and freeways.

Notes:

[a] Earthquake magnitudes and locations before 1932 are estimated by Real et al., 1978, and Toppozada et al., 1981 and 1982 based on reports of damage and felt effects. Magnitudes reported using the Richter scale.

[b] Earthquake damage information primarily compiled from the National Earthquake Information Center and the Berkeley Seismological Laboratory websites. Estimates of property damage values are in dollars valued to the year of damage.

Central Valley

Geology

The Central Valley area between Sacramento and Stockton is located within California's Great Valley geomorphic province, within Seismic Zone 3[2]. The Great Valley is a Mesozoic-Cenozoic sedimentary basin that formed to the west of the Sierra Nevada, and became filled with sediment from the Sierra mountain range since approximately 160 million years ago (CGS, 2002). The northern section of the Great Valley, north of Stockton, is designated as the Sacramento Valley. Over millions of years, the Sacramento Valley was subjected to many sea level rises and falls. Most recently, since the Neogene period (23.5 to 1.5 million years ago), a fall in sea level has caused the sedimentation of the basin to be nonmarine rocks and alluvial deposits (Beyer, 1988).

This region is characterized by very gently west-sloping terrain of generally low relief except where it is incised by channels of large streams and the American, Sacramento, Cosumnes, and Mokelumne Rivers.

Soils

Central Valley soils are generally silty and sandy loams, while west of Camanche Reservoir, soils are sandy and gravelly loams. In addition, soil maps identify tailings (presumably from gold-rush era placer mining) adjacent to or along the Mokelumne River valley.

Seismicity

The Sacramento Valley has undergone some deformation from earthquakes within the Quaternary period (the last 1.8 million years) (Wong, 1987). Historic earthquakes with magnitudes of 6-6.5 have occurred along the western margin of the valley (McCarthy et al., 1994), but the area has generally been tectonically stable, with erosion and sedimentation being the dominant geologic processes. The concealed Midland fault zone is approximately 23 miles southwest of the Sacramento area, while the Melones and Bear Mountains fault zones (part of the Foothills fault system) are on the eastern edge of the valley in the foothills, approximately 35 miles east of Sacramento (Wagner, et al., 1981).

The largest recorded historic earthquake along the Foothills fault system, in the eastern portion of the valley, was the Oroville earthquake of 1975, with a magnitude of 5.7. This earthquake is generally acknowledged to have resulted from a rapid seasonal fluctuation of the Oroville Reservoir water level, or a reservoir-induced earthquake (Toppozada and Morrison, 1982). The Foothill Fault Zone, a complex series of northwest trending-faults that are related to the Sierra Nevada uplift, and whose activity also is little understood, runs from about Oroville in the north to Fresno in the south. Earthquakes on nearby faults in the zone can be the source of ground shaking in the Sacramento area. The

California Geological Survey considers this fault system to be 'conditionally active' because there is generally a lack of clear evidence of recent activity. The Foothills fault system has a fairly low composite slip rate of 0.05 millimeter per year (mm/yr) with an estimated maximum magnitude earthquake of M6.5 (CGS, 2002) (see Table 4.2.B-1 above). The overall seismicity of the Central Valley area is low.

Upcountry

Geology

The Upcountry area is located within the foothills and highlands of the Sierra Nevada geomorphic province, east of the Central Valley area, within Seismic Zone 3.

The Sierra Nevada form a single tectonic and geomorphic province termed the Sierran Block, which is a block approximately 400 miles long of basement rocks[4] consisting of metamorphosed volcanic and sedimentary rock of Paleozoic and Mesozoic age (143 to 163 million years ago) intruded by Mesozoic age plutons[5]. The tectonic block tilts to the west, and disappears under the sediments of the Great Valley (CGS, 2002). The metamorphic bedrock contains goldbearing veins in the northwest trending Mother Lode.

The Upcountry area is composed of gently rolling slopes in the west to rugged mountain terrain in the east, with elevations as high as 6,000 feet surrounding Lower Bear Reservoir.

Soils

Upcountry soils in the Pardee and Lower Bear Reservoir areas are predominantly rocky and cobbly loams, and rock land.

Seismicity

The Sierran block is characterized by a low level of seismicity; however, a 5.6M earthquake was recorded in 1868, just south of Markleeville in Alpine County. Bedding[6], discontinuities[7], and faults within this block dip in many directions. The bedrock complex of the western Sierra Nevada is separated into three northwest-trending structural blocks by the Melones fault zone and the Bear Mountains fault zone. From east to west, these three structural blocks are the Calaveras Terrane (east of the Melones fault zone), the Placerville Belt, and the Western Belt, which abuts the Bear Mountains fault zone on the west.

[4] Basement rocks are defined as any metamorphic or igneous rocks (regardless of age) which are unconformably overlain by a sedimentary sequence.

[5] Plutons are igneous rocks which have consolidated from a melted state at a great depth from the surface.

[6] Bedding is defined as distinct layers of rock that form beds.

[7] Discontinuities are defined as an uneven surface between two layers of rock or sediment that represents either an interruption in the deposition of the layers or a displacement of one or both layers relative to each other.

4.2.B.3 Setting for Preferred Portfolio Components

Rationing

Rationing would be enforced within the EBMUD service area. The description of the EBMUD service area above presents the regional geologic setting applicable to this component.

Conservation

Conservation would be implemented within the EBMUD service area. The description of the EBMUD service area above presents the regional geologic setting applicable to this component.

Recycled Water

The precise locations of the recycled water projects within the EBMUD service area have not yet been determined. The regional description of the EBMUD service area above presents the regional geologic setting applicable to this component.

Northern California Water Transfers

The precise sources of water transfers have not yet been identified, but could occur in various counties (Yuba, Colusa, Glenn, Plumas, and Sacramento as an example) in the Sacramento Valley. Please see the regional setting for Central Valley and Upcountry for regional geologic setting applicable to this component.

Bayside Groundwater Project Phase 2

One of three sites where well facilities would be constructed is the Bayside Groundwater Project Phase 1 site. The other two well sites have not yet been identified and could be located within a broader area, including San Lorenzo, San Leandro, and the southern part of Oakland. The Bayside Groundwater Project Phase 1 site is shown in Figure 3-7 in Chapter 3.

The South East Bay Plain (SEBP) groundwater basin consists of unconsolidated sediments of Quaternary age. Water-bearing deposits include the early Pleistocene Santa Clara Formation, the late Pleistocene Alameda Formation, the early Holocene Temescal Formation, and Artificial Fill. The cumulative thickness of the unconsolidated sediments is about 1,000 feet (CRWQCB, 1999).

Sacramento Basin Groundwater Banking / Exchange

The precise locations of the proposed facilities needed for this component have not yet been identified but would be within Sacramento County. Please see the regional setting for the Central Valley for a general discussion of the geology, soils, and seismicity applicable to this component.

Regional Desalination

The proposed Regional Desalination facility would most likely be sited along the south shoreline of Suisun Bay (see Figure 3-8 in Chapter 3). This area consists of Holocene bay mud and artificial fill. The bay mud is composed of unconsolidated, water-saturated, dark plastic clay and silty clay rich in organic material with local lenses of well-sorted silt and sand and some beds of peat. The Holocene bay mud unit is mostly underlain by various Pleistocene deposits ranging in composition from weakly to moderately consolidated, poorly sorted, irregularly interbedded clay, silt, sand, and gravel to loose, well-sorted, fine- to medium-grained sand with subordinate silt (Helley, 1979).

The Concord-Green Valley fault system is located on the western border of the Regional Desalination project area. The fault, which is the easternmost strike-slip fault of larger San Andreas system in the San Francisco Bay Area, is characterized by aseismic creep[8] and is considered an active fault[9] (Bryant, 2002).

Enlarge Pardee Reservoir

Pardee Reservoir is located in the western Sierra Nevada, near the eastern margin of the Central Valley (see Figures 3-9 and 3-10 in Chapter 3). Bedrock in the western Sierra Nevada is sheared and faulted as a result of deformation that most likely occurred during the Mesozoic age. The reservoir is located within the Bear Mountains fault zone, bordered on the west by the Ione and Water Peak faults, and on the east by the Devil's Gate and Youngs Creek faults (FRWA, 2003; Wagner, 1981).

Enlarge Lower Bear Reservoir

The 727-acre Lower Bear Reservoir is located in the Sierra Nevada geomorphic province in the El Dorado National Forest, approximately 37 miles northeast of Pardee Reservoir (see Figure 3-11 in Chapter 3). Surrounded by Mesozoic granitic rocks, and Quaternary glacial deposits, the reservoir is part of the Bear River which flows into the Mokelumne River (Wagner, 1981).

The Melones fault zone is approximately 32 miles southwest of Lower Bear Reservoir. In addition, there is a fault system within the Sierra Nevada approximately 17 miles to the northwest in close proximity to the Upper and Lower Blue Lake area within Pliocene volcanics (Koenig, 1963).

Please see the regional setting for the Upcountry area for a general discussion of the seismicity applicable to this component.

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[8] A seismic creep is measurable surface displacement along a fault in the absence of notable earthquakes.

[9] An active fault is a fault which shows evidence of movement within the last 11,000 years.

IRCUP / San Joaquin Groundwater Banking / Exchange

The precise locations of the proposed facilities needed for this component have not yet been identified but would most likely be located within the counties of Alpine, Amador, Calaveras and San Joaquin (see Figure 3-12 in Chapter 3). Please see the regional setting for the Central Valley and Upcountry area for a general discussion of the seismicity applicable to this component.

4.2.B.4 Regulatory Setting

Geologic resources and hazards fall primarily within State and local jurisdictions. Seismic hazards are addressed by State and local requirements for identifying and avoiding faults when considering new development.

Federal Regulations

Seismic Hazard Mapping Act

The Seismic Hazard Mapping Act was passed in 1990, following the Loma Prieta earthquake, to reduce threats to public health and safety and to minimize property damage caused by earthquakes. The Act directs the California Department of Conservation – Geological Survey to identify and map areas prone to the earthquake hazards of liquefaction, earthquake induced landslides, and amplified groundshaking. Information provided by the mapping conducted under this act is only used as a tool for identification of potential hazards. The act requires site specific geotechnical investigations to identify potential seismic hazards and formulate mitigation measures prior to permitting most developments designed for human occupancy within the Zones of Required Investigation. Generally, only components that require operators to occupy buildings would be considered as occupied structures that must comply with the Seismic Hazard Mapping Act.

As of January 2006, 110 official seismic hazard zone maps showing areas prone to liquefaction and landslides had been published in California, and more are scheduled in the future. Most of the mapping has been performed in Southern California and the San Francisco Bay Area. Twenty-two official maps for the San Francisco Bay Area have been released, with preparation of 19 additional maps for San Mateo, Santa Clara, Alameda, and Contra Costa Counties planned or in progress. Seismic Hazard Maps for some of the EBMUD Service Area have been published, however, no maps are available for the Central Valley and Upcountry areas.

Uniform Building Code

The Uniform Building Code (UBC) contains engineering and design code requirements that address seismic safety for new construction. During the early 1970s and late 1980s, the UBC seismic design criteria underwent significant changes, which have reduced the risks associated with seismic activity. Requirements for evaluating expansive soil and specifying foundation design and construction standards to protect against damage from expansive soil are also contained in the UBC.

State Regulations

Alquist-Priolo Earthquake Fault Zoning Act

The Alquist-Priolo Earthquake Fault Zoning Act was passed in 1972, to mitigate the hazard of surface faulting to structures built for human occupancy. In accordance with this Act, the State Geologist established regulatory zones called “earthquake fault zones”, which average from about 200 to 500 feet on either side of the surface trace of active faults, and published maps showing these zones. Within these zones, buildings for human occupancy cannot be constructed across the surface trace or within 50 feet of active faults. Generally, project components would not be subject to the requirements of this act because no project facilities would be classified as buildings for human occupancy. However, facilities that require site personnel to occupy buildings for more than 2,000 hours per year may be considered applicable to the Act. Consequently, the Regional Desalination plant may be subject to the requirements of the Act if the final site is within the Green Valley/Concord “earthquake fault zone”.

California Building Code

The 2001 California Building Code (CBC) is based on the 1997UBC, with the addition of more extensive structural seismic provisions. The CBC is contained in the California Code of Regulations (CCR), Title 24, or the California Building Standards Code, and is a compilation of three types of building standards from three different origins, as follows:

- Building standards that have been adopted by State agencies without change from building standards contained in national model codes;
- Building standards that have been adopted and adapted from the national model code standards to meet California conditions; and
- Building standards, authorized by the California legislature, that constitute extensive additions not covered by the model codes that have been adopted to address particular California concerns.

Title 24, Part 2, Volume 2, Chapter 16 of the CCR contains definitions of seismic sources and the procedure used to calculate seismic forces on structures. The CBC covers grading and other geotechnical issues, building specifications, and nonbuilding structures. The project would include these types of improvements, and CBC would be applicable. However, the Building Seismic Safety Council (BSSC) acknowledges that tunnels and other lifeline facilities are not typical nonbuilding structures and are covered by other well established industry design criteria. Such facilities, therefore, are not typically under the jurisdiction of local building officials, and require technical considerations beyond the scope of the CBC (BSSC, 2003).

Division of Safety of Dams (DSOD)

The Department of Water Resources, with regulatory power from the California Water Code, delegates dam safety to the Division of Safety of Dams (DSOD) to protect people against loss of life and property from dam failure. DSOD engineers and engineering geologists review and approve plans and specifications for the design of dams and oversee their construction to ensure compliance with the approved plans and specifications. Geologic and seismic reviews include site geology, seismic setting, geologic/geotechnical site investigations, construction material evaluation, and seismic dam stability. In addition, Division engineers inspect existing dams on a yearly schedule to ensure they are performing and being maintained in a safe manner.

Regional/Local Regulations

Relevant goals and policies from local general plans related to geology, soils, and seismicity are summarized in Appendix B.

4.2.C Biological Resources

The California Natural Diversity Data Base (CNDDB) (CDFG 2008f) was reviewed for the most recent distribution information for special-status plant, wildlife and fish species within the WSMP 2040 Preferred Portfolio Study Area. Information on special-status plant species was compiled through a review of the following:

- California Native Plant Society Inventory of Rare and Endangered Plants of California (CNPS 2001, 2008);
- California Department of Fish and Game (CDFG) State and Federally Listed Endangered, Threatened, and Rare Plants of California (CDFG 2008e);
- CDFG Special Vascular Plants, Bryophytes, and Lichens List (CDFG 2008c);
- U.S. Fish and Wildlife Service (USFWS) Endangered and Threatened Wildlife and Plants; Proposed Rule (USFWS 1996a, 1997, 2001, 2004b);
- Sacramento Fish and Wildlife Office, USFWS Federal Endangered and Threatened Species List for the region (USFWS 2008);
- Status of Rare, Threatened and Endangered Vascular Plants in Alameda and Contra Costa Counties (Olson 1994); and
- Unusual and Significant Plants of Alameda and Contra Costa Counties (Lake 2001).

Information on special-status wildlife and fish species was compiled through a review of the following:

- California Natural Diversity Data Base (CDFG 2008f);
- CDFG State and Federally Listed Endangered and Threatened Animals of California (CDFG 2008d);
- CDFG Special Animals List (CDFG 2008b);
- USFWS Endangered and Threatened Wildlife and Plants; Proposed Rule (USFWS 1996a, 1997, 2001, 2004b); and
- USFWS Federal Endangered and Threatened Species List for the region (USFWS 2008).

The WSMP 2040 Preferred Portfolio Study Area spans a large geographic area throughout northern California that contains a wide variety of terrestrial and aquatic habitats and plant, wildlife and fish species. Habitats and species with the potential to occur within the Study Area are identified in this section. Further information is presented in Appendix C.

4.2.C.1 Sensitive Natural Communities

Sensitive natural communities are those that are considered rare in the region, support special-status plant or wildlife species, or receive regulatory protection (i.e., Section 404 of the Clean Water Act and/or the Sections1600 et seq. of the California Fish and Game Code). In addition, the CNDDB has designated a number of communities as rare (Holland 1986, CDFG 2008a).

Aquatic communities may fall under State and/or Federal jurisdiction as wetlands or other waters. Natural communities occurring within the WSMP 2040 Preferred Portfolio Study Area are listed in Table 4.2.C-1 and described in more detail in Appendix C.

Vegetation Communities

Table 4.2.C-1: Vegetation Communities/Habitats Potentially Occurring within the WSMP 2040 Preferred Portfolio Study Area

VEGETATION COMMUNITY	REGIONAL OCCURRANCE		
	EBMUD Service Area	Central Valley	Upcountry
Agricultural		X	X
Ruderal/Disturbed	X	X	X
California Annual Grassland	X	X	X
Valley Needlegrass Grassland[a]	X	X	X
Serpentine Bunch Grass[a]	X	X	
Alkali Seep[a]/Alkali Meadow[a]/Alkali Grassland[a]		X	
Coastal Brackish Marsh*/ Saline Emergent Wetland	X	X	
Northern Coast Salt Marsh[a]	X	X	
Freshwater Marsh/ Perennial Wetland/ Seasonal Wetland[a]	X	X	X
Northern Claypan and Hardpan Vernal Pool[a]		X	X
Elderberry Savannah[a]		X	X
Northern Maritime and Ione Chaparral[a] /Coastal Scrub	X	X	X
Great Valley Riparian Forest[a] /Willow Scrub	X	X	
Riparian Scrub/ Riparian Woodland	X	X	X
Oak Woodland (Coastal Live Oak Woodland / Valley Oak Woodland[a]/ Blue Oak Woodland)	X	X	X
Eucalyptus Woodland	X	X	X
Montane Hardwood/ Big Tree Forest[a]		X	X
Redwood	X		
Mixed Pine Forest		X	X
Foothill Pine Woodland	X	X	X
Riverine Habitat	X	X	X
Laucustrine Aquatic Habitat	X	X	X

Notes:
[a] Sensitive as designated by CNDDB (Holland 1986)
Please see Appendix C for a description of these communities.
Source: CNDDB 2008.

Special-Status Plants

Special-status plant species include those listed as endangered, threatened, rare or those species proposed for listing by USFWS, (1996, 1997, 2001, 2004b), CDFG (2008c, 2008e) and the California Native Plant Society (2001, 2008). The California Native Plant Society listing is sanctioned by CDFG and serves essentially as its list of "candidate" plant species. California Native Plant Society List 1B and List 2 species are considered eligible for State listing as endangered or threatened under the California Department of Fish and Game Code. Such species should be fully considered during preparation of environmental documents subject to the California Environmental Quality Act (CEQA). California Native Plant Society List 3 and List 4 species are considered to be either plants for which more information is needed or are uncommon enough that their status should be regularly monitored. Such plants may be eligible or may become eligible for State listing, and the California Native Plant Society and CDFG recommend that these species be evaluated for consideration during the preparation of CEQA documents.

Special-status plant species with potential to occur in the WSMP 2040 Preferred Portfolio Study Area are listed in Table 4.2.C-2. Brief descriptions of these species are presented in Appendix C.

Table 4.2.C-2: Special-Status Plant Species Potentially Occurring in the WSMP 2040 Preferred Portfolio Study Area

COMMON NAME	SCIENTIFIC NAME	FEDERAL LISTING STATUS	STATE LISTING STATUS	REGIONAL OCCURENCE		
				EBMUD SERVICE AREA	CENTRAL VALLEY	UPCOUNTRY
Adobe-lily	*Fritillaria pluriflora*		1B.2		X	
Ahart's dwarf rush	*Juncus leiospermus* var. *ahartii*		1B.2		X	
Alkali milk-vetch	*Astragalus tener* var. *tener*		1B.2	X	X	
Antioch Dunes evening-primrose	*Oenothera deltoides* ssp. *howellii*	Endangered	Endangered 1B.1	X	X	
Baker's navarretia	*Navarretia leucocephala* ssp. *bakeri*		1B.1		X	
Beach layia	*Layia carnosa*	Endangered	Endangered 1B.1	X		
Beaked clarkia	*Clarkia rostrata*		1B.3		X	
Bent-flowered fiddleneck	*Amsinckia lunaris*		1B.2	X	X	

Table 4.2.C-2: Special-Status Plant Species Potentially Occurring in the WSMP 2040 Preferred Portfolio Study Area (continued)

COMMON NAME	SCIENTIFIC NAME	FEDERAL LISTING STATUS	STATE LISTING STATUS	REGIONAL OCCURENCE		
				EBMUD SERVICE AREA	CENTRAL VALLEY	UPCOUNTRY
Big tarplant	*Blepharizonia plumosa*		1B.1	X	X	
Big-scale balsamroot	*Balsamorhiza macrolepis* var. *macrolepis*		1B.2	X	X	
Bisbee Peak rush-rose	*Helianthemum suffrutescens*		3.2		X	X
Blue coast gilia	*Gilia capitata* ssp. *Chamissonis*		1B.1	X		
Boggs Lake hedge-hyssop	*Gratiola heterosepala*		Endangered 1B.2		X	
Bolander's horkelia	*Horkelia bolanderi*		1B.2		X	
Brandegee's clarkia	*Clarkia biloba* ssp. *brandegeeae*		1B.2		X	
Brandegee's eriastrum	*Eriastrum brandegeeae*		1B.2		X	
Brazilian watermeal	*Wolffia brasiliensis*		2.3		X	
Brewer's western flax	*Hesperolinon breweri*		1B.2	X		
Bristly sedge	*Carex comosa*		2.1	X	X	
Brittlescale	*Atriplex depressa*		1B.2		X	
Brown fox sedge	*Carex vulpinoidea*		2.2		X	
California seablite	*Suaeda californica*	Endangered	1B.1	X		
Caper-fruited tropidocarpum	*Tropidocarpum capparideum*		1B.1	X	X	
Carquinez goldenbush	*Isocoma arguta*		1B.1		X	
Chaparral harebell	*Campanula exigua*		1B.2	X		
Chaparral ragwort	*Senecio aphanactis*		Rare	X		
Chinese Camp brodiaea	*Brodiaea pallida*	Threatened	Endangered 1B.1		X	
Choris' popcorn-flower	*Plagiobothrys chorisianus* var. *chorisianus*		1B.2	X		

Table 4.2.C-2: Special-Status Plant Species Potentially Occurring in the WSMP 2040 Preferred Portfolio Study Area (continued)

COMMON NAME	SCIENTIFIC NAME	FEDERAL LISTING STATUS	STATE LISTING STATUS	REGIONAL OCCURENCE		
				EBMUD SERVICE AREA	CENTRAL VALLEY	UPCOUNTRY
Coastal bluff morning-glory	*Calystegia purpurata* ssp. *Saxicola*		1B.2	X		
Coastal triquetrella	*Triquetrella californica*		1B.2	X		
Cobb Mountain lupine	*Lupinus sericatus*		1B.2		X	
Colusa grass	*Neostapfia colusana*	Threatened	Endangered 1B.1		X	
Colusa layia	*Layia septentrionalis*		1B.2		X	
Congdon's tarplant	*Centromadia parryi* ssp. *congdonii*		1B.2	X		
Contra Costa goldfields	*Lasthenia conjugens*	Endangered	1B.1	X		
Contra Costa manzanita	*Arctostaphylos manzanita* ssp. *Laevigata*		1B.2	X		
Coulter's goldfields	*Lasthenia glabrata* ssp. *coulteri*		1B.1		X	
Deep-scarred cryptantha	*Cryptantha excavata*		1B.3		X	
Delta button-celery	*Eryngium racemosum*		Endangered 1B.1		X	
Delta mudwort	*Limosella subulata*		2.1		X	
Delta tule pea	*Lathyrus jepsonii* var. *jepsonii*		1B.2	X	X	
Diablo helianthella	*Helianthella castanea*		1B.2	X		
Diamond-petaled California poppy	*Eschscholzia rhombipetala*		1B.1		X	
Dimorphic snapdragon	*Antirrhinum subcordatum*		4.3		X	
Drymaria-like western flax	*Hesperolinon drymarioides*		1B.2		X	
Dwarf downingia	*Downingia pusilla*		2.2		X	
Dwarf soaproot	*Chlorogalum pomeridianum* var. *minus*		1B.2		X	

Table 4.2.C-2: Special-Status Plant Species Potentially Occurring in the WSMP 2040 Preferred Portfolio Study Area (continued)

COMMON NAME	SCIENTIFIC NAME	FEDERAL LISTING STATUS	STATE LISTING STATUS	REGIONAL OCCURENCE		
				EBMUD SERVICE AREA	CENTRAL VALLEY	UPCOUNTRY
Ferris' milk-vetch	*Astragalus tener* var. *ferrisiae*		1B.1		X	
Fragrant fritillary	*Fritillaria liliacea*		1B.2	X		
Franciscan thistle	*Cirsium andrewsii*		1B.2	X		
Green jewel-flower	*Streptanthus breweri* var. *hesperidis*		1B.2		X	
Greene's tuctoria	*Tuctoria greenei*	Endangered	Rare 1B.1		X	
Hairless popcorn-flower	*Plagiobothrys glaber*		1A	X		
Hairy orcutt grass	*Orcuttia pilosa*	Endangered	Endangered 1B.1		X	
Hall's bush-mallow	*Malacothamnus hallii*		1B.2	X		
Hall's harmonia	*Harmonia hallii*		1B.2		X	
Heartscale	*Atriplex cordulata*		1B.2		X	
Heckard's pepper-grass	*Lepidium latipes* var. *heckardii*		1B.2		X	
Henderson's bent grass	*Agrostis hendersonii*		3.2		X	
Hoover's calycadenia	*Calycadenia hooveri*		1B.3		X	
Hoover's spurge	*Chamaesyce hooveri*	Threatened	1B.2		X	
Hospital Canyon larkspur	*Delphinium californicum* ssp. *interius*		1B.2		X	
Indian Valley brodiaea	*Brodiaea coronaria* ssp. *rosea*		Endangered 1B.1		X	
Ione buckwheat	*Eriogonum apricum* var. *apricum*	Endangered	Endangered 1B.1		X	X
Ione manzanita	*Arctostaphylos myrtifolia*	Threatened	1B.2		X	X
Irish Hill buckwheat	*Eriogonum apricum* var. *prostratum*	Endangered	Endangered 1B.1		X	
Jepson's milk-vetch	*Astragalus rattanii* var. *jepsonianus*		1B.2		X	

Table 4.2.C-2: Special-Status Plant Species Potentially Occurring in the WSMP 2040 Preferred Portfolio Study Area (continued)

COMMON NAME	SCIENTIFIC NAME	FEDERAL LISTING STATUS	STATE LISTING STATUS	REGIONAL OCCURENCE		
				EBMUD SERVICE AREA	CENTRAL VALLEY	UPCOUNTRY
Kellogg's horkelia	*Horkelia cuneata* ssp. *Sericea*		1B.1	X		
Konocti manzanita	*Arctostaphylos manzanita* ssp. *elegans*		1B.3		X	
Large-flowered fiddleneck	*Amsinckia grandiflora*	Endangered	Endangered 1B.1	X	X	
Layne's butterweed	*Senicio layneae*	Threatened			X	
Legenere	*Legenere limosa*		1B.1		X	
Lemmon's jewelflower	*Caulanthus coulteri* var. *lemmonii*		1B.2		X	
Loma Prieta hoita	*Hoita strobilina*		1B.1	X		
Long-leaved starwort	*Stellaria longifolia*		2.2		X	
Marin western flax	*Hesperolinon congestum*	Threatened	Threatened 1B.1	X		
Mariposa cryptantha	*Cryptantha mariposae*		1B.3		X	
Marsh checkerbloom	*Sidalcea oregana* ssp. *hydrophila*		1B.2		X	
Marsh skullcap	*Scutellaria galericulata*		2.2		X	
Mason's lilaeopsis	*Lilaeopsis masonii*		Rare 1B.1	X	X	
Milo Baker's lupine	*Lupinus milo-bakeri*		Threatened 1B.1		X	
Most beautiful jewel-flower	*Streptanthus albidus* ssp. *Peramoenus*		1B.1	X		
Mt. Diablo buckwheat	*Eriogonum truncatum*		1B.1	X		
Mt. Diablo fairy-lantern	*Calochortus pulchellus*		1B.2	X		
Mt. Diablo jewel-flower	*Streptanthus hispidus*		2.2	X		
Mt. Diablo manzanita	*Arctostaphylos auriculat*		1B.3	X		
Mt. Diablo phacelia	*Phacelia phacelioides*		1B.2	X		

Table 4.2.C-2: Special-Status Plant Species Potentially Occurring in the WSMP 2040 Preferred Portfolio Study Area (continued)

COMMON NAME	SCIENTIFIC NAME	FEDERAL LISTING STATUS	STATE LISTING STATUS	REGIONAL OCCURENCE		
				EBMUD SERVICE AREA	CENTRAL VALLEY	UPCOUNTRY
Norris' beard moss	*Didymodon norrisii*		2.2		X	
Northern California black walnut	*Juglans hindsii*		1B.1	X	X	
Oregon fireweed	*Epilobium oreganum*		1B.2		X	
Oregon meconella	*Meconella oregano*		1B.1	X		
Oval-leaved viburnum	*Viburnum ellipticum*		2.3	X		
Pallid manzanita	*Arctostaphylos pallida*	Threatened	Endangered 1B.1	X		
Palmate-bracted bird's-beak	*Cordylanthus palmatus*	Endangered	Endangered 1B.1		X	
Pappose tarplant	*Centromadia parryi* ssp. *parryi*		1B.2		X	
Parry's horkelia	*Horkelia parryi*		1B.2		X	X
Pincushion navarretia	*Navarretia myersii* ssp. *myersii*		1B.1		X	X
Pink creamsacs	*Castilleja rubicundula* ssp. *rubicundula*		1B.2		X	
Pleasant Valley mariposa-lily	*Calochortus clavatus* var. *avius*		1B.2		X	X
Point Reyes bird's-beak	*Cordylanthus maritimus* ssp. *Palustris*		1B.2	X		
Prairie wedge grass	*Sphenopholis obtusata*		2.2		X	X
Presidio clarkia	*Clarkia franciscana*	Endangered	Endangered 1B.1	X		
Recurved larkspur	*Delphinium recurvatum*		1B.2		X	
Red Hills soaproot	*Chlorogalum grandiflorum*		1B.2		X	
Red Mountain catchfly	*Silene campanulata* ssp. *campanulata*		Endangered 4.2		X	
Red-flowered bird's-foot-trefoil	*Lotus rubriflorus*		1B.1		X	

Table 4.2.C-2: Special-Status Plant Species Potentially Occurring in the WSMP 2040 Preferred Portfolio Study Area (continued)

COMMON NAME	SCIENTIFIC NAME	FEDERAL LISTING STATUS	STATE LISTING STATUS	REGIONAL OCCURENCE		
				EBMUD SERVICE AREA	CENTRAL VALLEY	UPCOUNTRY
Robust monardella	*Monardella villosa* ssp. *Globosa*		1B.2	X		
Robust spineflower	*Chorizanthe robusta* var. *robusta*	Endangered	1B.1	X		
Rose leptosiphon	*Leptosiphon rosaceus*		1B.1	X		
Round-leaved filaree	*California macrophylla*		1B.1	X	X	
Sacramento orcutt grass	*Orcuttia viscida*	Endangered	Endangered 1B.1		X	
Saline clover	*Trifolium depauperatum* var. *hydrophilum*		1B.2	X		
San Francisco Bay spineflower	*Chorizanthe cuspidata* var. *cuspidate*		1B.2	X		
San Francisco popcorn-flower	*Plagiobothrys diffuses*		Endangered 1B.1	X		
San Joaquin spearscale	*Atriplex joaquiniana*		1B.2	X	X	
Sanford's arrowhead	*Sagittaria sanfordii*		1B.2		X	
Santa Clara red ribbons	*Clarkia concinna* ssp. *Automixa*		4.3	X		
Santa Cruz tarplant	*Holocarpha macradenia*	Threatened	Endangered 1B.1	X		
Scabrid alpine tarplant	*Anisocarpus scabridus*		1B.3		X	
Scalloped moonwort	*Botrychium crenulatum*		2.2		X	
See individual subspecies!	*Streptanthus morrisonii*				X	
Showy golden madia	*Madia radiata*		1B.1		X	
Side-flowering skullcap	*Scutellaria lateriflora*		2.2		X	
Slender orcutt grass	*Orcuttia tenuis*	Threatened	Endangered 1B.1		X	

Table 4.2.C-2: Special-Status Plant Species Potentially Occurring in the WSMP 2040 Preferred Portfolio Study Area (continued)

COMMON NAME	SCIENTIFIC NAME	FEDERAL LISTING STATUS	STATE LISTING STATUS	REGIONAL OCCURENCE		
				EBMUD SERVICE AREA	CENTRAL VALLEY	UPCOUNTRY
Slender silver moss	*Anomobryum julaceum*		2.2	X		
Slender-leaved pondweed	*Potamogeton filiformis*		2.2	X		
Slough thistle	*Cirsium crassicaule*		1B.1		X	
Small-flowered calycadenia	*Calycadenia micrantha*		1B.2		X	
Snow Mountain buckwheat	*Eriogonum nervulosum*		1B.2		X	
Snow Mountain willowherb	*Epilobium nivium*		1B.2		X	
Soft bird's-beak	*Cordylanthus mollis* ssp. *mollis*	Endangered	1B.2	X	X	
Sonoma canescent manzanita	*Arctostaphylos canescens* ssp. *sonomensis*		1B.2		X	
Spiny-sepaled button-celery	*Eryngium spinosepalum*		1B.2		X	
Stebbins' lomatium	*Lomatium stebbinsii*		1B.1		X	X
Stony Creek spurge	*Chamaesyce ocellata* ssp. *rattanii*		1B.2		X	
Succulent owl's-clover	*Castilleja campestris* ssp. *succulenta*	Threatened	Endangered 1B.2		X	
Suisun Marsh aster	*Symphyotrichum lentum*		1B.2	X	X	
Tehama County western flax	*Hesperolinon tehamense*		1B.3		X	
Three-bracted onion	*Allium tribracteatum*		1B.2		X	
Tiburon buckwheat	*Eriogonum luteolum* var. *caninum*		1B.2	X		
Tiburon jewel-flower	*Streptanthus niger*	Endangered	Endangered 1B.3	X		
Tiburon mariposa-lily	*Calochortus tiburonensis*	Threatened	Threatened 1B.1	X		

Table 4.2.C-2: Special-Status Plant Species Potentially Occurring in the WSMP 2040 Preferred Portfolio Study Area (continued)

COMMON NAME	SCIENTIFIC NAME	FEDERAL LISTING STATUS	STATE LISTING STATUS	REGIONAL OCCURENCE		
				EBMUD SERVICE AREA	CENTRAL VALLEY	UPCOUNTRY
Tiburon paintbrush	*Castilleja affinis* ssp. *Neglecta*	Endangered	Threatened 1B.2	X		
Tongue-leaf copper moss	*Scopelophila cataractae*		2.2		X	
Tracy's eriastrum	*Eriastrum tracyi*		Rare 1B.2		X	
Tuolumne button-celery	*Eryngium pinnatisectum*		1B.2		X	
Two-fork clover	*Trifolium amoenum*	Endangered	1B.1	X		
Vernal pool smallscale	*Atriplex persistens*		1B.2		X	
Western leatherwood	*Dirca occidentalis*		1B.2	X		
Whipple's monkeyflower	*Mimulus whipplei*		1A		X	
White-rayed pentachaeta	*Pentachaeta bellidiflora*	Endangered	Endangered	X		
Woolly rose-mallow	*Hibiscus lasiocarpus*		2.2		X	
Wright's trichocoronis	*Trichocoronis wrightii* var. *wrightii*		2.1		X	
Yellow-lip pansy monkeyflower	*Mimulus pulchellus*		1B.2		X	

Notes:
1B = (CNPS) Eligible for State listing, CEQA review
2 = (CNPS) Eligible for State listing, not rare outside California, CEQA review
3 = (CNPS) Review list, more information needed, recommended for CEQA review
4 = (CNPS) Watch list, recommended for CEQA review
Source: CNDDB 2008, USFWS 2008, CNPS 2008.

Special-Status Wildlife and Fish

Special-status animal species include those listed by USFWS under the Federal Endangered Species Act (FESA) (CDFG, 1996, 1997, 2001, 2004b) and NMFS under the FESA (CDFG, 1996, 1997, 2001, 2004) and by CDFG under the California Endangered Species Act (CESA) (CDFG, 2008b, 2008d). USFWS officially lists species as either threatened, endangered, or as Candidates for listing. Additional species receive Federal protection under the Bald Eagle Protection Act (e.g., bald eagle, golden eagle), the Migratory Bird Treaty Act (MBTA) and State protection under CEQA Section 15380(d). All birds, except European starlings, English house sparrows, rock doves (pigeons), and non-migratory game birds such as quail, pheasant, and grouse, are protected under the Migratory Bird Treaty Act. However, non-migratory game birds are protected under California Fish and Game Code Section 3503. Many other species are considered by CDFG to be California Species of Special Concern, listed in Williams (1986), CDFG (2008b), CDFG (2008g), and Shuford and Gardali 2008, and others are on a CDFG Watch List (CDFG 2008b). In addition, CDFG's California Natural Diversity Data Base tracks species within California for which there is conservation concern, including many which are not formally listed, and assigns them a CNDDB Rank (CDFG 2008b). Although California Species of Special Concern, CDFG Watch List species, and species that are tracked by the CNDDB but not formally listed are afforded no official legal status, they may receive special consideration during the CEQA review process. CDFG further classifies some species under the following categories: "Fully Protected", "Protected birds" (CDFG Code Section 3511), "Protected mammals" (CDFG Code Section 4700), "Protected amphibian" (CDFG Code Section 5050 and Chapter 5, Section 41), "Protected reptile" (CDFG Code Section 5050 and Chapter 5, Section 42), and "Protected fish" (CDFG Code Section 5515). The designation "Protected" indicates that a species may not be taken or possessed except under special permit from CDFG; "Fully Protected" indicates that a species can be taken for scientific purposes by permit only (CDFG 2008b). The Fish and Game Code Sections3503, 3505, and 3800 prohibits the take, destruction or possession of any bird, nest or egg of any bird except English house sparrows and European starlings unless express authorization is obtained from CDFG.

Special-status wildlife species with potential to occur in the WSMP 2040 Preferred Portfolio Study Area are listed in Table 4.2.C-3. Brief descriptions of these species are presented in Appendix C.

Special-status fish species are legally protected or are otherwise considered sensitive by Federal, State, or local resource conservation agencies and organizations. A total of 10 special-status fish species occur or have the potential to occur in the WSMP 2040 Preferred Portfolio Study Area (see Table 4.2.C-4). Of the 10 species, Central Valley steelhead Evolutionarily Significant Unit (ESU) (*Oncorhynchus mykiss*), Central Valley spring-run Chinook salmon ESU (*O. tshawytscha*), Sacramento River winter-run Chinook salmon ESU, green sturgeon (*Acipenser medirostris*), and delta smelt (*Hypomesus transpacificus*) are Federally listed as threatened or endangered species. USFWS delisted Sacramento splittail from its Federally threatened status on September 22, 2003. National Oceanic and Atmospheric Administration, National Marine Fisheries Service (NMFS) determined that listing is not warranted for Central Valley fall-/late fall-run Chinook salmon. However, it is still designated as a Species of Concern because of concerns over specific risk factors. Hardhead and Sacramento perch are considered Species of Special Concern by CDFG and/or Federal Species of Concern by USFWS.

Table 4.2.C-3: Special-Status Wildlife Species Potentially Occurring in the WSMP 2040 Preferred Portfolio Study Area

COMMON NAME	SCIENTIFIC NAME	FEDERAL LISTING STATUS	STATE LISTING STATUS	REGIONAL OCCURRENCE		
				EBMUD SERVICE AREA	CENTRAL VALLEY	UPCOUNTRY
INVERTEBRATES						
A leaf-cutter bee	*Trachusa gummifera*		CNDDB	X		
Antioch dunes anthicid beetle	*Anthicus antiochensis*		CNDDB		X	
Antioch efferian robberfly	*Efferia antiochi*		CNDDB	X		
Bay checkerspot butterfly	*Euphydryas editha bayensis*	Threatened		X		
Blennosperma vernal pool anrenid bee	*Andrena blennospermatis*		CNDDB		X	
Bridges' coast range shoulderband	*Helminthoglypta nickliniana bridgesi*		CNDDB	X		
Button's Sierra sideband	*Monadenia mormonum buttoni*		CNDDB		X	
California floater	*Anodonta californiensis*		CNDDB		X	
California linderiella	*Linderiella occidentalis*		CNDDB		X	
Callippe silverspot butterfly	*Speyeria callippe callippe*	Endangered		X		
Conservancy fairy shrimp	*Branchinecta conservatio*	Endangered			X	
Grady's Cave amphipod	*Stygobromus gradyi*		CNDDB		X	
Grubbs' cave harvestman	*Banksula grubbsi*		CNDDB		X	
Grubbs' cave pseudoscorpion	*Aphrastochthonius grubbsi*		CNDDB		X	
Hairy water flea	*Dumontia oregonensis*		CNDDB		X	
King Tut Cave harvestman	*Banksula tutankhamen*		CNDDB		X	
Leech's skyline diving beetle	*Hydroporus leechi*		CNDDB		X	X
Lee's micro-blind harvestman	*Microcina leei*		CNDDB	X		

Table 4.2.C-3: Special-Status Wildlife Species Potentially Occurring in the WSMP 2040 Preferred Portfolio Study Area (continued)

COMMON NAME	SCIENTIFIC NAME	FEDERAL LISTING STATUS	STATE LISTING STATUS	REGIONAL OCCURRENCE		
				EBMUD SERVICE AREA	CENTRAL VALLEY	UPCOUNTRY
Longhorn fairy shrimp	*Branchinecta longiantenna*	Endangered		X		
Lum's micro-blind harvestman	*Microcina lumi*		CNDDB	X		
Martins' cave harvestman	*Banksula martinorum*		CNDDB		X	
Melones cave harvestman	*Banksula melones*		CNDDB		X	
Midvalley fairy shrimp	*Branchinecta mesovallensis*		CNDDB		X	
Mimic tryonia (California brackishwater snail)	*Tryonia imitator*		CNDDB	X		
Moestan blister beetle	*Lytta moesta*		CNDDB		X	
Monarch butterfly	*Danaus plexippus*		CNDDB	X		
Ricksecker's water scavenger beetle	*Hydrochara rickseckeri*		CNDDB		X	
Rudolph's cave harvestman	*Banksula rudolphi*		CNDDB		X	X
Sacramento anthicid beetle	*Anthicus sacramento*		CNDDB		X	
Sacramento Valley tiger beetle	*Cicindela hirticollis abrupta*		CNDDB		X	
San Bruno elfin butterfly	*Callophrys mossii bayensis*	Endangered		X		
Sandy beach tiger beetle	*Cicindela hirticollis gravida*		CNDDB	X		
Serpentine cypress wood-boring beetle	*Trachykele hartmani*		CNDDB		X	
Tiburon micro-blind harvestman	*Microcina tiburona*		CNDDB	X		
Tulare cuckoo wasp	*Chrysis tularensis*		CNDDB		X	
Valley elderberry longhorn beetle	*Desmocerus californicus dimorphus*	Threatened		X	X	X
Vernal pool anrenid bee	*Andrena subapasta*		CNDDB		X	

Table 4.2.C-3: Special-Status Wildlife Species Potentially Occurring in the WSMP 2040 Preferred Portfolio Study Area (continued)

COMMON NAME	SCIENTIFIC NAME	FEDERAL LISTING STATUS	STATE LISTING STATUS	REGIONAL OCCURRENCE		
				EBMUD SERVICE AREA	CENTRAL VALLEY	UPCOUNTRY
Vernal pool fairy shrimp	*Branchinecta lynchi*	Threatened		X	X	X
Vernal pool tadpole shrimp	*Lepidurus packardi*	Endangered			X	
Wilber Springs shore fly	*Paracoenia calida*		CNDDB		X	
Wilbur Springs minute moss beetle	*Ochthebius recticulus*		CNDDB		X	
Wilbur Springs shorebug	*Saldula usingeri*		CNDDB		X	
Yates snail=tight coin	*Ammonitella yatesii*		CNDDB		X	
REPTILES						
Alameda whipsnake	*Masticophis lateralis euryxanthus*	Threatened	Threatened	X		
Coast (California) horned lizard	*Phrynosoma coronatum (frontale population)*		SC		X	X
Giant garter snake	*Thamnophis gigas*	Threatened	Threatened		X	
Northwestern pond turtle	*Actinemys marmorata marmorata*		SC		X	X
San Joaquin whipsnake	*Masticophis flagellum ruddocki*		SC		X	
Silvery legless lizard	*Anniella pulchra pulchra*		SC		X	
Western pond turtle	*Clemmys (Actinemys) marmorata*		SC	X	X	
AMPHIBIANS						
California red-legged frog	*Rana aurora draytonii*	Threatened	SC	X	X	X
California tiger salamander	*Ambystoma californiense*	Threatened	SC	X	X	X
Foothill yellow-legged frog	*Rana boylii*		SC	X	X	X

Table 4.2.C-3: Special-Status Wildlife Species Potentially Occurring in the WSMP 2040 Preferred Portfolio Study Area (continued)

COMMON NAME	SCIENTIFIC NAME	FEDERAL LISTING STATUS	STATE LISTING STATUS	REGIONAL OCCURRENCE		
				EBMUD SERVICE AREA	CENTRAL VALLEY	UPCOUNTRY
Sierra Nevada yellow-legged frog	*Rana sierrae*	Candidate	SC		X	X
Western spadefoot toad	*Spea hammondii*		SC		X	X
Yosemite toad	*Bufus canorus*	Candidate	SC		X	
BIRDS						
Alameda song sparrow	*Melospiza melodia pusillula*	MBTA	SC	X		
American peregrine falcon	*Falco peregrinus anatum*	Delisted, MBTA	Endangered, FP	X	X	X
Bald eagle	*Haliaeetus leucocephalus*	Delisted, MBTA	Endangered, FP	X	X	X
Bank swallow	*Riparia riparia*	MBTA	Threatened			
Black skimmer	*Rynchops niger*	MBTA	SC	X		
Black-crowned night heron	*Nycticorax nycticorax*	MBTA	CNDDB	**X**	**X**	
Cackling (=Aleutian Canada) goose	*Branta hutchinsii leucopareia*	Delisted, MBTA	CNDDB	X	X	
California black rail	*Laterallus jamaicensis coturniculus*	MBTA	Threatened	X	X	
California brown pelican	*Pelecanus occidentalis obsoletus*	Endangered	Endangered	X		
California clapper rail	*Rallus longirostris obsoletus*	Endangered	Endangered, FP	X		
California horned lark	*Eremophila alpestris actia*	MBTA	WL	X	X	
California least tern	*Sternula antillarum browni*	Endangered	Endangered	X		
Caspian tern	*Hydroprogne caspia*	MBTA	CNDDB	X		
Cooper's hawk	*Accipiter cooperii*	MBTA	WL	X	X	
Double-crested cormorant	*Phalacrocorax auritus*	MBTA	WL	X	X	
Ferruginous hawk	*Buteo regalis*	MBTA	WL	X	X	
Golden eagle	*Aquila chrysaetos*	MBTA	FP	X	X	
Grasshopper sparrow	*Ammodramus savannarum*	MBTA	SC		X	
Great blue heron	*Ardea herodias*	MBTA	CNDDB	X	X	

Table 4.2.C-3: Special-Status Wildlife Species Potentially Occurring in the WSMP 2040 Preferred Portfolio Study Area (continued)

COMMON NAME	SCIENTIFIC NAME	FEDERAL LISTING STATUS	STATE LISTING STATUS	REGIONAL OCCURRENCE		
				EBMUD SERVICE AREA	CENTRAL VALLEY	UPCOUNTRY
Great egret	*Ardea alba*	MBTA	CNDDB	X	X	
Great gray owl	*Strix nebulosa*	MBTA	Endangered		X	
Loggerhead shrike	*Lanius ludovicianus*	MBTA	SC		X	
Long-eared owl	*Asio otus*	MBTA	SC		X	
Mountain plover	*Charadrius montanus*	MBTA	SC		X	
Northern goshawk	*Accipiter gentilis*	MBTA	SC		X	X
Northern harrier	*Circus cyaneus*	MBTA	SC	X	X	
Osprey	*Pandion haliaetus*	MBTA	WL	X	X	
Prairie falcon	*Falco mexicanus*	MBTA	WL	X	X	
Purple martin	*Progne subis*	MBTA	SC		X	
Saltmarsh common yellowthroat	*Geothlypis trichas sinuosa*	MBTA	SC	X	X	
San Pablo song sparrow	*Melospiza melodia samuelis*	MBTA	SC	X		
Sharp-shinned hawk	*Accipiter striatus*	MBTA	WL	X	X	
Short-eared owl	*Asio flammeus*	MBTA	SC	X		
Snowy egret	*Egretta thula*	MBTA	CNDDB	X	X	
Suisun song sparrow	*Melospiza melodia maxillaries*	MBTA	SC	X	X	
Swainson's hawk	*Buteo swainson's hawk*	MBTA	Threatened		X	
Tricolored blackbird	*Agelaius tricolor*	MBTA	SC	X	X	X
Western burrowing owl	*Athene cunicularia hypugea*	MBTA	SC	X	X	X
Western snowy plover	*Charadrius alexandrinus nivosus*	Threatened	SC	X		
Western yellow-billed cuckoo	*Coccyzus americanus occidentalis*	Candidate	Endangered		X	
White-faced ibis	*Plegadis chihi*	MBTA	WL		X	
White-tailed kite	*Elanus leucurus*	MBTA	FP	X	X	
Yellow warbler	*Dendroica petechia brewsteri*	MBTA	SC	X	X	
Yellow-breasted chat	*Icteria virens*	MBTA	SC		X	

Table 4.2.C-3: Special-Status Wildlife Species Potentially Occurring in the WSMP 2040 Preferred Portfolio Study Area (continued)

COMMON NAME	SCIENTIFIC NAME	FEDERAL LISTING STATUS	STATE LISTING STATUS	REGIONAL OCCURRENCE		
				EBMUD SERVICE AREA	CENTRAL VALLEY	UPCOUNTRY
Yellow-headed blackbird	*Xanthocephalus xanthocephalus*	MBTA	SC	X	X	
MAMMALS						
Alameda Island mole	*Scapanus latimanus parvus*		SC	X		
American badger	*Taxidea taxus*		SC	X	X	X
Berkeley kangaroo rat	*Dipodomys heermanni berkeleyensis*		CNDDB	X		
Big free-tailed bat	*Nyctinomops macrotis*		SC	X		
California wolverine	*Gulo gulo*		Threatened, FP			X
Hoary bat	*Lasiurus cinereus*		CNDDB	X	X	
Humboldt marten	*Martes americana humboldtensis*		SC			X
Pacific fisher	*Martes pennanti (pacifica) DPS*	Candidate	SC		X	X
Pallid bat	*Antrozous pallidus*		SC	X	X	
Riparian (=San Joaquin Valley) woodrat	*Neotoma fuscipes riparia*	Endangered	SC		X	
Riparian brush rabbit	*Sylvilagus bachmani riparius*	Endangered	Endangered		X	
Salt-marsh harvest mouse	*Reithrodontomys raviventris*	Endangered	Endangered, FP	X		
Salt-marsh wandering shrew	*Sorex vagrans halicoetes*		SC	X		
San Francisco dusky-footed woodrat	*Neotoma fuscipes annectens*		SC	X		
San Joaquin kit fox	*Vulpes macrotis mutica*	Endangered	Threatened		X	
San Joaquin pocket mouse	*Perognathus inornatus inornatus*		CNDDB		X	
San Pablo vole	*Microtus californicus sanpabloensis*		SC	X		
Silver-haired bat	*Lasionycteris noctivagans*		CNDDB	X	X	
Suisun shrew	*Sorex ornatus sinuosus*		SC	X		

Table 4.2.C-3: Special-Status Wildlife Species Potentially Occurring in the WSMP 2040 Preferred Portfolio Study Area (continued)

COMMON NAME	SCIENTIFIC NAME	FEDERAL LISTING STATUS	STATE LISTING STATUS	REGIONAL OCCURRENCE		
				EBMUD SERVICE AREA	CENTRAL VALLEY	UPCOUNTRY
Townsend's big-eared bat	*Corynorhinus townsendii*		SC		X	
Western mastiff bat	*Eumops perotis californicus*		SC	X	X	
Western pipestrelle	*Pipistrellus hesperus*		CNDDB		X	
Western red bat	*Lasiurus blossevillii*		SC		X	
Western small-footed myotis	*Myotis ciliolabrum*		CNDDB		X	
Yuma myotis	*Myotis yumanensis*		CNDDB		X	

Note:
SC = CDFG Species of Concern
WL = CDFG Watch List
MBTA = Migratory Bird Treaty Act
CNDDB = tracked by the CNDDB
FP = CDFG Fully Protected
Source: CNDDB 2008, USFWS 2008

Brief descriptions of special-status fish species are presented in Appendix C.

Wildlife Movement Corridors and Habitat Fragmentation

Wildlife movement includes migration (usually one direction per season), inter-population movement (long-term genetic exchange) and small travel pathways (daily movement corridors within an animal's territory). While small travel pathways usually facilitate movement for daily home range activities such as foraging or escape from predators, they also provide connection between outlying populations and the main corridor, permitting an increase in gene flow between populations.

These linkages between habitat types can extend for miles between primary habitat areas and occur on a large scale throughout California. Habitat linkages facilitate movement between populations located in discrete areas and populations located within larger habitat areas. The mosaic of habitats found within a large-scale landscape results in wildlife populations that consist of discrete sub-populations comprising a large single population, often referred to as a meta-population. Even where patches of pristine habitat are fragmented, such as occurs with coastal scrub, the movement between wildlife populations is facilitated through habitat linkages (i.e., migration corridors and movement corridors).

Table 4.2.C-4: Special-Status Fish Species Potentially Occurring in the WSMP 2040 Preferred Portfolio Study Area

COMMON NAME	SCIENTIFIC NAME	FEDERAL LISTING STATUS	STATE LISTING STATUS	REGIONAL OCCURRENCE		
				EBMUD SERVICE AREA	CENTRAL VALLEY	UPCOUNTRY
Central Valley steelhead	*Oncorhyncus mykiss*	Threatened		X	X	
Sacramento River winter-run Chinook salmon	*Oncorhyncus tshawytscha*	Endangered	Endangered	X	X	
Central Valley spring-run Chinook salmon	*Oncorhyncus tshawytscha*	Threatened	Threatened	X	X	
Central Valley fall/late fall–run Chinook salmon	*Oncorhyncus tshawytscha*		SC	X	X	
Green sturgeon Southern Distinct Population Segment (DPS)	*Acipenser medirostris*	Threatened		X	X	
Delta smelt	*Hypomesus transpacificus*	Threatened	Threatened	X	X	
Longfin smelt[a]	*Hypomesus transpacificus*	SC	SC	X	X	
Sacramento splittail	*Pogonichthys macrolepidotus*	Delisted	SC	X	X	
Hardhead	*Mylopharodon conocephalus*		SC		X	X
San Joaquin roach	*Lavinia symmetricus* sp.		SC		X	

Notes:
[a] Legal Status Definitions

Federal Listing Categories (USFWS & NMFS)
- E Endangered (legally protected)
- T Threatened (legally protected)
- SC Species of Concern

State Listing Categories (CDFG)
- E Endangered (legally protected)
- T Threatened (legally protected)
- SC Species of Concern

Source: Compiled by EDAW 2008

Depending on the condition of the corridor, gene flow between populations may be high in frequency, thus allowing for high genetic diversity within the population, or may be low in frequency. Potentially low frequency gene flow may lead to complete isolation and, if pressures are strong, potential local extinction (McCullough 1996, Whittaker 1998).

Habitat fragmentation, by definition, is an event that creates a greater number of habitat patches that are smaller in size than the original contiguous tract(s) of habitat. Fragmentation of primary habitat types can hinder regional wildlife movements.

The resulting reduced interaction between individuals changes the long-term dynamics of populations distributed among fragments and an inability to genetically adapt or respond to environmental pressures. This increases the probability of extinction for these populations compared to those associated with non-fragmented landscapes (Kupfer *et al*. 1997, Zuidema *et al*. 1996). Effects of fragmentation on the movement or dispersal of organisms is crucial to composition and diversity (Opdam 1990, Tiebout III & Anderson 1997). Considering the impacts resulting in potential fragmentation of primary habitat types and loss of valuable dispersal corridors is imperative when assessing the biological impacts of a project.

4.2.C.2 Regional Setting

The regional setting for the WSMP 2040 Preferred Portfolio includes the EBMUD service area, the Central Valley, and Upcountry areas. Each of these areas includes a variety of vegetation communities, wildlife habitats, and aquatic habitats (see Table 4.2.C-1).

EBMUD Service Area

The EBMUD service area, as shown in Figure 2-1 in Chapter 2, Background, includes 20 incorporated cities and 15 unincorporated communities in Alameda and Contra Costa counties.

Within this area, 62 special-status plants (CDFG 2008f, USFWS 2008) have the potential to occur (see Table 4.2.C-2). These species include but are not limited to the Contra Costa goldfields (*Lasthenia conjugens*), large-flowered fiddleneck (*Amsinckia grandiflora*), Congdon's tarplant (*Centromadia parryi* ssp. *congdonii*), California seablite (*Suaeda californica*), soft bird's-beak (*Cordylanthus mollis* ssp. *mollis*), pallid manzanita (*Arctostaphyllos pallida*).

Within this area, 66 special-status wildlife species (CDFG 2008f, USFWS 2008) have the potential to occur (see Table 4.2.C-3). These species include but are not limited to the California red-legged frog (*Rana aurora draytonii*), California tiger salamander (*Ambystoma californiense*), Alameda whipsnake (*Masticophis lateralis euryxanthus*), western pond turtle (*Clemmys marmorata*), salt-marsh harvest mouse (*Reithrodontomys raviventris*), San Joaquin kit fox (*Vulpes macrotis mutica*), San Francisco dusky-footed woodrat (*Neotoma fuscipes annectens*), California clapper rail (*Rallus longirostris obsoletus*), California black rail (*Laterallus jamaicensis coturniculus*), western burrowing owl (*Athene cunicularia hypugea*), nesting birds, roosting bats, and vernal pool crustaceans.

Within this area, 8 special-status fish have the potential to occur (see Table 4.2.C-4). These species include but are not limited to Central Valley steelhead (*Oncorhyncus mykiss*), Sacramento River winter-run Chinook salmon (*O. tshawytscha*) and Central Valley spring-run Chinook salmon.

Central Valley

The Central Valley region of the WSMP Preferred Portfolio Study Area includes the counties of Glenn, Colusa, Sacramento, San Joaquin, and portions of Yuba, Amador, and Calaveras. Within this area, a variety of vegetation communities (see Table 4.2.C-1 and described in Appendix C), wildlife habitats, and aquatic habitats occur including alkali seep, agricultural, California annual grassland, serpentine bunch grass, coastal brackish marsh, freshwater marsh, elderberry savannah, vernal pool, seasonal wetland, perennial wetland, chaparral, riparian scrub, valley oak woodland, riparian woodland, eucalyptus, mixed pine forest, and riverine and laucustrine aquatic habitats (Sawyer and Keeler-Wolf 1995, Cowardin et al. 1979, Holland 1986).

Within this area, 106 special-status plants (CDFG 2008f, USFWS 2008) have the potential to occur (see Table 4.2.C-2). These species include but are not limited to the yellow-lip pansy monkeyflower (*Mimulus pulchellus*), soft bird's-beak, and Ione manzanita (*Arctostaphyllos myrtifolia*).

Within this area, 93 special-status wildlife species (CDFG 2008f, USFWS 2008) have the potential to occur (see Table 4.2.C-3). These species include but are not limited to the California red-legged frog, foothill yellow-legged frog (*Rana boylii*), California tiger salamander, San Joaquin whipsnake (*Masticophis flagellum ruddocki*), western pond turtle, San Joaquin pocket mouse (*Perognathus inornatus inornatus*), San Joaquin kit fox, western burrowing owl, nesting birds, roosting bats, valley elderberry longhorn beetle (*Desmocerus californicus dimorphus*), and vernal pool crustaceans.

Within this area, 10 special-status fish have the potential to occur (see Table 4.2.C-4). These species include but are not limited to Central Valley steelhead, Sacramento River winter-run Chinook salmon and Central Valley spring-run Chinook salmon.

Upcountry

The Upcountry area consists of the foothills and highlands of the Sierra Nevada. Counties within this region include, Alpine and portions of Yuba, Amador, and Calaveras. The Upcountry area consists of forested lands and steep terrain. Within this area, a variety of vegetation communities (see Table 4.2.C-1 and Appendix C), wildlife habitats, and aquatic habitats occur including agricultural, California annual grassland, vernal pools and swales, seasonal wetland, perennial wetland, riparian scrub, chaparral, eucalyptus, blue oak woodland, valley oak woodland, foothill pine woodland, riparian woodland, and riverine and laucustrine aquatic habitats.

Within the Upcountry area, 8 special-status plants (CDFG 2008f, USFWS 2008) that have the potential to occur, including Ione Manzanita and legenere.

Within this area, 16 special-status wildlife species (CDFG 2008f, USFWS 2008) have the potential to occur (see Table 4.2.C-3). These species include, but are not limited to

California red-legged frog, California tiger salamander, western spadefoot toad (*Spea hammondii*), nesting birds, roosting bats, and vernal pool crustaceans.

Within this area, one special-status fish species has the potential to occur, hardhead (*Mylopharodon conocephalus*) (see Table 4.2.C-4).

4.2.C.3 Setting for Preferred Portfolio Components

Rationing and Conservation

Rationing and conservation would be implemented within the EBMUD service area. The biological resources within the EBMUD service area are described above in Section 4.2.C.2, Regional Setting. Plant, wildlife and fish species known to occur in the EBMUD service area are identified in Tables 4.2.C-2, 4.2.C-3, and 4.2.C-4 above.

Recycled Water

The precise locations of the recycled water projects have not yet been determined but would most likely be constructed within the EBMUD service area. The biological resources within the EBMUD service area are described above in Section 4.2.C.2, Regional Setting. Plant, wildlife and fish species known to occur in the EBMUD service area are identified in Tables 4.2.C-2, 4.2.C-3, and 4.2.C-4 above.

Northern California Water Transfers

The precise sources of water transfers have not yet been identified, but for the purposes of this PEIR they are expected to occur within the Sacramento Valley, in the Central Valley. Biological resources within the Central Valley are identified in Tables 4.2.C-2, 4.2.C-3, and 4.2.C-4 above.

Bayside Groundwater Project Phase 2

Bayside Groundwater Project Phase 2 may include the addition of one new production well on the Bayside Groundwater Project Phase 1 site (see Figure 3-7 in Chapter 3). The Phase 1 site is located in San Lorenzo, near the westerly terminus of Grant Avenue.

The certified EIR for the Phase 1 project identified 13 special-status species potentially present in the Phase 1 project area. Nearly all of these species were associated with the brackish marsh near Bockman Canal at the southerly edge of the Phase 1 site, or the more distant seasonal wetlands to the southwest. The EIR concluded that the presence of any of these species was unlikely.

The EIR identified disturbance to clapper rail and black rail during nesting season from certain Phase 1 construction activities as a potentially significant impact. To mitigate this risk, EBMUD retained a qualified expert to conduct a USFWS clapper rail field survey protocol in February/March 2008. The survey confirmed that no rails were present in the area of potential disturbance.

Other potential sites within the EBMUD service area for Bayside Groundwater Project Phase 2 facilities have not yet been identified. The biological resources that may be affected by these facilities are identified above for the EBMUD service area in Section 4.2.C.2, Regional Setting, and are listed in Tables 4.2.C-2, 4.2.C-3 and 4.2.C-4.

Sacramento Basin Groundwater Banking / Exchange

The precise locations of the proposed facilities (e.g., recharge ponds, wells, pipelines, pumps, etc.) needed for this component have not yet been identified. They would be located within Sacramento County. The biological resources within the Central Valley area are described in the regional setting above, and identified in Table 4.2.C-2 and Table 4.2.C-3 for plants and wildlife, respectively.

Regional Desalination

The specific location of the regional desalination facilities has not been identified; however, proposed facilities would most likely be located along the western Delta, in the vicinity of the south shore of Suisun Bay, within Contra Costa County (see Figure 3-8 in Chapter 3). This area includes a portion of the former Concord Naval Weapons Station and is characterized by vegetation communities including ruderal/disturbed, annual grassland, salt marsh, alkali, scrub, riparian scrub and woodland, and seasonal wetlands.

Based upon on a literature review and a familiarity with the flora and fauna within the potential Regional Desaliniation area, 10 special-status plants have some potential to occur including, but not limited to, Congdon's tarplant (see Appendix C).

A total of 18 special-status animal species are considered to have some potential to occur including, but not limited to salt marsh harvest mouse, tri-colored blackbird, California black rail, and nesting birds (see Appendix C).

Enlarge Pardee Reservoir

Pardee Reservoir is located 38 miles northeast of Stockton, and approximately 12 miles southwest of the Town of Jackson in Amador and Calaveras counties (see Figures 3-9 and 3-10 in Chapter 3). Pardee Reservoir is located along the Mokelumne River upstream of Camanche Reservoir and currently extends from Pardee Dam Road in the west to approximately 2 miles west of SR 49. The vegetation communities within the area of the Enlarge Pardee Reservoir component include annual grassland, chaparral, oak woodland, Sierran black sage scrub, riparian woodland, riparian scrub, and perennial wetland.

Based upon on a literature review including a search of the CNDDB and review of previous documents and studies, and a familiarity with the flora and fauna within the area of the Enlarge Pardee Reservoir component, 6 special-status plants (see Appendix C) have some potential to occur, including but not limited to Bisbee Peak rush-rose (*Helianthemum suffrutescens*), and Mariposa cryptantha (*Cryptantha mariposae*).

A total of 9 special-status animal species (see Appendix C) are considered to have some potential to occur. In addition, special-status bats and several species of birds have potential to occur in this area.

Enlarge Lower Bear Reservoir

Lower Bear Reservoir is located within the Mokelumne River Watershed in Amador County, approximately 15 miles east of the Town of Pioneer on SR 88 (see Figure 3-11 in Chapter 3).

Based upon on a literature review including a search of the CNDDB and review of previous documents and studies, and a familiarity with the flora and fauna within the area of the Enlarge Lower Bear Reservoir component, 2 special-status plants (see Appendix C) have some potential to occur. A total of 5 special-status animal species (see Appendix C) are considered to have some potential to occur. In addition, special-status bats and several species of birds have potential to occur in this area.

IRCUP / San Joaquin Groundwater Banking / Exchange

The precise locations of the proposed facilities (e.g., pipeline, intertie, pump station) needed for this component have not yet been identified. They would be located in the Central Valley within the counties of Alpine, Amador, Calaveras, and San Joaquin (see Figure 3-12 in Chapter 3, Preferred Portfolio and Alternative Portfolios). The biological resources within the Central Valley area are identified in Tables 4.2.C-2, 4.2.C-3 and 4.2.C-4 above.

4.2.C.4 Regulatory Setting

A number of Federal, State and local policies provide the regulatory framework that guides the protection of biological resources. The following discussion summarizes those laws that are most relevant to biological resources within the WSMP 2040 Preferred Portfolio Study Area.

Riparian areas, wetlands, waters of the U.S., and special-status species and communities are considered sensitive biological resources and fall under the jurisdiction of several regulatory agencies. Impacts to these areas often require Federal, State, and/or local permits or agreements. The permits required vary depending upon the location of the project and the type and extent of impacts. However, prior to the issuance of any permit for actions that would result in impacts to wetlands, waters, or special-status species or communities, notification to all or some of the following agencies may be required:

- U.S. Army Corps of Engineers (Corps), Sacramento and San Francisco Districts;
- CDFG;
- California Regional Water Quality Control Board (RWQCB);
- USFWS; and
- NMFS.

An overview of the jurisdiction, application requirements and required permits for each of the above-listed agencies is provided in the following sections.

Federal Regulations

Clean Water Act, Section 404

As discussed in Section 4.2.A, Hydrology, Groundwater and Water Quality, Section 404 of the Clean Water Act (CWA) of 1972 regulates activities that result in the discharge of dredged or fill material into waters of the U.S., including wetlands. The Corps has the principal authority to regulate discharges of dredged or fill material into waters of the U.S. However, U.S. EPA has oversight authority and retains veto power over the Corps' decision to issue permits.

Waters of the U.S. include: 1) all waters which are currently used, or were used in the past, or may be susceptible to use in interstate or foreign commerce, including all waters which are subject to the ebb and flow of tide; 2) all interstate waters including interstate wetlands; 3) all other waters such as interstate lakes, rivers, streams (including intermittent streams), mudflats, sandflats, wetlands, sloughs, prairie potholes, vernal pools, wet meadows, playa lakes, or natural ponds, the use, degredation or destruction of which could affect interstate or foreign commerce; 4) tributaries of the above; and 5) territorial seas.

Federally jurisdictional wetlands are defined as those areas that are inundated or saturated by surface water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, bogs, vernal pools, seeps, marshes and similar areas.

The Corps asserts jurisdiction over "adjacent wetlands," which are hydrologically connected wetlands that may in some cases appear "isolated." The Regional Water Quality Board (RWQCB) has authority over "waters of the State" under the Porter-Cologne Water Quality Control Act. Furthermore, RWQCB typically, in practice, asserts jurisdiction similar to CDFG in creek or river systems, from top of bank to top of bank. The RWQCB asserts that it has authority over all wetlands, including isolated wetlands.

Any discharge of dredged or fill material into waters of the U.S. must be approved by the Corps pursuant to Section 404 of the CWA. Two permit types are possible:

1) Discretionary Individual Permits; or

2) Nationwide Permits (NWPs) which are already in place, non-discretional, and generally less time-consuming than the Individual Permit. NWPs may be grouped together or “stacked” with certain limitations.

A standard Individual Permit is required if there are:

1) Discharges that will result in the fill of any tidal waters or wetlands; or

2) Impacts to more than one-half acre of non-tidal waters or wetlands, and/or impacts to greater than 300 linear feet of non-tidal waters or wetlands, including creeks (either perennial or ephemeral and generally intermittent as well), arroyos or vegetated and unvegetated tributaries.

3) In contrast, projects that result in impacts of less than one-half acre and/or less than 300 linear feet may be authorized under one of the existing Crops NWPs if they meet all of the NWP General Conditions.

Rivers and Harbors Act

As discussed in Section 4.2.A, Hydrology, Groundwater and Water Quality, the Rivers and Harbors Act of 1899 prohibits the unauthorized alteration or obstruction of any navigable waters of the U.S. Under Section 10 of the Rivers and Harbors Act, the construction of structures in, over, or under, excavation of material from, or deposition of material into “navigable waters” are regulated by the Corps. Navigable waters of the U.S. are defined as those waters subject to the ebb and flow of the tide shoreward to the mean high-water mark or those that are currently used, have been used in the past, or may be susceptible to use to transport interstate or foreign commerce. A Letter of Permission or permit from the Corps is required prior to any work being completed within navigable waters.

Federal Endangered Species Act

The Federal Endangered Species Act (FESA) prohibits “take” of Federally-listed Threatened or Endangered wildlife species. FESA Section 7 defines “take” to mean “harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or attempt to engage in any such conduct” 16 U.S.C. Section 1532(19). The FESA requires that actions authorized, funded or carried out by Federal agencies do not jeopardize the continued existence of a Federally-listed species or adversely modify designated Critical Habitat for such species.

If a Federal agency determines that a proposed Federal action (i.e., issuance of a Clean Water Act Section 404 permit for wetland fill) “may affect” a listed species and/or designated Critical Habitat, the agency must consult with the USFWS and/or NOAA Fisheries for protected marine and anadromous fish species in accordance with Section 7 of the FESA. As an outcome of the consultation, the Federal agency and applicant may receive authorization to take species. If there is no Federal agency involvement and take of a Federally-listed species may occur, the applicant may be required to obtain Incidental Take authorization from the USFWS.[1]

Migratory Bird Treaty Act

The Migratory Bird Treaty Act (MBTA) provides that it shall be unlawful, except as permitted by regulations, “to pursue, take, or kill…any migratory bird, or any part, nest or egg of any such bird, included in the terms of conventions” with certain other countries (16 U.S. Code [USC] 703). This prohibition includes direct and indirect acts, although harassment and habitat modification are not included unless they result in direct loss of birds, nests, or eggs. The current list of species protected by the MBTA includes several hundred species and essentially includes all native birds.

Sustainable Fisheries Act

In response to growing concern about the status of U.S. fisheries, the Sustainable Fisheries Act of 1996 (Public Law [PL] 104-297) was passed by Congress to amend the Magnuson-Stevens Fishery Conservation and Management Act (PL 94-265), the primary law governing marine fisheries management in the Federal waters of the U.S. Under the Sustainable Fisheries Act, consultation is required by NMFS on any activity that might adversely affect essential fish habitat (EFH). EFH includes those habitats that fish rely on throughout their life cycles. It encompasses habitats necessary to allow sufficient production of commercially valuable aquatic species to support a long-term sustainable fishery and contribute to a healthy ecosystem.

Lower Mokelumne River Joint Settlement Agreement

The Lower Mokelumne River Joint Settlement Agreement (JSA) is described in Section 2.4.5 of this PEIR. Regulatory Commission (FERC) The flow measures included in the JSA include minimum water releases from the Camanche Dam during each freshwater life stage of the anadromous fishes and non-flow measures include those for the Mokelumne River ecosystem from Pardee Reservoir to the Delta.

[1] The Incidental Take authorization allows “incidental” taking of Federally-listed species if the take is “incidental to and not the purpose of, the carrying out of an otherwise lawful activity” 16 U.S.C. §1539(a)(1)(b).

State Regulations

California Endangered Species Act

Pursuant to CESA, a permit from the CDFG is required for projects that could result in the take of a species that is State-listed as threatened or endangered. Under CESA, “take” is defined as an activity that would directly or indirectly kill an individual of a species; the CESA definition of take does not include “harming” or “harassing,” as the FESA definition does. As a result, the threshold for take is higher under CESA than under FESA (i.e., habitat modification is not necessarily considered take under CESA).

California Native Plant Protection Act

In addition to CESA, the California Native Plant Protection Act provides protection to endangered and “rare” plant species, subspecies, and varieties of wild native plants in California. The California Native Plant Protection Act’s definitions of “endangered” and “rare” closely parallel the CESA definitions of “endangered” and “threatened” plant species.

California Oak Woodlands Conservation Act

The California Oak Woodlands Conservation Act provides additional protection to the oak woodland communities of the State (PRC Section 21083.4(b)). If a county determines, under the Act, that a project may impose a significant impact to oak woodlands, the county may require one or more of the following mitigations:

- Conserve oak woodlands through the use of conservation easements;
- Planting an appropriate number of trees, including maintaining plantings and replacing dead or diseased trees;
- Contribute funds to the Oak Woodlands Conservation Fund that may be used for the following:
  - Grants for the purchase of oak woodlands conservation easements;
  - Grants for land improvements;
  - Cost-sharing incentive payments to private landowners who enter into long-term conservation agreements;
  - Public education and outreach;
  - Assistance to local governments entities, park and open-space districts resource conservation districts and non-profits organizations. (California Fish and Game Code Sections1363 (d)(1)-(6)); and
- Other mitigation measures developed by the county. (California Public Resource Code Sections 21083.4(b)(1)-(4).

California Fish and Game Code Sections 3503 and 3513 - Protection of Birds

Section 3503 of the Fish and Game Code states that it is unlawful to take, possess, or needlessly destroy the nest or eggs of any bird. Section 3503.5 specifically states that it is unlawful to take, possess, or destroy any raptors (i.e., eagles, hawks, owls, and falcons), including their nests or eggs. Section 3513 of the California Fish and Game Code provides for adoption of the MBTA's provisions. It states that it is unlawful to take or possess any migratory nongame bird as designated in the MBTA or any part of such migratory nongame bird. These State codes offer no statutory or regulatory mechanism for obtaining an incidental take permit for the loss of nongame, migratory birds. Typical violations include destruction of active nests resulting from removal of vegetation in which the nests are located. Violation of Sections 3503.5 and 3513 could also include disturbance of nesting pairs that results in failure of an active raptor nest.

Fully Protected Species under the Fish and Game Code

Protection of fully protected species is described in four sections of the Fish and Game Code that list 37 fully protected species (Fish and Game Code Sections 3511, 4700, 5050, and 5515). These statutes prohibit take or possession at any time of fully protected species. CDFG is unable to authorize incidental take of fully protected species when activities are proposed in areas inhabited by those species. CDFG has informed non-Federal agencies and private parties that they must avoid take of any fully protected species in carrying out projects.

California Fish and Game Code, Sections 1600 – 1607

CDFG exercises jurisdiction over wetland and riparian resources associated with rivers, streams, and lakes under California Fish and Game Code Sections 1600 to 1607. CDFG has the authority to regulate work that will:

1) Divert, obstruct, or change the natural flow of a river, stream, or lake;

2) Change the bed, channel, or bank of a river, stream, or lake; or

3) Use material from a streambed.

CDFG typically asserts that its jurisdictional area along a river, stream or creek is bounded by the top-of-bank or the outermost edges of riparian vegetation. Typical activities regulated by CDFG under Sections 1600-1607 authority include installing outfalls, stabilizing banks, creek restoration, implementing flood control projects, constructing river and stream crossings, diverting water, damming streams, gravel mining, logging operations and jack-and-boring.

Careful project design, including the minimization of impacts and reduction of hard structure surface area (i.e., minimal amounts of cement or rip-rap), is critical for CDFG approval. CDFG emphasizes the use of biotechnical or bioengineered creek-related components (emphasis on natural materials, sometimes in conjunction with hard materials) that minimize the need for hard structures in creeks.

Clean Water Act, Section 401 and Porter-Cologne Water Quality Control Act

As discussed in Section 4.2.A, Hydrology, Groundwater and Water Quality, pursuant to Section 401 of the Clean Water Act and EPA 404b)(1) guidelines, in order for a Corps permit applicant to conduct any activity which may result in discharge into navigable waters, they must provide a certification from the RWQCB that such discharge will comply with the State water quality standards. The RWQCB has a policy of no-net-loss of wetlands in effect and typically requires mitigation for all impacts to wetlands before it will issue a water quality certification thereof.

Under the Porter-Cologne Water Quality Control Act (Cal. Water Code Sections13000-14920), the RWQCB is authorized to regulate the discharge of waste that could affect the quality of the State's waters. Therefore, even if a project does not require a Federal permit (i.e., a 404 permit from the Corps), it may still require review and approval of the RWQCB. Following the U.S. Supreme Court's SWANNC decision (*Solid Waste Association of Northern Cook County vs. United States Corps of Engineers*), the State Water Resources Control Board issued Guidance for Regulation of Discharges to Isolated Waters to assist the regional boards in regulating isolated waters (State Water Resources Control Board 2004). These guidelines are intended to ensure that isolated wetlands that do not fall under Federal jurisdiction or State jurisdiction via CDFG are still regulated under the Porter-Cologne Water Quality Control Act (Cal. Water Code Sections13000-14920) and as such are treated on a priority basis by the RWQCB.

When reviewing applications, the RWQCB focuses on ensuring that projects do not adversely affect the "beneficial uses" associated with waters of the State. Generally, the RWQCB defines beneficial uses to include all of the resources, services and qualities of aquatic ecosystems and underground aquifers that benefit the State. In most cases, the RWQCB seeks to protect these beneficial uses by requiring the integration of water quality control measures into projects that will result in discharge into waters of the State. For most construction projects, RWQCB requires the use of construction and post-construction Best Management Practices (BMPs). In many cases, proper use of BMPs, including bioengineering detention ponds, grassy swales, sand filters, modified roof techniques, drains, and other features, will speed project approval from RWQCB. Development setbacks from creeks are also requested by RWQCB as they often lead to less creek-related impacts in the future.

Regional/Local Regulations

San Francisco Bay Conservation and Development Commission

The McAteer-Petris Act (Cal. Govt. Code Sections 66600-66694) established the San Francisco Bay Conservation and Development Commission (BCDC). BCDC's responsibilities include, but are not limited to: (1) regulating filling and dredging in San Francisco and Suisun Bays; (2) protecting the Suisun Marsh; and (3) regulating new development within the first 100 feet inland from the Bay. BCDC's jurisdiction extends over the Bay, up to mean high tide and to 5 feet above mean sea level in marshes; and over a 100-foot shoreline band inland from the line of mean high tide or the line five foot above mean sea level adjacent to marshes.

The *Suisun Marsh Protection Plan* was developed in 1976 by BCDC and CDFG, as directed by the Nejedly-Bagley-Z'berg Suisun Marsh Preservation Act of 1974.
The objectives of the plan are to preserve and enhance approximately 85,000 acres of Suisun Marsh, including its aquatic and wildlife habitats and upland areas adjacent to the marsh.

Comprehensive Conservation and Management Plan – The San Francisco Estuary Project

The Comprehensive Conservation and Management Plan (CCMP) was prepared by the San Francisco Estuary Project. BCDC manages the open waters, tidal marshes, managed wetlands, salt ponds, and narrow shoreline band of the San Francisco Bay segment of the Estuary (San Francisco Estuary Project 1993) and implements the CCMP. The Land Use Goals of the CCMP include the following:

- Establish and implement land use and transportation patterns and practices that protect, enhance, and restore the Estuary's open waters, adjacent wetlands, adjacent essential uplands habitat, and tributary waterways;
- Coordinate and improve planning, regulatory, and development programs of local, regional, State, and Federal agencies to improve the health of the Estuary; and
- Adopt and utilize land use policies that provide incentives for more active participation by the private sector in cooperative efforts that protect and improve the Estuary.

Implementation Strategy – San Francisco Bay Joint Venture

The San Francisco Bay Joint Venture is a collaborative effort by 27 public agencies and private non-profit and corporate organizations to protect, restore, increase and enhance wetlands, riparian habitat and associated uplands throughout the San Francisco Bay

Area to benefit birds, fish and other wildlife. Its Implementation Strategy details the organization's efforts to restore the San Francisco Estuary.

San Joaquin County Multi-Species Habitat Conservation and Open Space Plan

The San Joaquin County Multi-Species Habitat Conservation and Open Space Plan (SJMSCP), approved in 2000, provides comprehensive mitigation, pursuant to local, State, and Federal regulations, for impacts to 97 species from SJMSCP-permitted activities. The SJMSCP relies on take avoidance, compensation for incidental take, and loss of habitat through payment of fees. These fees are to be used to preserve and create habitat preserves. Participation in the SJMSCP is voluntary for local jurisdictions and project proponents.

Safe Harbor Agreements

Safe Harbor Agreements are voluntary arrangements between USFWS or NOAA-Fisheries and cooperating non-Federal landowners. The purpose of a Safe Harbor Agreement is to promote voluntary management for listed species on non-Federal property while providing participating landowners assurances that no additional future regulatory restrictions will be imposed due to these activities.

The Lower Mokelumne Safe Harbor Agreement, begun in 2006, between the California Association of Resource Conservation Districts and USFWS is intended to promote ecosystem restoration and conservation of included endangered species, through the voluntary restoration, enhancement, and management of native riparian habitat in the lower Mokelumne River watershed in California. This agreement pertains to Valley elderberry longhorn beetle, and is intended to provide certain regulatory assurances to landowners participating in such activities, without negatively affecting farming activities. This Agreement covers non-Federal lands in the lower Mokelumne River watershed in San Joaquin County lying within the lower Mokelumne River watershed from the confluence with the Cosumnes River, upstream to the Camanche Dam, exclusive of lands within the watershed of Dry Creek upstream of its crossing with Highway 99.

A second Safe Harbor Agreement, the Safe Harbor Agreement for EBMUD lands in San Joaquin, Amador and Calaveras counties, is expected to be in place by spring of 2009.

County and City General Plans

Relevant goals and policies from local general plans related to biological resources are summarized in Appendix B.

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4.2.D Land Use and Recreation

4.2.D.1 Regional Setting

EBMUD Service Area

The EBMUD service area, shown in Figure 2-1 and described in Section 2.4.1, includes 20 incorporated cities and 15 unincorporated communities in Alameda and Contra Costa counties. Land uses within the EBMUD service area include urban and rural areas, as well as open space lands. Residential, commercial, and industrial uses occur throughout the service area. In general, the densities of residential and commercial uses are higher in the cities west of the Berkeley-Oakland hills (e.g., Oakland, Berkeley, Albany) versus the cities to the east (e.g., Orinda, Lafayette, and Danville). Heavy industrial uses occur primarily along the west side of the EBMUD service area along San Francisco Bay (e.g., Emeryville, Oakland, Berkeley, and Richmond), although light industrial uses also exist in concentrated clusters in other cities. Open space areas occur throughout the service area in the form of neighborhood and regional parks, and golf courses.

Grazing lands are located throughout the eastern half of the EBMUD service area. In addition, small nurseries and greenhouses are scattered throughout local communities. Some unique farmlands, as defined by the California Department of Conservation (CDC), exist in the service area (see definitions of this farmland designation in Section 4.2.D.3, Regulatory Setting). Private vineyards are found in the Lamorinda area (Lafayette, Moraga, Orinda). In addition to parks and golf courses described above, other recreational features include bicycle lanes which extend throughout the service area. Sensitive land uses, such as residences, convalescent homes, and schools, also occur throughout the service area.

Central Valley

Major cities and communities in the Central Valley include Sacramento and adjacent suburbs in Sacramento County, and Marysville in Yuba County. Land uses in this region consist generally of expansive agricultural lands and related facilities, interspersed with rural residential uses. Cities and suburban and rural communities located throughout the Valley add to the variety of land uses (e.g., commercial uses). Prime Farmland, Farmland of Statewide Importance, Unique Farmlands, and Farmland of Local Importance as defined by the CDC occur throughout the Valley. Recreational features within the Central Valley include rivers, national wildlife refuges, and neighborhood parks and bicycle lanes in larger communities. Sensitive land uses, such as convalescent homes and schools, are located primarily within developed communities. Residential uses also occur within these communities and spread throughout the agricultural portions of the Valley.

Upcountry

The Upcountry area consists of the foothills and highlands of the Sierra Nevada. Counties within this region include Plumas, Alpine and portions of Yuba, Amador, and Calaveras. The Upcountry area consists primarily of forested lands and steep terrain but also includes grazing lands. Commercial uses are concentrated in small communities, whereas residential uses are located within communities as well as interspersed in the forested lands. Recreational features within this region include waterbodies (e.g., reservoirs and rivers) and national forests. Sensitive land uses, such as residences, convalescent homes, and schools, occur primarily within developed communities.

4.2.D.2 Setting for Preferred Portfolio Components

Rationing and Conservation

The Rationing and Conservation components would be implemented within the EBMUD service area. Land uses within the EBMUD service area are described in the regional setting above.

Recycled Water

The precise locations of the Recycled Water facilities have not yet been determined but would most likely be located within the EBMUD service area, in residential, commercial, industrial, and/or open space areas. The land uses within the EBMUD service area are described in the regional setting above.

Northern California Water Transfers

Specific water transfer sources have not yet been identified, but would most likely originate in the Sacramento Valley as described in Section 3.2.5 of the PEIR. The Sacramento Valley counties contain a variety of uses, including forestry and agricultural uses. The acreages of agricultural lands vary by county and include Prime Farmland, Farmland of Statewide Importance, Unique Farmland, and Farmland of Local Importance. Some of these farmlands may be under Williamson Contract (see Section 4.2.D.3 for more information on Williamson contracts). Recreational uses occur throughout these counties, as described above in the regional setting for the Central Valley and Upcountry areas.

Bayside Groundwater Project Phase 2

One of three sites where Bayside Groundwater Project Phase 2 facilities would be constructed is the Bayside Groundwater Project Phase 1 site in the unincorporated community of San Lorenzo. The Phase 1 site is bounded to the west by the Oro Loma Sanitary District Wastewater Treatment Plant, to the north by Grant Avenue, to the east by an industrial storage yard, and to the south by Bockman Canal. The Phase 1 site is designated Light Industrial and Research & Development/Office in the County of Alameda Eden Area General Plan (2007). The nearest sensitive receptors are approximately 1,000 feet north and east of the Phase 1 site, separated by industrial uses.

Locations for the other facilities included in the Bayside Groundwater Project Phase 2 component have not been determined, but they would be located within the SEBPB in the EBMUD service area, as shown in Figure 3-6 in Chapter 3. Land uses in the San Lorenzo, San Leandro and south Oakland area are primarily urban in nature but contain open space uses, such as parks and golf courses. Land uses are within the EBMUD service area are described in the regional setting above.

Sacramento Basin Groundwater Banking / Exchange

The general location of facilities needed for the Sacramento Basin Groundwater Banking / Exchange component have not yet been identified but would most probably overlie Sacramento County's Central (groundwater) Basin (See Figure 4.2.A-1 in Section 4.2.A.2). Developed, urban areas are concentrated in the north and west portions of the County in and around the City of Sacramento. The eastern, southern, and extreme northwestern portions of the county consist primarily of open space uses, including agriculture, recreation, and reserves. Agricultural lands in the watershed may include Prime Farmland, Farmland of Statewide Importance, Unique Farmland, and Farmland of Local Importance. Some of these farmlands may be under Williamson Contract.

Regional Desalination

The Regional Desalination component would most likely be located along the southern shoreline of Suisun Bay east of Antioch, in unincorporated Contra Costa County. The area is bounded generally by the shoreline to the north and the railroad corridor to the south (see Figure 3-8 in Chapter 3). The Contra Costa General Plan land use designations for the potential desalination area include heavy industrial, open space, public/semi-public, and agricultural lands.

The potential Regional Desalination project area contains open space with some industrial uses (refineries) near I-680 and the Benicia-Martinez Bridge, and within the Concord Naval Weapons Station. The Mirant Pittsburg power plant is located to the east. Residential uses are located east of the Mirant Pittsburg power plant, and south of the Regional Desalination project area, along Willow Pass Road and Port Chicago Highway. Nearby parks include Riverview Park, Marina Park, City Park, and DeAnza Park in the City of Pittsburg.

The Concord Naval Weapons Station supported war efforts through the end of the Gulf War, processing and shipping out thousands of tons of ammunition to the Middle East. Due to changes in global military operations, the Inland Area of the base experienced a gradual mothballing of its facilities in recent decades. The 2005 BRAC (Base Realignment and Closure) round designated parts of the 12,800 acre Concord Naval Weapons Station for closure and eventual reuse. The 5,200 acres comprising the Inland Area was to be conveyed and reused according to BRAC regulations, while the Tidal Area would be passed onto the Army. (http://www.concordnws.org/news.htm; accessed February 3, 2009)

In 2006, the City of Concord was designated as the Land Reuse Authority and charged with preparing a Reuse Plan as well as negotiating with the Department of Defense on development issues. The Concord City Council selected the Clustered Villages alternative as the Preferred Reuse Plan at its meeting on January 12, 2009. The Clustered Villages alternative features retail, residential and commercial development, pedestrian-friendly villages, and designates about 65 percent of the Inland Area as parks and open space. The plan includes land for a number of community amenities, including a tournament-level sports complex, a university/education center, a public safety training facility, and parks. The plan will undergo additional environmental review by the City before it is adopted as the City's final Reuse Plan in the summer of 2009.

Suisun Bay is used for navigation and recreation. An enclosed marina is located in the residential area immediately east of the Mirant Pittsburg power plant. The Mirant power plant contains a dock that juts out into Suisun Bay. Another marina is located within the Regional Desalination project area, at the terminus of McAvoy Road, north of the Port Chicago Highway.

Enlarge Pardee Reservoir

Pardee Reservoir is in Amador and Calaveras counties, 38 miles northeast of Stockton and approximately 12 miles southwest of the Town of Jackson. The majority of the lands immediately adjacent to Pardee Reservoir and the Mokelumne River are owned by EBMUD (FRWA, 2003). Other entities owning land around the reservoir include the Bureau of Land Management (BLM), Jackson Valley Irrigation District (JVID), Pacific Gas and Electric Company (PG&E), and private landowners.

Existing land uses immediately surrounding the Pardee Reservoir consist mainly of grazing, which is carried out on EBMUD lands for fire suppression purposes (FRWA, 2003). Because of the steep topography, grazing is also the primary land use on BLM, JVID, and privately owned lands adjacent to the reservoir. EBMUD maintains a 100- to 300-foot wide, fenced buffer between grazing activities and the reservoir banks. The Amador County General Plan designates the areas north of the Pardee Reservoir as Agricultural-General, Mineral Resources Zone, and Open-Recreation. The Calaveras County General Plan Future Land Use Map designates the areas south of the Pardee Reservoir as Timberlands/Mineral Resource Area 2A/Dam Inundation Area, Future Single Family Residential (5 to 40 acres), and Wildlife Habitats/Botanical Areas.

No Farmland of Statewide Importance, Farmland of Local Importance, or Unique Farmland exists within the area potentially affected by the enlargement of Pardee Reservoir (FRWA, 2003). The potentially affected area around the reservoir is grazing land.

Recreational uses occur at the northwestern edge of the Pardee Reservoir at the Pardee Reservoir Recreation Area, which is owned and operated by EBMUD, shown on Figure 3-10 in Chapter 3, Preferred Portfolio and Alternative Portfolios. The Pardee Reservoir Recreation Area permits public fishing, boating, and camping, and is open from the first Friday in February through the last Sunday in October but closed during the remainder of the year for the migratory bird season, as part of EBMUD's wildlife enhancement program (FRWA, 2003). Concession-operated facilities include a full-service marina, launch ramp, coffee shop and store, 2 swimming pools, over 100 campsites, full hook-up RV sites, hiking trails, a fishing dock, horseshoe and bocce ball courts, flush restrooms, showers, picnic tables, and barbeques. Restricted areas are located on the west side of the reservoir, at the dam, along the spillway, and in the vicinity of the outlet tower.

Except for the Pardee Reservoir Recreation Area and trails, EBMUD-owned land around the reservoir is closed to the public (FRWA, 2003). Outside of the Pardee Reservoir Recreation Area, the Mokelumne Coast to Crest Trail extends along the south side of the reservoir from the south arm to the end of the east arm (about 8 miles up the Mokelumne River Canyon). The trail is 10.6 miles long, and its lowest point is 600 feet above mean sea level (msl), at McAffee Gulch. A staging area is located at the head of this horseback riding and hiking trail. The trail and staging areas are open year-round.

The closest sensitive receptors to the proposed reservoir expansion site are the recreation sites adjacent to the reservoir, including campgrounds.

The Mokelumne River is one of several rivers in the region that offers whitewater recreation opportunities. The Electra Recreation Area and Electra Run is a 3.5-mile-long stretch of the Mokelumne River between PG&E’s Electra Afterbay Dam and State Route (SR) 49. The Electra Recreation Area supports whitewater boating, fishing, gold mining, and swimming. Various entities own the land along this stretch of the river, including private landowners, PG&E, and BLM. Public access to this area is via SR 49 and Electra Road, which runs along the north side of the river (FRWA, 2003).

Most activity is concentrated around PG&E’s Electra Day Use Area, approximately 0.20 mile below the Electra Powerhouse Afterbay Dam. The area has a restroom, parking area, picnicking facilities, and sandy beach area. Two other well-defined beaches with restroom facilities are located along this stretch of the river (0.45 and 0.91 mile downstream from the Electra Powerhouse Afterbay Dam).

The Electra Run extends approximately 3 miles from below the PG&E Electra Afterbay Dam to the SR 49 bridge (FRWA, 2003). Access to the put-in for the whitewater run is from SR 49 and Electra Road, near the Electra Picnic Area. Two take-out areas are used by boaters: one on Electra Road approximately 0.5 mile upstream from the SR 49 bridge, and the other at the SR 49 bridge. The run has a gradient of about 25 feet per mile and encompasses about 12 rapids ranging in difficulty from Class II to Class III. The resource is a very short 1-day run, which boaters often boat twice in one day. Two Class II/Class III rapids distinguish the run-- the Chute, approximately 1.74 miles downstream from the Electra Powerhouse Afterbay Dam, and an s-turn about 2.31 miles downstream from the dam. The run features a slalom course site where the Sierra Club holds its annual Mokelumne River Slalom Race in mid-October.

Flows in the reach of the river between the Electra Afterbay and Pardee Reservoir are affected by releases from the Electra Powerhouse and upstream hydrologic conditions (FRWA, 2003). Flows that support whitewater boating range from 500 to 3,000 cfs. Based on boater evaluations, the minimum flow for whitewater boating on the river (i.e., the point at which the river provides a marginally acceptable whitewater experience) is 500 cfs. Flows of 800 cfs or greater are necessary to support quality whitewater experiences, while flows of approximately 1,500 cfs are optimal for whitewater recreation. Above 3,000 cfs, the difficulty and danger of the whitewater increases significantly, providing fewer recreation opportunities.

The popularity and use of the Electra Run is the result of a combination of factors (FRWA, 2003). Few other river sections in the offer the combination of proximity to local and regional populations, accessibility via good paved roads, and reliable later summer flows as the Electra Run.

Enlarge Lower Bear Reservoir

Lower Bear Reservoir is in the Mokelumne River Watershed in Amador County, approximately 15 miles east of the Town of Pioneer on State Route 88 (see Figure 3-11 in Chapter 3). Lower Bear Reservoir is surrounded by El Dorado National Forest, as well as PG&E lands. The U.S. Forest Service (USFS) has grazing lands south of Lower Bear Reservoir. The land surrounding the reservoir is also under timber management by PG&E and the USFS and is designated as Open-Recreation and Open-Forest (Amador County, 2008).

The existing dam and reservoir are owned and operated by PG&E as part of its Federal Energy Regulatory Commission (FERC) licensed Project 137. Lower Bear Reservoir provides outdoor recreation opportunities, including fishing, boating, swimming, camping, hiking, snowmobiling, and OHV use. All of the campgrounds and day use areas at Lower Bear Reservoir are operated by the USFS; however, PG&E was required to make several improvements to these facilities as part of the recent FERC relicensing of Project 137, as they are located within the FERC Project boundary (New FERC License issued October 2001).

The Bear River Resort is located on the northwestern side of Lower Bear Reservoir and is operated under a PG&E lease. The resort provides recreationists with summer boat rentals, winter snowmobile rentals, a store, restaurant, 126 campsites (including 30 trailer sites) and a marina. Camp Ritchie, which PG&E leases to the Church of Jesus Christ of Latter Day Saints (LDS), is operated as a 120-person per season summer camp for girls. Camp Wishon Boy Scouts Camp is operated under a USFS Special Use Permit and is located on the eastern side of Lower Bear Reservoir.

The closest sensitive receptors to the proposed reservoir expansion site are the recreation sites adjacent to the reservoir, including the campgrounds, day use sites, Bear River Resort, Camp Ritchie, and Camp Wishon.

IRCUP / San Joaquin Groundwater Banking

The precise locations of the proposed facilities (e.g., pipeline, intertie, pump station) needed for this component have not yet been identified but would be located within the counties of Alpine, Amador, Calaveras, and San Joaquin (see Figure 3-12 in Chapter 3, Preferred Portfolio and Alternative Portfolios). These counties include a variety of land uses, including rural residential, commercial, agricultural and open space uses. Scattered rural residential uses occur to the east and south. Recreation does not occur at this location, as it is within private property, although recreation occurs within and around other parts of Camanche Reservoir. The nearest sensitive receptor is a residence that is more than 1,000 feet from this site.

The acreages of agricultural lands vary by county, with the most agricultural lands in San Joaquin County. These lands may include Prime Farmland, Farmland of Statewide Importance, Unique Farmland, and Farmland of Local Importance, some of which may be under Williamson Contract. Grazing also occurs in the area. Forested open space areas include the Stanislaus National Forest, which crosses the Amador, Calaveras, and Alpine counties. Major cities in these counties include Stockton, Lodi, Tracy, and Manteca, all located within San Joaquin County.

4.2.D.3 Regulatory Setting

Federal Regulations

Sierra Planning Area Management Framework Plan Amendment

BLM land use policies in the Pardee Reservoir area are provided in the Sierra Planning Area Management Framework Plan Amendment (Bureau of Land Management 1988 as sited in FRWA 1993). The policies that apply to the Mokelumne River encourage and promote water-based recreation opportunities.

State Regulations

Agricultural Land Designations

The CDC, Office of Land Conservation, maintains a statewide inventory of farmlands. These lands are mapped by the Division of Land Resource Protection as part of the Farmland Mapping and Monitoring Program. The maps are updated every 2 years with the use of aerial photographs, a computer mapping system, public review, and field reconnaissance. Farmlands are divided into the following five categories based on their suitability for agriculture:

- Prime Farmland is land that has the best combination of physical and chemical characteristics for crop production. Prime Farmland has the soil quality, growing season, and moisture supply needed to produce sustained high yields of crops when treated and managed;
- Farmland of Statewide Importance is land other than Prime Farmland that has a good combination of physical and chemical characteristics for crop production;
- Unique Farmland is land that does not meet the criteria for Prime Farmland or Farmland of Statewide Importance, but has been used for the production of specific crops with high economic value;
- Farmland of Local Importance is either currently producing crops or has the capability of production, but does not meet the criteria of the categories above; and
- Grazing Land is land on which the vegetation is suited to grazing livestock.

Williamson Act Contracts

The California Land Conservation Act of 1965, commonly known as the Williamson Act, enables local governments to enter into contracts with private landowners for the purpose of promoting the continued use of the land in agricultural or related open space use. In return, landowners receive property tax assessments that are based on farming and open space uses instead of full market value. Local governments receive an annual subvention (subsidy) of forgone property tax revenues from the State via the Open Space Subvention Act of 1971.

The Williamson Act empowers local governments to establish “agricultural preserves” consisting of lands devoted to agricultural uses and other compatible uses. Upon establishment of such preserves, the locality may offer to owners of included agricultural land the opportunity to enter into annually renewable contracts that restrict the land to agricultural use for at least 10 years (i.e., the contract continues to run for 10 years following the first date upon which the contract is not renewed).

Cancellation of a Williamson Act contract involves an extensive review and approval process, in addition to payment of fees of up to 12.5 percent of the property value. The local jurisdiction approving the cancellation must find that the cancellation is consistent with the purpose of the California Land Conservation Act or is in the public interest. Several subfindings must be made to support either finding, as defined in California Government Code Section 51282.

State Lands Commission

The State Lands Commission jurisdiction includes a 3-mile-wide section of tidal and submerged land adjacent to the coast and offshore islands, bays, estuaries, and lagoons. It also includes the waters and underlying beds of more than 120 rivers, lakes, streams, and sloughs. The State holds these lands for the public trust purposes of water-related commerce, navigation, fisheries, recreation, and open space. The Commission may grant dredging permits and issue land use leases for activities within its jurisdiction. The agency does not have a comprehensive use plan for these lands but manages them according to State laws and regulations.

Delta Protection Commission

The Delta Protection Act of 1992 (California Water Code Section 12220) established the Delta Protection Commission. This Commission has land use planning jurisdiction over the Delta Primary Zone, which generally consists of the lands that were not within either the urban limit line or sphere of influence line of any local government's general plan or existing studies as of January 1, 1992. The Primary Zone, which comprises approximately 66 percent of the Delta, encompasses portions of San Joaquin, Contra Costa, Solano, Yolo, and Sacramento counties. The Delta Protection Commission is charged with preparing a regional plan for the Primary Zone to address land uses and resource management, with particular emphasis on agriculture, which was designated by the Delta Protection Act as the primary use of this zone, along with wildlife habitat and recreation. The Commission adopted its *Land Use and Resource Management Plan* for the Delta Primary Zone (Delta Plan) in 1995. The policies within the Delta Plan were codified under CCR, Title 14, Chapter 3 in 2000, and revised in 2002.

Other Delta Planning Initiatives

A variety of planning efforts are underway to protect water quality and biological resources in the Delta. These initiatives are described in Sections 8.3.4 through 8.3.6 of this PEIR.

Regional/Local Regulations

San Francisco Bay Plan

The San Francisco Bay Plan, administered by the San Francisco Bay Conservation and Development Commission (BCDC), is described in Section 4.2.A.3 of this PEIR. BCDC's jurisdiction extends over the Bay, up to mean high tide and five feet above mean sea level in marshes, and over a 100-foot shoreline band inland from the line of mean high tide or the line five feet above mean sea level in marshes. BCDC's responsibilities include, but are not limited to (1) regulating filling and dredging in San Francisco Bay, which includes Suisun Bay; (2) protecting the Suisun Marsh, the largest remaining wetland in California; and (3) regulating new development within the first 100 feet inland from the Bay to ensure that maximum feasible public access to the Bay is provided. BCDC's land use authority relates primarily to ensuring public access.

County and City General Plans and Zoning Ordinances

All cities and counties are required to adopt a comprehensive, long-term general plan for the physical development of the jurisdiction.[1] County and city general plans act as "blueprints" for the long-term physical development of each county/city and contain goals, policies and implementation measures that provide planning guidance for the future. The Land Use Element of each general plan designates land uses within the respective jurisdiction and presents land use goals, policies, and implementation measures that provide planning guidance for the future, including provisions regarding agricultural and recreation lands.

Zoning ordinances adopted by local communities are one of many instruments by which the policies of the general plan are carried out. While EBMUD strives to conform with local zoning requirements, construction of facilities for the production, treatment, generation, storage, and transmission of water, the location and construction of the facilities would be exempt from zoning and building ordinances of local jurisdictions.[2]

A summary of relevant goals and policies from local general plans related to land use and recreation is presented in Appendix B.

[1] Government Code, Section 65300 *et seq*.

[2] Government Code Sections 53091, 53095.

4.2.E Transportation

4.2.E.1 Regional Setting

EBMUD Service Area

The EBMUD service area, shown in Figure 2-1 in Chapter 2 of this PEIR, includes 20 incorporated cities and 15 unincorporated communities in Alameda and Contra Costa counties. The transportation network within the service area consists of state highways, surface streets, railways, public transit systems, and air systems that connect the cities within the service area and provide access to areas outside the service area. Major highways that pass through the service area include the following:

- Interstate (I-) 880, which runs generally north to south, extends along the east side of San Francisco Bay and connects I-80 in Oakland to State Route (SR) 17 in San Jose. Cities along I-880 within EBMUD's service area include Oakland, Alameda, San Leandro, and San Lorenzo;
- I-80, which runs generally north to south, extends through many East Bay communities (e.g., Richmond, El Cerrito, Albany, Berkeley, Oakland, and Emeryville within the EBMUD service area) and connects to US 101 in San Francisco via the San Francisco – Oakland Bay Bridge;
- I-680 runs generally north to south. It originates north of Suisun Bay and extends south to the junction with I-280 in the South Bay. Cities and communities within the EBMUD service area along I-680 include Walnut Creek, Danville, and San Ramon;
- I-580 runs generally north and south and extends from its junction with US 101 in the North Bay to its junction with I-5, south of the City of Tracy. Cities within the EBMUD service area along I-580 include Oakland, Piedmont, San Leandro, and Castro Valley;
- SR 24 runs generally east to west and extends from I-580 in the west to I-680 in the east, connecting the cities on the west side of the Berkeley-Oakland hills to those on the east side;
- SR 13 is a short highway that connects I-580 to SR 24, and connects the cities of Oakland and Berkeley; and
- SR 4 runs generally east to west and extends from I-80 near Hercules east to SR 160 near the Town of Oakley.

Within each individual jurisdiction, the local traffic network consists of arterial streets, collector streets, and local streets. Typically, arterial streets accommodate through traffic and extend around, rather than through, residential neighborhoods, commercial centers, and industrial areas. Collector streets supplement and provide access to arterial streets and neighborhoods; on such streets, the needs of through traffic and turning and parking must be balanced. Local streets primarily provide access to abutting properties; ease of access, pedestrian safety, and parking have priority over traffic movement. Bicycle trails extend throughout the region, along roadways and on designated recreational trails.

The public transit network consists of the Bay Area Rapid Transit (BART) subway, buses, and rail. BART provides subway service in both Alameda and Contra Costa counties within the EBMUD service area. Alameda-Contra Costa Transit District (AC Transit) provides bus service throughout the East Bay as well as express service across the Bay Bridge to San Francisco. The Central Contra Costa Transit Authority (CCCTA) also provides bus service in central Contra Costa County within the EBMUD service area.

The Union Pacific Railroad network extends through the region and provides both freight and passenger service. Amtrak's Capitol Corridor route provides intercity rail passenger service between Sacramento and San Jose, including the EBMUD service area. The Oakland International Airport is located within the EBMUD service area in Oakland. Smaller airports and airstrips are scattered throughout the Bay Area.

Central Valley

Major highways within the Central Valley region of the WSMP 2040 Preferred Portfolio Study Area (in the counties of Glenn, Colusa, Sacramento, San Joaquin, and portions of Yuba, Amador and Calaveras) include the following:

- I-5, which runs generally north to south through the counties of Glenn, Colusa, Sacramento, and San Joaquin;
- I-80, which runs northwest and northeast from the San Francisco Bay Area through the counties of Yolo and Sacramento to Truckee near the border of Nevada;
- US 50, which runs generally east to west from the City of Sacramento through Sacramento County to the Lake Tahoe region; and
- SR 99, which runs generally north to south through the counties of Sacramento and San Joaquin.

The road network in the Central Valley includes arterial, collector, and local roads. In addition, private roads within agricultural areas provide access to farmlands. The public transit network includes light rail in Sacramento and bus service in the Central Valley. Airports include the Sacramento International Airport and smaller airports and airstrips throughout the Central Valley.

Upcountry

No major highways extend through the Upcountry region of the WSMP 2040 Preferred Portfolio Study Area (in the counties of Plumas, Calaveras, Amador, and Alpine). The road network within the upcountry area consists of a variety of public and private roadways. Limited bus service is provided in the Upcountry area. Small airports and airstrips are scattered throughout the Upcountry area.

4.2.E.2 Setting for Preferred Portfolio Components

Rationing and Conservation

The Rationing and Conservation components would be implemented within the EBMUD service area. The transportation network within the EBMUD service area is described in the regional setting above.

Recycled Water

The precise locations of the recycled water projects have not yet been determined. It is expected that they would be constructed within the EBMUD service area, connected by the transportation network described in the regional setting for the EBMUD service area above.

Northern California Water Transfers

The sources of water transfers have not yet been identified, but for the purposes of this PEIR it is assumed they would occur in the Sacramento Valley. Roadways, including the major highways identified in the regional setting for the Central Valley and Upcountry regions, provide intra- and inter-county connections.

Railroads, bus routes, and public/private airports are scattered throughout these counties.

Bayside Groundwater Project Phase 2

One of three sites where well facilities would be constructed is the Bayside Groundwater Project Phase 1 site. The most direct access to the site from the highway is provided by I-880 from Hesperian Boulevard to Grant Avenue. Railroad tracks cross Grant Avenue at Railroad Avenue.

AC Transit operates local bus routes in the San Lorenzo region; Bus Route 93 extends along Grant Avenue and terminates at the intersection with Worthley Drive, 2 blocks north of the Bayside Groundwater Project Phase 1 site (AC Transit 2008). The Hayward Airport is approximately 8,000 feet southeast of the site.

Locations for the other facilities included in Phase 2 of the Bayside Groundwater Project have not been determined, but they would be located within the SEBPB within the

EBMUD service area, as shown in Figure 3-6 in Chapter 3. The transportation network within the EBMUD service area is described in the regional setting above.

Sacramento Basin Groundwater Banking / Exchange

Locations for the facilities proposed under the Sacramento Basin Groundwater Banking / Exchange component have not yet been identified. Roadways that provide intra-county connections include those shown in Section 4.2.E.1 above. Railroads, light rails, bus routes, and airports provide transit service throughout Sacramento County.

Regional Desalination

The Regional Desalination component would most likely be located along the south shoreline of Suisun Bay in Contra Costa County (see Figure 3-8 in Chapter 3). Major roads in the area include Willow Pass Road / West 10th Street and North Parkside Drive. The nearest highways are SR 4, SR 160 and I-680. Railroad tracks extend through the southern portion of the potential regional desalination area. The Tri-Delta Transit operates local bus routes in the Pittsburg region. Bus Routes 387 and 394 travel along Willow Pass Road and West 10th Street, respectively (Tri Delta Transit 2008). Buchanan Field Airport is southwest of the potential Desalination area, near the junction of I-680 and SR 4.

Enlarge Pardee Reservoir

Pardee Reservoir is 38 miles northeast of Stockton and 12 miles southwest of the Town of Jackson (see Figures 3-9 and 3-10 in Chapter 3). Pardee Dam Road generally runs north to south on the west side of the reservoir; Stoney Creek Road runs east to west north of the reservoir. Stoney Creek Road provides public access to the Pardee Recreation Area facilities. Access to Pardee Reservoir is via either SR 12 or SR 88, both approximately 3 miles north and south, respectively, of the reservoir. These highways connect just west of Camanche Reservoir. SR 49 is located east of Pardee Reservoir, and crosses the Mokelumne River near Electra Road. Middle Bar Road also crosses the river. Both roads connect the Town of Jackson north of the River to locations south of the river. No railroads, bus services or airports occur in the vicinity of Pardee Reservoir.

Enlarge Lower Bear Reservoir

Lower Bear Reservoir is located within the Mokelumne River Watershed in Amador County, approximately 15 miles east of the Town of Pioneer on SR 88 (see Figure 3-11 in Chapter 3). Lower Bear Reservoir is accessible by Bear River Road, off SR 88. No railroads, bus services or airports exist in the vicinity of Lower Bear Reservoir.

IRCUP / San Joaquin Groundwater Banking / Exchange

The precise locations of the proposed facilities (e.g., pipeline, intertie, pump station) needed for this component have not yet been identified, but could occur in various counties (San Joaquin, Amador, Calaveras, and Alpine) discussed in the regional setting for the Central Valley and Upcountry regions (see Figure 3-12 in Chapter 3).

Railroads, bus routes, and airports provide transit service within these counties.

4.2.E.3 Regulatory Setting

State Regulations

Any encroachment within the right-of-way of a state highway or route would be subject to California Department of Transportation (Caltrans) regulations, including issuance of an encroachment permit and the provision of temporary traffic control systems. Encroachment permits are intended to safeguard the affected jurisdictions' properties, either by providing preventive measures to be implemented during project construction, or providing corrective measures if damage occurs. Traffic control systems could include traffic control warning signs, lights, and/or safety devices to ensure the safety of the traveling public.

Regional/Local Regulations

Cities and counties are responsible for planning, designing, constructing, operating and maintaining local public roadways within their jurisdictions. Any encroachment within the right-of-way of a City or County roadway would require an encroachment permit and the provision of temporary traffic control systems, as required by the public works department of the affected jurisdiction.

Transportation-related goals, policies, and implementation measures from local general plans that may be relevant to the WSMP 2040 Preferred Portfolio are summarized in Appendix B.

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4.2.F Air Quality

4.2.F.1 Regional Setting

California is divided into 15 air basins that contain distinctive natural factors that affect air quality. The Preferred Portfolio components are located within four air basins: San Francisco Bay Area Air Basin (SFBAAB), San Joaquin Valley Air Basin (SJVAB), Sacramento Valley Air Basin (SVAB), and the Mountain Counties Air Basin (MCAB). Ambient concentrations of criteria air pollutants and toxic air contaminants (TACs) are determined by the amount of emissions from sources and the atmosphere's ability to transport and dilute such emissions. Terrain, wind, atmospheric stability, and the presence of sunlight all affect transport and dilution of emissions. Therefore, existing air quality conditions are determined by such natural factors as topography, meteorology, and climate, in addition to the amount of emissions from existing sources.

Topography, Meteorology, and Climate

Please refer to Appendix D for a description of the topography, meteorology and climate of each air basin within the WSMP 2040 Preferred Portfolio Study Area.

Criteria Air Pollutants

Concentrations of several air pollutants–ozone (O_3), carbon monoxide (CO), nitrogen dioxide (NO_2), sulfur dioxide (SO_2), respirable and fine particulate matter (PM_{10} and $PM_{2.5}$), and lead–are used as indicators of ambient air quality conditions. These pollutants are commonly referred to as "criteria air pollutants" because they are the most prevalent air pollutants known to be deleterious to human health, and extensive documentation is available on the health-effects criteria for these pollutants. A description of these pollutants is provided in Appendix D.

Table 4.2.F-1 presents the California ambient air quality standards (CAAQS) and national ambient air quality standards (NAAQS).

The California Air Resources Board (ARB) maintains an emissions inventory for criteria air pollutants for each county and basin within California. The inventories of the basins relevant to the Preferred Portfolio are presented in Tables D-1, D-2, D-3, and D-4 in Appendix D. Within the SFBAAB, mobile source emissions account for 56, 89, and 86 percent of the reactive organic gasses (ROG), CO, and NO_X emissions, respectively. Stationary sources, primarily fuel combustion and petroleum production and marketing, account for approximately 83 percent of the SFBAAB's sulfur oxides (SO_X) emissions. Lastly, the majority of PM_{10} and $PM_{2.5}$ emissions (i.e., 83 and 65 percent, respectively) are generated from areawide sources.

Table 4.2.F-1: Summary of Ambient Air Quality Standards

POLLUTANT	AVERAGING TIME	CALIFORNIA STANDARDS [b,c]	NATIONAL STANDARDS[a]	
			Primary [c,d]	Secondary [c,e]
Ozone	1-hour	0.09 ppm (180 µg/m^3)	–	–
	8-hour	0.070 ppm (137 µg/m^3)	0.075 ppm (147 µg/m^3)	Same as Primary Standard
Carbon Monoxide (CO)	1-hour	20 ppm (23 mg/m^3)	35 ppm (40 mg/m^3)	–
	8-hour	9.0 ppm (10 mg/m^3)	9 ppm (10 mg/m^3)	
Nitrogen Dioxide (NO_2)	Annual Arithmetic Mean	0.030 ppm (56 µg/m^3)	0.053 ppm (100 µg/m^3)	Same as Primary Standard
	1-hour	0.18 ppm (338 µg/m^3)	–	
Sulfur Dioxide (SO_2)	Annual Arithmetic Mean	–	0.030 ppm (80 µg/m^3)	–
	24-hour	0.04 ppm (105 µg/m^3)	0.14 ppm (365 µg/m^3)	–
	3-hour	–	–	0.5 ppm (1300 µg/m^3)
	1-hour	0.25 ppm (655 µg/m^3)	–	–
Respirable Particulate Matter (PM_{10})	Annual Arithmetic Mean	20 µg/m^3	-	Same as Primary Standard
	24-hour	50 µg/m^3	150 µg/m^3	
Fine Particulate Matter ($PM_{2.5}$)	Annual Arithmetic Mean	12 µg/m^3	15 µg/m^3	Same as Primary Standard
	24-hour	–	35 µg/m^3	
Lead[f]	30-day Average	1.5 µg/m^3	–	–
	Calendar Quarter	–	1.5 µg/m^3	Same as Primary Standard

Table 4.2.F-1: Summary of Ambient Air Quality Standards (continued)

POLLUTANT	AVERAGING TIME	CALIFORNIA STANDARDS [b,c]	NATIONAL STANDARDS [a]	
			Primary [c,d]	Secondary [c,e]
Sulfates	24-hour	25 µg/m³	No National Standards	
Hydrogen Sulfide	1-hour	0.03 ppm (42 µg/m³)		
Vinyl Chloride[f]	24-hour	0.01 ppm (26 µg/m³)		
Visibility-Reducing Particle Matter	8-hour	Extinction coefficient of 0.23 per kilometer—visibility of 10 miles or more (0.07—30 miles or more for Lake Tahoe) because of particles when the relative humidity is less than 70%.		

Notes: µg/m³ = micrograms per cubic meter; ppm = parts per million

[a] National standards (other than ozone, particulate matter, and those based on annual averages or annual arithmetic means) are not to be exceeded more than once a year. The ozone standard is attained when the fourth highest 8-hour concentration in a year, averaged over 3 years, is equal to or less than the standard. The PM_{10} 24-hour standard is attained when 99% of the daily concentrations, averaged over 3 years, are equal to or less than the standard. The $PM_{2.5}$ 24-hour standard is attained when 98% of the daily concentrations, averaged over 3 years, are equal to or less than the standard. Contact the U.S. Environmental Protection Agency for further clarification and current Federal policies.

[b] California standards for ozone, CO (except Lake Tahoe), SO_2 (1- and 24-hour), NO_2, particulate matter, and visibility-reducing particles are values that are not to be exceeded. All others are not to be equaled or exceeded. California ambient air quality standards are listed in the Table of Standards in Section 70200 of Title 17 of the California Code of Regulations.

[c] Concentration expressed first in units in which it was issued (i.e., parts per million [ppm] or micrograms per cubic meter [µg/m³]). Equivalent units given in parentheses are based on a reference temperature of 25°C and a reference pressure of 760 torr. Most measurements of air quality are to be corrected to a reference temperature of 25°C and a reference pressure of 760 torr; ppm in this table refers to ppm by volume, or micromoles of pollutant per mole of gas.

[d] National Primary Standards: The levels of air quality necessary, with an adequate margin of safety, to protect the public health.

[e] National Secondary Standards: The levels of air quality necessary to protect the public welfare from any known or anticipated adverse effects of a pollutant.

[f] ARB has identified lead and vinyl chloride as toxic air contaminants with no threshold of exposure for adverse health effects determined. These actions allow for the implementation of control measures at levels below the ambient concentrations specified for these pollutants.

Source: ARB 2008b.

Within the SJVAB, mobile source emissions account for 40, 78, and 81 percent of the total ROG, CO, and NO_X during 2006, respectively. Areawide sources account for 83 and 63 percent of the PM_{10} and $PM_{2.5}$ emissions, respectively. Finally, stationary source emissions account for a majority (i.e., 76 percent) of the basin's SO_X emissions.

Within the SVAB, mobile source emissions accounted for 54, 71, and 84 percent of the total ROG, CO, and NO_X emissions generated within the air basin in 2006, respectively. In addition, the areawide sources accounted for 87 and 73 percent of the total PM_{10} and $PM_{2.5}$ emissions, respectively.

Within the MCAB, mobile source emissions within the basin account for a majority of the ROG and NO_X emissions (59 and 83 percent, respectively). However, mobile sources only account for 47 percent of the CO emissions versus areawide sources, which account for 50 percent of the CO emissions. PM_{10} and $PM_{2.5}$ emissions were predominately generated by areawide sources (92 and 87 percent, respectively).

Ambient Air Quality Monitoring Data and Attainment Status

ARB and local air districts maintain air quality monitoring stations throughout California, which measure ambient air concentrations of criteria air pollutants. The specific pollutants monitored differ from station to station; however, data are used to represent ambient (background) air concentrations within that region or air basin. More specifically, both ARB and the U.S. Environmental Protection Agency (USEPA) use air quality monitoring data to designate areas in terms of attainment through comparisons with the health-based ambient air quality standards (shown in Table 4.2.F-1). The purpose of these designations is to identify areas with air quality problems and thereby initiate planning efforts for improvement. The three basic designation categories are "nonattainment," "attainment," and "unclassified." The "unclassified" designation is used in an area that cannot be classified on the basis of available information as meeting or not meeting the standards. In addition, the California designations include a subcategory of the nonattainment designation, called "nonattainment-transitional." The nonattainment-transitional designation is given to nonattainment areas that are progressing and nearing attainment.

Toxic Air Contaminants (TACs)

Concentrations of TACs are also used as indicators of ambient air quality conditions. A TAC is defined as an air pollutant that may cause or contribute to an increase in mortality or in serious illness, or that may pose a hazard to human health. TACs are usually present in minute quantities in the ambient air; however, their high toxicity or health risk may pose a threat to public health even at low concentrations.

According to the *California Almanac of Emissions and Air Quality* (ARB 2008a), most of the estimated health risks from TACs can be attributed to relatively few compounds, the most important being particulate matter from diesel-fueled engines. Diesel particulate matter (DPM) differs from other TACs in that it is not a single substance, but a complex mixture of hundreds of substances. Although DPM is emitted by diesel-fueled internal combustion engines, the composition of the emissions varies depending on engine type, operating conditions, fuel composition, lubricating oil, and presence or absence of an emission control system.

Unlike the other TACs, no ambient monitoring data are available for DPM because no routine measurement method currently exists. However, ARB has made preliminary estimates of concentrations based on a PM exposure method. This method uses the ARB emissions inventory's PM_{10} database, ambient PM_{10} monitoring data, and the results from several studies to estimate concentrations of DPM. In addition to DPM, the TACs for which data are available that pose the greatest existing ambient risk in California are benzene, 1,3-butadiene, acetaldehyde, carbon tetrachloride, hexavalent chromium, para-dichlorobenzene, formaldehyde, methylene chloride, and perchloroethylene.

Ambient Air Quality Monitoring Data

ARB maintains a statewide air quality monitoring network for TACs as well as criteria air pollutants; 17 stations monitor up to 64 TACs. Typically, TACs are sampled, analyzed, and reported as 24-hour averages. ARB compiles and reports the annual emissions (i.e., tons per year) of 10 TACs for five of the most populous air basins within California. The 10 TACs reported represent those that pose the greatest known health risk in California, based on ambient air quality data. The most recent annual TAC emissions inventory data for the SFBAAB are shown in Table D-1 in Appendix D.

Odors

Odors are generally regarded as an annoyance rather than a health hazard. However, manifestations of a person's reaction to foul odors can range from psychological (e.g., irritation, anger, or anxiety) to physiological (e.g., circulatory and respiratory effects, nausea, vomiting, and headache). The characteristics of odor are described in Appendix D. Industries and/or facilities that are likely to emit objectionable odors include wastewater treatment plants, landfills, composting facilities, petroleum refineries, chemical and fiberglass manufacturers, among others, which occur throughout the WSMP 2040 Preferred Portfolio Study Area.

EBMUD Service Area (San Francisco Bay Area Air Basin)

The EBMUD service area is within the San Francisco Bay Area Air Basin. The SFBAAB includes all of Contra Costa, Marin, Napa, San Francisco, San Mateo, and Santa Clara counties, as well as the southern half of Sonoma County and the southwestern portion of Solano County.

Criteria Air Pollutants

Ambient Air Quality Monitoring Data and Attainment Status

Concentrations of criteria air pollutants are measured at several monitoring stations in the SFBAAB. Due to the large geographical area that the EBMUD service area covers, monitoring data for the entire SFBAAB are summarized in Table 4.2.F-2 to represent regional ambient air quality and individual station data, where basin-wide data were not available. Table 4.2.F-3 shows the ambient air monitoring data for years 2005, 2006, and 2007 (the most recent available). The most recent attainment designations with respect to the national ambient air quality standards (NAAQS) and California ambient air quality standards (CAAQS) for the SFBAAB are shown in Table 4.2.F-4.

Central Valley (San Joaquin Valley and Sacramento Valley Air Basins)

The Central Valley portion of the proposed project would include portions of the San Joaquin Valley Air Basin (SJVAB) as well as the Sacramento Valley Air Basin (SVAB). The following section describes the regional conditions within both air basins.

Ambient Air Quality Monitoring Data

Ambient air pollutant concentrations are an essential component of describing existing air quality in a region. Tables 4.2.F-5 and 4.2.F-6 show the ambient air concentrations within the SJVAB and SVAB, respectively. When basin-wide concentrations were not available, monitoring data from a specific monitoring station representative of the basin (i.e., near the center of the basin) were used.

Attainment Status

Tables 4.2.F-7, 4.2.F-8, and 4.2.F-9 present the attainment status of the SJVAB and SVAB with respect to the NAAQS and CAAQS. The SVAB contains two distinctive areas with respect to air quality, due to the population of Sacramento County. Attainment status for Sacramento County and the remaining SVAB (excluding Sacramento County) tends to differ due the unique characteristics of Sacramento County. Therefore, Table 4.2.F-8 presents the attainment status of the Sacramento County portion of the SVAB with respect to the NAAQS and CAAQS, and Table 4.2.F-9 presents the attainment status of the SVAB excluding Sacramento County with respect to the NAAQS and CAAQS.

Table 4.2.F-2: Summary of Annual Ambient Air Quality Data — San Francisco Bay Area Air Basin

	2005	2006	2007
OZONE			
SFBAAB-wide data			
Maximum concentration (1-hour/8-hour, ppm)	0.120/0.090	0.127/0.106	0.120/0.091
Number of days State standard exceeded (8-hour)	9	22	9
Number of days national standard exceeded (1-hour/8-hour)	0/1	1/12	0/1
CARBON MONOXIDE (CO)			
1-hour data (Pittsburg — 10th Street Monitoring Station), 8-hour data (SFBAAB-wide)			
Maximum concentration (1-hour/8-hour, ppm)	3.3/3.11	3.3/2.94	2.8/2.71
Number of days State standard exceeded (8-hour)	0	0	0
Number of days national standard exceeded (1-hour/8-hour)	0/0	0/0	0/0
NITROGEN DIOXIDE (NO_2)			
SFBAAB-wide data			
Maximum concentration (1-hour, ppm)	0.074	0.107	0.069
Number of days State standard exceeded	0	0	0
Annual average (ppm)	0.013	0.013	0.012
SULFUR DIOXIDE (SO_2)			
Pittsburg — 10th Street Monitoring Station (Basin-wide data are not available)			
Maximum concentration (24-hour, ppm)	0.010	0.009	0.008
Number of days State standard exceeded	0	0	0
Number of days national standard exceeded	0	0	0
FINE PARTICULATE MATTER ($PM_{2.5}$)			
Concord — 2975 Treat Boulevard (Basin-wide data are not available)			
Maximum concentration ($\mu g/m^3$) (National/California [1])	48.9/48.9	62.1/62.1	46.2/46.8
Number of days national standard exceeded (measured/calculated [2])	0/0.0	0/0.0	0/0.0
State annual average ($\mu g/m^3$)	9.3	10.0	8.7

Table 4.2.F-2: Summary of Annual Ambient Air Quality Data — San Francisco Bay Area Air Basin (continued)

	2005	2006	2007
RESPIRABLE PARTICULATE MATTER (PM_{10})			
SFBAAB-wide data			
Maximum concentration (μg/m^3) (National/California [1])	78.1/80.8	103.9/106.3	72.9/77.8
Number of days State standard exceeded (measured/calculated [2])	4/23.3	13/77.3	4/24.3
Number of days national standard exceeded (measured/calculated [2])	0/0.0	0/0.0	0/0.0

Notes:
μg/m^3 = micrograms per cubic meter; ppm = parts per million; — = data not available
1 State and national statistics may differ for the following reasons: State statistics are based on California-approved samplers, whereas national statistics are based on samplers using Federal reference or equivalent methods. State and national statistics may therefore be based on different samplers. State statistics are based on local conditions while national statistics are based on standard conditions. State criteria for ensuring that data are sufficiently complete for calculating valid annual averages are more stringent than the national criteria.
2 Measured days are those days that an actual measurement was greater than the level of the State daily standard or the national daily standard. Measurements are typically collected every 6 days. Calculated days are the estimated number of days that a measurement would have been greater than the level of the standard had measurements been collected every day. The number of days above the standard is not necessarily the number of violations of the standard for the year.
Sources: ARB 2008d;USEPA 2008b

Table 4.2.F-3: Summary of 2006 Estimated Emissions Inventory for Toxic Air Contaminants

TOXIC AIR CONTAMINANTS	EMISSION (TONS PER YEAR)		
	SFBAAB	SVAB	SJVAB
Acetaldehyde	1,521	1,047	1,761
Benzene	1,836	1,039	1,789
1,3-Butadiene	394	376	503
Carbon Tetrachloride	0.94	0.05	0
Chromium (Hexavalent)	0.08	0.04	0.22
para-Dichlorobenzene	279	105	147
Formaldehyde	3,488	2,193	4,396
Methylene Chloride	963	366	429
Perchloroethylene	709	410	588
Diesel Particulate Matter	4,697	3,159	7,695

Notes:
SFBAAB = San Francisco Bay Area Air Basin; SVAB = Sacramento Valley Air Basin; SJVAB = San Joaquin Valley Air Basin
Source: ARB 2008a

Table 4.2.F-4: California and National Attainment Status for the San Francisco Bay Area Air Basin

POLLUTANT	DESIGNATION/CLASSIFICATION	
	CALIFORNIA[a]	NATIONAL[b]
Ozone (1-Hour)	Nonattainment	-
Ozone (8-Hour)	Nonattainment[3]	Nonattainment (Marginal)
Carbon Monoxide (CO)	Attainment	Attainment/Unclassifiable
Nitrogen Dioxide (NO_2)	Attainment	Attainment/Unclassifiable
Sulfur Dioxide (SO_2)	Attainment	Attainment
Respirable Particulate Matter (PM_{10})	Nonattainment	Unclassified
Fine Particulate Matter ($PM_{2.5}$)	Nonattainment	Attainment/Unclassifiable
Lead[c]	Attainment	Attainment
Sulfates	Attainment	No National Standards
Hydrogen Sulfide	Unclassified	
Vinyl Chloride[d]	Unclassified	
Visibility Reducing Particles	Unclassified	

Notes:

a Unclassified (U): The data are incomplete and do not support a designation of attainment or nonattainment.
Attainment (A): The State standard for that pollutant was not violated at any site in the area during a 3-year period.
Nonattainment (N): There was at least one violation of a State standard for that pollutant in the area.
Nonattainment/Transitional (NT) (a subcategory of the nonattainment designation): The area is close to attaining the standard for that pollutant.

b Nonattainment (N): Any area that does not meet (or that contributes to ambient air quality in a nearby area that does not meet) the national primary or secondary ambient air quality standard for the pollutant.
Attainment (A): Any area that meets the national primary or secondary ambient air quality standard for the pollutant.
Unclassifiable (U): Any area that cannot be classified on the basis of available information as meeting or not meeting the national primary or secondary ambient air quality standard for the pollutant.

c ARB has not issued area classifications based on the new State 8-hour standard. The previous classification for the 1-hour ozone standard was Serious.

d ARB has identified lead and vinyl chloride as "toxic air contaminants" with no threshold level of exposure for adverse health effects determined.

Source: ARB 2008e, USEPA 2008c.

Table 4.2.F-5: Summary of Annual Ambient Air Quality Data — San Joaquin Valley Air Basin

	2005	2006	2007
OZONE (O_3)			
SJVAB-wide data			
Maximum concentration (1-hour/8-hour, ppm)	0.134/0.113	0.141/0.121	0.138/0.110
Number of days State standard exceeded (1-hour/8-hour)	83/124	90/141	69/138
Number of days national standard exceeded (1-hour/8-hour)	8/72	18/86	3/65
CARBON MONOXIDE (CO)			
1-hour data (Stockton—Hazelton Station), 8-hour data (SJVAB-wide)			
Maximum concentration (1-hour/8-hour, ppm)	4.3/2.95	4.4/3.73	3.6/3.16
Number of days State standard exceeded (8-hour)	0	0	0
Number of days national standard exceeded (1-hour/8-hour)	0/0	0/0	0/0
NITROGEN DIOXIDE (NO_2)			
SJVAB-wide data			
Maximum concentration (1-hour, ppm)	0.087	0.100	0.101
Number of days State standard exceeded	0	0	0
Annual average (ppm)	0.014	0.014	0.013
SULFUR DIOXIDE (SO_2)			
Fresno — 3425 North 1st Street (Basin-wide data is not available for SO_2.)			
Maximum concentration (24-hour, ppm)	—	—	0.067
Number of days State standard exceeded	—	—	0
Number of days national standard exceeded	—	—	0
FINE PARTICULATE MATTER ($PM_{2.5}$)			
Stockton — 3425 North 1st Street (Basin-wide data is not available for $PM_{2.5}$.)			
Maximum concentration ($\mu g/m^3$) (National/California [a])	63.0/70.0	47.0/53.3	52.0/66.8
Number of days national standard exceeded (measured/calculated [b])	0/0.0	0/0.0	0/0.0
State annual average ($\mu g/m^3$)	12.5	13.5	13.5
RESPIRABLE PARTICULATE MATTER (PM_{10})			
SJVAB-wide data			
Maximum concentration ($\mu g/m^3$) (National/California [a])	131.0/137.0	304.0/255.0	172.1/135.0
Number of days State standard exceeded (measured/calculated [b])	24/146.3	27/166.8	28/145.2
Number of days national standard exceeded (measured/calculated [b])	0/0.0	2/4.2	1/1.4

Notes:
$\mu g/m^3$ = micrograms per cubic meter; ppm = parts per million; — = data not available

[a] State and national statistics may differ for the following reasons: State statistics are based on California-approved samplers, whereas national statistics are based on samplers using Federal reference or equivalent methods. State and national statistics may therefore be based on different samplers. State statistics are based on local conditions while national statistics are based on standard conditions. State criteria for ensuring that data are sufficiently complete for calculating valid annual averages are more stringent than the national criteria.

[b] Measured days are those days that an actual measurement was greater than the level of the State daily standard or the national daily standard. Measurements are typically collected every 6 days. Calculated days are the estimated number of days that a measurement would have been greater than the level of the standard had measurements been collected every day. The number of days above the standard is not necessarily the number of violations of the standard for the year.

Sources: ARB 2008d; USEPA 2008b

Table 4.2.F-6: Summary of Annual Ambient Air Quality Data — Sacramento Valley Air Basin

	2005	2006	2007
OZONE			
SVAB-wide data			
Maximum concentration (1-hour/8-hour, ppm)	0.134/0.117	0.143/0.114	0.138/0.122
Number of days State standard exceeded (1-hour/8-hour)	33/62	44/88	15/61
Number of days national standard exceeded (1-hour/8-hour)	3/25	7/39	1/10
CARBON MONOXIDE (CO)			
1-hour data (North Highlands—Blackfoot Way Station), 8-hour data (SVAB-wide)			
Maximum concentration (1-hour/8-hour, ppm)	8.0/4.19	7.5/4.19	5.1/5.58
Number of days State standard exceeded (8-hour)	0	0	0
Number of days national standard exceeded (1-hour/8-hour)	0/0	0/0	0/0
NITROGEN DIOXIDE (NO_2)			
SVAB-wide data			
Maximum concentration (1-hour, ppm)	0.079	0.097	0.127
Number of days State standard exceeded	0	0	0
Annual average (ppm)	0.011	0.012	0.011
SULFUR DIOXIDE (SO_2)			
North Highlands — 7823 Blackfoot Way (Basin-wide data are not available for SO_2.)			
Maximum concentration (24-hour, ppm)	0.002	0.003	0.004
Number of days State standard exceeded	0	0	0
Number of days national standard exceeded	0	0	0
FINE PARTICULATE MATTER ($PM_{2.5}$)			
Sacramento —2701 Avalon Drive (Basin-wide data are not available for $PM_{2.5}$.)			
Maximum concentration ($\mu g/m^3$) (National/California [a])	80.0/81.4	78.0/78.0	61.0/61.0
Number of days national standard exceeded (measured/calculated [b])	5/5.2	2/2.0	0/0.0
State annual average ($\mu g/m^3$)	11.5	15.2	12.3
RESPIRABLE PARTICULATE MATTER (PM_{10})			
SVAB-wide data			
Maximum concentration ($\mu g/m^3$) (National/California [a])	110.0/109.0	159.6/111.0	119.0/119.0
Number of days State standard exceeded (measured/calculated [b])	25/42.4	11/53.4	6/36.4
Number of days national standard exceeded (measured/calculated [b])	0/—	1/—	0/—

Notes:
$\mu g/m^3$ = micrograms per cubic meter; ppm = parts per million; — = data not available

[a] State and national statistics may differ for the following reasons: State statistics are based on California-approved samplers, whereas national statistics are based on samplers using Federal reference or equivalent methods. State and national statistics may therefore be based on different samplers. State statistics are based on local conditions while national statistics are based on standard conditions. State criteria for ensuring that data are sufficiently complete for calculating valid annual averages are more stringent than the national criteria.

[b] Measured days are those days that an actual measurement was greater than the level of the State daily standard or the national daily standard. Measurements are typically collected every 6 days. Calculated days are the estimated number of days that a measurement would have been greater than the level of the standard had measurements been collected every day. The number of days above the standard is not necessarily the number of violations of the standard for the year.

Sources: ARB 2008d; USEPA 2008b

Table 4.2.F-7: California and National Attainment Status for the San Joaquin Valley Air Basin

POLLUTANT	DESIGNATION/CLASSIFICATION	
	CALIFORNIA[a]	NATIONAL[b]
Ozone (1-Hour)	Nonattainment	-
Ozone (8-Hour)	Nonattainment[c]	Nonattainment (Serious)
Carbon Monoxide (CO)	Attainment/Unclassified[d]	Attainment/Unclassifiable
Nitrogen Dioxide (NO_2)	Attainment	Attainment/Unclassifiable
Sulfur Dioxide (SO_2)	Attainment	Attainment/Unclassifiable
Respirable Particulate Matter (PM_{10})	Nonattainment	Nonattainment (Serious)
Fine Particulate Matter ($PM_{2.5}$)	Nonattainment	Nonattainment
Lead	Attainment	Attainment
Sulfates	Attainment	No National Standards
Hydrogen Sulfide	Unclassified	
Vinyl Chloride	Unclassified	
Visibility Reducing Particles	Unclassified	

Notes:

[a] Unclassified (U): The data are incomplete and do not support a designation of attainment or nonattainment.
Attainment (A): The State standard for that pollutant was not violated at any site in the area during a 3-year period.
Nonattainment (N): There was at least one violation of a State standard for that pollutant in the area.
Nonattainment/Transitional (NT) (a subcategory of the nonattainment designation): The area is close to attaining the standard for that pollutant.

[b] Nonattainment (N): Any area that does not meet (or that contributes to ambient air quality in a nearby area that does not meet) the national primary or secondary ambient air quality standard for the pollutant.
Attainment (A): Any area that meets the national primary or secondary ambient air quality standard for the pollutant.
Unclassifiable (U): Any area that cannot be classified on the basis of available information as meeting or not meeting the national primary or secondary ambient air quality standard for the pollutant.

[c] ARB has not issued area classifications based on the new State 8-hour standard. The previous classification for the 1-hour ozone standard was Severe.

[d] Kings County, Madera County, and Merced County are classified as Unclassified for Carbon Monoxide (Source: California Code of Regulations, Title 17, Section 60202, http://ccr.oal.ca.gov)

Source: ARB 2008e, USEPA 2008c.

Table 4.2.F-8: California and National Attainment Status for the Sacramento Valley Air Basin (Sacramento County)

POLLUTANT	DESIGNATION/CLASSIFICATION	
	CALIFORNIA[a]	NATIONAL[b]
Ozone (1-Hour)	Nonattainment	-
Ozone (8-Hour)	Nonattainment[c]	Nonattainment (Serious)
Carbon Monoxide (CO)	Attainment	Attainment/Unclassifiable
Nitrogen Dioxide (NO_2)	Attainment	Attainment/Unclassifiable
Sulfur Dioxide (SO_2)	Attainment	Unclassifiable
Respirable Particulate Matter (PM_{10})	Nonattainment	Nonattainment (Moderate)
Fine Particulate Matter ($PM_{2.5}$)	Nonattainment	Attainment/Unclassifiable
Lead[4]	Attainment	Attainment
Sulfates	Attainment	No National Standards
Hydrogen Sulfide	Unclassified	
Vinyl Chloride[d]	Unclassified	
Visibility Reducing Particles	Unclassified	

Notes:
[a] Unclassified (U): The data are incomplete and do not support a designation of attainment or nonattainment.
Attainment (A): The State standard for that pollutant was not violated at any site in the area during a 3-year period.
Nonattainment (N): There was at least one violation of a State standard for that pollutant in the area.
Nonattainment/Transitional (NT) (a subcategory of the nonattainment designation): The area is close to attaining the standard for that pollutant.
[b] Nonattainment (N): Any area that does not meet (or that contributes to ambient air quality in a nearby area that does not meet) the national primary or secondary ambient air quality standard for the pollutant.
Attainment (A): Any area that meets the national primary or secondary ambient air quality standard for the pollutant.
Unclassifiable (U): Any area that cannot be classified on the basis of available information as meeting or not meeting the national primary or secondary ambient air quality standard for the pollutant.
[c] ARB has not issued area classifications based on the new State 8-hour standard. The previous classification for the 1-hour ozone standard was Serious.
[d] ARB has identified lead and vinyl chloride as "toxic air contaminants" with no threshold level of exposure for adverse health effects determined.
Source: ARB 2008e, USEPA 2008c.

Table 4.2.F-9: California and National Attainment Status for the Sacramento Valley Air Basin (Excluding Sacramento County)

POLLUTANT	DESIGNATION/CLASSIFICATION	
	CALIFORNIA[a]	NATIONAL[b]
Ozone (O_3) 1-Hour	Nonattainment	-
Ozone (O_3) 8-Hour	Nonattainment[c]	Attainment/Unclassifiable[d]
Carbon Monoxide (CO)	Attainment/Unclassified[e]	Attainment/Unclassifiable
Nitrogen Dioxide (NO_2)	Attainment	Attainment/Unclassifiable
Sulfur Dioxide (SO_2)	Attainment	Unclassifiable
Respirable Particulate Matter (PM_{10})	Nonattainment	Unclassifiable
Fine Particulate Matter ($PM_{2.5}$)	Nonattainment/Unclassified[f]	Attainment/Unclassifiable
Lead[g]	Attainment	Attainment
Sulfates	Attainment	No National Standards
Hydrogen Sulfide	Unclassified	
Vinyl Chloride[g]	Unclassified	
Visibility Reducing Particles	Unclassified	

Notes:

[a] Unclassified (U): The data are incomplete and do not support a designation of attainment or nonattainment.
Attainment (A): The State standard for that pollutant was not violated at any site in the area during a 3-year period.
Nonattainment (N): There was at least one violation of a State standard for that pollutant in the area.
Nonattainment/Transitional (NT) (a subcategory of the nonattainment designation): The area is close to attaining the standard for that pollutant.

[b] Nonattainment (N): Any area that does not meet (or that contributes to ambient air quality in a nearby area that does not meet) the national primary or secondary ambient air quality standard for the pollutant.
Attainment (A): Any area that meets the national primary or secondary ambient air quality standard for the pollutant.
Unclassifiable (U): Any area that cannot be classified on the basis of available information as meeting or not meeting the national primary or secondary ambient air quality standard for the pollutant.

[c] ARB has not issued area classifications based on the new State 8-hour standard. The previous classification for the 1-hour ozone standard was Moderate with the exception of Colusa County and Glenn County, which remain designated as Nonattainment-Transitional.

[d] Chico Area (Butte County) is designated as Subpart 1 nonattainment for the 8-hour ozone standard.

[e] Colusa, Glenn, Shasta, Tehama, and Yuba County are designated as Unclassified for Carbon Monoxide (Source: California Code of Regulations, Title 17, Section 60202, http://ccr.oal.ca.gov). The remaining portions are Attainment.

[f] Butte County is designated as Nonattainment for $PM_{2.5}$. (Source: California Code of Regulations, Title 17, Section 60210, http://ccr.oal.ca.gov). The remaining portions are Unclassified.

[g] ARB has identified lead and vinyl chloride as "toxic air contaminants" with no threshold level of exposure for adverse health effects determined.

Source: ARB 2008e, USEPA 2008c.

Upcountry (Mountain Counties Air Basin)

Ambient Air Quality Monitoring Data and Attainment Status

Table 4.2.F-10 presents the ambient air concentrations of criteria air pollutants within the MCAB. Similar to the ambient air concentrations presented for other air basins, when basin-wide concentrations were not available, specific monitoring station data were used. The attainment status of the MCAB with respect to the NAAQS and CAAQS is shown in Table 4.2.F-11.

TAC emissions in the MCAB are not anticipated to be high relative to the other project air basins (i.e., SFBAAB, SJVAB, and SVAB) due to the lower population of the MCAB.

4.2.F.2 Setting for Preferred Portfolio Components

Rationing and Conservation

The Rationing and Conservation components would be implemented within the EBMUD service area. The EBMUD service area is contained within the SFBAAB. Air quality characteristics of the SFBAAB are described above in the Regional Setting.

Recycled Water

The precise locations of the recycled water projects have not yet been determined but would most likely be within the EBMUD service area. The EBMUD service area is contained within the SFBAAB. Air quality characteristics of the SFBAAB are described above in the Regional Setting.

Northern California Water Transfers

The precise sources of water transfers have not yet been identified, but for the purposes of this PEIR it is assumed they would occur in the Sacramento Valley. These counties are contained within the SVAB and the MCAB. Air quality characteristics of the SVAB and MCAB are described above in the Regional Setting.

Bayside Groundwater Project Phase 2

The Bayside Groundwater Project Phase 2 facilities would be located within EBMUD service area (see Figure 3-7 in Chapter 3). The EBMUD service area is contained within the SFBAAB. Air quality characteristics of the SFBAAB are described above in the Regional Setting.

Sacramento Basin Groundwater Banking / Exchange

The precise locations of the proposed facilities needed for this component have not yet been identified but would be in Sacramento County, which is located within the SVAB. Air quality characteristics of the SVAB are described above in the Regional Setting.

Table 4.2.F-10: Summary of Annual Ambient Air Quality Data — Mountain Counties Air Basin

	2005	2006	2007
OZONE			
MCAB-wide data			
Maximum concentration (1-hour/8-hour, ppm)	0.128/0.120	0.134/0.116	0.115/0.107
Number of days State standard exceeded (1-hour/8-hour)	41/85	50/103	19/88
Number of days national standard exceeded (1-hour/8-hour)	2/38	5/44	0/23
CARBON MONOXIDE (CO)			
1-hour data (Jackson—Clinton Road Station), 8-hour data (MCAB-wide)			
Maximum concentration (1-hour/8-hour, ppm)	2.4/1.18	—/0.58	—/0.68
Number of days State standard exceeded (8-hour)	0	0	0
Number of days national standard exceeded (1-hour/8-hour)	—/0	—/0	—/0
NITROGEN DIOXIDE (NO_2)			
MCAB-wide data			
Maximum concentration (1-hour, ppm)	—	0.006	0.010
Number of days State standard exceeded	—	0	0
Annual average (ppm)	—	—	—
SULFUR DIOXIDE (SO_2)			
There are no monitoring stations that monitor for SO_2 within the MCAB.			
Maximum concentration (24-hour, ppm)	—	—	—
Number of days State standard exceeded	—	—	—
Number of days national standard exceeded	—	—	—
FINE PARTICULATE MATTER ($PM_{2.5}$)			
San Andreas — 501 Gold Strike Road (Basin-wide data are not available for $PM_{2.5}$.)			
Maximum concentration ($\mu g/m^3$) (National/California [a])	21.0/21.0	23.0/23.0	24.4/24.4
Number of days national standard exceeded (measured/calculated [b])	0/0.0	0/0.0	0/0.0
State annual average ($\mu g/m^3$)	7.0	8.6	7.9
RESPIRABLE PARTICULATE MATTER (PM_{10})			
MCAB-wide data			
Maximum concentration ($\mu g/m^3$) (National/California [a])	127.3/73.0	167.1/97.0	127.0/116.0
Number of days State standard exceeded (measured/calculated [b])	2/6.0	2/0.0	2/0.0
Number of days national standard exceeded (measured/calculated [b])	0/—	1/—	0/—

Notes:
$\mu g/m^3$ = micrograms per cubic meter; ppm = parts per million; — = data not available

[a] State and national statistics may differ for the following reasons: State statistics are based on California-approved samplers, whereas national statistics are based on samplers using Federal reference or equivalent methods. State and national statistics may therefore be based on different samplers. State statistics are based on local conditions while national statistics are based on standard conditions. State criteria for ensuring that data are sufficiently complete for calculating valid annual averages are more stringent than the national criteria.

[b] Measured days are those days that an actual measurement was greater than the level of the State daily standard or the national daily standard. Measurements are typically collected every 6 days. Calculated days are the estimated number of days that a measurement would have been greater than the level of the standard had measurements been collected every day. The number of days above the standard is not necessarily the number of violations of the standard for the year.

Sources: ARB 2008d; USEPA 2008b

Table 4.2.F-11: California and National Attainment Status for the Mountain Counties Air Basin

POLLUTANT	DESIGNATION/CLASSIFICATION	
	CALIFORNIA[a]	NATIONAL[b]
Ozone (O_3) 1-Hour	Nonattainment	-
Ozone (O_3) 8-Hour	Nonattainment[c]	Nonattainment[d]
Carbon Monoxide (CO)	Unclassified[e]	Attainment/Unclassifiable
Nitrogen Dioxide (NO_2)	Attainment	Attainment/Unclassifiable
Sulfur Dioxide (SO_2)	Attainment	Unclassifiable
Respirable Particulate Matter (PM_{10})	Nonattainment[f]	Unclassifiable
Fine Particulate Matter ($PM_{2.5}$)	Unclassified[g]	Attainment/Unclassifiable
Lead[h]	Attainment	Attainment
Sulfates	Attainment	No National Standards
Hydrogen Sulfide	Unclassified	
Vinyl Chloride[h]	Unclassified	
Visibility Reducing Particles	Unclassified	

Notes:

[a] Unclassified (U): The data are incomplete and do not support a designation of attainment or nonattainment.
Attainment (A): The State standard for that pollutant was not violated at any site in the area during a 3-year period.
Nonattainment (N): There was at least one violation of a State standard for that pollutant in the area.
Nonattainment/Transitional (NT) (a subcategory of the nonattainment designation): The area is close to attaining the standard for that pollutant.

[b] Nonattainment (N): Any area that does not meet (or that contributes to ambient air quality in a nearby area that does not meet) the national primary or secondary ambient air quality standard for the pollutant.
Attainment (A): Any area that meets the national primary or secondary ambient air quality standard for the pollutant.
Unclassifiable (U): Any area that cannot be classified on the basis of available information as meeting or not meeting the national primary or secondary ambient air quality standard for the pollutant.

[c] Plumas and the northeast portion of Sierra County are designated as Unclassified.

[d] Plumas and the northeast portion of Sierra County are classified as unclassified/attainment.

[e] Plumas and Tuolumne Counties are designated as Attainment.

[f] Amador, Tuolumne, and Mariposa Counties are designated as Unclassified.

[g] A portion of Plumas County (i.e., Portola Valley) is designated as Nonattainment.

[h] ARB has identified lead and vinyl chloride as "toxic air contaminants" with no threshold level of exposure for adverse health effects determined.

Source: ARB 2008e, USEPA 2008c.

Regional Desalination

The Regional Desalination component would most likely be located along the south shoreline of Suisun Bay in Contra Costa County, which is within the SFBAAB (see Figure 3-8 in Chapter 3). Air quality characteristics of the SFBAAB are described above in the Regional Setting.

Enlarge Pardee Reservoir

Pardee Reservoir is in both Amador and Calaveras County, which is contained within the MCAB (see Figures 3-9 and 3-10 in Chapter 3). Air quality characteristics of the MCAB are described above in the Regional Setting.

Enlarge Lower Bear Reservoir

The Lower Bear Reservoir is in Amador County, which is contained within the MCAB (see Figure 3-11 in Chapter 3). Air quality characteristics of the MCAB are described above in the Regional Setting.

IRCUP / San Joaquin Groundwater Banking / Exchange

The precise locations of the proposed facilities needed for this component have not yet been identified. They would be located within the counties of Alpine, Amador, Calaveras, and San Joaquin and contained within the SJVAB and MCAB (see Figure 3-12 in Chapter 3). Air quality characteristics of the SJVAB and MCAB are described above in the Regional Setting.

4.2.F.3 Regulatory Setting

Development and construction of the WSMP 2040 Preferred Portfolio components would occur within multiple air basins. Air quality within these areas is addressed through the efforts of Federal, State, regional, and local government agencies. These agencies work jointly, as well as individually, to improve air quality through legislation, regulations, planning, policymaking, education, and a variety of other programs. The agencies that are primarily responsible for improving the air quality within the WSMP Preferred Portfolio Study Area include the USEPA, ARB, Bay Area Air Quality Management District (BAAQMD), San Joaquin Valley Air Pollution Control District (SJVAPCD), Sacramento Metropolitan Air Quality Management District (SMAQMD), and Amador County Air Pollution Control District (ACAPCD).

Criteria Air Pollutants

Federal Regulations (U.S. Environmental Protection Agency)

USEPA is responsible for enforcing the Federal Clean Air Act (CAA)[1] and the NAAQS that it establishes.[2] These standards identify levels of air quality for seven criteria pollutants: O_3, CO, NO_2, SO_2, PM_{10}, $PM_{2.5}$, and lead. The prescribed levels are considered to be the maximum levels of ambient air pollutants determined safe (with an adequate margin of safety) to protect the public health and welfare.

The 1990 CAA Amendments (CAAA), the most recent major amendments, were enacted to better protect the public's health and create more efficient methods for lowering pollutant emissions.[3] The CAAA's major areas of improvement include air basin designations, automobile/heavy-duty engine emissions, and toxic air pollutants. USEPA designates air basins as being in "attainment" or "nonattainment" for each of the seven criteria pollutants. Nonattainment air basins are ranked according to the degree of nonattainment (marginal, moderate, serious, severe, or extreme). The air basin is then required to submit a State Implementation Plan (SIP) that describes how the State will achieve the Federal standards by specified dates. The extent of a given SIP depends on the severity of the air quality within the State or specific air basin. The SIP is modified periodically to reflect the latest emissions inventories, planning documents, and rules and regulations of the air basins. USEPA must review all SIPs to determine whether they conform to the mandates of the CAA and its amendments, and to determine whether implementation will achieve air quality goals. If USEPA determines a SIP to be inadequate, a Federal implementation plan that imposes additional control measures may be prepared for the nonattainment area. Failure to submit an approvable SIP or to implement the plan within the mandated time frame may result in sanctions on transportation funding and stationary air pollution sources in the air basin.

State Regulations (California Air Resources Board)

ARB is responsible for coordination and oversight of State and local air pollution control programs in California and for implementing the California Clean Air Act (CCAA). The CCAA, which was adopted in 1988, required ARB to establish CAAQS, which are shown in Table 4.2.F-1. ARB has established CAAQS for sulfates, hydrogen sulfide, vinyl chloride, visibility-reducing particulate matter, and the above-mentioned criteria air pollutants. Much like the NAAQS, the CAAQS are the maximum levels of ambient air pollutants determined safe to protect the public health and welfare. In most cases the CAAQS are more stringent than the NAAQS. Differences in the standards are generally explained by the health effects studies considered during the standard-setting process and the interpretation of the studies. In addition, the CAAQS incorporate a margin of

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1 U.S. Code, Title 42, Section 7401, Clean Air Act Extension of 1970.
2 U.S. Environmental Protection Agency, Office of Air Quality Planning and Standards, 40 CFR Parts 50, *National Primary and Secondary Ambient Air Quality Standards*.
3 U.S. Code, Title 42, Clean Air Act Amendments of 1990, Public Law 101-549.

safety to protect sensitive individuals. ARB also sets health-based air quality standards and control measures for TACs.

The CCAA requires that all local air districts in the State endeavor to achieve and maintain the CAAQS by the earliest practical date. The act specifies that local air districts should focus particular attention on reducing the emissions from transportation and areawide emission sources, and provides districts with the authority to regulate indirect sources.

Among ARB's other responsibilities are overseeing local air districts' compliance with California and Federal laws, approving local air quality plans, submitting SIPs to USEPA, monitoring air quality, determining and updating area designations and maps, and setting emissions standards for new mobile sources, consumer products, small utility engines, off-road vehicles, and fuels.

There are 15 nonattainment areas for the national ozone standard and two nonattainment areas for the $PM_{2.5}$ standard. The SIP must show how each area will attain the Federal standards by identifying necessary reductions in pollution emissions in each area, in addition to emission controls. ARB and local air districts are currently developing plans to meet new national air quality standards for ozone and $PM_{2.5}$. The draft State Strategy for California's 2007 SIP was released in April 2007, and the adopted version transmitted to USEPA in November 2007 (ARB 2008f).

Regional Regulations

Regional regulatory agencies that are responsible for maintaining air quality in the WSMP 2040 Preferred Portfolio Study Area include BAAQMD, SJVAPCD, SMAQMD, and ACAPCD. These agencies have developed CEQA Guidelines, air quality plans, and rules and regulations to manage air quality within their respective air basins. The rules and regulations that would be required during development of the Preferred Portfolio components are shown below. Please see Appendix D for further air district information (e.g., CEQA guidelines, air quality plans).

BAAQMD Rules and Regulations

BAAQMD is responsible for limiting the amount of emissions that can be generated throughout the basin by stationary sources. Specific rules and regulations have been adopted to limit emissions generated and identify specific pollution reduction measures that must be implemented in association with various uses and activities. These rules regulate emissions of not only State and Federal criteria pollutants, but also of toxic air contaminants. The rules are also subject to ongoing refinement by BAAQMD.

In general, all stationary sources with air emissions are subject to BAAQMD's rules governing their operational emissions. Some emissions sources are subject to further regulation through BAAQMD's permitting process. Through this permitting process, BAAQMD also monitors stationary emissions and uses this information in developing the Clean Air Plan (CAP). The primary BAAQMD rules applicable to the project include the following:

- Regulation 2, Rule 1: General Permit Requirements;
- Regulation 2, Rule 5: New Source Review of Toxic Air Contaminants;
- Regulation 6: Particulate Matter and Visible Emissions;
- Regulation 7: Odorous Substances;
- Regulation 8, Rule 3: Architectural Coatings;
- Regulation 8, Rule 8: Wastewater Collection and Separation Systems;
- Regulation 8, Rule 15: Emulsified Asphalt;
- Regulation 11: Hazardous Pollutants; and
- Regulation 11, Rule 2: Asbestos.

SJVAPCD Rules and Regulations

SJVAPCD adopts rules and regulations to limit the generation of emissions (i.e., criteria pollutants and air toxics) from a range of sources and activities. Preferred Portfolio components are subject to SJVAPCD rules and regulations in effect at the time of construction. Specific rules applicable to the construction and operation of the WSMP 2040 Preferred Portfolio may include, but are not limited to:

- Regulation II, Rule 2201: New and Modified Stationary Source Review;
- Regulation II, Rule 2280: Portable Equipment Registration;
- Regulation III, Rule 3135: Dust Control Plan Fee;
- Regulation IV, Rule 4002: National Emissions Standards for Hazardous Air Pollutants;
- Regulation IV, Rule 4101: Visible Emissions;
- Regulation IV, Rule 4102: Nuisance;
- Regulation IV, Rule 4601: Architectural Coatings;
- Regulation IV, Rule 4641: Cutback, Slow Cure, and Emulsified Asphalt, Paving and Maintenance Operations;
- Regulation IV, Rule 4702: Internal Combustion Engines–Phase 2;
- Regulation VII: Toxic Air Pollutants;
- Regulation VIII: Fugitive PM_{10} Prohibitions, which includes the following rules:

- Rule 8011–General Requirements;
- Rule 8021–Construction, Demolition, Excavation, Extraction, and Other Earthmoving Activities;
- Rule 8031–Bulk Materials (handling and storage);
- Rule 8041–Carryout and Trackout (of dirt and other materials onto paved public roads);
- Rule 8051–Open Areas;
- Rule 8061–Paved and Unpaved Roads (construction and use); and
- Rule 8071–Unpaved Vehicle/Equipment Traffic Areas;

- Rule 9110–General Conformity; and
- Rule 9510–Indirect Source Review (ISR).

Rules 8011-8081 are designed to reduce PM_{10} emissions (predominantly dust/dirt) generated by human activity, including construction and demolition activities, road construction, bulk materials storage, paved and unpaved roads, carryout and trackout, and landfill operations. Compliance with Regulation VIII is mandatory, and compliance by the project applicant is assumed in this analysis. If a nonresidential project is 5.0 or more acres in area, a Dust Control Plan must be submitted as specified in Section 6.3.1.of Rule 8021. Therefore, the applicant is required to submit a Dust Control Plan. Construction activities shall not commence until SJVAPCD has approved the Dust Control Plan.

Rule 9510 was adopted to reduce the impacts of growth in emissions from all new development in the San Joaquin Valley. The purposes of Rule 9510 are to (1) fulfill SJVAPCD's emission reduction commitments in the PM_{10} and Ozone Attainment Plans, (2) achieve emission reductions from the construction and use of development projects through design features and on-site measures, and (3) provide a mechanism for reducing emissions from the construction of and use of development projects through off-site measures. The rule is applicable to any applicant (any person or entity that undertakes a development project) that, upon full buildout, has a project encompassing 2,000 square feet or more. Therefore, the rule is applicable to the Preferred Portfolio.

Rule 9510 requires applicants subject to the rule to provide information that enables SJVAPCD to quantify the construction and operational $NO_{X,}$ and PM_{10} exhaust emissions. Rule 9510 requires construction exhaust emissions to be reduced by 20 percent for NO_X and 45 percent for PM_{10} when compared to the statewide fleet average. For operations, emissions of NO_X must be reduced by 33.3 percent and emissions of exhaust PM_{10} must be reduced by 50 percent; the operations emissions reductions may occur over a period of 10 years. Both construction and operations emissions reductions may be achieved by on-site measures or by payment of an off-site fee, or by a combination of both methods. However, if the initial emissions calculation shows that emissions would be less than 2 tons per year (tons/yr) of NO_X or exhaust PM_{10}, then emission reduction measures are not required.

On-site measures for mitigation of construction emissions may include the use of cleaner fuels, retrofitted equipment on engines and exhaust systems, and the use of new, low-emissions engine types. Measures to reduce operations emissions include building designs for energy efficiency and site designs and procedures to reduce trip generation.

SMAQMD Rules and Regulations

Preferred Portfolio components would be subject to SMAQMD rules and regulations in effect at the time of construction. Specific SMAQMD rules applicable to the off-site program element may include, but are not limited to:

- Regulation 2, Rule 201: General Permit Requirements;
- Regulation 4, Rule 401: Ringelmann Chart/Opacity;
- Regulation 4, Rule 402: Nuisance;
- Regulation 4, Rule 403: Fugitive Dust;
- Regulation 4, Rule 404: Particulate Matter;
- Regulation 4, Rule 442: Architectural Coating;
- Regulation 4, Rule 453: Cutback and Emulsified Asphalt Materials;
- Regulation 9: Toxic Air Contaminants/Hazardous Air Pollutants; and
- Regulation 9, Rule 902: Asbestos.

In addition, effective as of October 10, 2005, if modeled construction-generated emissions for a project are not reduced to SMAQMD's threshold of significance (85 pounds per day [lb/day]) by the application of the standard construction mitigation, then an off-site construction mitigation fee is recommended. Payment of the fee is required before the issuance of a grading permit. This fee is used by SMAQMD to purchase off-site emissions reductions. This is done through SMAQMD's Heavy Duty Incentive Program, through which select owners of heavy-duty equipment in Sacramento County can repower or retrofit their old engines with cleaner engines or technologies.

ACAPCD Rules and Regulations

Preferred Portfolio components that would occur within Amador County are subject to ACAPCD rules and regulations in effect at the time of construction. Specific ACAPCD rules applicable to the off-site program element may include, but are not limited to:

- Regulation 2, Rule 202: Visible Emissions;
- Regulation 2, Rule 205: Nuisance;
- Regulation 2, Rule 207: Particulate Matter;
- Regulation 3, Rule 218: Fugitive Dust Emissions; and
- Regulation 9: Nonvehicular Airborne Toxic Control Measures.

Local Regulations

A summary of relevant goals and policies from local general plans related to air quality is presented in Appendix B.

Toxic Air Contaminants

Air quality regulations also focus on TACs or, in Federal parlance, hazardous air pollutants (HAPs). In general, for those TACs that may cause cancer, all concentrations present some risk. In other words, there is no threshold level below which adverse health impacts may not be expected to occur. This contrasts with the criteria air pollutants, for which acceptable levels of exposure can be determined, and for which ambient standards have been established (Table 4.2.F-1). Instead, USEPA and ARB regulate HAPs and TACs, respectively, through statutes and regulations that generally require the use of the maximum or best available control technology for toxics (MACT and BACT) to limit emissions. These, in conjunction with additional rules set forth by regional air districts, establish the regulatory framework for TACs.

Federal Hazardous Air Pollutant Programs

USEPA has programs for identifying and regulating HAPs. Title III of the CAAA directed USEPA to promulgate national emissions standards for HAPs (NESHAP). The NESHAP for major sources of HAPs may differ from those for area sources. Major sources are defined as stationary sources with potential to emit more than 10 tons/yr of any HAP or more than 25 tons/yr of any combination of HAPs; all other sources are considered area sources.

The CAAA called on USEPA to promulgate emissions standards in two phases. In the first phase (1992-2000), USEPA developed technology-based emissions standards designed to reduce emissions as much as feasible. These standards are generally referred to as requiring MACT. For area sources, the standards may be different, based on generally available control technology. In the second phase (2001-2008), USEPA is required to promulgate health risk-based emissions standards where deemed necessary to address risks remaining after implementation of the technology-based NESHAP standards.

The CAAA also required USEPA to promulgate vehicle or fuel standards containing reasonable requirements that control toxic emissions of, at a minimum, benzene and formaldehyde. Performance criteria were established to limit mobile-source emissions of benzene, formaldehyde, and 1,3-butadiene. In addition, Section 219 of the CAAA required the use of reformulated gasoline in selected areas with the most severe ozone nonattainment conditions to further reduce mobile-source emissions.

State Toxic Air Contaminant Programs

TACs in California are regulated primarily through the Tanner Air Toxics Act (Assembly Bill [AB] 1807 [Chapter 1047, Statutes of 1983]) and the Air Toxics Hot Spots Information and Assessment Act (AB 2588 [Chapter 1252, Statutes of 1987]). AB 1807 sets forth a formal procedure for ARB to designate substances as TACs. Research, public participation, and scientific peer review must occur before ARB can designate a substance as a TAC. To date, ARB has identified more than 21 TACs and adopted USEPA's list of HAPs as TACs. Most recently, particulate matter emissions from diesel exhaust (diesel PM) was added to the ARB list of TACs.

Once a TAC is identified, ARB then adopts an airborne toxics control measure (ATCM) for sources that emit that particular TAC. If there is a safe threshold for a substance at which there is no toxic effect, the control measure must reduce exposure below that threshold. If there is no safe threshold, the measure must incorporate best available control technology (BACT) to minimize emissions; for example, the ATCM limits truck idling to 5 minutes (Title 13, Section 2485 of the California Code of Regulations).

The Hot Spots Act requires that existing facilities that emit toxic substances above a specified level prepare an inventory of toxic emissions, prepare a risk assessment if emissions are significant, notify the public of significant risk levels, and prepare and implement risk reduction measures.

ARB has adopted control measures for diesel PM and more stringent emissions standards for various on-road mobile sources of emissions, including transit buses and off-road diesel equipment (e.g., tractors, generators). Recent and future milestones include the low-sulfur diesel fuel requirement and tighter emissions standards for heavy-duty diesel trucks (2007) and off-road diesel equipment (2011) nationwide. Over time, replacing older vehicles will result in a vehicle fleet that produces substantially lower levels of TACs than under current conditions. Mobile-source emissions of TACs (e.g., benzene, 1,3-butadiene, diesel PM) have been reduced significantly over the last decade, and will be reduced further in California through a progression of regulatory measures (e.g., Low Emission Vehicle/Clean Fuels and Phase II reformulated gasoline regulations) and control technologies. With implementation of ARB's Risk Reduction Plan, it is expected that diesel PM concentrations will be reduced by 75 percent in 2010 and 85 percent in 2020 from the estimated year-2000 level. Adopted regulations are also expected to continue to reduce formaldehyde emissions from cars and light-duty trucks. As emissions are reduced, it is expected that risks associated with exposure to the emissions will also be reduced.

In addition, the *Air Quality and Land Use Handbook: A Community Health Perspective*, published by ARB, provides guidance on land use compatibility with sources of TACs (ARB 2005). The handbook is not a law or adopted policy but offers advisory recommendations for the siting of sensitive receptors near uses associated with TACs, such as freeways and high-traffic roads, commercial distribution centers, rail yards, ports, refineries, dry cleaners, gasoline stations, and industrial facilities, to help keep children and other sensitive populations out of harm's way.

At the local level, air pollution control or management districts may adopt and enforce ARB control measures. The applicable air districts have established rules and regulations to limit the emissions of TACs within their jurisdiction, which are presented in Appendix D. In some cases, permits would only be granted to certain operations if they are constructed and operated in accordance with applicable regulations, including new-source review standards and air toxics control measures.

It is important to note that the air quality permitting process applies only to stationary sources; properties that may be exposed to elevated levels of TACs from nonstationary sources (e.g., vehicles) and the nonstationary sources themselves are not subject to this process or to any requirements of toxics best available control technology (T-BACT) implementation. Rather, emissions controls on nonstationary sources are subject to regulations implemented on the State and Federal level.

Regional Toxic Air Contaminant Programs

Toxic air contaminants are also regulated at the regional level by air districts. Through established rules and regulations, air districts regulate point source and area-wide sources of TACs and HAPs. As shown above, the BAAQMD, SJVAPCD, SMAQMD, and ACAPCD all have established rules that regulate the use, handling, and/or permitting of TACs and HAPs within their respective jurisdiction.

Odors

Odors are typically considered a local air quality problem. USEPA and ARB have not established regulations that deal with the generation of odors. However, air districts have developed rules (e.g., nuisance) that would apply to and regulate the generation of odors. As shown above in Rules and Regulations, the applicable air districts enforce rules that pertain to odors (i.e., nuisances).

4.2.G Noise

4.2.G.1 Regional Setting

EBMUD Service Area

The EBMUD service area, shown in Figure 2-1 in Chapter 2, Background, encompasses a large area with a myriad of noise-sensitive land uses and source types. Existing noise-sensitive land uses in the EBMUD service area include residences, schools, hospitals, convalescent homes, places of worship, parks, golf courses, and office and commercial uses in communities and cities (e.g., Berkeley, Oakland, and Walnut Creek). Existing noise source types generally include traffic, rail, and neighborhood activities. The existing noise environment within most of the service area is influenced primarily by transportation noise sources from the following:

Railroads

- Union Pacific Railroad;
- Burlington Northern and Santa Fe Railway;
- Joint Power Board - “Caltrains;”
- Amtrak;
- Bay Area Rapid Transit (BART) Lines;

Major Roadways

- Interstate 80 (I-80);
- Interstate 238 (I-238);
- Interstate 580 (I-580);
- Interstate 680 (I-680);
- Interstate 880 (I-880);
- Interstate 980 (I-980);
- State Route 4 (SR 4);
- State Route 13 (SR 13);
- State Route 20 (SR 20);
- State Route 24 (SR 24);
- State Route 61 (SR 61);
- State Route 77 (SR 77);
- State Route 112 (SR 112);
- State Route 123 (SR 123);
- State Route 185 (SR 185);

Airports

- Metropolitan Oakland International;
- Alameda Naval Air Station; and
- Hayward Air Terminal.

Noise from interspersed industrial, commercial and office land uses (e.g., related stationary sources) and outdoor neighborhood activities (e.g., people talking, dogs barking, and operation of landscaping and agricultural equipment) contribute to the existing noise environment within in the EBMUD service area. More specifically, heavy and light industrial areas, commercial centers, office buildings, and residential parks exist in the EBMUD service area (e.g., Port of Oakland, Hilltop Mall, and Hillside Nature Area). Stationary noise sources attributable to the above uses may include heating, ventilation, air conditioning packages, loading docks, power plants, parking lots, sporting and event centers, landfills, aggregate operations, wood processing facilities, pump stations, industrial manufacturing facilities, trucking operations, tire shops, auto maintenance shops, metal fabricating shops, shopping centers, drive-up windows, car washes, loading docks, public works projects, batch plants, aggregate operations, bottling and canning plants, recycling centers, and electric generating stations.

Central Valley

The Central Valley is dotted with cities and rural areas that are surrounded by agricultural uses. Noise-sensitive land uses in the Central Valley include residences, schools, hospitals, convalescent homes, places of worship, parks, golf courses, and office and commercial uses in communities and cities (e.g., Stockton, Lodi, and Elk Grove). Existing noise source types generally include traffic, rail, and agricultural activities. The existing noise environment within most of this valley area is influenced primarily by transportation noise sources from the following:

Railroads

- Union Pacific Railroad;
- Burlington Northern and Santa Fe Railway;
- California Northern Railroad;
- California Central Traction;
- Amtrak;

Major Roadways:

- Interstate 5 (I-5);
- Interstate 80 (I-80);
- Interstate 205 (I-205);
- State Route 4 (SR 4);
- State Route 12 (SR 12);
- State Route 26 (SR 26);
- State Route 88 (SR 88);
- State Route 99 (SR 99);
- State Route 120 (SR 120);

Airports

- Stockton Metropolitan;
- Sharpe Army Air Field; and
- Agricultural Airstrips.

The stationary noise sources in the area are primarily agricultural-related in the rural regions (e.g., Port of Stockton, Hammer Lane commercial center, and Oak Park). However, higher density areas in the Central Valley contain similar stationary noise sources as discussed above for the EBMUD service area.

Upcountry

The Upcountry area consists of small communities, rural residential areas and forested lands. Noise sources in this region, which includes Plumas, Alpine and portions of Yuba, Amador, and Calaveras counties, are generally concentrated in small, community areas. Noise sensitive land uses in the Upcountry include residences, schools, hospitals, convalescent homes, places of worship, parks, golf courses, and office and commercial uses in communities and cities within the Upcountry area (e.g., Jackson, San Andreas, and Angels Camp). Existing noise source types generally include traffic, rail, and agricultural activities. The existing noise environment within most of this Upcountry area is influenced primarily by transportation noise sources from the following:

Railroads

- Union Pacific Railroad;
- Sierra Railroad;

Major Roadways

- State Route 4 (SR 4);
- State Route 12 (SR 12);
- State Route 26 (SR 26);
- State Route 49 (SR 49);
- State Route 70 (SR 70);
- State Route 88 (SR 88);
- State Route 99 (SR 99); and
- State Route 109 (SR 109).

Areas are designated for heavy and light industrial, commercial and other uses that generate noise (e.g., Sierra Pine, Sonora Plaza, Willow Springs Shale Mine). Stationary noise sources in the Upcountry are generally related to small community areas in rural regions. Higher density areas are expected to be exposed to stationary noise sources attributable to light industrial, commercial, and recreational sources that also contribute to existing community noise levels (e.g., Westover Field Amador County, Martel Plaza, and Detert Park). Stationary noise sources are discussed above in the EBMUD service area.

4.2.G.2 Setting for Preferred Portfolio Components

Rationing and Conservation

Rationing and conservation would occur within the EBMUD service area. The noise sources and noise-sensitive receptors within the EBMUD service area are described above.

Recycled Water

The precise locations of the recycled water projects have not yet been determined. They would most likely be located within the EBMUD service area, in residential, commercial, industrial and/or open space areas. The noise sources and noise-sensitive receptors within each region are described above.

Northern California Water Transfers

The precise sources of water transfers have not yet been identified, but for the purposes of this PEIR it is assumed they would occur in the Sacramento Valley. The noise sources and noise-sensitive receptors within each county are described above in the Central Valley and the Upcountry settings.

Bayside Groundwater Project Phase 2

The Bayside Groundwater Project Phase 2 site is in San Lorenzo near the coastline (see Figure 3-6 in Chapter 3), south of the Metropolitan Oakland International airport. Uses adjacent to the site are industrial, consisting of a wastewater treatment plant, wrecking yard, and cargo distribution yard. Noise sources associated with industrial uses include trucks idling, on-site truck circulation and forklifts operation, truck refrigeration units, pallets dropping, and the use of railroad spurs. The nearest existing noise-sensitive land use to the Bayside Groundwater Project Phase 2 site is 1,400 feet to the north and east. Sites for other new facilities for this component have not yet been identified, but would be located in within the South East Bay Plain groundwater basin. The noise sources and noise-sensitive receptors within the EBMUD service area are described above.

Sacramento Basin Groundwater Banking / Exchange

Specific site locations for the proposed facilities (e.g., recharge ponds, wells, pipelines, pumps) have not yet been identified but are anticipated to be within Sacramento County. The noise sources and noise-sensitive receptors within Sacramento County are described above in the Central Valley setting.

Regional Desalination

The Regional Desalination component would mostly likely be located along the southern shoreline of Suisun Bay, in unincorporated Contra Costa County (see Figure 3-8 in

Chapter 3). The potential area consists of open space, and adjacent land uses are industrial in nature (e.g., refineries). The area also contains the Burlington Northern and Santa Fe Railway, which is considered the dominant noise source in the area. Existing noise-sensitive receptors (e.g., residences) are located to the south. Other noise sources and noise-sensitive receptors in this area are described in the EBMUD service area above.

Enlarge Pardee Reservoir

The Pardee Reservoir component would increase the storage capacity of the existing reservoir (see Figures 3-9 and 3-10 in Chapter 3). Adjacent land uses are primarily agricultural and recreational. The Pardee Recreation area is located in the northwestern edge of the reservoir and the Pardee Center, which provides year round housing for EBMUD staff, is near the existing south spillway. Rural residential uses are scattered throughout the adjacent reservoir vicinity. The existing noise environment at Pardee Reservoir is primarily dominated by recreation users (e.g., watercraft-related noise), area traffic noise (e.g., SR 49, Middle Bar Road/Gwin Mine Road, Paloma Road, Pardee Dam Road, Stony Creek Road), and infrequent aircraft overflights.

Enlarge Lower Bear Reservoir

Lower Bear Reservoir is in the Upcountry area (see Figure 3-11 in Chapter 3) and provides recreational opportunities year-round. The Bear River Resort and additional campground (e.g., day-use sites, Camp Ritchie and Camp Winton) and recreation areas located within the vicinity of the reservoir are the only noise-sensitive land uses in this remote area. The existing noise environment consists primarily of boating activities on the reservoir and traffic noise attributable to Highway 88, Dufrene Road, Bear River Road, and Little Bear NO 1 Road.

IRCUP / San Joaquin Groundwater Banking / Exchange

The precise locations of the proposed facilities (e.g., pipeline, intertie, and pump station) needed for this component have not yet been determined but would be within the counties of Alpine, Amador, Calaveras, and San Joaquin (see Figure 3-12 in Chapter 3). Noise-sensitive land uses in these areas consists of rural residential, commercial, agricultural, and open space. The existing noise sources and noise-sensitive receptors within each region are described above in the Central Valley and Upcountry settings.

4.2.G.3 Acoustic Fundamentals

Acoustics is the scientific study that evaluates perception, propagation, absorption, and reflection of sound waves. Sound is a mechanical form of radiant energy, transmitted by a pressure wave through a solid, liquid, or gaseous medium. Sound that is loud, disagreeable, unexpected, or unwanted is generally defined as noise; consequently, the perception of sound is subjective in nature and can vary substantially from person to person. Common sources of environmental noise and noise levels are presented in Figure 4.2.G-1.

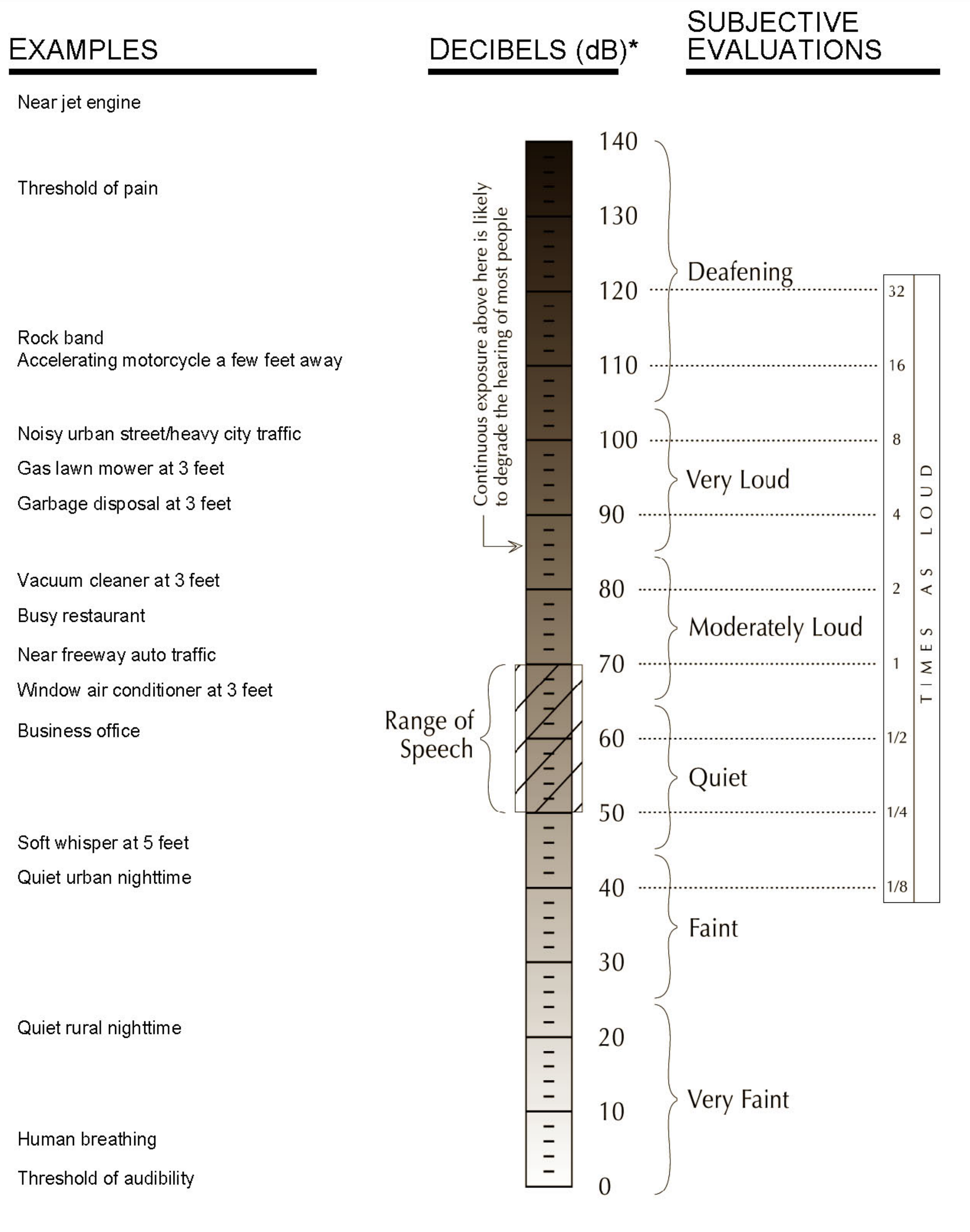
A sound wave is initiated in a medium by a vibrating object (e.g., vocal chords, the string of a guitar, the diaphragm of a radio speaker). The wave consists of minute variations in pressure, oscillating above and below the ambient atmospheric pressure. The number of pressure variation cycles occurring per second is referred to as the frequency of the sound wave and is expressed in hertz.

The decibel (dB) scale was introduced as a simple way to measure the million-fold range of sound pressures to which the human ear is sensitive. A sound level expressed in dB is logarithmic; it does not follow normal algebraic methods and cannot be directly added. For example, a 65 dB source of sound, such as a truck, when joined by another 65 dB source results in a sound amplitude of 68 dB, not 130 dB (i.e., doubling the source strength increases the sound pressure by 3 dB). A sound level increase of 10 dB corresponds to 10 times the acoustical energy, and an increase of 20 dB equates to a 100 fold increase in acoustical energy.

The loudness of sound preserved by the human ear depends primarily on the overall sound pressure level and frequency content of the sound source. The human ear is not equally sensitive to loudness at all frequencies in the audible spectrum. To better relate overall sound levels and loudness to human perception, frequency-dependent weighting networks were developed. The standard weighting networks are identified as A through E. A strong correlation exists between humans' perception of sound and A-weighted sound levels (dBA). For this reason, the dBA can be used to predict community response to noise from the environment and transportation. Sound levels expressed as dB in this section are A-weighted sound levels, unless noted otherwise.

Noise can be generated by a number of sources, including mobile sources (transportation noise sources) such as automobiles, trucks, and airplanes and stationary sources (non-transportation noise sources) such as construction sites, machinery, and commercial and industrial operations. As acoustic energy spreads through the atmosphere from the source to the receiver, noise levels attenuate (decrease) depending ground absorption characteristics, atmospheric conditions, and the presence of physical barriers (walls, building facades, berms). Noise generated from mobile sources generally attenuate at a rate of 4.5 dB per doubling of distance (dB/DD). Stationary noise sources spread with more spherical dispersion patterns that attenuate at a rate of 6 dB to 7.5 dB/DD.

Figure 4.2.G-1 Common Noise Sources and Levels



* dB are "average" values as measured on the A-scale of a sound-level meter.
From Concepts in Architectural Acoustics: M. David Egan, McGraw Hill, 1972 and U.S. Department of Housing and Urban Development, Office of Community Planning and Development "The Noise Guidebook."

Source: Data compiled by EDAW in 2008.

Atmospheric conditions, such as wind speed, turbulence, temperature gradients, and humidity, may additionally alter the propagation of noise and affect levels at a receiver. Furthermore, the presence of a large object (barrier) between the source and the receptor can provide significant attenuation of noise levels at the receiver. The amount of noise level reduction or "shielding" provided by a barrier depends primarily on the barrier's size, location relative to the source and receivers, and the frequency spectra of the noise. Natural barriers, such as berms, hills, or dense woods, and human-made features, such as buildings and walls, may be used as noise barriers.

Noise Descriptors

The intensity of environmental noise fluctuates over time, and several different descriptors of time-averaged noise levels are used. The selection of a proper noise descriptor for a specific source depends on the spatial and temporal distribution, duration, and fluctuation of both the noise source and the environment. The noise descriptors most often used to describe environmental noise are defined below:

L_{max} (Maximum Noise Level): The highest A/B/C weighted integrated noise level occurring during a specific period of time.

L_{min} (Minimum Noise Level): The lowest A/B/C weighted integrated noise level during a specific period of time.

Peak: The highest weighted or unweighted instantaneous peak to peak value occurring during a measurement period.

L_n (Statistical Descriptor): The noise level exceeded n percent of a specific period of time, generally accepted as an hourly statistic. An L_{10} would be the noise level exceeded during 10 percent of the measurement period.

L_{eq} (Equivalent Noise Level): The energy mean (average) noise level. The steady state sound level which, in a specified period of time contains the same acoustical energy as a varying sound level over the same time period.

L_{dn} (Day-Night Noise Level): The 24-hour L_{eq} with a 10 dB "penalty" applied during nighttime noise-sensitive hours, 10:00 p.m. through 7:00 a.m. The L_{dn} attempts to account for the fact that noise during this specific period of time is a potential source of disturbance with respect to normal sleeping hours.

CNEL (Community Noise Equivalent Level): The CNEL is similar to the L_{dn} described above, but with an additional 5 dB "penalty" for the noise-sensitive hours between 7:00 p.m. to 10:00 p.m., which are typically reserved for relaxation, conversation, reading, and television. If using the same 24-hour noise data, the CNEL is typically 0.5 dB higher than the L_{dn}.

SEL (Sound Exposure Level): The SEL describes the cumulative exposure to sound energy over a stated period of time.

SENEL (Single Event Noise Exposure Level): An SEL occurs when the measurement period is defined by the start and end times of a single noise event, such as an automobile passby, aircraft flyover, or individual industrial operations.

Effects of Noise on Humans

Excessive and chronic exposure to elevated noise levels can result in auditory and non-auditory effects on humans. Auditory effects of noise on people are those relating to temporary or permanent hearing loss caused by loud noises. Non-auditory effects of exposure to elevated noise levels are those relating to behavioral and physiological effects. The non-auditory behavioral effects of noise on humans is primarily associated with the subjective effects of annoyance, nuisance, and dissatisfaction; which lead to interference with activities such as communications, sleep, and learning. The non-auditory physiological health effects of noise on humans has been the subject of considerable research efforts attempting to discover correlations between exposure to elevated noise levels and health problems, such as hypertension and cardiovascular disease. The mass of research infers that noise-related health issues are predominantly the result of behavioral stressors and not a direct noise-induced response. The extent to which noise contributes to non-auditory health effects remains a subject of considerable research, with no definitive conclusions.

The degree to which noise results in annoyance and interference is highly subjective and may be influenced by a number of non-acoustic factors. The number and effect of these non-acoustic environmental and physical factors varies depending on individual characteristics of the noise environment, such as sensitivity, level of activity, location, time of day, and length of exposure. One key aspect in the prediction of human response to new noise environments is the individual level of adaptation to an existing noise environment. The greater the change in noise levels attributed to a new noise source, relative to the environment an individual has become accustomed to, the less tolerable the new noise source will be.

A change in sound level of 1 dB, excluding controlled conditions and pure tones, is generally not perceivable by humans. Outside of controlled laboratory conditions the average human ear barely perceives a change of 3 dB. A change of 5 dB generally fosters a noticeable change in human response, and an increase of 10 dB is subjectively perceived as a doubling of loudness.

Vibration

Vibration is the periodic oscillation of a medium or object with respect to a given reference point. Sources of vibration include natural phenomena (e.g., earthquakes, volcanic eruptions, sea waves, landslides) and those introduced by human activity (e.g., explosions, machinery, traffic, trains, construction equipment). Vibration sources may be continuous, such as operating factory machinery, or transient in nature, such as explosions. Vibration levels can be depicted in terms of amplitude and frequency, relative to displacement, velocity, and acceleration.

Vibration amplitudes are commonly expressed in peak-particle-velocity (PPV) or root-mean-square (RMS) vibration velocity. PPV is defined as the maximum instantaneous positive or negative peak of a vibration signal. PPV is typically used in the monitoring of transient and impact vibration and has been found to correlate well with the stresses experienced by buildings (FTA 2006, Caltrans 2004). PPV and RMS vibration velocity are normally described in inches per second (in/sec).

Although PPV is appropriate for evaluating the potential for building damage, it is not always suitable for evaluating human response. The response of the human body to vibration relates well to average vibration amplitude; therefore, vibration impacts on humans are evaluated in terms of RMS vibration velocity. Similar to airborne sound, vibration velocity can be expressed in decibel notation as vibration decibels (VdB). The logarithmic nature of the decibel serves to compress the broad range of numbers required to describe vibration.

Typical outdoor sources of perceptible groundborne vibration include construction equipment, steel-wheeled trains, and traffic on rough roads. Although the effects of vibration may be imperceptible at low levels, moderate and high levels may result in detectable vibrations and slight damage to nearby structures, respectively. At the highest levels of vibration, damage to structures is primarily architectural (e.g., loosening and cracking of plaster or stucco coatings) and rarely results in damage to structural components. The range of vibration important to the proposed project occurs from approximately 50 VdB, the typical background vibration-velocity level, to 100 VdB, the general threshold at which minor damage can occur in fragile buildings (FTA 2006).

4.2.G.4 Regulatory Setting

The Federal, State, and local regulations discussed below are applicable to the proposed project regarding noise and vibration standards.

Federal Regulations

The U.S. Environmental Protection Agency (USEPA) Office of Noise Abatement and Control was originally established to coordinate Federal noise control activities. After its inception, the USEPA's Office of Noise Abatement and Control issued the Federal Noise Control Act of 1972, establishing programs and guidelines to identify and address the effects of noise on public health and welfare and the environment. Administrators of USEPA determined in 1981 that subjective issues, such as noise, would be better addressed at lower levels of government. Consequently, in 1982, responsibilities for regulating noise control policies were transferred to State and local governments. However, noise control guidelines and regulations contained in the rulings by the USEPA in prior years remain upheld by designated Federal agencies, allowing more individualized control for specific issues by designated Federal, State, and local government agencies.

With respect to vibration, the Federal Transit Administration (FTA) addresses human response to groundborne vibration with guidelines for maximum-acceptable vibration criteria for different types of land uses. These guidelines recommend 65 VdB based on the RMS velocity amplitude for land uses where low ambient vibration is essential for interior operations (e.g., hospitals, high-tech manufacturing, laboratory facilities); 80 VdB for residential uses and buildings where people normally sleep; and 83 VdB for institutional land uses with primarily daytime operations (e.g., schools, churches, clinics, offices) (FTA 2006).

State Regulations

The State of California General Plan Guidelines, published by the State Governor's Office of Planning and Research (OPR), provides guidance on the acceptability of projects within areas exposed to specific noise levels. Table 4.2.G-1 presents acceptable and unacceptable levels of community noise exposure for various land use categories (OPR 2003). The guidelines also present adjustment factors that may be used to arrive at noise acceptability standards that reflect a particular community's noise control goals, the sensitivity to noise, and assessment of the relative importance of noise pollution.

For the protection of fragile, historic, and residential structures, the California Department of Transportation (Caltrans) recommends a more conservative threshold of 0.2 in/sec PPV for normal residential buildings and 0.08 in/sec PPV for old or historically significant structures (Caltrans 2004). These standards are more stringent than the Federal standard established by the Committee on Hearing, Bioacoustics, and Biomedics of the National Academy of Science ("CHABA Guidelines").

Regional/Local Regulations

Relevant goals and policies from local general plans and county codes and ordinances related to noise are summarized in Appendix B.

Table 4.2.G-1: OPR Land Use Noise Compatibility Guidelines

LAND USE CATEGORY	COMMUNITY NOISE EXPOSURE (L_{dn} OR CNEL, dB)			
	Normally Acceptable[a]	Conditionally Acceptable[b]	Normally Unacceptable[c]	Clearly Unacceptable[d]
Residential—low-density single family, duplex, mobile home	<60	55–70	70–75	75+
Residential—multiple family	<65	60–70	70–75	75+
Transient lodging, motel, hotel	<65	60–70	70–80	80+
School, library, church, hospital, nursing home	<70	60–70	70–80	80+
Auditorium, concert hall, amphitheater		<70	65+	
Sports arenas, outdoor spectator sports		<75	70+	
Playground, neighborhood park	<70		67.5–75	72.5+
Golf courses, stable, water recreation, cemetery	<75		70–80	80+
Office building, business commercial and professional	<70	67.5–77.5	75+	
Industrial, manufacturing, utilities, agriculture	<75	70–80	75+	

Notes:
dB = A-weighted decibel; CNEL = Community Noise Equivalent Level; L_{dn} = day-night average noise level.
[a] Specified land use is satisfactory, based on the assumption that any buildings involved are of normal conventional construction, without any special noise insulation requirements.
[b] New construction or development should be undertaken only after a detailed analysis of the noise reduction requirements is made and needed noise insulation features included in the design. Conventional construction, but with closed windows and fresh air supply systems or air conditioning will normally suffice.
[c] New construction or development should generally be discouraged. If new construction or development does proceed, a detailed analysis of the noise reduction requirements must be made and needed noise insulation features included in the design. Outdoor areas must be shielded.
[d] New construction or development should generally not be undertaken.
Source: OPR 2003

4.2.H Cultural Resources

4.2.H.1 Regional Setting

This section provides background information on cultural resources that have been found or are likely to occur in the WSMP 2040Preferred Portfolio Study Area. Cultural resources include paleontological (fossilized) resources, archaeological resources, historical resources, and human remains. Programmatic mitigation measures to reduce or eliminate potentially significant impacts on these resources are identified in Section 5.2.H. Site-specific analysis of cultural resource impacts will be conducted as part of project-level CEQA review for subsequent WSMP 2040 Preferred Portfolio component projects.

EBMUD Service Area

Prehistoric Setting

Over time, changing climatic patterns affected the variety and availability of natural resources throughout California. These changes led to shifts in subsistence and settlement patterns among Native American inhabitants and contributed, at least in part, to regional cultural differences seen in the archaeological record.

By mid prehistoric times (after 3000 B.C.), the Costanoan and Miwok peoples resided in and near the EBMUD service area (Moratto 1984). An estimated 7,000 to10,000 Native Americans lived near San Francisco Bay by the time of the first major European contact in 1770 (Kroeber 1925, Levy 1978). Archaeological remains that provide evidence of prehistoric occupation of the San Francisco Bay Area (Bay Area) include numerous shellmounds and occupation sites that lined the shores of the San Francisco, San Pablo and Suisun Bays (Nelson 1909, Gifford 1916). The locations of these shellmounds approximately follow the current shoreline, but also line major tributaries.

Ethnographic Setting

The EBMUD service area was predominantly occupied by Costanoan Indians, a member of the Penutian linguistic family. The word “Costanoan” was derived from a Spanish word meaning coast people or coastal dwellers, who occupied the area roughly from the Carquinez Strait to the region south of Monterey Bay and east to the Diablo Range (Basin Research Associates 2004, Levy 1978). The Costanoans, also known as the Ohlone, entered the Bay Area approximately 1,500 years ago, via the Sacramento-San Joaquin Delta (Delta) region, displacing earlier Hokan speakers living in the area.

Linguistic and archaeological data seem to suggest that Plains Miwok bands held the northern San Joaquin Valley area until some time during the Late Horizon (ca. 1500 A.D.) (Wallace 1978). Migration of other tribes from the south and east caused tribes on the upper portions of the San Joaquin River to spread northward along the valley floor, resulting in displacement of the Costanoans westward by the Yokuts (Kroeber 1925, 1959).

Spanish expeditions in the eighteenth century encountered Costanoan tribes all along the coastline in the Bay Area. By 1832, the Coastanoan population had been reduced by approximately 80 percent due to disease and conflict with Europeans. More information on the Coastanoans is presented in Appendix E.

Historic Setting

Alameda County

Alameda County was formed in 1853, from portions of Santa Clara and Contra Costa counties (Willard 1988). Alvarado, the county seat as of 1853, was founded in 1852. The adjacent cities of Union City and New Haven, along with Alvarado, were collectively known as Alvarado. Alvarado was an active shipping port partially relating to the salt and beet-sugar industries. The county seat was moved to San Leandro in 1854, and to Oakland in 1873.

The cities of Alameda, Albany, Berkeley, Emeryville, Oakland, Piedmont and part of San Leandro are located on what was once Rancho San Antonio, one of the Mexican land grant ranchos, which was deeded to the Peralta family in 1820. As Americans from the east began visiting the region in the mid- nineteenth century, pressures mounted on the Peraltas to begin selling portions of their grant to help fend off squatters taking up residence on the vast property. In fact, it was a group of squatters, Edson Adams, Andrew Moon, and Horace Carpentier, that laid out plans for the city of Oakland on Peralta lands (Hoover et al. 1990).

Contra Costa County

Contra Costa County, established in 1850, was one of the original 27 counties of California. Its name, given by Spaniards in San Francisco, means “opposite coast”. The county was originally to be called Mt. Diablo County, but the name was changed prior to incorporation. The cities of Antioch, Brentwood, Clayton, Concord, Danville, El Cerrito, Hercules, Lafayette, Martinez (the County seat), Moraga, Oakley, Orinda, Pinole, Pittsburg, Pleasant Hill, Richmond, San Pablo, San Ramon, and Walnut Creek are located in Contra Costa County, and the most prominent natural point is Mount Diablo, standing in almost the center of the county (Hoover et al. 1990).

There were 18 Mexican land grants made in Contra Costa County, with remaining lands designated as ‘el sobrante,' (surplus or excess), and considered common lands. These land grants included Rancho Monte del Diablo (present day Concord) which was granted to Don Salvio Pacheco in 1834. In1834, Rancho Arroyo de Las Nueces y Bolbones (present day Walnut Creek) was granted to Dona Juana Sanchez de Pacheco, and in

1835, Rancho Los Meganos was granted Jose Noriega, situated in what is now the Brentwood area (Wikipedia, last updated 1/12/09).

Prior to 1903, most travel to central Contra Costa County was by boat or rail to Martinez on the northern waterfront and from there to farming regions to the south. In 1903, the first tunnel through the Oakland hills was constructed, exiting in the hills above Orinda with the road continuing on to Lafayette, Walnut Creek, and Danville.

Central Valley

Prehistoric Setting

Geologically, the Central Valley is filled several kilometers deep with alluvial soils washed down from the Sierra Nevada via the Sacramento and San Joaquin rivers. The two rivers merge north of the Study Area, forming a system of channels and marshes comprising the Delta, which flows into Suisun Bay. Prehistoric populations were concentrated along the river channels and in the vicinity of the Delta, as these were the areas with the richest available resources. Therefore, there is an increased likelihood of finding cultural resources in proximity to drainages, rivers, and the Delta. These resources could take the form of occupation and/or burial sites, lithic scatters, bedrock mortar sites, pictograph or petroglyph areas, or traditional cultural use areas.

Historic Setting

Although numerous historic-era endeavors and activities took place throughout the Central Valley, those that most shaped the historical record included early exploration, mining, agriculture, transportation, and flood control. As with the prehistoric era, early settlement in the region would naturally gravitate towards areas with abundant natural resources, including fresh water for irrigation. Early mining efforts focused on stream and river channels with more readily accessible gold deposits. Since historic use was concentrated around and near watercourses, there is an increased probability of finding historic cultural resources in those parts of the Study Area. The historic setting of the Central Valley is further described in Appendix E.

Upcountry

Prehistoric Setting

The cultural chronology devised for the New Melones Reservoir region, in Calaveras County, (Moratto et al. 1988) is relevant to the Upcountry portion of the WSMP 2040 Preferred Portfolio Study Area because it forms a basis for analysis of any finds in that area, and proper analysis of sites and artifacts leads to an assessment of eligibility to the National Register of Historic Places or California Register of Historical Resources. This study synthesized prior research that had taken place in the vicinity of the Study Area.

Historic Setting

Historic-era developments in the Sierra Nevada foothills took on a much different character than those activities which took place in the Central Valley or in the Bay Area. While endeavors more commonly associated with the Central Valley, such as agriculture, ranching, and transportation, certainly occurred in the foothills, their prominence in shaping the economic and cultural landscapes were overshadowed in large part by mining. In Alpine, Amador, Calaveras, and Plumas counties, boom-and-bust Gold Rush towns and camps were established along major rivers and creeks, beginning in the 1840s. Some died out within a few years as veins and placer deposits played out, and others thrived and became major regional economic and transportation centers throughout the nineteenth and twentieth centuries. Remnants of historic resources could include building and cabin foundations and pads, ditches, tailings, mine shafts, placer gouges, wells, privies, or garbage dumps. Please see Appendix E for more information on the historic setting relevant to the Upcountry area.

4.2.H.2 Setting for Preferred Portfolio Components

Cultural resources database and literature searches have not been conducted for the Preferred Portfolio Study Area, primarily because the precise locations of many of the components' proposed facilities have not yet been determined. Information identified below on potential sites is based on a general understanding of the historical or pre-historical activities that occurred at proposed component locations as described in summary form above. Cultural resources database searches and literature reviews will be conducted for each component upon initiation of project-specific environmental review.

Rationing and Conservation

Rationing and Conservation would be implemented within the EBMUD service area. These are policy actions that require no physical alteration of land forms, and thus have no effect upon cultural resources.

Recycled Water

Recycled water projects would most likely be located within the EBMUD service area. The general proximity of the EBMUD service area to the San Francisco bayshore and drainages flowing into the bay and the long historical record of human migration and settlements in proximity to these watercourses, suggest high probability of undiscovered cultural materials and artifacts. However, it is also likely that recycled water facilities that are built in areas previously disturbed by construction activities would be unlikely to yield new discoveries of such materials.

Northern California Water Transfers

The precise sources of water transfers have not yet been identified, but for the purposes of this PEIR it is assumed they would occur in the Sacramento Valley. Areas considered highly sensitive locations are those located near natural water sources, as early historic settlement and most prehistoric settlement are closely linked to the proximity of a water source.

Bayside Groundwater Project Phase 2

Phase 2 facilities would be located at the Bayside Groundwater Project Phase 1 site in San Lorenzo, and at two other locations overlying the South East Bay Plain (SEBP) Groundwater basin, most likely in San Lorenzo (see Figure 3-7 in Chapter 3), San Leandro, or the southern portion of Oakland. The general proximity of these venues to the San Francisco Bay shoreline and drainages suggest the possibility of discovery of cultural resource artifacts.

Sacramento Basin Groundwater Banking / Exchange

Facilities for this component would most likely be located within the boundaries of the Central Basin of the Sacramento Valley. Areas considered highly sensitive locations are those located near natural water bodies, as early historic settlement and most prehistoric settlement are closely linked to the proximity of a water source.

Regional Desalination

As stated in Section 3.2.5, while three locations are being considered for the Regional Desalination facility, this PEIR assumes it would most likely be constructed along the south shore of Suisun Bay in East Contra Costa County (see Figure 3-8 in Chapter 3). This area was included in Nelson's (1909) survey of the San Francisco Bay region, in which he noted the locations of hundreds of prehistoric shellmound sites. While Nelson did not record any such feature in this location, it is likely that other manifestations of prehistoric occupation exist in the proposed regional desalination area because of evidence of prehistoric settlement along the coastline.

Enlarge Pardee Reservoir

Pardee Reservoir's inundation zone below 614 feet elevation encompasses over 40 culturally-significant sites (FRWA 2003; see Figures 3-9 and 3-10 in Chapter 3). These sites are identified in Appendix E of this PEIR. Pardee Dam and the Middle Bar Bridge are listed on the National Register of Historic Places (NRHP). Middle Bar and Big Bar mining sites are listed on the California Register of Historical Resources (CRHR).

Under the NRHP, Pardee Dam's five major elements (dam, south spillway, Jackson Creek spillway, powerhouse, and intake facility tower) comprise a discontinuous historic district (FRWA 2003). Common to engineering structures of its era, the dam is treated with architectural details to soften its massive appearance, including a series of small towers along its crest, each with a decorative light standard.

Middle Bar Bridge is located near the town of Paloma at the upstream end of the reservoir and spans 204 feet across the Mokelumne River. The bridge is an example of a steel Pratt truss bridge with a one-lane single span.

Big Bar and Middle Bar mining sites are listed as California Historical Landmarks (FRWA 2003). The Middle Bar site is submerged in Pardee Reservoir for part of each year. Middle Bar is located 2.8 miles south of SR 49 on Middle Bar Road. The site occupies both sides of the Mokelumne River, connected by Middle Bar Bridge.

Enlarge Lower Bear Reservoir

Since Lower Bear Reservoir is fed by a river, a high potential exists for discovery of prehistoric cultural resources (see Figure 3-11 in Chapter 3). Prehistoric occupation or food processing sites may be located adjacent to the original Bear River channel, at the bottom of the pool.

IRCUP / San Joaquin Groundwater Banking / Exchange

This region may contain a variety of known or unknown prehistoric and historic resources (see Figure 3-12 in Chapter 3). Areas considered highly sensitive locations are those located near natural water sources, as early historic settlement and most prehistoric settlement are closely linked to the proximity of a water source.

4.2.H.3 Regulatory Setting

Federal Regulations

National Historic Preservation Act

Section 106 of the NHPA and its implementing regulations (36 CFR 800, as amended in 2004) require Federal agencies to consider the potential effects of their proposed undertakings on historic properties. Historic properties are cultural resources that are listed on, or are eligible for listing on, the NRHP (36 CFR 800.16[l]). Undertakings include activities directly carried out, funded, or permitted by Federal agencies. Federal agencies must also allow the Advisory Council on Historic Preservation (ACHP) to comment on the proposed undertaking and its potential effects on historic properties. Implementation of the proposed Preferred Portfolio would require permitting under Section 404 of the Clean Water Act and Section 408 approval from the U.S. Army Corps of Engineers (the Corps). Therefore, Corps compliance with Section 106 is required in relation to the proposed WSMP 2040 Preferred Portfolio.

The implementing regulations for Section 106 of the NHPA require consultation with the State Historic Preservation Officer (SHPO), federally recognized Indian tribes and other

Native Americans, and interested members of the public throughout the compliance process. The four principal steps of consultation are as follows:

- Initiate the Section 106 process (36 CFR Section 800.3);
- Identify historic properties, resources eligible for inclusion in the NRHP (36 CFR Section 800.4);
- Assess the effects of the undertaking on historic properties within the area of potential effect (APE) (36 CFR Section 800.5); and
- Resolve adverse effects (36 CFR Section 800.6).

Adverse effects on historic properties are often resolved through preparation of a Memorandum of Agreement or Programmatic Agreement developed in consultation between the appropriate Federal agency, the SHPO, Indian tribes, and interested members of the public. The ACHP is also invited to participate. The agreement describes stipulations to mitigate adverse effects on historic properties.

Under the National Historic Preservation Act, adverse effects on historic properties from projects, primarily those under Federal sponsorship or undertaken in partnership with a Federal entity, include, but are not limited to:

- Physical destruction of or damage to the property;
- Alteration of a property, including restoration, rehabilitation, repair, maintenance, stabilization, hazardous material remediation, and provision of handicapped access, that is not consistent with applicable guidelines;
- Removal of the property from its historic location;
- Change of the character of the property's use or physical features that contribute to its historic significance or that would qualify it for inclusion on the National Register of Historic Places; and
- Introduction of visual, atmospheric, or audible elements that diminish the integrity of the property's significant historic features.

National Register of Historic Places

The NRHP listing criteria (36 CFR Section 60.4) states: The quality of significance in American history, architecture, archeology, engineering, and culture is present in districts, sites, buildings, structures, and objects that possess integrity of location, design, setting, materials, workmanship, feeling, and association and:

(a) That are associated with events that have made a significant contribution to the broad patterns of our history; or

(b) That are associated with the lives of persons significant in our past; or

(c) That embody the distinctive characteristics of a type, period or method of construction, or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction; or

(d) That have yielded, or may be likely to yield, information important in prehistory or history.

Paleontological Resources Preservation Act

This statute limits the collection of rare and scientifically significant fossils to qualified researchers who obtain permits from the appropriate State or Federal agencies, and agree to donate recovered materials to public institutions where they will remain accessible to the public and to other researchers.

State Regulations

California Environmental Quality Act

CEQA includes provisions that specifically address the protection of cultural resources. CEQA requires consideration of impacts of a project on unique archaeological resources and historical resources. A unique archaeological resource, as defined in Public Resources Code (PRC) Section 21083.2(g), is an archaeological artifact, object, or site about which it can be clearly demonstrated that, without merely adding to the current body of knowledge, there is a high probability that it:

- Contains information needed to answer important scientific research questions and that there is a demonstrable public interest in that information;
- Has a special and particular quality such as being the oldest of its type or the best available example of its type; or
- Is directly associated with a scientifically recognized important prehistoric or historic event or person.

Section 15064.5(a) of the State CEQA Guidelines generally defines a historical resource as:

- A resource listed in, or determined to be eligible by the State Historical Resources Commission for listing in the California Register of Historic Resources;
- A resource included in a local register of historical resources or identified as significant in a historical resource survey; and

- Any other object, building, structure, site, area, place, record, or manuscript that a lead agency determines to be historically significant, as supported by substantial evidence.

California Register of Historical Resources

The CRHR includes resources that are listed on, or formally determined eligible for listing on, the NRHP (see above), as well as some California State Landmarks and Points of Historical Interest (PRC Section 5024.1, 14 CCR Section 4850). Properties of local significance that have been designated under a local preservation ordinance (e.g., local landmarks or landmark districts) or that have been identified in a local historical resources inventory may be eligible for listing on the CRHR and are presumed to be significant resources for purposes of CEQA, unless a preponderance of evidence indicates otherwise (State CEQA Guidelines Section 15064.5[a][2]). The eligibility criteria for listing in the CRHR are similar to those for NRHP listing but focus on the importance of the resources to California history and heritage. A cultural resource may be eligible for listing in the CRHR if it:

- Is associated with events that have made a significant contribution to the broad patterns of California's history and cultural heritage;
- Is associated with the lives of persons important in our past;
- Embodies the distinctive characteristics of a type, period, region, or method of construction, or represents the work of an important creative individual, or possesses high artistic values; or
- Has yielded, or may be likely to yield, information important in prehistory or history.

Regional/Local Regulations

County and City General Plans

Relevant goals and policies from local general plans related to cultural resources are summarized in Appendix B.

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4.2.I Visual Resources

4.2.I.1 Regional Setting

EBMUD Service Area

The EBMUD service area includes a diversity of visual elements. A predominant visual feature is the Berkeley-Oakland hills, which divides the EBMUD service area into two sub-regions (the West of Hills and East of Hills). Other distinctive visual features visible from various perspectives within the West of Hills sub-region include the San Francisco Bay, San Francisco Bay Bridge, San Mateo Bridge, Treasure Island, City of San Francisco skyline (including the high rises), Mormon Temple in the Oakland hills, Oakland Coliseum, and elevated BART stations and lines. The major visual feature visible from various locations within the East of Hills sub-region is Mt. Diablo, which appears as a double pyramid and rises to a peak elevation of 3,849 feet.

Visual characteristics in the two regions are influenced greatly by land use patterns and densities. In general, the West of Hills area is dominated visually by a greater percentage of urban and higher density residential, commercial, and industrial development. The East of Hills area is visually characterized by its suburban and rural quality at reduced densities. In both sub-regions, open space areas, including grazing lands and regional parks that occur on the rolling hills, neighborhood parks, school yards, cemeteries, and golf courses, are scattered throughout the communities, softening the urban edge.

The appearance of the EBMUD service area is also influenced by the seasons. In the wet seasons (i.e., winter and spring), the grasslands of the Berkeley-Oakland hills and Mt. Diablo are a lush green. During the dry seasons (i.e., summer and fall), the grasslands take on a golden hue.

Designated scenic routes are located throughout the EBMUD service area, as shown in Table 4.2.I-1. Scenic vistas, which provide views of varied landscapes throughout the service area, are available from look-out points on public roads in the hills, and on trails in regional and State parks, as well as within EBMUD's watershed and recreation lands. The views from these vantage points tend to be broad, encompassing vast areas of landscape.

Visibility of particular objects depends on the location of the viewer and presence of surrounding obstructions. Views are typically characterized according to distance, as they vary greatly depending on the object's distance from the site location and surrounding obstructions. Long-range views refer to those views that are visible from a long distance (e.g., in terms of miles). Mid-range views are those that are visible from several hundred feet or less, and short-range views are those in close proximity to the viewer (e.g., across the street or within a block). Long-range views are typically available from vista points in an elevated location, whereas short-range views are available from street level.

Table 4.2.I-1: Scenic Routes within the EBMUD Service Area

COUNTIES	ROUTES	SCENIC DESIGNATION
Alameda	I-680 I-580	Officially Designated State Scenic Highway; Eligible State Scenic Highway
	SR 84	Officially Designated State Scenic Highway
Contra Costa	I-680 SR 24	Officially Designated State Scenic Highway

Note: A highway may be designated scenic depending upon how much of the natural landscape can be seen by travelers, the scenic quality of the landscape, and the extent to which development intrudes upon the traveler's enjoyment of the view. The status of a State scenic highway changes from eligible to officially designated when the local jurisdiction adopts a scenic corridor protection program, applies to the California Department of Transportation (Caltrans) for scenic highway approval, and receives notification from Caltrans that the highway has been designated as a Scenic Highway.

More detailed descriptions of the visual resources are provided for components where the locations of facilities are known.

Central Valley

The Central Valley area extends from the flat, open lands of the Sacramento Valley to the transitional zone between the Sacramento Valley and the foothills of the western slope of the Sierra Nevada. The dominant visual features are the Coast Ranges to the west and the Sierra Nevada Mountains to the east. The visual character of the Central Valley includes the developed suburban landscape comprised of residential, commercial, and light industrial uses and expansive, undeveloped areas of grazing lands and geometrically-shaped farmlands of rice, row crops, and orchards. Significant visual features include the Sacramento, American, Mokelumne, and Cosumnes Rivers and their riparian corridors.

Upcountry

The Upcountry area is characterized by forested lands and steep terrain. The dominant visual features to the west are annual grassland and native oak woodlands that occur in varying densities. The southwestern area consists visually of a rural, pastoral landscape of rangeland and open space, with residences scattered throughout the foothills. Conifer forests dominate the visual field above about 2,500 feet elevation, with scattered rock outcroppings and patches of grassland. Many water features (e.g., lakes, reservoirs, and rivers) occur in the Upcountry area, and include Camanche and Pardee Reservoirs to the south, Salt Springs and Bear River Reservoir to the north, and the Mokelumne River, which trends northeast to southwest. Rural communities, such as Jackson, add to the variety of visual elements in the region.

4.2.I.2 Setting for Preferred Portfolio Components

Rationing and Conservation

Rationing and conservation measures would be implemented within the EBMUD service area. Visual resources within the EBMUD service area are described in the regional setting above.

Recycled Water

The precise locations of the recycled water projects have not yet been determined but would most likely be constructed in the EBMUD service area, potentially near residential, commercial, or industrial areas. The visual characteristics of these areas would differ depending on location, available vantage points and distances of viewers.

Northern California Water Transfers

As stated in Section 3.2.5, this PEIR assumes that the Northern California Water Transfers component would involve water transfers within the Sacramento Valley. Because the sources of water transfers have not yet been determined, the visual qualities of these counties are generally described. Designated scenic routes in the counties relevant to this component are shown in Table 4.2.I-2 below.

Table 4.2.I-2: Scenic Routes within the Sacramento Valley

COUNTIES	ROUTES	SCENIC DESIGNATION
Yuba	SR 49	Eligible State Scenic Highway
Colusa	SR 20 SR 16	Eligible State Scenic Highway
Glenn	None	None
Plumas	SR 89 SR 70 SR 36	Eligible State Scenic Highway
Sacramento	SR 160	Officially Designated State Scenic Highway; Officially Designated County Scenic Highway

Note: A highway may be designated scenic depending upon how much of the natural landscape can be seen by travelers, the scenic quality of the landscape, and the extent to which development intrudes upon the traveler's enjoyment of the view. The status of a State scenic highway changes from eligible to officially designated when the local jurisdiction adopts a scenic corridor protection program, applies to the California Department of Transportation (Caltrans) for scenic highway approval, and receives notification from Caltrans that the highway has been designated as a Scenic Highway.

According to the Yuba County General Plan, “Yuba County is divided among three geographic/physiographic regions: the Sacramento Valley, the Sierra Nevada foothills, and the mountain environment of the Sierra Nevada mountains” (Yuba County 1994). “The Valley portions of the County are characterized by orchards and crop lands, punctuated by urbanized areas... The Sierra Nevada, the North Coast Ranges, and Sutter Buttes are visible from most Valley locations… The foothills are characterized [visually] by rolling terrain covered by oak woodlands interspersed with mosaic patterns of grasslands and chaparral vegetation. There are large, uninterrupted expanses of foothill countryside utilized for cattle ranching... The mountainous regions of Yuba County are characterized by steep slopes and mixed coniferous forests." Streams, lined by riparian vegetation, are located within the Valley and Foothills, and the upper Sierra slopes offer scenic vistas.

The visual character of Colusa County is typical of the rural counties of the Sacramento Valley (Colusa County 1989). A checkerboard of large-acreage farms dominates the eastern half of the county, with land ownership and road alignments following square mile section lines. The land is flat and covered by fields of rice, orchards, and row crops. Views are expansive, framed only by the rolling foothills of the Coast Range to the west and the jagged peaks of the Sutter Buttes on the east. To the west, large farms give way to much larger cattle and sheep ranches, cultivated fields give way to arid rangeland, and the flat terrain transitions into rolling hills and spectacular upland valleys. Farther west, the land becomes more rugged and wild, until finally reaching the summit of Snow Mountain in a wilderness area some 7,000 feet above the valley floor.

Glenn County has a variety of scenery, including the Sacramento River and streams, foothill and mountain areas, agricultural vistas on the valley floor, the Sacramento National Wildlife Refuge, glimpses of wildlife, and a distant view of Mount Lassen (Glenn County 1993).

Plumas County is situated where the Sierra Nevada and Cascade mountain ranges meet. Primarily a mountainous region (elevations ranging from 2,250 to over 10,000 feet), the County is visually characterized by numerous lakes, rivers, streams, and forests (Plumas and Lassen National Forests). Sceneries include narrow canyons, mountain valleys, meadows, and lofty peaks. The diversity in elevation in Pumas County provides an assortment of viewing opportunities and is considered a valuable scenic resource. Two routes within the county have National Scenic Byways designations: Feather River National Scenic Byway and the Volcanic Legacy Scenic byway.

Sacramento County has a variety of scenery, dominated by agricultural lands and urban areas. Agricultural uses dominate the land use pattern in the unincorporated county, occupying 65 percent of the area (Sacramento County 1993). Residential uses, as a group, occupy 21 percent of the land, while nonresidential uses cover the remaining 14 percent. Major open space areas include the Sacramento-San Joaquin Delta's (Delta's) islands, waterways, and wetlands; and the extensive Consumnes River floodplain. Oak woodlands and grasslands extend from Highway 50 south to San Joaquin in the East County.

Bayside Groundwater Project Phase 2

Some of the new facilities that would be constructed under the Bayside Groundwater Project Phase 2 component would likely be sited at the Phase 1 site, as described in Section 3.2.5 (see Figure 3-7 in Chapter 3). The visual quality of the Phase 1 site and vicinity is industrial, consisting of wastewater treatment plant structures to the west and storage facilities to the east. To the north and south, the visual quality is of flat, disturbed vacant land. While San Francisco Bay and the Bockman Canal are near the Phase 1 site, they are not directly visible due to the generally flat topography of the area. The other potential Phase 2 facility sites have not yet been identified but would most likely be in commercial or industrial areas of San Lorenzo, San Leandro, and/or south Oakland.

Sacramento Basin Groundwater Banking / Exchange

Please refer to the discussion of the Northern California Water Transfers component for a description of the visual resources in Sacramento County.

Regional Desalination

The potential Regional Desalination area would most likely be located along the south shoreline of Suisun Bay in east Contra Costa County (see Figure 3-8 in Chapter 3). The visual quality of the area is dominated by the expansive, flat terrain of open space with intervening industrial uses (e.g., transmission lines, railroad tracks, refinery tanks, and bunkers within the former Concord Naval Weapons Station). Views of the area are available from adjacent public roadways, nearby residential uses along local streets, elevated viewpoints (e.g., I-680 / Benicia-Martinez Bridge and the hills south of the site), and Suisun Bay. Due to the mostly flat landscape, views of the area are mainly from a short distance, with the exception of the hills to the south. There are no designated scenic highways in the vicinity of the potential Regional Desalination area.

Enlarge Pardee Reservoir

Pardee Reservoir lies in the foothills of the Sierra Nevada –and encompasses 37 miles of shoreline, with its three main arms extending east, north, and south (see Figures 3-9 and 3-10 in Chapter 3). The majority of the area surrounding the reservoir is a rural, pastoral landscape comprised of open space. The dominant vegetation surrounding the existing reservoir shoreline is grassland, chaparral, riparian habitat, oak woodland, and foothill pine. The built environment surrounding the reservoir is limited, consisting of roads and reservoir facilities, which are located along the western shoreline of the reservoir's North and South Arms. Also located to the west, Pardee Dam Road extends along the entire length of the reservoir. Scattered throughout the Eastern Arm and eastern shoreline of the reservoir are several unimproved, dirt roads and trails.

Pardee Reservoir is a significant visual feature in the regional landscape (FRWA 2003). The lake and shoreline contrast sharply with the nearby rolling wooded foothills, and occupy the foreground of the various viewsheds around the lake and the adjacent area. In general, views of this area are limited to recreationists, Pardee Dam Road motorists, and facility staff members (FRWA 2003). Visual quality is highest in the winter and spring when reservoir levels are high, although views by the public are highest from February to October, when the Pardee Recreation Area is open. As summer progresses, reservoir drawdown typically exposes a ring of bare soil along the shoreline, negatively affecting the visual quality.

The upper Mokelumne River flows into the east arm of the Pardee Reservoir (FRWA 2003). The uplands surrounding the Mokelumne River Canyon are characterized by rolling hills and small valleys, with occasional rock outcrops. The dominant natural vegetation in these upland areas is annual grassland and native oak woodlands. The area is a rural, pastoral landscape of rangeland and open space, with residences scattered throughout the hills. The built environment along this stretch of the river is limited and includes two 60 kV transmission lines and the one-lane steel girder Middle Bar Bridge. SR 49, an eligible State scenic highway and designated scenic highway in the Calaveras County General Plan, crosses the Mokelumne River at Big Bar via a two-lane bridge (FRWA 2003), adjacent to the Mokelumne River Lodge. In general, views of the upper Mokelumne River are limited to recreationists (including anglers and boaters), SR 49 motorists, and lodge visitors (FRWA 2003).

Enlarge Lower Bear Reservoir

Lower Bear Reservoir is in Amador County, in the foothills of the western slope of the Sierra Nevada. The reservoir's main arm extends to the northeast (see Figure 3-11 in Chapter 3). The majority of the area surrounding the reservoir is a rural, forested landscape of open space. Mixed conifer forest dominates the surrounding vegetation-type around the reservoir. The built environment surrounding the reservoir is limited, consisting of roads and reservoir facilities (including the main dam, saddle dam, spillway, and recreation facilities). The dam and associated facilities are located along the southwestern shoreline of the reservoir. Bear River Road extends along the entire western and much of the southern length of the reservoir. Several unimproved, dirt roads and trails are located to the south and northwest of the reservoir.

Lower Bear Reservoir is a significant visual feature in the regional landscape. The reservoir is a prominent feature from a SR 88 pull-out. SR 88 is a designated Scenic Highway in the National Highway System. Visual quality is highest in the winter and spring when reservoir levels are high. As summer progresses, reservoir drawdown typically exposes a ring of bare soil along the shoreline, negatively affecting the visual quality.

IRCUP / San Joaquin Groundwater Banking / Exchange

Proposed facilities under the IRCUP / San Joaquin Groundwater Banking / Exchange component could be located within any of the following counties: Amador, San Joaquin, Calaveras, and Alpine (see Figure 3-12 in Chapter 3). Because the locations of the proposed facilities have not yet been determined, the visual qualities of these counties are generally described. Designated scenic routes in these counties are shown in Table 4.2.I-3.

Table 4.2.I-3: Scenic Routes within the IRCUP / San Joaquin Groundwater Banking / Exchange Area

COUNTIES	ROUTES	SCENIC DESIGNATION
San Joaquin	I-580	Officially Designated State Scenic Highway
Amador	SR 88 SR 49	Officially Designated State Scenic Highway; Eligible State Scenic Highway
Calaveras	SR 49 SR 4	Officially Designated State Scenic Highway; Eligible State Scenic Highway
Alpine	SR 88 SR 89 SR 4	Officially Designated State Scenic Highway

Note: A highway may be designated scenic depending upon how much of the natural landscape can be seen by travelers, the scenic quality of the landscape, and the extent to which development intrudes upon the traveler's enjoyment of the view. The status of a State scenic highway changes from eligible to officially designated when the local jurisdiction adopts a scenic corridor protection program, applies to the California Department of Transportation (Caltrans) for scenic highway approval, and receives notification from Caltrans that the highway has been designated as a Scenic Highway.

Amador County has a variety of scenery, including the Mokelumne River and streams, several reservoirs, foothill and mountain areas, agricultural lands, forest and a portion of the U.S. Forest Service (USFS) Mokelumne Wilderness area.

San Joaquin County consists of relatively flat agricultural lands. The foothills of the Diablo Range define the southwest corner of the County, and the foothills of the Sierra Nevada lie along the County’s eastern boundary (San Joaquin County 2005). In addition to the agricultural lands, a complex network of creeks, rivers, and canals define the visual character and landscape and include the San Joaquin, the Mokelumne, the Calaveras, and the Stanislaus Rivers. All rivers lead to the Delta in the western half of the County.

Calaveras County is located along the western slope of the Sierra Nevada Mountain Range and contains extremely varied geography. The elevation ranges from 300 feet in the western part of County (characterized by rolling foothills) to a peak height of 8,170 feet in the east near the Alpine County boundary, with deep ravines and intervening steep ridges (Calaveras County 1996). The primary attributes that contribute to the scenic quality of the area include reservoirs, rivers and streams, rolling hills with oak habitat, ridgelines, limestone caves, and giant sequoia forests. "Views and access to these natural features help to reinforce the rural character of the County." (Calaveras County 1996) Three significant rivers traverse the County- the Calaveras, the Stanislaus, and the Mokelumne. Agricultural lands (rangeland and irrigated pasture) add to the visual variety in the County. Calaveras Big Tree State Park, Stanislaus National Forest, and the historic Gold Rush towns also contribute to the visual character of Calaveras County.

Alpine County's topography is characterized by high rugged peaks and ridges, deep canyons, mountain meadows, and numerous streams and lakes (Alpine County General Plan 2005). SR 88 is an officially designated State scenic highway, and the East Fork of the Carson River was designated as a California Wild and Scenic River in 1989. "The Mokelumne and Carson/Iceberg Wilderness Areas encompass much of the southern and eastern portions of the County." (Alpine County 1999) Agricultural lands, which are primarily used for cattle ranching and sheep production, are aesthetically important to the County as well. The architectural styles of new development have often complimented the rural and historic flavor of the County.

4.2.I.3 Regulatory Setting

State Regulations

California Scenic Highway Program

In 1963, the California legislature created the Scenic Highway Program to preserve and protect scenic highway corridors from change that would diminish the aesthetic value of lands adjacent to highways. The State laws governing the Scenic Highway Program are found in the Streets and Highways Code, Section 260 et seq. A highway or county road may be designated scenic depending upon how much of the natural landscape can be seen by travelers, the scenic quality of the landscape, and the extent to which development intrudes upon the traveler's enjoyment of the view.

Designated scenic highways within the WSMP 2040 Preferred Portfolio Study Area are identified in Tables 4.2.I-1, 4.2.I-2 and 4.2.I-3.

Regional/Local Regulations

Relevant goals and policies from local general plans related to visual resources are summarized in Appendix B.

4.2.J Hazards

This chapter discusses the relationship of the Preferred Portfolio components to three categories of hazards that could adversely affect human health and safety, and that could potentially degrade the environment: hazardous materials, hazardous waste products, and wildland fires. Hazardous substances are commonly used in commercial, agricultural, and industrial applications, and are also components of many typical building materials. Hazardous materials are substances that pose a substantial threat if released to the workplace or environment, according Section 25501(h) of the California Health and Safety Code. If such materials are released into the soil, groundwater, or air in an uncontrolled manner, their quantity, concentration, or physical/chemical characteristics could pose a public health risk. Title 22 of the California Code of Regulations, Division 4.5 defines a waste substance as hazardous if it is toxic (causes adverse human health effects), ignitable (has the ability to burn), corrosive (causes severe burns or damage to materials), or reactive (causes explosions or generates toxic gases).

Wildland fire risks are classified and mapped by the California Department of Forestry and Fire Protection (CAL FIRE, formerly CDF).

4.2.J.1 Regional Setting

EBMUD Service Area

As described in Chapter 2, EBMUD provides water service to 1.3 million people in Alameda and Contra Costa counties and has facilities and properties located throughout the two counties. The District also manages extensive watershed lands in the East Bay Area and provides firefighting and watershed management services in its service area.

The hill and watershed areas of Alameda and Contra Costa counties are considered high risk wildfire hazard areas. The East Bay Oakland Hills, the areas around Upper San Leandro Reservoir and Chabot Reservoir, and the Pleasanton-Sunol Ridge areas of western Alameda County are defined by CAL FIRE as “areas of substantial forest fire risk and hazard” (CAL FIRE 2008). The hills of the Richmond-El Cerrito and Orinda area in Contra Costa County are rated as “Very High Fire Hazard Severity Zone.” Motorized construction equipment in use in those portions of the Preferred Portfolio study area that are classified as a “Very High Fire Hazard Severity Zone” can become both a source of fuel and a source of ignition.

The hill areas around San Pablo and Briones Reservoirs and Mt. Diablo are defined as “Substantial Fire Hazard Severity Zones” (CAL FIRE 2008).

Central Valley

The WSMP 2040 Preferred Portfolio Study Area encompasses urban and rural lands that support residences, small businesses (e.g., gas stations and stores), and industries (e.g., wineries, packing companies, and dairy operations), as well as agricultural lands. Undocumented soil contamination could exist at or near commercial and industrial sites, along railroad tracks where pesticides or other chemicals could have been used or released, and potentially in cultivated areas where agricultural chemicals are used. Modern farming practices include the use of fuel, pesticides and fertilizers which, if improperly stored or used, can expose individuals to hazardous materials or associated waste products.

Areas near grasslands and grazing lands, chaparral scrub, oak woodlands, and coniferous forests are subject to wildland fires. The eastern foothills of the Central Valley are designated by CAL FIRE as "wildland areas that may contain substantial forest fire risks and hazards". A few smaller areas within these substantial risk zones have been defined as "Very High Fire Hazard Severity Zones" (CAL FIRE 2008).

Upcountry

The Upcountry area consists of forested lands and steep terrain. Commercial uses are concentrated in communities, whereas residential uses are interspersed in the wildlands. Commercial and residential land uses may handle, store, generate, and dispose of hazardous materials. Soil and groundwater contamination could exist at some of the commercial locations, particularly from leakages at aboveground petroleum storage facilities and underground storage tanks. Undocumented soil and contamination could exist from these types of petroleum storage facilities, as well as from mine tailings from historic mining operations. Most of these areas, containing oak woodland and coniferous forests, have a wildland fire rating from "high" to "severe".

4.2.J.2 Setting for Preferred Portfolio Components

A hazardous materials data search has not been conducted for any of the Preferred Portfolio component locations, as locations for proposed facilities have not yet been determined. As such, the presence or absence of hazardous material sites (e.g., aboveground petroleum storage tanks, underground storage tanks, sites listed by the State of California or EPA) is not known. Information on the presence and absence of hazardous materials for each component is based on a general understanding of the type of existing land uses occurring at proposed component locations or other documents with information about potential sites. An assessment of hazardous materials would be conducted for each component upon initiation of project-specific environmental review.

Rationing and Conservation

The Rationing and Conservation components would be implemented within the EBMUD service area. The setting for the EBMUD service area is described above in the regional setting.

Recycled Water

The precise locations of the recycled water facilities have not yet been determined. They would most likely be located within the EBMUD service area, in urbanized areas with residential, commercial, industrial, and/or open space uses. The setting for the EBMUD service area is described above in the regional setting.

Northern California Water Transfers

Specific water transfer sources have not yet been identified, but for the purposes of this PEIR it is assumed they would originate in the Sacramento Valley, as described in Section 3.2.5 of the PEIR. The setting for the Sacramento Valley is described above in the Central Valley regional setting.

Wildland areas that contain substantial forest fire risks and hazards exist within most of the Sacramento Valley counties. For example, the extreme eastern portions of Sacramento and Yuba Counties, the western portion of Colusa County, the central portion of Glenn County, and the Lake Almanor and SR 70 corridor of Plumas County are all within areas designated by CAL FIRE as “substantial” wildland fire risk zones (CAL FIRE 2008).

Bayside Groundwater Project Phase 2

One of the sites where Bayside Groundwater Project Phase 2 facilities would likely be located is the existing Bayside Groundwater Project Phase 1 site (see Figure 3-7 in Chapter 3). Portions of this area were leased to various construction and salvage firms between the 1980s and 2000 (EBMUD 2005). High-voltage Pacific Gas and Electric Company (PG&E) power transmission lines are also located to the east of this site.

Soil and groundwater studies conducted for the Phase 1 site indicated the soils and groundwater were free of diesel, motor oil, gasoline, PCBs or chlorinated pesticides. No total petroleum hydrocarbons such as diesel, motor oil, kerosene, and gasoline, volatile organic compounds, MTBE, PCBs, chlorinated pesticides, or cyanide were found in any of the groundwater samples (EBMUD 2005).

Permitted uses of hazardous materials and environmental cases where soil or groundwater contamination may be present within one-half mile of the Phase 1 site include small quantity generators, registered and permitted aboveground and underground storage tanks, and sites with waster discharge permits. Because the use and handling of hazardous materials at permitted sites are subject to strict regulation, the potential for an uncontrolled release of hazardous materials from these sites is low.

Sites on which release of hazardous materials is suspected, or that have had cause for hazardous materials investigations, may exist in the area. These sites have been identified by regulatory agencies as potential sources of soil and groundwater contamination from site disturbance activities, such as removal or repair of a UST, a release of hazardous materials, or excavation for construction. The status of each environmental case varies and can be active (ongoing investigations or remediation), closed (remediation or cleanup completed and approved by the regulatory agency), or unknown. Such occurrences within one-half mile of the Bayside Groundwater Project Phase 1 site include releases of gasoline or diesel, leaking underground storage tanks (LUST) (EBMUD 2005).

The Bayside Groundwater Project Phase 2 would include new facilities at two additional sites that have not been identified, but would be within a broader area including San Lorenzo, San Leandro, and southern Oakland within the EBMUD service area. This is an urbanized area that includes industrial, commercial, and residential uses and open space. The setting for the EBMUD service area is described above in the regional setting.

Sacramento Basin Groundwater Banking / Exchange

The precise locations of the facilities needed for this component have not yet been identified. The setting information presented above for the Central Valley and Upcountry areas is relevant to this component. The proximity of dry grasslands, woodlands, and coniferous forests in portions of the Sacramento Basin pose substantial forest fire risks and hazards (Department of Forestry 2008).

Regional Desalination

As stated in Section 3.2.5, while three potential sites are being considered for the Regional Desalination component, this PEIR assumes it would most likely be located along the south shore of Suisun Bay in eastern Contra Costa County (see Figure 3-8 in Chapter 3, Preferred Portfolio and Alternative Portfolios).

Contra Costa County contains extensive heavy industrial development, which may be associated with hazardous materials uses along its north coast. Land uses involving hazardous materials or other hazards considered in this section include the former Concord Naval Weapons Station site, petroleum and chemical refineries, and pipelines for the transportation of natural gas, crude oil, and refined petroleum products. Some amount of contamination is expected within commercial and industrial areas along or near the south shore of Carquinez Straits/Suisun Bay. The site of a potential desalination plant is within the sphere of influence of businesses known to use, generate, and/or store hazardous materials.

Hazardous materials are produced in the County and then transported via the industrial corridor (Highway 4), which begins in the City of Richmond and ends in the City of Oakley, near the eastern area of the potential site of the Regional Desalination facility (Contra Costa County 2005). Annual grasslands adjacent to urbanized land along the south shore of Carquinez Straits/Suisun Bay are designated by CAL FIRE as within moderate to high fire hazard severity zones (CAL FIRE 2008).

Enlarge Pardee Reservoir

Numerous old mine sites exist in or above the Pardee Reservoir inundation area (see Figures 3-9 and 3-10 in Chapter 3). These include the historic Gwyn Gold Mine, and other placer mining locations that may be associated with mine tailings and mine wastes. These sites could potentially be sources of contaminants (FRWA 2003). The reservoir is upstream of the historic Penn Mine, a large abandoned facility in northwestern Calaveras County, upstream of Camanche Reservoir (USGS 2008). The entire inundation area is designated as among “wildland areas that may contain substantial forest fire risks and hazards” by CAL FIRE. The area downstream of the reservoir is designated by CAL FIRE as a ‘substantial’ forest fire risk area.

General setting information for Pardee Reservoir is presented above in the regional setting for the Upcountry area.

Enlarge Lower Bear Reservoir

The Enlarge Lower Bear Reservoir component is surrounded by El Dorado National Forest and PG&E lands (see Figure 3-11 in Chapter 3). Camping, resorts, picnic, and recreational boat launch areas surround Lower Bear Reservoir within steep, forested terrain. No urban, commercial or industrial land uses are present in the surrounding area. However, undocumented soil contamination could exist at or near sites of former gold and ore mining operations, which occurred historically throughout Amador County.

PG&E has an ongoing timber harvesting plan around the reservoir and conducts annual hazard tree removal along its adjacent powerlines. The USFS has grazing lands south of the reservoir. Lower Bear Reservoir is within a High Fire Hazard Severity Zone.

General setting information for Lower Bear Reservoir is presented above in the regional setting for the Upcountry area.

IRCUP / San Joaquin Groundwater Banking / Exchange

The precise locations of the proposed facilities (e.g., pipeline, intertie, pump station) needed for this component have not yet been identified but would be located within the counties of Alpine, Amador, Calaveras, and San Joaquin (see Figure 3-12 in Chapter 3). The general risk exposures outlined above for the Central Valley and the Upcountry apply at the programmatic level.

4.2.J.3 Regulatory Setting

Hazardous materials and hazardous wastes are subject to extensive Federal, State, and local regulations to protect public health and the environment. In general, these regulations define hazardous materials; establish reporting requirements; set guidelines for handling, storage, transport, remediation, and disposal of hazardous wastes; and require health and safety provisions for workers and the public. Regulatory agencies also maintain databases of sites that handle hazardous wastes or store hazardous materials in Underground Storage Tanks (USTs) and of environmental cases where hazardous materials may have been released to the soil or groundwater. A summary of the most pertinent regulations is provided below.

Federal Regulations

Table 4.2.J-1 identifies the Federal agencies that regulate hazardous materials. Key Federal regulations are discussed below.

Table 4.2.J-1: Federal Regulations on Hazardous Materials

REGULATORY AGENCY	AUTHORITY
Environmental Protection Agency (USEPA)	• Federal Water Pollution Control Act • Clean Air Act • Resource Conservation & Recovery Act • Comprehensive Environmental Response, Compensation & Liability Act • Superfund Amendments & Reauthorization Act • Federal Insecticide, Fungicide & Rodenticide Act
Department of Transportation (DOT)	• Hazardous Material Transportation Act
Occupational Safety and Health Administration (OSHA)	• Occupational Safety & Health Act

Specific Hazardous Materials Regulations

The Federal Resource Conservation and Recovery Act (RCRA) regulates the generation, transportation and disposal of hazardous waste under the jurisdiction of USEPA. In addition, RCRA provides a framework for the management of non-hazardous wastes. In 1992, USEPA granted the enforcement authority of RCRA to the State of California's DTSC (identified in Table 4.2.J-2 below).

The Emergency Planning & Community Right to Know Act (EPCRA) (Title III of the Superfund Amendments and Reauthorization Act) requires that each state appoint a

State Emergency Response Commission (Commission). The Commission is responsible for creating Emergency Planning Districts and naming a Local Emergency Planning Committee (LEPC) for each District. These LEPCs are made up of representatives from local fire departments, law enforcement agencies, public works departments, and hospitals, as well as health officials, other government representatives, the news media, and community and industrial groups.

One important requirement of EPCRA is that facilities using hazardous chemicals or materials over a threshold quantity must prepare hazard assessments, prevention programs, and Emergency Response Plans (ERPs). These ERPs must be filed with the LEPCs so that they are aware of the hazards that may exist and can respond effectively in the event of an emergency to minimize public exposure, injury, and loss of life. Examples of facilities that are subject to the requirements of EPCRA include chemical manufacturers, certain wholesalers and retailers of chemical products, water treatment and wastewater treatment facilities, facilities with ammonia refrigeration systems, utilities, and various Federal facilities. EBMUD's water and wastewater treatment plants are subject to the requirements of EPCRA.

State/Regional Regulations

Table 4.2.J-2: State and Regional Regulations on Hazardous Materials

REGULATORY AGENCY	AUTHORITY
Department of Toxic Substances Control (DTSC)	• Health and Safety Code CCR Titles 17, 19 & 22
Department of Industrial Relations (Cal-OSHA)	• California Occupational Safety & Health Act
Department of Transportation (Caltrans)	• Hazardous materials transportation
Public Utilities Commission (PUC)	• Natural gas pipelines; General Order No. 112-D
Office of Emergency Services (OES)	• Hazardous Materials Release/Response Plans • Acutely Hazardous Materials Law
State Fire Marshall	• Uniform Fire Code, CCR Title 19 • Hazardous liquid pipelines
Health & Welfare Agency	• Safe Drinking Water & Toxic Enforcement Act
State Water Resources Control Board (SWRCB)	• Porter-Cologne Water Quality Control Act • CCR Title 23
Regional Water Quality Control Boards (RWQCBs)	• Underground Storage Tanks • National Pollution Discharge Elimination System (NPDES) permit requirements
Bay Area Air Quality Management District (BAAQMD); San Joaquin Valley Air Pollution Control District (SJVAPCD); Calaveras County Air Pollution Control District (CCAPCD); Sacramento Metropolitan Air Quality Management District (SMAQMD); Amador County Air Pollution Control District (ACAPCD)	• California Clean Air Act

Specific Wastewater Recycling Regulations

Wastewater recycling in California is regulated under Title 22, Division 4, of the California Code of Regulations. The regulations establish acceptable levels of constituents in recycled water for a range of uses and assurance of reliability in the production of recycled water.

As described in Section 4.2.A.3, EBMUD's recycled water program is permitted under General Order 96-011 issued by the San Francisco RWQCB. This permit sets requirements related to water quality and allowed uses.

Local Regulations

Table 4.2.J-3 identifies the local agencies that regulate hazardous materials.

Table 4.2.J-3: Local Regulations on Hazardous Materials

REGULATORY AGENCY	AUTHORITY
County Departments of Environmental Health	• Hazardous material disclosure • Underground storage tanks • Contaminated sites cleanup • CCR Title 22 • CEQA implementation
County Agricultural Commissioners	• Agricultural chemicals regulation
County and City Fire Departments	• Hazardous materials disclosure • Underground storage tanks • Emergency response

EBMUD's policies and procedures related to managing hazardous materials and fire hazard include the Trench Spoils Field Management Practice Program, the Emergency Operations Plan, and the Fire Management Plan.

District Trench Spoils Field Management Practice Program

The District's *Trench Spoils Field Management Practice Program* (EBMUD 1997) specifies procedures to be implemented prior to and during trenching work to minimize worker exposure to contaminants of concern and ensure the proper disposal of trench spoils, including soil and groundwater produced during dewatering.

EBMUD's Workplace Health and Safety staff is responsible for ensuring that appropriate precautions for construction workers are implemented. District Environmental Compliance staff determine appropriate disposal options for excavated soils and dewatered groundwater.

EBMUD Emergency Operations Plan

EBMUD's *Emergency Operations Plan* (1999) outlines procedures to be followed in the event of natural disasters, severe storms, major system failures or terrorist attacks. A site-specific emergency response plan is in place for individual District facilities, using the District-wide program as a guide.

Fire Management Plan

The District's fire management program and Fire Management Plan address fire management issues on East Bay watershed lands and seek to minimize environmental impacts. The District is responsible for watershed management surrounding four reservoirs (Briones, San Pablo, Upper San Leandro, and Lafayette), one non-reservoir watershed basin (Pinole Valley), and a portion of the Chabot Reservoir watershed basin. The purpose of the Fire Management Plan is to provide a proactive, comprehensive, and strategic management approach that addresses the full range of vegetation types and environmental conditions, defines and develops a strategic fuel break network, and identifies a system of Fire Management Units.

County and City General Plans

A summary of relevant goals and policies from city and county general plans related to hazards is presented in Appendix B.

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4.2.K Public Services and Utilities

4.2.K.1 Regional Setting

The setting information presented below applies to the entire WSMP 2040 Preferred Portfolio Study Area, including the EBMUD service area, the Central Valley, and the Upcountry area.

Water-Related Services

Drinking Water

Rivers and groundwater are the primary drinking water supply sources for communities in Northern California. The major source of water in Northern California, particularly during the dry summer months, is runoff from the Sierra Nevada snow pack that is captured for later use in numerous reservoirs.

Drinking water is also supplied by the Sacramento-San Joaquin Delta (Delta). Inflow to the Delta comes primarily from the Sacramento and San Joaquin Rivers, but also from smaller east side tributaries such as the Mokelumne and Cosumnes Rivers. Delta water is pumped and distributed through State Water Project (SWP) and Central Valley Project (CVP) canals to users in both Northern and Southern California. The SWP is operated and maintained by the California Department of Water Resources (DWR) and the CVP is operated by the Federal Bureau of Reclamation.

Groundwater also supplies drinking water to many areas of Northern California. Groundwater is the portion of water beneath the Earth's surface that can be collected with wells or which flows naturally to the surface via seepage or springs. California's enormous groundwater reservoirs are delineated into 431 groundwater basins, underlying about 40 percent of the surface area of the State.

Various water districts provide drinking, wastewater, and flood control services throughout the WSMP 2040 Preferred Portfolio Study Area. EBMUD provides water services to an estimated 1.3 million people plus industrial, commercial, and institutional water users in the East Bay region of the San Francisco Bay Area within its 340-square-mile service area.

In the Upcountry area, Calaveras County Water District and Amador Water Agency provide water and wastewater services to customers within their respective counties. In addition, Amador Water Agency provides water service to wholesale customers. The Jackson Valley Irrigation District, also in Amador County, provides irrigation water to the local farming community. Other local water utilities, such as Valley Springs Public Utility District, provide water and/or wastewater services to their communities. Some utilities use groundwater as source water.

Calaveras County Water District boundaries encompass approximately 640,000 acres of land ranging from the San Joaquin Valley to the Sierra Nevada Mountains. The District currently provides water service to approximately 12,500 municipal, residential, and commercial customers in four improvement districts located throughout the County. The District currently provides sewer service to approximately 4,500 customers in six improvement districts located throughout the County (CCWD 2008).

The Amador Water Agency water system serves the areas of Jackson, Martell, Sutter Creek, Sutter Hill, Ione, Amador City, and Drytown with treated water from two water treatment plants at Sutter Hill and Ione. This system also provides untreated (raw) water from the Amador Canal to hundreds of customers between Lake Tabeaud and Sutter Hill, and Sutter Hill and Ione. The primary source of consumptive water is the Mokelumne River, which is supplied from rainfall and snowmelt from the Sierra Mountain Range. This water is diverted into the Amador Canal at Lake Tabeaud and is gravity fed to the two water treatment plants (AWA 2008).

Several Community Services Districts provide water and wastewater services to Plumas County. Plumas County is highly dependent upon groundwater for domestic, commercial and agricultural uses.

Wastewater Services

In urban areas, municipalities or agencies collect wastewater for treatment. In rural areas and small town, septic tanks are the most commonly used wastewater treatment system. A septic system is a small scale sewage treatment system common in areas with no connection to main sewage pipes provided by private corporations or local governments. Wastewater infrastructure occurs through the WSMP 2040 Preferred Portfolio Study Area and includes treatment plants, pump stations, buried pipelines, septic tanks and associated infrastructure.

Flood Control Services

In urban areas, some water agencies provide flood control in addition to providing drinking water services. Flood control is partially provided by reservoirs, which are often managed to provide water supply as well as flood protection. For example, EBMUD's Camanche Reservoir is operated to store water for irrigation and for stream-flow regulation, to provide flood protection, to provide water to meet the needs of downstream water rights holders, to provide recreational facilities to the public, and water for fisheries and riparian habitat. County flood control districts are also common throughout the WSMP 2040 Preferred Portfolio Study Area and provide flood protection facilities. In the Delta, flood control is provided by levees and agricultural ditches.

Law Enforcement Services

Law enforcement services in the WSMP 2040 Preferred Portfolio Study Area are provided by the county sheriff in unincorporated areas or by contract to other communities, and by city police agencies. A few smaller cities and towns have formed community services districts to pool law enforcement resources. The California Highway Patrol (CHP) has primary law enforcement jurisdiction on State and Federal highways, and over all commercial trucking. The CHP may also patrol local communities, although such activity is usually provided in times of emergency.

EBMUD's uniformed rangers routinely supervise District watershed lands, recreational areas and EBMUD upcountry facilities. Although they are not sworn peace officers, rangers provide many forms of assistance to the public in both routine and emergency circumstances, and provide a visible liaison with first-response law enforcement organizations.

Fire Protection Services

Fire protection services in the WSMP 2040 Preferred Portfolio Study Area are provided by a number of agencies, including county fire departments, city fire departments, and fire districts. A number of the counties also have volunteer fire departments.

In addition, the California Department of Forestry and Fire Protection (CAL FIRE, formerly CDF) provides fire protection and emergency aide services for both wildland and residential/commercial areas. CAL FIRE has two units in the Central Valley, the Tehama-Glenn Unit and the Nevada-Yuba Placer Unit. The Amador-El Dorado and Tuolumne-Calaveras units are responsible for the Upcountry area and the Santa Clara unit is located in the EBMUD service area. EBMUD rangers also provide fire protection on and about district lands. Particularly in upcountry and local watershed areas, ranger vehicles are equipped to help extinguish small fires or contain the spread of larger range fires, in cooperation with local and State firefighting agencies.

Solid Waste Management

The California Integrated Waste Management Board (CIWMB) maintains facility information and waste stream profiles for all counties and other waste management jurisdictions in the State. Active landfills are located throughout the WSMP 2040 Preferred Portfolio Study Area. Table 4.2.K-1 shows the characteristics of landfills within the Study Area.

Natural Gas

Natural gas customers in California are served by a network of regional natural gas pipelines that traverse the State. In northern California, natural gas pipelines are primarily owned by Pacific Gas and Electric Company (PG&E). Regional pipelines

Table 4.2.K-1: Landfills within the WSMP 2040 Preferred Portfolio Study Area by County

	COUNTY	LANDFILL(S)	REMAINING CAPACITY (CUBIC YARDS)	REMAINING CAPACITY (PERCENT)	MAX. PERMITTED TONS PER DAY	CONSTRUCTION/ DEMOLITION WASTE ACCEPTED? (YES OR NO)	CONTAMINATED SOIL ACCEPTED? (YES OR NO)
EBMUD Service Area	Alameda County	Altamont Landfill - Resource Recovery	45,720,000	73.7%	11,500	Yes	Yes
		Tri Cities Recycling – Disposal Facility	NA	0%	2,346	Yes	No
		Vasco Road Sanitary Landfill	9,870,704	30.9%	2,250	Yes	Yes
	Contra Costa County	Keller Canyon Landfill	63,408,410	84.5%	3,500	Yes	No
		Acme Landfill	175,000	65.1%	1,500	Yes	No
Central Valley	Colusa County	Stonyford Disposal Site	55,683	37.3%	10	Yes	No
	Glenn County	Glenn County Landfill Site	1,203,200	100%	100	Yes	No
	San Joaquin County	Foothill Sanitary Landfill	97,900,000	96%	1,500	Yes	No
		Forward Landfill, Inc.	40,031,058	78.4%	8,668	Yes	Yes
		North County Landfill	17,600,000	100%	825	Yes	No
	Sacramento County	L - D Landfill Company	4,100,000	68%	2,540	Yes	No
		Sacramento County Landfill (KIEFER)	112,900,000	96.2%	Not available	Yes	No
	Yuba County	Ostrom Road Landfill	40,600,000	97.1%	3,000	Yes	Yes
Upcountry	Calaveras County	Rock Creek Landfill	7,007,000	91.6%	500	Yes	No
	Plumas County	Chester Sanitary Landfill	126,800	32.5%	44 tons per year	Yes	No

Note:
Based on California Integrated Waste Management Board's online landfill database from 2000 (CIWMB 2008b)
(http://www.ciwmb.ca.gov/Profiles/Facility/Landfill/default.asp?VW=JSELECT&MTYPE=Landfill)

generally range from 2 to 42 inches in diameter, and large natural gas pipelines range from 33 to 42 inches in diameter. PG&E also has a natural gas storage facility in northern Contra Costa County and western San Joaquin County.

Conveyance Facilities

Transmission lines, in addition to any petroleum or natural gas pipeline alignments, fiber optic cables, telephone utilities, water, sewer, and storm drains are generally located in road right-of-ways.

Electricity Supply

PG&E, Sacramento Municipal Utility District (SMUD), Western Area Power Administration (WAPA) and municipal utilities provide electricity in northern California (CEC 2008a). Most of California's electricity transmission lines, not including distribution lines, are owned by PG&E (approximately 58 percent of the State's transmission line mileage).

Despite California's policies to diversify the electric supply, in 2004, natural gas accounted for 40.8 percent of the electricity supply. The following additional electricity sources supplied the remainder of California's electricity: coal (21.3 percent), large hydroelectric plants (14.9 percent), nuclear (12.8 percent), geothermal (4.8 percent), biomass (2 percent), small hydroelectric plants (1.6 percent), wind (1.5 percent), and solar (0.3 percent) (CEC 2005).

In 2002, California imposed a requirement that all electrical corporations much purchase a minimum quantity of renewable energy resources as part of their energy portfolio. The amount of renewable energy required is based on a specified percentage of total kilowatt-hours sold to retail customers each year. Electrical corporations were mandated to increase procurement of eligible renewable energy resources by at least 1 percent per year so that 20 percent of its retail sales are procured from renewable resources by the end of 2017 (Public Utilities Code, Section 399.15), and publicly owned utilities have been asked to consider establishing a similar target. In the case where an electrical corporation fails to procure sufficient eligible renewable energy resources in a given year, that electrical corporation must procure additional eligible renewable energy resources in subsequent years to compensate for the shortfall.

Current Energy Use

Electricity

Despite improvements in power plant licensing, energy efficiency programs, and continued technological advances, development of new energy supplies is not keeping pace with the State's increasing demand (CEC 2005). Although California continues to be the national leader in energy efficiency and conservation, the State's energy infrastructure may not be able to meet the State's energy delivery needs in the near future. While per capita electricity consumption in the United States has increased by 45 percent over the last 30 years, per capita energy use in California has remained essentially level (CEC 2005). California's ability to minimize increases in electricity consumption over the past 30 years has been the result of the State's energy efficiency measures. Implementation of energy efficiency measures has saved more than 40,000 gigawatt-hours (GWh) of electricity through 2003 as well as 12,000 megawatts of peak demand (CEC 2005).

Peak demand reduction is very important in that it serves to reduce electricity price volatility, improve electricity reliability, and delay the need to construct additional electricity-generating infrastructure. The electricity generation system must be able to accommodate high summer peak energy demands, in addition to demand swings caused by weather variability and the economy. Although peak demand periods typically only occur for between 50 and 100 hours per year, they impose huge burdens on the electrical system. According to a report prepared by the California Energy Commission (CEC), the electricity system would be able to meet peak electricity demand in the summer of 2008 in California, even with hotter-than-average temperatures (CEC 2005).

Despite efforts to minimize California's increases in energy demand, electricity consumption in California grew by 3% between 2001 and 2004, increasing from 250,241 GWh to 270,927 GWh. Electricity use is forecasted to grow between 1.2 and 1.5 percent annually, from 270,927 GWh in 2004, to between 310,716 and 323,372 GWh by the end of 2016.

The 2005 Energy Report assessment of electricity supply and demand concluded that maintaining adequate electricity reserves will be difficult over the next few years due to increasing electricity demand (CEC 2005). In addition to the increased demand, the potential for higher-than-average summer temperatures (with associated high air-conditioning usage) in the future as well as decreased hydroelectricity generation related to lower-than-average precipitation years in the future will also serve to decrease electricity supplies. In addition to concerns about meeting the State's growing electric demand, a critical infrastructure issue is the electricity transmission system, which has become progressively stressed in recent years.

EBMUD Hydroelectricity Generation Capacity

Pardee and Camanche Dams provide an average annual energy generation of 140 GWh per year and 40 GWh per year of hydroelectric power, respectively, that is not dependent on natural gas.

Energy Use Associated with Water Infrastructure Projects

Three percent of all electricity generated in the U.S. is used to transport and treat water and wastewater (NRDC and Pacific Institute 2004). Electricity availability is critical for water supply and wastewater processing. California's water infrastructure uses large amounts of energy to for water treatment' distribution; wastewater collection, treatment, and discharge; as well as recycled water treatment and distribution. In California, the SWP is the largest single user of energy in the State. The process of moving water from the Sacramento-San Joaquin Delta to Southern California through the SWP uses 2 to 3 percent of all electricity consumed in the State. EBMUD electricity consumption is less intensive than many water providers in California because the regional water system relies heavily on gravity, as opposed to pumping, to bring water from the Mokelumne River to local storage facilities.

Overall, California's water infrastructure accounts for approximately 20 percent of the State's electricity consumption as well as one-third of the non-power plant natural gas consumption, and about 88 million gallons of diesel fuel (CEC 2005). The CEC has identified opportunities for improving water-related electricity use, both through water infrastructure improvements as well as through water end-user efficiencies and conservation that could reduce electricity demand related to the State's water sector. In California, 58 percent of water-related electricity is used by agricultural, residential, commercial, and industrial end uses. The remaining 42 percent of water-related electricity is used to treat and distribute water and treat the discharged wastewater (CEC 2005). Therefore, cost effective end user efficiencies and conservation could result in significant energy savings in the water sector in addition to efficiencies in distribution, peak load shifting, and water treatment. According to the CEC, industry experts estimate that untapped energy efficiency opportunities in water and wastewater treatment range from 5 to 30 percent.

In their report entitled *Energy Down the Drain - The Hidden Costs of California's Water Supply* (2004), the National Resources Defense Council (NRDC) and Pacific Institute highlight the connections between the water sector and energy use and provided suggestions for cost savings, waste reduction, and environmental protection that can be achieved through the integration of energy considerations in water supply planning. This report emphasizes that considering energy considerations in water resource planning provides opportunities for significant energy savings and minimize contributions to global climate change. Increased water conservation, water reuse, and end use-related energy conservation (e.g., energy used for heating water or by cloths washers) offer significant opportunities for water and energy conservation.

Mokelumne River Hydroelectric Generation

Hydropower facilities convert the energy of flowing or falling water into electrical power. Water released from a reservoir flows through a tunnel or pipeline to a powerhouse where it rotates one or more turbines. The spinning turbines drive electricity power generators. There are six major hydropower generation facilities on the Mokelumne River. The Mokelumne River Project (FERC Project #137) consists of four powerhouses: the Salt Springs, Tiger Creek, West Point, and Electra Powerhouses, all owned and operated by PG&E. The fifth and sixth, Pardee and Camanche Powerhouses (FERC Project #2916, Lower Mokelumne Project), are owned and operated by EBMUD.

Salt Springs Reservoir is located in eastern Amador County, about 30 miles east-northeast of Jackson. The approximately 141,900 acre-foot (175,000,000 m^3) reservoir is formed by Salt Springs Dam on the North Fork of the Mokelumne River and a short pipeline from the reservoir conveys water to the 39.8 MW (authorized install capacity) Salt Springs Powerhouse. Four reservoirs, in addition to Salt Springs Reservoir, provide water storage for Salt Springs Unit 1 and downstream powerhouses: Meadow Lake, Twin Lake, Lower Blue Lake, and Upper Blue Lake. Upper Bear River Reservoir empties directly into Lower Bear River Reservoir, and both reservoirs serve Salt Springs Unit 2. Cole Creek is a tributary of the North Fork Mokelumne River, and when sufficient flows are available in Cole Creek, water is diverted from the creek into the Bear River Tunnel for Unit 2 at the Salt Spring Powerhouse.

Tiger Creek Powerhouse is located on the North Fork Mokelumne River, downstream of the Salt Springs Powerhouse. The Tiger Creek conduit conveys water to the Tiger Creek Powerhouse from the Salt Springs Powerhouse and also picks up several stream diversions. Tiger Creek Regulator Reservoir, on Tiger Creek, and Tiger Creek Forebay store water conveyed by the Tiger Creek conduit before it is delivered to the Tiger Creek Powerhouse.

After going through Tiger Creek Powerhouse, water is diverted to Tiger Creek Afterbay on the Mokelumne River and then to the West Point Powerhouse. After existing the West Point Powerhouse, water goes directly into the Electra Powerhouse Tunnel Intake. Lake Tabeaud serves as the forebay for the powerhouse. After going through Electra Powerhouse, Electra Afterbay Dam serves to regulate flows in the Mokelumne River below the powerhouse. Following Electra Afterbay, water enters into Pardee Reservoir and Powerhouse and then Camanche Reservoir and Powerhouse before being released back into the Mokelumne River. The amount of hydropower generated at facilities on the Mokelumne River in any particular year depends on hydrologic conditions in that year, as well as preceding years. The maximum operating capacity of the PG&E powerhouses on the Mokelumne River is 214.5 megawatts (MW) (Salt Springs: 44 MW; Tiger Creek: 58 MW; West Point: 14.5 MW; Electra: 98 MW). The average energy production of these facilities is 1,036 GWh/year. (FERC 2001; CPUC 2000).

EBMUD's hydroelectric powerhouses on the Mokelumne River produce approximately 23.6 MW (nameplate capacity) from Pardee Powerhouse and 10.8 MW (nameplate capacity) from Camanche Powerhouse. The nameplate capacity is the maximum rated output of electrical power production equipment under specific conditions designated by the manufacturer and is commonly expressed in MW. During a year of average runoff, Pardee Powerhouse generates 110 GWh/year of electrical energy, and Camanche Powerhouse generates 40 GWh/year of electrical energy, for a total of approximately 150 GWh/year.

4.2.K.2 Setting for Preferred Portfolio Components

Rationing

Rationing would be enforced within the EBMUD service area. The public services and utilities within the EBMUD service area are described above.

Conservation

Conservation would be implemented within the EBMUD service area. The public services and utilities within the EBMUD service area are described above.

Recycled Water

The precise locations of the recycled water projects have not yet been determined but would most likely be located within the EBMUD service area. The public services and utilities within the EBMUD service area are described above.

Northern California Water Transfers

The precise sources of water transfers have not yet been identified, but for the purposes of this PEIR it is assumed they would occur in the Sacramento Valley. Please see Section 4.2.K.1 above for a discussion of the public services, utilities, and energy in the Central Valley, which includes this area.

Bayside Groundwater Project Phase 2

One of three sites where well facilities would be constructed is a property owned by EBMUD (see Figure 3-7 in Chapter 3). The other two well sites have not yet been identified and could be within a broader area, including San Lorenzo, San Leandro, and the southern part of Oakland (EBMUD 2005). These areas contain transmission lines, fiber optic cables, telephone utilities, water, sewer, and storm drains, which are generally located in road right-of-ways.

Oro Loma Sanitary District (OLSD) is the agency responsible for wastewater collection, treatment, and disposal in the Phase 2 area. OLSD treats 15 million gallons per day (MGD) of sewage, including sewage flow from the Castro Valley Sanitary District. The OLSD plant, located immediately west of the site, has a design capacity of approximately 20 MGD. OLSD treats the wastewater to a secondary level through physical, biological, and chemical processes. The treated effluent is disposed of through a discharge pipe into the deep waters of the San Francisco Bay. A secondary sedimentation tank was added, increasing the plant's advanced secondary treatment capability to 20 MGD. Currently, there are three sewer trunk lines (one 66-inch-diameter and two 30-inch-diameter pipelines) along Grant Avenue leading to the OLSD wastewater treatment plant.

There are two major drainage channels near the Phase 2 site -- San Lorenzo Creek and Bockman Canal.

Sacramento Basin Groundwater Banking / Exchange

The precise locations of the proposed facilities (e.g., recharge ponds, wells, pipelines, pumps, etc.) needed for this component have not yet been identified but would be located within Sacramento County. Please see Section 4.2.K.1 for a discussion of the public services, utilities, and energy in the WSMP 2040 Preferred Portfolio Study Area which is applicable to Sacramento County.

Regional Desalination

As stated in Section 3.2.5, while three potential locations are being considered for the Regional Desalination component, this PEIR assumes that it would most likely be located along the southern shoreline of Suisun Bay, in east Contra Costa County (see Figure 3-8 in Chapter 3). Street right-of-ways likely contain electrical transmission lines and buried fiber optic cables, telephone utilities, water, sewer, and storm drains.

The Mirant Pittsburg Power Plant is a natural gas-fired plant and the largest power plant on the Bay. The plant is owned by Mirant, a new energy company, formed by the Southern Company of Atlanta in 2001. The plant is surrounded by fuel oil tanks, which are connected via a pipeline to the power plant at Antioch and to Chevron's refinery in Richmond.

The City of Pittsburg owns and operates the water treatment plant that supplies water to the residents of Pittsburg. The City of Pittsburg also maintains the collection system that transports sewage to the treatment plant at Delta Diablo Sanitation District.

Enlarge Pardee Reservoir

Please see Section 4.2.K.1 above for a discussion of the public services, utilities, and energy in the WSMP 2040 Preferred Portfolio Study Area, which is applicable to this component.

Several power transmission lines cross the upper part of Pardee Reservoir and the area between the existing and proposed replacement dams (see Figures 3-9 and 3-10 in Chapter 3). The powerlines are as follows:

- A 60-kV transmission line crossing the Mokelumne River, just upstream of the State Route (SR) 49 bridge;
- A 60-kV transmission line crossing the upper part of the reservoir, about 4,000 feet downstream of the Middle Bar Bridge;
- A 60-kV transmission line extending to the south from the substation, located on the roof of the existing powerhouse;
- A distribution line extending from the existing powerhouse substation to Pardee Center; and
- A distribution line near the right abutment of the existing Jackson Creek Dam.

Enlarge Lower Bear Reservoir

Pleas see Section 4.2.K.1 for a discussion of the public services, utilities, and energy in the WSMP 2040 Preferred Portfolio Study Area, which is applicable to this component (see Figure 3-11 in Chapter 3).

Amador County Water Agency provides potable water at the various campsites and the Bear River Resort by Lower Bear Reservoir. On-site septic systems are also located at various campsites and the resort.

IRCUP / San Joaquin Groundwater Banking

The precise locations of the proposed facilities (e.g., recharge ponds, wells, pipelines, pumps, etc.) needed for this component have not yet been identified but would be located within San Joaquin County (see Figure 3-12 in Chapter 3). Please see Section 4.2.K.1 for a discussion of the public services, utilities, and energy, which is applicable to this component.

4.2.K.3 Regulatory Setting

Federal Regulations

National Energy Policy

The National Energy Policy was established by the National Energy Policy Development Group in 2001 to help the private sector and as appropriate, State and local governments promote dependable, affordable, and environmentally sound production and distribution of energy for the future (NEPDG 2001). This policy includes the principle of advancing new and environmentally friendly technologies to increase energy supplies and encourage cleaner, more efficient energy use. Modernizing energy conservation and energy infrastructure, increasing energy supplies, increasing energy security, and protecting the environment are all goals of the policy.

State Regulations

California Public Utilities Commission

The CPUC regulates privately owned electric, natural gas, telecommunications, water, railroad, rail transit, and passenger transportation companies and is responsible for ensuring that consumers have safe, reliable utility service at reasonable rates, protecting against fraud, and promoting the health of California's economy. This exclusive power extends to all aspects of the location, design, construction, maintenance, and operation of regulated utility facilities. The CPUC has provisions that require regulated utilities to work closely with local governments and to give due consideration to their concerns.

California Integrated Waste Management Act of 1989

The California Integrated Waste Management Act of 1989 (Assembly Bill (AB) 939) was enacted to address concerns about the increase in waste stream and decrease in landfill capacity. The 1989 act requires all California cities and counties to implement programs to reduce, recycle, and compost at least 25 percent of waste by the year 1995, and to divert at least 50 percent from landfills by 2005 (PRC Section 41780). In 2008, California diverted 58 percent of its waste stream. The California Integrated Waste Management Board is the State agency that is designated to oversee, manage, and track the waste generated in California each year. Each city and county must submit an annual report to the Board including a calculation of the annual diversion rate as well as a description of the progress made toward implementing diversion programs that have been selected in the jurisdiction's planning documents.

Regulations Governing Utility Safety and Service at Construction Sites

Excavation activities are regulated through the California Occupational Health and Safety Administration Trench Construction Safety Orders. In addition, California Department of Health Services (DHS) standards (Waterworks Standards (Title 22, Chapter 16, Section 64572)) require at least (1) a 10-foot horizontal separation between parallel sewer and water mains; (2) a 1-foot vertical separation between perpendicular water and sewer line crossings; and (3) encasement of sewer mains in protective sleeves where a new water line crosses under or over an existing wastewater main. In the event that separation requirements cannot be maintained, EBMUD or its contractors would obtain a DHS variance by providing sewer encasement or other measure deemed suitable by the DHS.

2005 California Energy Action Plan II

The Energy Action Plan II is the State's principal energy planning and policy document. The original 2003 Energy Action Plan, developed by CEC, the California Power Authority (CPA), and the CPUC, included goals for California's energy future and set forth a commitment to achieve these goals through specific actions. Energy Action Plan II was developed in 2005 and identifies further actions necessary to meet California's future energy needs. The Plan describes a coordinated implementation plan for State energy policies, and identifies specific action areas to ensure that California's energy is adequate, affordable, technologically advanced, and environmentally sound. Specific action areas focused on in Energy Action Plan II include increasing energy efficiency; use of advanced metering and dynamic pricing tariffs to achieve demand response; aggressively developing renewable energy resources; augmenting existing facilities; replacing aging infrastructure; avoiding over-reliance on a single fuel source; achieving significant reductions in gasoline and diesel use and increasing the use of alternative fuels for transportation; encouraging research, development, and demonstration (RD&D) projects in energy efficiency technologies; and contributing to greenhouse gas (GHG) emission reductions.

The Energy Action Plan II includes the following energy efficiency action specific to water supply systems:

- Identify opportunities and support programs to reduce electricity demand related to the water supply system during peak hours, and opportunities to reduce the energy needed to operate water conveyance and treatment systems.

In 2002, California established its Renewable Portfolio Standard program which required 20 percent of electricity sales to come from renewable sources by 2017. The CPUC subsequently accelerated that goal to 2010 for electrical corporations, and the CEC further recommended that the State increase the target for all retail electricity sellers to 33 percent by 2020.

Building Energy Efficiency Standards

The Energy Efficiency Standards for Residential and Nonresidential Buildings, as specified in Title 24, Part 6, of the California Code of Regulations, were established in 1978 in response to a legislative mandate to reduce California's energy consumption. The standards are updated periodically to allow consideration and possible incorporation of new energy efficiency technologies and methods. The current version of the standards have went into effect on October 1, 2005, and the CEC has begun development of an update. California's building efficiency standards (along with those for energy-efficient appliances) have saved more than $56 billion in electricity and natural gas costs since 1978 (CEC 2008c). It is estimated that the standards will save an additional $23 billion by 2013.

Regional/Local Regulations

Renewable Energy Facilitation Plan: A Strategy for EBMUD to Promote Renewable Energy

In 2002, EBMUD commissioned a plan for the utility's role in renewable energy use. A Technical Advisory Committee composed of experts in the renewable energy field reviewed possible strategies and a market survey gauged customer opinions. Key findings and recommendations are as follows:

- A majority of EBMUD customers support the utility establishing renewable energy policies and programs;
- EBMUD can encourage renewable energy use by providing information about commercially available renewable energy services to its water and wastewater customers through its regular communication channels; and
- EBMUD can influence the future purchasing decisions of its customers by increasing the use of renewable energy in its own operations and reporting on the benefits of those investments.

EBMUD Policy 83

On April 14, 1998, the District's Board of Directors adopted Policy 83 to explore opportunities created by the deregulation of energy, telecommunications, and other public utilities. Policy 83 provides a framework that allows the District to explore options for providing a broader range of services under its authority in the Municipal Utility District (MUD) Act. An important part of the policy framework in Policy 83 is that any additional EBMUD services cannot negatively affect existing water and wastewater customers. The District's mission is to manage the natural resources entrusted it, provide water and wastewater services for the people in the EBMUD service area, and protect the environment for future generations. The District's Policy 83 encourages evaluation and consideration of opportunities to enhance the District's mission, so long as such opportunities do not result in a detriment to existing customers or a depletion of staff resources.

EBMUD Fire Management Plan

EBMUD's Fire Management Plan (October 2000) is to guide the implementation of fire protection and preparedness activities that meet key watershed management objectives in the EBMUD service area. The Fire Management Plan provides a brief history of fire management in the East Bay; describes recent planning and management efforts to enable more proactive fire management practices; and presents fire assessment, fire reduction, and fire management implementation strategies and tactics.

County and City General Plans

Relevant goals and policies from city and county general plans are summarized in Appendix B.

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4.2.L Environmental Justice

The concept of environmental justice embraces the principles of fair treatment of all people regardless of race, color, nation of origin, or income. *Environmental justice communities* are commonly identified as those where residents are: (1) predominantly minorities or low-income; (2) excluded from the environmental policy setting or decision-making process; (3) subject to a disproportionate impact from one or more environmental hazards; and (4) subject to disparate implementation of environmental regulations, requirements, practices and activities. Environmental justice efforts attempt to address the inequities of environmental protection within these communities. Legal authorities to support these efforts include both statutory and common-law protections. Both the Federal government and the State of California have taken formal steps in recent years to address this issue.

An *Environmental Justice Study Area* (EJSA) is a minority or low-income community that may bear a disproportionate share of the negative environmental consequences resulting from industrial, municipal, and commercial operations or the execution of Federal, State, local, and tribal programs and policies. For the purposes of this PEIR, an EJSA area is defined as an area where either the minority and low-income population exceeds 50 percent or where the percentages of these communities exceed those of the affected County.

According to Federal government guidelines, a *minority person* is defined as an individual of Black (not of Hispanic origin), Hispanic, Asian, Native American, or Other origins. The Federal government further considers a *minority population* to be present if the minority population percentage of the affected area is greater than the minority population percentage in the general population or other appropriate unit of geographic analysis (census tracts are generally considered appropriate). Federal guidelines stipulate that minority population should be identified where either (a) the minority population of the affected area exceeds fifty percent, or (b) the minority population percentage of the affected area is measurably greater than the minority population percentage in the general population or other appropriate unit of geographic analysis.

The Federal Department of Housing and Urban Development (HUD) defines *low-income* by comparing annual income for various sized households to an area's median income. For California, the three-year average median household income for the Years 2004-2006 was $53,770 (US Census Bureau 2007). For poverty categories, HUD issues income guidelines to define *extremely low-income* households (those with 30 percent or less of an area's median income), *very low-income* households (those with 50 percent or less of the area median income), and *low-income* households (those with 80 percent or less of the area median income). For California, a household income of $43,016 is defined as "low-income" (see Table 4.2.L-1).

Table 4.2.L-1: Three-Year-Average Median Household Income in California: 2004-2006

MEDIAN INCOME	30% MEDIAN	50% MEDIAN	80% MEDIAN
$53,770	$16,131	$26,885	$43,016
Source: U.S. Census Bureau 2007, Population Survey			

A *low-income population* refers to any readily identifiable group of low-income persons who live in geographic proximity and, if circumstances warrant, geographically dispersed/ transient persons (such as migrant workers or Native Americans) who would be similarly affected by the WSMP 2040 Preferred Portfolio.

4.2.L.1 Regional Setting

EBMUD Service Area

The EBMUD service area, shown in Figure 2-1 in Chapter 2, Background, includes 20 incorporated cities and 15 unincorporated communities in Alameda and Contra Costa counties. The 2004 update of the 2000 U.S. Census reports median household incomes for Alameda and Contra Costa counties as $57,649 and $65,459, respectively. The 2006 American Community Survey (ACS) estimates the median household incomes for Alameda County as $64,424 and Contra Costa County as $74,241 (in 2006 inflation-adjusted dollars) (Tables 4.2.L-2 and 4.2.L-3).

Table 4.2.L-2: Household Income in Alameda County

INCOME ($)	HOUSEHOLDS (#)	PERCENT (%)
Less than $10,000	32,296	6.2
$10,000 to $14,999	28,828	5.6
$15,000 to $24,999	41,544	8.0
$25,000 to $34,999	43,655	8.4
$35,000 to $49,999	58,082	11.2
$50,000 to $74,999	88,844	17.2
$75,000 to $99,000	66,592	12.9
$100,000 to $149,000	88,249	17.0
$150,000 to $199,999	37,851	7.3
$200,000 or more	31,300	6.0
Households	**517,241**	**100.0**
Median Household Income	$64,424	
Source: U.S Census Bureau 2007, Population Survey		

According to Federal guidelines, the low income level (80 percent of median) for Alameda County is $51,539. Therefore, about 39 percent of all Alameda County

Table 4.2.L-3: Household Income in Contra Costa County

INCOME ($)	HOUSEHOLDS (#)	PERCENT (%)
Less than $10,000	15,566	4.3
$10,000 to $14,999	10,630	3.0
$15,000 to $24,999	26,359	7.3
$25,000 to $34,999	26,922	7.5
$35,000 to $49,999	39,430	11.0
$50,000 to $74,999	62,236	17.3
$75,000 to $99,000	52,467	14.6
$100,000 to $149,000	63,100	17.6
$150,000 to $199,999	28,688	8.0
$200,000 or more	33,973	9.5
Households	**359,371**	**100.0**
Median Household Income	$74,241	
Source: U.S Census Bureau 2007, Population Survey		

households are considered by Federal guidelines as "low-income." The low income level for Contra Costa County is $59,393; about 33 percent of all Contra Costa County households are considered by Federal guidelines as "low-income."

The 2006 demographic estimates within the EBMUD service area, by race, are summarized in Table 4.2.L-4.

Table 4.2.L-4: Population and Percentage Racial Composition in the EBMUD Service Area

COUNTY (POPULATION)	WHITE	BLACK OR AFRICAN AMERICAN	AMERICAN INDIAN	ASIAN	SOME OTHER RACE	HISPANIC OR LATINO (OF ANY RACE)	TOTAL MINORITY
Alameda (1,457,426)	666,814 (45.8%)	189,538 (13.0%)	8,446 (0.6%)	357,939 (24.6%)	181,563 (12.5%)	312,426 (21.4%)	790,612 (54.2%)
Contra Costa (1,024,319)	611,204 (59.7%)	94,010 (9.2%)	4,428 (0.4%)	136,508 (13.3%)	137,683 (13.4%)	224,134 (21.9%)	413,115 (40.3%)
Source: U.S. Census Bureau 2006, American Community Survey							

Central Valley

For the purposes of the WSMP 2040 Preferred Portfolio, the Central Valley includes the counties of Glenn, Colusa, Sacramento, San Joaquin, and portions of Yuba, Amador, and Calaveras; portions of latter counties are considered part of the upcountry area. Central Valley County household income and racial composition are summarized in Tables 4.2.L-5 and 4.2.L-6).

Table 4.2.L-5: Central Valley and Upcountry Household Income Profiles

CENTRAL VALLEY COUNTY	HOUSEHOLDS (#)	MEDIAN HOUSEHOLD INCOME ($)	FEDERALLY-DEFINED LOW INCOME LEVEL ($)	PERCENT OF LOW INCOME HOUSEHOLDS (%)
Glenn	9,197	$32,107 (b)	$25,686	38%
Colusa	6,081	$35,062 (b)	$28,050	50%
Sacramento	500,292	$53,930 (a)	$43, 144	46%
San Joaquin	210,462	$51,951 (a)	$42,561	47%
Yuba	24,256	$38,006 (a)	$30,405	47%
Amador	12,741	$42,280 (b)	$33,824	40%
Calaveras	16,449	$41,022 (b)	$32,818	42%
Alpine	492	$41,875 (b)	$33,500	39%
Plumas	9,006	$36,351 (b)	$29,091	36%

Source: (a) U.S. Census Bureau 2006, American Community Survey; (b) U.S. Census Bureau 2000, American Community Survey

Table 4.2.L-6: Population and Percentage Racial Composition in the Central Valley and Upcountry

COUNTY (POPULATION)	WHITE	BLACK OR AFRICAN AMERICAN	AMERICAN INDIAN	ASIAN	SOME OTHER RACE	HISPANIC OR LATINO (OF ANY RACE)	TOTAL MINORITY
Glenn (26,453)	18,988 (71.8%)	155 (0.6%)	552 (2.1%)	893 (3.4%)	4,845 (18.2%)	7,840 (29.6%)	7,465 (28.2%)
Colusa (18,804)	12,090 (64.3%)	103 (0.5%)	439 (2.3%)	228 (1.2%)	5,091 (27.1%)	8,752 (46.5%)	6,714 (35.7%)
Sacramento (1,374,724)	836,709 (60.9%)	139,081 (10.1%)	13,620 (1.0%)	188,021 (13.7%)	139,186 (10.1%)	265,550 (19.3%)	53,801 (39.1%)
San Joaquin (673,170)	417,339 (62.0%)	47,524 (7.1%)	5,919 (0.9%)	95,344 (14.2%)	77,767 (11.1%)	240,636 (35.7%)	255,831 (38.0%)
Yuba (70,396)	48,043 (68.2%)	1,490 (2.1%)	1,149 (1.6%)	4,971 (7.1%)	9,068 (12.9%)	15,418 (21.9%)	22,353 (31.8%)
Amador (35,100)	30,113 (85.8%)	1,359 (3.9%)	626 (1.8%)	350 (1.0%)	1,805 (5.1%)	3,126 (8.9%)	4,987 (14.2%)
Calaveras (40,554)	36,982 (91.2%)	304 (0.7%)	705 (1.7%)	345 (0.9%)	877 (2.2%)	2,765 (6.8%)	3,572 (8.8%)
Alpine (1,208)	890 (73.7%)	7 (0.6%)	228 (18.9%)	4 (0.3%)	18 (1.5%)	94 (7.8%)	318 (26.3%)
Plumas (20,824)	19,113 (91.8%)	130 (0.6%)	530 (2.5%)	110 (0.5%)	392 (1.9%)	1,177 (5.7%)	1,711 (8.2%)

Source: 2000 U.S. Census and 2006, American Community Survey

Minority and low income populations are distributed throughout the Central Valley, although these communities are concentrated near metropolitan areas, such as the City of Sacramento and Stockton, but also elsewhere in the areas of Lodi and Manteca. The Hispanic communities are the largest and fastest-growing minority populations in the region.

Upcountry

The Upcountry area consists of the foothills and highlands of the Sierra Nevada. The counties within this region include Plumas, Alpine and portions of Yuba, Amador, and Calaveras. Tables 4.2.L-5 and 4.2.L-6 summarize the U.S. Census data on the percentage of low-income households and racial composition of these counties. The minority and low income communities in the Upcountry area are relatively isolated and small, distributed throughout the rural and agricultural areas that characterize these counties.

4.2.L.2 Setting for Preferred Portfolio Components

Rationing and Conservation

Rationing and conservation would be implemented within the EBMUD service area. The composition of the low-income/minority population characteristics that define a potential EJSA in the EBMUD service area are described above.

Recycled Water

The precise locations of the recycled water projects have not yet been determined but would most likely be located within residential, commercial, industrial, and/or open space portions of the service area. The composition of the low-income/minority population characteristics that define the potential EJSA in the EBMUD service area are described above.

Northern California Water Transfers

The precise sources of water transfers have not yet been identified, but for the purposes of this PEIR it is assumed they would occur in the Sacramento Valley. The characteristic economic and racial composition of the communities that would define the potential EJSAs within these counties is described above.

Bayside Groundwater Project Phase 2

The proposed Bayside Groundwater Project Phase 2 facilities (e.g., wells, treatment plants, pipelines) would overlie the thicker parts of the aquifer in the South East Bay Plain Groundwater Basin in Alameda County. The composition of the low-income/minority population characteristics that define the potential EJSA in the Alameda County portion of the EBMUD service area are described above.

The 2000 Census reports median household income for the census tracts encompassing the potential Bayside Groundwater Project Phase 2 area ranging from $25,903 to $64,016 (Table 4.2.L-7). One of three sites where well facilities would be constructed is the Bayside Groundwater Project Phase 1 site (Census Tract 4359) (see Figure 3-7 in Chapter 3). Based on Federal guidelines, between 34 percent and 44 percent of the households within these Census Tracts would be characterized as "low-income" (household income level of $20,722 to $51,213). This compares to the 45 percent estimate of "low-income" households in all of Alameda County.

Table 4.2.L-7: Household Income Profiles in the Potential Area of the Bayside Groundwater Project Phase 2 (2000 Census)

ALAMEDA COUNTY CENSUS TRACT	HOUSEHOLDS	MEDIAN HOUSEHOLD INCOME	FEDERALLY-DEFINED LOW INCOME LEVEL	PERCENT OF LOW INCOME HOUSEHOLDS
4073	712	$29,470	$23,576	41%
4088	1,481	$25,903	$20,722	44%
4090	971	$29,904	$23,923	41%
4091	682	$29,597	$23,678	43%
4092	781	$40,104	$32,083	39%
4324	1,818	$50,729	$40,583	34%
4325	2,858	$50,804	$40,643	34%
4332	2,708	$50,304	$40,243	38%
4333	2,194	$53,200	$42,560	36%
4334	2,255	$64,016	$51,213	36%
4335	1,416	$61,154	$48,923	39%
4336	2,153	$52,555	$42,044	44%
4358	1,637	$56,662	$45,330	34%
4359[a]	1,686	$58,774	$47,020	37%
4360	1,441	$58,719	$46,975	39%
4361	1,734	$47,667	$38,134	44%
Total County	**523,787**	**$55,946**	**$44,757**	**45%**

[a] The Bayside Groundwater Project Phase 1 site is within this census tract.
Source: U.S. Census Bureau 2008, 2000 Census

Table 4.2.L-8 provides a summary of Census Tract racial composition within the potential area of the Bayside Groundwater Project Phase 2 site. Racial minorities range between a low of approximately 29 percent to a high of approximately 86 percent of the total population within the project area Census Tracts. The minority population range of 29 to

86 percent compares to the 51 percent estimate of racial minorities (non-white) in all of Alameda County.

Table 4.2.L-8: Population and Racial Composition in the Vicinity of the Bayside Groundwater Project Phase 2 Component

CENSUS TRACT (POPULATION)	WHITE	BLACK OR AFRICAN AMERICAN	AMERICAN INDIAN	ASIAN	SOME OTHER RACE	HISPANIC OR LATINO (OF ANY RACE)	TOTAL MINORITY
4073 (2,516)	812 (32%)	558 (22%)	39 (2%)	176 (7%)	801 (32%)	1,323 (53%)	1,704 (68%)
4088 (5,174)	728 (14%)	2,378 (46%)	20 (0.4%)	582 (11%)	1,255 (24%)	1,981 (38%)	4,446 (86%)
4090 (3,327)	487 (15%)	2,077 (62%)	26 (0.8%)	65 (2%)	525 (16%)	968 (29%)	2,840 (85%)
4091 (2,163)	308 (14%)	1,489 (69%)	12 (0.6%)	38 (2%)	288 (13%)	607 (28%)	1,855 (86%)
4092 (3,111)	445 (14%)	1,789 (57%)	16 (0.5%)	125 (4%)	618 (20%)	1,057 (34%)	2,666 (86%)
4324 (5,411)	2,709 (50%)	394 (7%)	55 (1%)	1,108 (20%)	822 (15%)	1,605 (30%)	2,702 (50%)
4325 (8,676)	3,415 (40%)	750 (9%)	97 (1%)	2,652 (31%)	1,186 (14%)	2,254 (26%)	5,261 (61%)
4332 (6,562)	2,997 (46%)	757 (12%)	33 (0.5%)	1,880 (29%)	498 (8%)	1,103 (17%)	3,565 (54%)
4333 (6,635)	3,695 (56%)	188 (3%)	63 (1%)	1,774 (27%)	611 (9%)	1,372 (21%)	2,940 (44%)
4334 (6,014)	2,284 (38%)	412 (7%)	23 (0.4%)	2,832 (47%)	200 (3%)	548 (9%)	3,730 (62%)
4335 (4,092)	2,425 (59%)	100 (2%)	32 (0.8%)	1,019 (25%)	335 (8%)	707 (17%)	1,667 (41%)
4336 (5,901)	3,045 (52%)	462 (8%)	49 (0.8%)	1,556 (26%)	427 (7%)	976 (16%)	2,856 (48%)
4358 (5,034)	3,031 (60%)	151 (3%)	46 (0.9%)	982 (19%)	549 (11%)	1,259 (25%)	2,003 (40%)
4359 (4,817)	3,041 (63%)	92 (2%)	35 (0.7%)	954 (20%)	358 (7%)	848 (18%)	1,776 (37%)
4360 (4,252)	3,024 (71%)	67 (2%)	38 (0.9%)	402 (9%)	469 (11%)	1,072 (25%)	1,228 (29%)
4361 (4,873)	2,934 (60%)	194 (4%)	44 (0.9%)	752 (15%)	645 (13%)	1,349 (28%)	1,939 (40%)
Total County (1,443,741)	**704,334 (49%)**	**215,598 (15%)**	**9,146 (0.6%)**	**295,218 (20%)**	**138,221 (9%)**	**273,910 (19%)**	**739,407 (51%)**
Source: U.S. Census Bureau 2008, 2000 Census							

Sacramento Basin Groundwater Banking / Exchange

The precise locations of the proposed facilities (e.g., recharge ponds, wells, pipelines, pumps, etc.) needed for this component have not yet been identified but would be located within Sacramento County. The characteristic economic and racial composition of the Sacramento County communities that would define a potential EJSA is described above.

Regional Desalination

As stated in Section 3.2.5, while three potential locations are being considered for the Regional Desalination component, this PEIR assumes that it would most likely be located along the southern shoreline of Suisun Bay, in east Contra Costa County (Figure 3-8 in Chapter 3). The precise location has not been identified. The characteristic economic and racial composition of Contra Costa County along the southern shoreline of Suisun Bay is summarized in Table 4.2.L-9 and Table 4.2.L-10 (based on the 2000 U.S. Census data).

Table 4.2.L-9: Household Income Profiles in the Vicinity of the Regional Desalination Component

CONTRA COSTA COUNTY CENSUS TRACT	HOUSEHOLDS	MEDIAN HOUSEHOLD INCOME	FEDERALLY-DEFINED LOW INCOME LEVEL	PERCENT OF LOW INCOME HOUSEHOLDS
3141.03	1,591	$48,014	$38,411	41%
3142	1,749	$45,067	$36,054	44%
3150	1,195	$73,691	$58,953	30%
3200.01	1,143	$48,899	$39,119	41%
Total County	344,422	$63,675	50,940	29%
Source: U.S. Census Bureau 2008, 2000 Census				

Enlarge Pardee Reservoir

Pardee Reservoir is in Amador and Calaveras counties, 38 miles northeast of Stockton and approximately 12 miles southwest of the Town of Jackson (see Figures 3-9 and 3-10 in Chapter 3). The majority of the lands immediately adjacent to Pardee Reservoir and the Mokelumne River are owned by EBMUD. Other entities owning land around the reservoir include the Bureau of Land Management (BLM), Jackson Valley Irrigation District (JVID), PG&E, and private landowners. The characteristic economic and racial composition of the area related to this component that would define a potential EJSA is contained within the U.S. Census 2000, Tracts 5 and 2.10 for Amador and Calaveras counties, as summarized below in Tables 4.2.L-11 and 4.2.L-12.

Table 4.2.L-10: Population and Percentage Racial Composition in the Vicinity of the Regional Desalination Component

CENSUS TRACT (POPULATION)	WHITE	BLACK OR AFRICAN AMERICAN	AMERICAN INDIAN	ASIAN	SOME OTHER RACE	HISPANIC OR LATINO (OF ANY RACE)	TOTAL MINORITY
3141.03 (5,468)	1,972 (36.1%)	1,099 (20.1%)	62 (1.1%)	767 (14.0%)	1,115 (20.4%)	2,071 (37.9%)	3,496 (63.9%)
3142 (6,270)	3,214 (51.3%)	295 (4.7%)	63 (1.0%)	476 (7.6%)	1,710 (27.3%)	3,017 (48.1%)	3,056 (48.7%)
3150 (3,596)	2,196 (61.1%)	250 (7.0%)	13 (0.4%)	642 (17.9%)	265 (7.4%)	631 (17.5%)	1,400 (38.9%)
3200.01 (3,249)	2,465 (76.2%)	59 (1.8%)	54 (1.7%)	76 (2.3%)	370 (11.4%)	786 (24.2%)	784 (23.8%)
Total County (948,816)	**619,576 (65.3%)**	**87,444 (9.2%)**	**5,501 (0.6%)**	**103,198 (10.9%)**	**80,912 (8.5%)**	**168,059 (17.7%)**	**329,240 (34.7%)**
Source: U.S. Census Bureau 2008, 2000 Census							

Table 4.2.L-11: Household Income Profiles in the Vicinity of Pardee Reservoir

CENSUS TRACT (COUNTY)	HOUSEHOLDS	MEDIAN HOUSEHOLD INCOME	FEDERALLY-DEFINED LOW INCOME LEVEL	PERCENT OF LOW INCOME HOUSEHOLDS
Census Tract 5 (Amador County)	1,178	$45,184	$36,147	44.5%
Total Amador County	**12,741**	**$42,280**	**$33,824**	**40%**
Census Tract 2.10 (Calaveras County)	2,783	$47,325	$37,860	40.1%
Total Calaveras County	**16,449**	**$41,022**	**$32,818**	**42%**
Source: U.S. Census Bureau 2008, Census 2000				

Enlarge Lower Bear Reservoir

Lower Bear Reservoir is in the Mokelumne River Watershed in Amador County, approximately 15 miles east of the Town of Pioneer on SR 88 (see Figure 3-11 in Chapter 3). The existing dam and reservoir are owned and operated by Pacific Gas and Electric Company (PG&E). Lower Bear Reservoir is surrounded by El Dorado National Forest, as well as PG&E lands. The U.S. Forest Service (USFS) has grazing lands south of Lower Bear Reservoir. The land surrounding the reservoir is also under timber management by PG&E and USFS. The closest sensitive receptors to the proposed reservoir expansion site are the recreation sites adjacent to the reservoir.

Table 4.2.L-12: Population and Percentage Racial Composition in the Vicinity of Pardee Reservoir

COUNTY (POPULATION)	WHITE	BLACK OR AFRICAN AMERICAN	AMERICAN INDIAN	ASIAN	SOME OTHER RACE	HISPANIC OR LATINO (OF ANY RACE)	TOTAL MINORITY
Census Tract 5 (2,856)	2,616 (91.6%)	14 (0.5%)	53 (1.8%)	8 (0.3%)	31 (1.1%)	157 (5.5%)	240 (8.4%)
Total Amador County (35,100)	**30,113 (85.8%)**	**1,359 (3.9%)**	**626 (1.8%)**	**350 (1.0%)**	**1,805 (5.1%)**	**3,126 (8.9%)**	**4,987 (14.2%)**
Census Tract 2.10 (7,542)	6,638 (88.0%)	44 (0.6%)	138 (1.8%)	86 (1.1%)	286 (3.8%)	736 (9.8%)	904 (12.0%)
Total Calaveras County (40,554)	**36,982 (91.2%)**	**304 (0.7%)**	**705 (1.7%)**	**345 (0.9%)**	**877 (2.2%)**	**2,765 (6.8%)**	**3,572 (8.8%)**
Source: U.S. Census Bureau 2008, Census 2000							

The characteristic economic and racial composition in the vicinity of Lower Bear Reservoir that would define a potential EJSA is contained within the U.S. Census 2000, Tract 1 for Amador County, as summarized below in Tables 4.2.L-13 and 4.2.L-14.

Table 4.2.L-13: Household Income Profiles in the Vicinity of Lower Bear Reservoir

CENSUS TRACT (COUNTY)	HOUSEHOLDS	MEDIAN HOUSEHOLD INCOME	FEDERALLY-DEFINED LOW INCOME LEVEL	PERCENT OF LOW INCOME HOUSEHOLDS
Census Tract 1 (Amador County)	2,663	$39,417	$31,534	36%
Total Amador County	**12,741**	**$42,280**	**$33,824**	**40%**
Source: U.S. Census Bureau 2008, Census 2000				

IRCUP / San Joaquin Groundwater Banking / Exchange

The precise locations of the proposed facilities (e.g., pipeline, intertie, pump station) needed for this component have not yet been identified but would be located within the counties of Alpine, Amador, Calaveras, and San Joaquin (see Figure 3-12 in Chapter 3). The previous tables (Tables 4.2.L-5 and 4.2.L-6) summarize the U.S. Census 2000 data on the percentage of low-income households and racial composition of Alpine, Amador, Calaveras, and San Joaquin counties.

Table 4.2.L-14: Population and Percentage Racial Composition in the Vicinity of Lower Bear Reservoir

COUNTY (POPULATION)	WHITE	BLACK OR AFRICAN AMERICAN	AMERICAN INDIAN	ASIAN	SOME OTHER RACE	HISPANIC OR LATINO (OF ANY RACE)	TOTAL MINORITY
Census Tract 1 (5,880)	5,703 (97%)	0 (0%)	19 (0.3%)	13 (0.2%)	29 (0.5%)	307 (5%)	177 (3%)
Total Amador County (35,100)	**30,113 (85.8%)**	**1,359 (3.9%)**	**626 (1.8%)**	**350 (1.0%)**	**1,805 (5.1%)**	**3,126 (8.9%)**	**4,987 (14.2%)**

Source: U.S. Census Bureau 2008, Census 2000

4.2.L.3 Regulatory Setting

Federal Regulations

Executive Order 12898

Executive Order 12898, "Federal Actions to Address Environmental Justice in Minority and Low-Income Populations", requires that each Federal agency, to the greatest extent practical and permitted by law, shall "make achieving environmental justice part of its mission by identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations in the United States and its territories and possessions..." Thus, Federal agencies are to ensure that their actions do not result directly or indirectly in discrimination on the basis of color, race, or national origin, and that potential impacts on minority or low-income populations be taken into account during preparation of environmental and socioeconomic analyses of projects or programs that are proposed, funded, or licensed by Federal agencies.

State Regulations

California Government Code Section 65040.12

California Government Code, Section 65040.12(e), defines environmental justice as "the fair treatment of people of all races, cultures, and incomes with respect to the development, adoption, implementation and enforcement of environmental laws, regulations, and policies". California Government Code, Section 65040.12(a) designates the Governor's Office of Planning and Research (OPR) as the coordinating agency in State government for environmental justice programs, and requires OPR to develop guidelines for incorporating environmental justice into general plans.

CEQA Guidelines Section 15131

Section 15131 of the CEQA Guidelines state that economic or social information may be included in an Environmental Impact Report (EIR), but those economic or social effects shall not be considered significant effects on the environment. In an EIR, the lead agency can trace the chain of cause and effect from the proposed decision on the project through anticipated economic or social changes resulting from the project that, in turn, lead to physical changes in the environment. Identified potential economic/social changes also can be used to determine the significance of the physical changes on the environment.

Regional /Local Regulations

Relevant goals and policies from local general plans are summarized in Appendix B.

5 IMPACTS AND MITIGATION MEASURES

5. Impacts and Mitigation Measures

Chapter 5 presents the significance criteria used to evaluate the physical changes in the environmental setting (presented in Chapter 4 of this PEIR) to determine potential program-level impacts, discusses anticipated environmental impacts potentially resulting from the WSMP 2040 Preferred Portfolio, and identifies feasible mitigation measures for potentially significant impacts.

5.1 Organization of the Impact Analysis

5.1.1 Significance Criteria

As defined by CEQA Guidelines 15064.7(a), a threshold of significance is an identifiable quantitative, qualitative or performance standard for a particular environmental effect. EBMUD used significance criteria to determine the potential impacts from implementation of the WSMP 2040 Preferred Portfolio. The significance criteria are based primarily on Appendix G of the CEQA Guidelines.

The significance criteria presented in this chapter provide a rational basis for determining whether WSMP 2040 Preferred Portfolio would have significant environmental impacts. They are presented prior to the evaluation of potential effects for each environmental topic.

5.1.2 Characterization of Impact Significance

CEQA defines significance as a substantial or potentially substantial adverse change to the environment (Section 15382). The determination of significance by the lead agency is based on threshold criteria specific to each resource category. In CEQA, a significance threshold identifies the point at which the severity of an impact changes from less than significant to significant, with or without mitigation. The following terms are used in this PEIR to characterize impacts:

- **No Impact:** No adverse environmental impacts would occur;
- **Less than Significant:** Environmental impacts would not exceed the significance criteria;
- **Less than Significant with Mitigation:** Adverse environmental impacts would potentially occur (impacts would exceed the significance criteria or threshold defined for each environmental issue), but mitigation measures would be implemented to reduce adverse effects to less-than-significant levels;
- **Potentially Significant:** Adverse environmental impacts would potentially occur, and no mitigation measures are identified to reduce impacts to levels below the significance criteria; and

- **Beneficial**: No adverse environmental effects would occur, and one or more environmental baseline conditions would improve as a result of the proposed action.[1]

CEQA Guidelines Section 15126.4[a] states that, "an EIR shall describe feasible measures which could minimize significant adverse impacts…and [that are] fully enforceable through permit conditions, agreements, or other legally binding instruments." A mitigation measure is intended to do one or more of the following:

- Avoid the impact altogether by not taking a certain action or parts of an action;
- Minimize impacts by limiting the degree or magnitude of the action and its implementation;
- Rectify the impact by repairing, rehabilitating, or restoring the affected environment;
- Reduce or eliminate the impact over time through preservation and maintenance operations during the life of the action; or
- Compensate for the impact by replacing or providing substitute resources or environments.

Potentially significant impacts that cannot be mitigated to less-than-significant levels may be unavoidable.

Potentially Significant Impacts Identified in this PEIR

The program-level evaluation presented in Chapter 5 characterizes the impacts of the Preferred Portfolio. In most instances, impacts are described qualitatively, not quantitatively, due to the lack of project description details (e.g., locations of components, project sequencing, design drawings and construction methods). This approach is consistent with program-level CEQA evaluation.

Many of the impacts identified in this PEIR are conservatively characterized as potentially significant because detailed information concerning the Preferred Portfolio components was not available at the time the PEIR was prepared. Many Preferred Portfolio components would need more detailed project-level CEQA analysis when those components are proposed for implementation. It is possible that the project-level impact analyses will demonstrate that the potentially significant impacts identified in the PEIR would be less-than-significant, or could be mitigated to less-than-significant levels through siting and/or design modifications.

[1] CEQA does not require the identification of beneficial effects.

Presentation of Significance Criteria and Potential Impacts and Mitigation Measures

The potential impacts and mitigation measures are presented by environmental topic in the following order:

A. Hydrology, Groundwater, and Water Quality

B. Geology, Soils, and Seismicity

C. Biological Resources

D. Land Use and Recreation

E. Transportation

F. Air Quality

G. Noise

H. Cultural Resources

I. Visual Resources

J. Hazards

K. Public Services, Utilities, and Energy

L. Environmental Justice

Certain topics have been eliminated from further analysis in this PEIR because EBMUD, as lead agency, determined that the Preferred Portfolio would not result in adverse impacts for a particular environmental topic. For example the Rationing and Conservation components would not result in hydrology, groundwater and water quality impacts. Where effects not found to be significant occur, they are identified immediately following the presentation of significance criteria for a particular resource topic. A summary of all effects not found to be significant is included in Chapter 9, to fulfill the requirements of CEQA Guidelines Section 15128.

Impact Discussion

Program-level impacts are presented as Impact 5.2.Y-Z, where Y is the subsection of the environmental topic (e.g., A. Hydrology), and Z is the impact number in that subsection. This method of organization is intended to help readers quickly identify where they are in the evaluation of impacts. Mitigation measures to reduce potential effects are numbered in a similar manner.

For each environmental impact, a general discussion of the potential impacts that are applicable to some or all of the Preferred Portfolio components is presented first. Where appropriate, the general impact discussion is followed by a discussion of distinctions that apply to certain component(s).

5.1.3 Assumptions for Impact Analysis

Construction Assumptions

The components evaluated in this PEIR have not been developed sufficiently to identify specific construction scenarios that would be implemented. As such, some basic assumptions for construction have been made for the purposes of this PEIR, to assist in the evaluation of program-level environmental impacts.

In general, most components would require the construction of above-ground structures and underground pipelines. Different construction techniques may be required for certain components that would involve the enlargement of dams and construction of recharge ponds. Construction methods are qualitatively described below.

Typical equipment that would be used for construction include excavators, dozers, backhoes, dump trucks, concrete trucks, flatbed trucks, front-end loaders, cranes, compactors, dewatering pumps, vacuum trucks, fork lifts, water trucks, street sweepers, welding machines, jackhammers, concrete saws, generators, ventilating blowers and trenchers, air compressors, and various air and electric-powered hand tools. For all construction activities, dewatering may be necessary if excavation activities occur below the water table.

Staging areas would be needed to accommodate storage of equipment and stockpiling of material. They may be accommodated on-site at existing treatment facilities or off-site, depending on space availability. Haul routes have not yet been identified, and would be selected based on accesses to highways and the presence of sensitive receptors.

Construction schedules have not been determined. Construction activities typically occur during weekday hours, although the exact timing would be based on affected jurisdictions' allowable construction hours identified in City/County noise ordinances or codes. The construction durations would vary by component, ranging from months to years, and may be seasonal if construction occurs within sensitive areas (e.g., waterways, areas of protected plant and wildlife species). The number of construction crews needed for each project and the construction schedule would vary depending on the complexity of the selected project and cannot be determined at this time.

Structures

Where structures would be required (e.g., recycled water projects, regional desalination, groundwater / banking exchange components, etc.), the construction steps typically include site preparation (e.g., clearing of vegetation, etc), excavation for structure foundations (depth dependent on the facility dimensions), installation of structure and other underground components (conduits, pipelines, etc.), placement of fill, and surface restoration (e.g., site grading and cleanup).

Pipelines

Where pipelines would be required, they would typically be installed by the open trench construction technique, where a trench is excavated prior to installation of the pipeline segment. Trench dimensions would vary depending on the size of the installed pipes. Construction activities would likely occur within the trench, as well as a larger easement that includes additional space for truck and equipment access along the trench. An alternative construction method would be used for sensitive crossings (e.g., busy intersections, railroads, etc.). Pipeline installation would likely use jack-and-bore methods, which usually employ a horizontal boring machine or auger that advances the tunnel bore. For this type of installation, carrier pipe is typically installed inside a casing pipe. Jacking methods involve installing a pipeline by pushing pipes through the ground with large hydraulic jacks situated within a jacking pit located at one end of the pipeline alignment.

Recharge Pond Construction

Construction of a recharge pond (under the Sacramento Basin Groundwater Banking / Exchange component) would require excavation of a shallow hole, and benching and compacting of the sides to create a basin. The bottom soil would be removed or disked to promote percolation.

Reservoir Enlargement

The primary construction activities for the Enlarge Lower Bear and Pardee Reservoir components would be the excavation of dam foundations and spillways; transportation of fill materials from borrow areas on the project sites and from off-site sources; transportation of unusable soil and rock to disposal sites; construction of dam embankments; upgrade of intake structures and waterways, and relocation of existing recreation facilities. Lands where inundation would occur would be cleared of all vegetation, debris, and other materials that may conflict with reservoir operations.

Operations Assumptions

Some basic assumptions for operations have been made for purposes of the program-level impact evaluation presented in this PEIR.

Recycled Water

Operation of recycled water facilities requires treating wastewater to tertiary standards, consistent with CCR Title 22 requirements for unrestricted reuse. Once treated, the water is distributed via dedicated pipelines for recycled water only. Recipients of recycled water typically include refineries, golf courses, cemeteries and municipal landscaping.

Northern California Water Transfers

New facilities and/or changes in operations may be required to implement water transfers, as described in Section 3.2.5. EBMUD treatment plants would be used to treat water to District standards.

Bayside Groundwater Project Phase 2

Project facilities would be designed to inject treated water into the aquifer during years when surplus water is available, and to recover stored groundwater during a drought.

5.2.A Hydrology, Groundwater, and Water Quality

5.2.A.1 Significance Criteria

In accordance with Appendix G of the CEQA Guidelines, a significant impact on hydrology, groundwater, and water quality would occur if the WSMP 2040 Preferred Portfolio would:

- Violate any water quality standards or waste discharge requirements;
- Substantially deplete groundwater supplies or interfere substantially with groundwater recharge such that there would be a net deficit in aquifer volume or a lowering of the local groundwater table level (e.g., the production rate of pre-existing nearby wells would drop to a level which would not support existing land uses or planned uses for which permits have been granted);
- Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, in a manner which would result in substantial erosion or siltation on- or off-site;
- Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, or substantially increase the rate or amount of surface runoff in a manner which would result in flooding on- or off-site;
- Create or contribute runoff water which would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff;
- Degrade substantially water quality;
- Place housing within a 100-year flood hazard area as mapped on a Federal Flood Hazard Boundary or Flood Insurance Rate Map or other flood hazard delineation map;
- Place within a 100-year flood hazard area structures which would impede or redirect flood flows;
- Expose people or structures to a significant risk of loss, injury or death involving flooding, including flooding as a result of the failure of a levee or dam; or
- Cause inundation by seiche, tsunami, or mudflow.

5.2.A.2 Issues Dismissed from Further Analysis

The WSMP 2040 Preferred Portfolio would not place housing within any defined flood hazard area, nor would it expose people or housing structures to 100-year floods.

5.2.A.3 Components That Would Not Result in Hydrology, Groundwater, and Water Quality Impacts

Water Rationing and Conservation

The Rationing component of the WSMP Preferred Portfolio would involve voluntary or mandatory reduction of water consumption during droughts or emergencies, thereby offsetting demands on water supply sources. Consequently, rationing would not cause significant adverse environmental impacts to hydrology, groundwater, and water quality but rather would provide benefits by reducing the demand to be served. Rationing would provide EBMUD the flexibility to meet the reduced increment in demand through a combination of water sources as identified in Chapter 3, Preferred Portfolio and Alternative Portfolios.

Water conservation also provides benefits in the form of increased water use efficiency through the implementation of specific improvements or actions implemented primarily at the individual level. No large-scale infrastructure or facilities would be required for the Conservation component, and thus no resulting adverse impacts are anticipated.

5.2.A.4 Potential Hydrology, Groundwater, and Water Quality Impacts

Impact 5.2.A-1: Potential to degrade water quality from construction.

The general discussion presented below addresses the following Preferred Portfolio components:

- Recycled Water;
- Northern California Water Transfers;
- Bayside Groundwater Phase 2;
- Sacramento Basin Groundwater Banking / Exchange;
- Regional Desalination;
- Enlarge Pardee and Lower Bear Reservoirs; and
- IRCUP / San Joaquin Groundwater Banking / Exchange.

Proposed facilities developed as part of the above components would include a mix of the following: new treatment plants, wells, pump stations, recharge ponds, dam-related facilities, and pipelines. The exact combination and locations of these facilities for many of the components have not been identified, and could occur in both urban (e.g., residential, commercial, and industrial uses) and rural areas. Many surface waters exist throughout the WSMP 2040 Preferred Portfolio Study Area, ranging from small creeks, lakes, and lagoons to large rivers. Runoff from areas of construction could drain directly to one or more of these waterbodies.

In general, construction activities, including vegetation removal, grading, staging, and excavation, would expose soils to the erosive forces of wind, rain and stream flow, and may result in the transportation of sediment into local drainages, increasing turbidity and degrading water quality. In addition, fuels, solvents and/or other chemicals used in construction activities could be released into and degrade the quality of these local drainages (please refer to Impact 5.2.J-1 in Section 5.2.J, Hazards, for a discussion of impacts associated with the accidental spill of oil, grease, fuel, or other hazardous materials during construction activities).

Construction-related impacts associated with the degradation of water quality are considered ***potentially significant***. Implementation of Mitigation Measures 5.2.A-1a and 5.2.A-1b below would reduce these potential impacts to less-than-significant levels.

Discussion of Specific Components

Bayside Groundwater Project Phase 2, Sacramento Basin Groundwater Banking and Exchange, and IRCUP / San Joaquin Groundwater Banking and Exchange

Water quality impacts may result from surface run-off and/or cross-contamination of aquifer zones during well installation and development. Specifically, installation of wells on or adjacent to properties with known or unknown contamination would have the potential to affect groundwater quality of the underlying aquifer.

Construction of all municipal supply wells would be required to comply with local and California Department of Public Health (DPH) permitting requirements under the Federal Safe Drinking Water Act. These include completion of a Drinking Water Source Assessment and Protection (DWSAP) report for each proposed well site. Completion of a DWSAP report and the resulting well-head protection program for individual well sites would reduce the potential for contamination to affect drinking water supplies to acceptable levels.

Standard local and/or DPH requirements also include the establishment of sanitary seals for potable supply wells, as well as minimum horizontal and vertical separation of up to 10 feet from other conveyance structures, such as sewer lines or drainages, that could act as cross-contamination sources. Additionally, the requirements typically include a water quality monitoring program to prevent contamination of drinking water supply sources. As the locations of many of the proposed wells have not yet been determined, the impact associated with cross-contamination of aquifer zones is considered ***potentially significant.*** Implementation of Mitigation Measures 5.2.A-1a and 5.2.A-1b below would reduce this potential impact to a less-than-significant level.

Mitigation Measure 5.2.A-1a. Comply with State NPDES general construction permit.

Any project with a combined disturbance area of one acre or more must obtain a National Pollutant Discharge Elimination System (NPDES) Construction Activity Stormwater Permit. As part of the NPDES permit, a Stormwater Pollution Prevention Plan (SWPPP) must be developed.

EBMUD shall require its contractors to file a Notice of Intent with the appropriate local Regional Water Quality Control Board (RWQCB) indicating compliance with the NPDES General Permit for Discharges of Stormwater Runoff Associated with Construction Activity (General Permit) and to prepare and implement a SWPPP outlining Best Management Practices (BMPs) for construction/post-construction activities (ABAG, 1995; California Stormwater Quality Association, 2004). BMPs include measures guiding the management and operation of construction sites to control the contribution of pollutants to storm water runoff from construction areas. These measures address procedures for controlling erosion and sedimentation, and managing the construction process to control potential water pollution sources. Erosion and sedimentation control practices typically include, but are not limited to, the following:

- Restricting construction to dry-weather months;
- Installing temporary erosion control devices (e.g., silt fences, straw wattles, silt/sedimentation basins or traps, temporary revegetation) to control erosion from disturbed areas;
- Stabilizing soil;
- Replanting graded and fill areas;
- Installing runoff control devices (e.g., straw bales, silt fences, drainage swales, geofabrics, check dams, and sand bag dikes) to limit sediment in stormwater runoff;
- Performing equipment maintenance to be performed at least 100 feet from water bodies and wetlands, with measures in place to contain and control spills of petroleum products.
- Directing drainage from work sites away from water bodies or wetlands where feasible;
- Preventing erosion of uplands and sedimentation of creeks, tributaries, and ponds;
- Minimizing creek bank instability;
- Preventing flooding; and
- Restoring post-construction grades to preconstruction contours.

EBMUD shall perform routine inspections of the construction areas to verify that the BMPs specified in the SWPPP are properly implemented and maintained. EBMUD shall notify its contractors immediately if there is a noncompliance issue that will require compliance.

Mitigation Measure 5.2.A-1b: Use proper well installation methodologies.

Prior to and following any well installation activities (including borehole drilling), EBMUD and/or its contractors shall thoroughly decontaminate all drilling and well development equipment and soil/water quality sampling equipment. In situations where surface and/or shallow soil contamination is expected, conductor casing shall be used to prevent the downward migration of contaminants. EBMUD and/or its contractors shall install all wells with sanitary seals to prevent the possibility of cross-contamination via the direct introduction of contaminants.

Impact Significance After Mitigation: Less than Significant

Impact 5.2.A-2 Potential to degrade water quality from waste discharge.

The general discussion below addresses the following Preferred Portfolio components:

- Recycled Water;
- Northern California Water Transfers;
- Bayside Groundwater Phase 2;
- Sacramento Basin Groundwater Banking and Exchange;
- Regional Desalination; and
- IRCUP / San Joaquin Groundwater Banking and Exchange.

New or expanded treatment facilities associated with the above components would generate liquid wastes, such as backwash, washdown and sanitary wastes during operation. These wastes would be discharged to the local sanitary sewer system for treatment prior to discharge to the Bay or local surface water body. All wastes would be treated to comply with individual treatment plant permit limits (set by the appropriate RWQCB) prior to discharge and would not exceed any discharge limits designed to protect water quality.

Therefore, water quality impacts associated with the operation of new or expanded treatment plants would be considered *less than significant*. No mitigation is required.

Discussion of Specific Components

The following Preferred Portfolio components allow for more specific discussion and are presented below.

Regional Desalination

Operation of the proposed desalination facility would result in the production of a waste discharge with increased salt content (i.e., brine). The concentration of this brine solution has yet to be determined and would be based on the concentration of salts in the intake water; the treatment processes used, and plant capacity. The potential effects of this brine on Bay receiving waters depends on a number of environmental variables, including variations in salinity and temperature of the receiving waters, freshwater inflow and tidal and wind actions in the mixing and dispersal of the discharge. The brine discharge may exceed established water quality objectives and numerical standards identified for the receiving water body. For the purposes of this analysis, impacts on water quality would be considered ***potentially significant***. Implementation of Mitigation Measure 5.2.A-2 below would reduce these potential impacts to less-than-significant levels.

Operation of the intake screens would generate a waste stream consisting of solids and debris diverted with the intake that would require disposal in a landfill, by incineration, or as required by local authorities. However, this disposal can be done via contracts with licensed and permitted facilities and therefore presents a ***less than significant*** impact. No mitigation is required.

Enlarge Pardee and Lower Bear Reservoirs

There are no expected waste discharges that would result from reservoir enlargement. However, river water quality downstream of the enlarged reservoirs would be expected to improve following construction, primarily because the larger pools of cold water in the enlarged reservoirs would contribute to cooler water downstream in the summer and autumn months as releases from these reservoirs occur. This would be a ***beneficial*** impact of the enlarged reservoirs. No mitigation is required.

Please refer to Section 5.2.C, Biological Resources, for a discussion of potential impacts to fisheries resources.

Mitigation Measure 5.2.A-2: Conduct modeling and incorporate the results into the design for the Regional Desalination component.

This mitigation measure applies to the Regional Desalination component.

EBMUD and its partners shall conduct numerical hydrodynamic modeling to evaluate the variables affecting salinity and to provide input to a plant outfall design that minimizes impacts to receiving waters. Proper design and construction of the facility outfall will mitigate impacts from brine discharge by maximizing the rapid dispersion and mixing of saline effluent such that the changes to the salinity of waters in the outfall vicinity are minimized.

Impact Significance: Less than Significant for Recycled Water, Northern California Water Transfers, Bayside Groundwater Phase 2, Sacramento Basin Groundwater Banking / Exchange, Regional Desalination and IRCUP / San Joaquin Groundwater Banking / Exchange components

Impact Significance After Mitigation: Less than Significant for Regional Desalination component

Beneficial for the Enlarge Pardee and Lower Bear Reservoirs components

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Impact 5.2.A-3: Potential to violate water quality standards and waste discharge requirements for the land application of recycled water.

The general discussion below addresses the following Preferred Portfolio components:

- Recycled Water; and
- Sacramento Basin Groundwater Banking and Exchange.

The potential exists for projects using recycled water for landscape irrigation to violate water quality standards, either through the runoff of recycled water for irrigation to surface water bodies (as a result of over-application) or through the percolation of applied water for landscape irrigation to groundwater. It should be noted that all recycled water projects would be implemented in accordance with all applicable Federal and State requirements (please see Section 4.2.A, Hydrology, Groundwater, and Water Quality for a discussion of these regulations).

There are no Federal standards governing wastewater reclamation and reuse in the United States, although the U.S. Environmental Protection Agency (EPA) has sponsored the preparation of *Guidelines for Water Reuse* (Camp Dresser & McKee, 1992). Many states, including California, have developed wastewater reclamation regulations. In all cases, the regulations have been established with the objective of protecting public health and allowing for the safe use of recycled water. The California Department of Public Health (DPH) establishes water quality criteria, treatment process requirements, and treatment reliability criteria for reclamation operations, which are set forth in Title 22, Division 4, Chapter 3, of the *California Code of Regulations (CCR) Water Recycling Criteria.* RWQCBs are responsible for reviewing proposed recycled water projects, and for issuing waste discharge requirements and water recycling requirements through the RWQCB's permitting process. DPH has the responsibility for reviewing proposed water recycling projects, and for providing comments and/or recommendations to the appropriate RWQCB.

The existing Title 22 *Water Recycling Criteria* address treatment requirements for three main types of recycled water uses: landscape irrigation, recreational impoundments, and industrial uses. The treatment requirements are based on the expected degree of human contact with recycled water under each type of use. Treatment requirements are expressed as treatment process requirements (e.g., bio-oxidation, coagulation) as well as performance standards (e.g., disinfection standards and contaminant reduction).

The existing Title 22 standards are among the most stringent standards in the world for public health protection, and are about 100 times more stringent than comparable standards established by the World Health Organization. Since the adoption of Title 22 in 1978, the use of recycled water for non-potable (not fit to drink) uses has expanded throughout the State and is projected to continue to grow over the next several decades. Under Title 22, tertiary disinfected recycled water has previously qualified for the highest allowable uses, including landscape irrigation and use in recreational impoundments. To be used as a supply source for this designation, the recycled water shall be at all times adequately oxidized, coagulated, clarified, filtered, and disinfected water; this process requirement constitutes the most stringent treatment practicable. To be considered adequately disinfected, the median number of coliform organisms in the recycled water may not exceed a Most Probable Number (MPN) of 2.2 per 100 milliliters over a seven-day period.

DPH has also produced regulations and guidance documents for the production and use of recycled water in areas receiving water that meets Title 22 *Water Recycling Criteria*. The guidelines focus on application and management specifications for various recycled water uses, including general use requirements, landscape irrigation requirements, impoundment requirements, and agricultural reuse area guidelines (DHS, 2004). General requirements include the following:

- Preparation of an Engineer's Report on the production, distribution and use of the recycled water;
- Posting signs to inform the public in areas where recycled water is in use;
- Confining recycled water to authorized use areas;
- Use of purple recycled water distribution and transmission system piping to indicate that it contains recycled water; and
- Other requirements designed to ensure that recycled water use does not adversely affect public health.

Specific requirements established by Title 22 that are applicable to the proposed components are contained in Article 4, Section 60310 – *Use Area Requirements*.

This section restricts irrigation of disinfected tertiary recycled water within 50 feet of any domestic water supply well, and prohibits the over-application or any direct runoff of applied recycled water. EBMUD would provide additional operational guidelines and work with the end users to implement the guidelines to further reduce overspraying and ponding.

Recycled water to be used for landscape irrigation would be of very high quality. Nitrates in the recycled water are readily taken up by plants, although over-application of recycled water could result in the percolation of recycled water through the root zone and into the soil column or the direct runoff to surface water bodies. Recycled water could potentially contain trace amounts of pharmaceutical compounds such as antibiotics, steroids, antidepressants, painkillers, estrogen and other hormones (endocrine disruptors). These compounds can pass through the body unmetabolized or partially metabolized, and can be present in domestic wastewater in the range of a few parts per billion to a few parts per trillion. These and other compounds are collectively known within the water industry as “emerging contaminants”, and are not presently regulated at the Federal, State or local level, although their environmental fate, transport, and health effects are the subject of on-going research.

Current treatment methods (including physical, chemical and biological processes) remove some pharmaceutical compounds and emerging contaminants from the wastewater. These compounds may be present in the recycled water but at minute concentrations near or below current analytical detection limits. The presence of trace amounts of these compounds in the recycled water would not adversely affect landscape irrigation or any other proposed uses of the recycled water within the project areas. Natural processes, such as biological and photo-degradation at or below the ground surface would further break down residual contamination. Residual traces of chemicals, if any, would not adversely affect groundwater quality. During irrigation, recycled water is applied to landscaped areas only to meet the evapotranspiration requirements, and would not produce surface runoff or percolate through the soil to groundwater. The use and application of recycled water would follow the *Regulations and Guidance for Recycled Water* (DHS, 2004) through the Recycled Water Use Permit. It is unlikely that the minute quantities of these compounds, if present, could migrate through the soil and into groundwater during the wet weather season. If this migration were to occur, the concentrations would be extremely low, if even detectable.

EBMUD would ensure that recycled water meets all appropriate Title 22 requirements for unrestricted reuse; as such, impacts to water quality or public health would be considered ***less than significant***. However, to ensure that recycled water would not be over-applied during irrigation such that it would run off into adjacent water bodies or seep into the groundwater aquifers, Recommended Mitigation Measure 5.2.A-3 should be implemented.

Recommended Mitigation Measure 5.2.A-3: Implement EBMUD-required BMPs for recycled water users.

This mitigation measure applies to components incorporating the use of recycled water.

EBMUD customers using recycled water are issued a water reuse permit and must designate a Site Supervisor to undergo training on BMPs and the safe and efficient use requirements for recycled water. Additionally, EBMUD will perform yearly site evaluations to ensure that customers are applying recycled water correcting and are following the permit requirements.

Impact Significance: Less than Significant

Impact 5.2.A-4: Potential to degrade groundwater and drinking water quality from the direct introduction of non-local water into native groundwater basins.

The general discussion below addresses the following Preferred Portfolio components:

- Bayside Groundwater Phase 2;
- Sacramento Basin Groundwater Banking and Exchange; and
- IRCUP / San Joaquin Groundwater Banking and Exchange.

In general, ambient groundwater differs in quality from surface water supplies. When blended together, surface water and groundwater may interact, causing adverse geochemical reactions that can lead to the formation of precipitants and/or the mobilization of constituents such as metals that were otherwise bound to aquifer soils. In addition, the composition of EBMUD's surface water may be such that although it is generally of better quality it contains concentrations of some constituents that are also found in groundwater supplies. The long-term recharging and storage of surface water with higher concentrations into a groundwater basin with lower concentrations may result in the gradual increase of concentrations of that constituent in groundwater. Conversely, surface water recharge can improve ambient groundwater quality by diluting existing higher mineral concentrations for constituents such as calcium, sodium, iron and manganese. Depending on the nature and magnitude of the basin loading and/or geochemical reactions, the mixing of surface water and groundwater sources may lead to long-term changes in groundwater quality.

Discussion of Specific Components

The following Preferred Portfolio components allow for more specific discussion and are presented below.

Bayside Groundwater Phase 2

Potable water from the District's water distribution system (a blend of Mokelumne River water and local runoff) would be used to recharge the SEBPB. EBMUD's potable water supplies meet established drinking water standards and therefore are not expected to exceed regional water quality objectives for the SEBPB as established by the San Francisco Bay Region RWQCB[1]. The quality of the drinking water to be injected into the aquifer during project implementation will meet State and Federal drinking water standards for all constituents. The injected water is, based on demonstration testing, of better quality than ambient groundwater with the exception of disinfection by-products (DBPs) such as trihalomethanes (THMs) and haloacetic acids (HAAs).

Potable water from the EBMUD distribution system that would be used for subsurface injection will introduce DBPs and DBP-forming residual disinfection chemicals into the groundwater system. Introduced concentrations of DBPs will be below the applicable MCLs for drinking water, and are expected to undergo microbial attenuation with their concentration decreasing with distance from the injection point. DBP-forming chemicals (such as chloramines) introduced into the groundwater can, in the presence of natural organic matter, react chemically to form DBPs. However, based on demonstration testing and sampling conducted as part of the Bayside Groundwater Phase 1 and on currently available information present in published literature from studies on similar projects, the chloramine residuals are expected to remain relatively stable and combined with the limited amount of organic matter typically found in groundwater systems forming only low levels of disinfection by-products. And as has occurred with DBPs introduced directly to the groundwater, DBPs formed in groundwater from disinfection residuals have been found to generally degrade over time due to microbial activities and natural attenuation. For example, data from the demonstration testing for the Bayside Groundwater Phase 1 showed that native groundwater formed about 1 to 2 parts per billion (ppb) THMs and no HAAs. This detected concentration of THMs is well below the primary MCL of 80 ppb for this class of constituents.

A comparison of local groundwater quality with EBMUD-treated potable water from surface waters was conducted as part of the EIR prepared for Bayside Groundwater Phase 1. This comparison indicated that the native groundwater, when mixed with treated potable drinking water from surface sources, would continue to meet all existing primary and secondary drinking water standards and would improve basin water quality overall. As the Bayside Groundwater Phase 2 facilities will also be located in the same SEBPB aquifer system as used for the Phase 1 project, this conclusion is anticipated to be also valid for the Phase 2 project. However, as the specific locations for all Phase 2 facilities have not yet been identified and assuming the potential for varying water quality within the Deep Aquifer spatially over the basin, impacts would be considered ***potentially***

[1] Regional Water Quality Control Board, *San Francisco Bay Basin (Region 2) Water Quality Control Plan (Basin Plan)* (2007)

significant for the purposes of this EIR until additional site-specific studies can confirm this conclusion. Implementation of Mitigation Measure 5.2.A-4 below would reduce potential impacts to less-than-significant levels.

Sacramento Basin Groundwater Banking and Exchange

Sacramento River water taken at the FRWP intake would be used to recharge the Central Basin via percolation ponds. Sacramento River water quality is generally influenced by water quality from upstream reservoir release operations, tributary flows, agricultural runoff, subsurface drainage flows and diversions, with other impacts from permitted discharges from municipal and industrial (M&I) sources, urban runoff and spills. In general, the quality of the Sacramento River is high, with moderate amounts of alkalinity and minerals and low levels of disinfection by-product precursors. Turbidity levels in the Sacramento River are higher during the winter and early spring months, usually associated with reservoir releases or storm events. Data collected from the river indicate that there is a low prevalence of *Giardia* and *Cryptosporidium* in the river, with protozoa only detected sporadically and at low concentrations (SGA, 2003). After treatment, however, Sacramento River water meets all Federal and State drinking water standards and there is generally no persistent constituent of the raw water that warrants additional treatment.

Groundwater in the Sacramento area occurs in unconfined to semi-confined aquifers with most recharge occurring along active river and stream channels (particularly in the American and Sacramento River channels) and applied water. There are no regionally-confined aquifers such as are found in the San Joaquin Valley. In general, groundwater is extracted from both lower and upper aquifer systems, with better water quality occurring in the upper aquifer system. The upper aquifer system is preferred over the lower aquifer system as the lower system contains higher concentrations of iron and manganese, in addition to elevated concentrations of total dissolved solids (SGA, 2003).

At present, no design work has been conducted on this component; therefore, the targeted aquifer zone for water storage has not yet been identified. In addition, no studies have been conducted to date regarding the potential for adverse geochemical reactions or water quality changes resulting from the blending of Sacramento River water with ambient groundwater during subsurface storage. Therefore, for the purposes of this EIR, until additional studies can be conducted, impacts would be considered ***potentially significant.*** Implementation of Mitigation Measure 5.2.A-4 below would reduce potential impacts to less-than-significant levels.

IRCUP / San Joaquin Groundwater Banking and Exchange

Mokelumne River water would be recharged into the Eastern San Joaquin Groundwater Basin as part of this component. Mokelumne River water quality is generally of high quality, though the water may become turbid during storm events. Mokelumne River water is low in total dissolved solid loads and typically requires only minimal treatment to meet Federal and State drinking water standards. Downstream of Pardee Reservoir, the river's water quality is influenced by upstream reservoir releases, tributary flows, agricultural runoff, subsurface drainage flows and diversions, discharges from M&I sources, and urban runoff and spills.

Groundwater in the northeastern portion of the San Joaquin Valley (specifically in the Eastern San Joaquin Groundwater Basin) generally occurs in multiple hydrogeologic formations, with these formations grouped as either east-side or west-side formations based on their location relative to the San Joaquin River and the source of sedimentary material of which they are composed (NESJCGBA, 2004). The most important water-bearing formations in East San Joaquin County are the Mehrten, Laguna, Victor and Alluvial deposits, some of which have thicknesses up to 1,000 feet. Key to the western portion of San Joaquin County is a regionally-extensive aquitard known as the Corcoran Clay layer. This aquitard divides upper and lower water-bearing zones in that portion of the county. Zones above the Corcoran Clay typically encompass poorer water quality than those below.

Groundwater recharge to the basin occurs along its eastern side along active river and stream channels, including those related to the Cosumnes River, Mokelumne River, Dry Creek, Calaveras River, Stanislaus River, Tuolumne River and San Joaquin River. In addition, recharge from percolation of precipitation and applied water also occurs.

Groundwater in the Eastern San Joaquin Groundwater Basin has been heavily used in the past, with groundwater levels in the central portion of the basin dropping continuously between the 1950's and the early 1980's. In the northern portion of the basin, groundwater levels continued to decline into the early 1990's, in some cases forcing the abandonment of shallower wells and construction of deeper wells. In addition, the historic overdraft conditions have resulted in steep eastward groundwater gradients from the Delta towards the cones of depression, resulting in increased salinity levels in groundwater (NESJCGBA, 2004).

While prior studies have identified potential locations of groundwater recharge within the northern section of San Joaquin County, the precise location of the IRCUP/San Joaquin Groundwater Banking and Exchange (including its various components) have not been identified. Therefore, until this project is better defined, impacts to groundwater levels and water quality are presumed to be ***potentially significant.*** Implementation of Mitigation Measure 5.2.A-4 below would reduce potential impacts to less-than-significant levels.

Mitigation Measure 5.2.A-4: Implement a groundwater monitoring program.

EBMUD and its project partners shall establish project-specific groundwater monitoring well networks and implement comprehensive groundwater monitoring programs to establish the pre-project conditions of groundwater basins and to monitor the impact of operations on groundwater levels and water quality and respond accordingly. The groundwater monitoring programs will specify monitoring and water quality sampling frequency, parameters, and protocols and response actions. The monitoring programs will be developed and conducted in accordance with State and Federal regulatory requirements such as those under the jurisdiction of DPH and the RWQCB.

Impact Significance After Mitigation: Less than Significant

Impact 5.2.A-5: Potential for saltwater intrusion from the operation of groundwater wells.

The general discussion below addresses the following Preferred Portfolio components:

- Bayside Groundwater Phase 2; and
- IRCUP / San Joaquin Groundwater Banking and Exchange.

Saltwater intrusion is the increase in water salinity resulting from the movement of saline water into a fresh water system. This can occur in coastal aquifers, such as the East Bay Plain Groundwater Basin and the adjacent Niles Cone Groundwater Basin, where the shallow aquifers are in communication with San Francisco Bay, or in places such as San Joaquin County where saline water can intrude from either the Delta region or from deeper connate aquifers. Intrusion of saltwater into a freshwater aquifer degrades the water quality for most beneficial uses and, depending on the degree of salinity, can render the aquifer unusable.

Generally, recharge to the SEBPB would create a hydraulic gradient from the hills west towards the Bay. In San Joaquin County, recharge to the groundwater basin normally occurs in the foothill region on the eastern side of the basin, creating a hydraulic gradient generally from the hills west towards the Delta. The increase in volume of water stored in production aquifers in either groundwater basin would minimize the potential for saltwater intrusion by reducing pumping depressions and keeping groundwater levels elevated.

However, the hydraulic gradient could be reversed and saltwater could intrude into the production aquifers from either the Bay or the Delta if pumping causes sufficient drawdown in target aquifers. Additionally, in San Joaquin County, a larger zone of depression resulting from pumping could cause an upward gradient from deeper saline connate aquifers, thereby impacting the production aquifer. Finally, if pumping increases in deeper zones, downward vertical gradients could also increase, which would promote the migration of saltwater from intruded shallow aquifers into deeper aquifers. In all cases, the storage and extraction projects would be designed and operated to minimize these potential impacts, but until the specific project location has been identified and the project designed to meet site-specific conditions, such an impact would be considered ***potentially significant***. Implementation of Mitigation Measures 5.2.A-4 and 5.2.A-5 would reduce this potential impact to a less-than-significant level.

Mitigation Measure 5.2.A-5: Use numerical modeling to properly design the groundwater storage and extraction project such that saltwater intrusion is minimized during project operations.

In addition, implement Mitigation Measure 5.2.A-4 above.

Impact Significance After Mitigation: Less than Significant

Impact 5.2.A-6: Potential effects on groundwater supplies and production of existing wells from recharge and/or extraction operations.

The general discussion below addresses the following Preferred Portfolio components:

- Northern California Water Transfers;
- Bayside Groundwater Phase 2;
- Sacramento Basin Groundwater Banking and Exchange; and
- IRCUP / San Joaquin Groundwater Banking and Exchange.

In general, existing wells in the vicinity of new groundwater wells have the potential to be affected by proposed injection and extraction operations, as described below. Similarly, increased extractions from existing wells resulting from added groundwater use in lieu of surface water supplies (as may result from surface water transfers) could also produce impacts on adjacent wells.

Recharge operations may create an increase in static groundwater conditions causing nearby active wells or improperly abandoned wells to flow at the surface. During groundwater extraction (as for storage recovery), nearby wells may experience a temporary interference from project operations resulting in declining water levels or well yields. Groundwater level fluctuations and interference to existing wells would be either temporary or long-term in nature, depending on the extraction operations, and would be considered ***potentially significant***. Implementation of Mitigation Measures 5.2.A-6a through 5.2.A-6c below would reduce these potential impacts to less-than-significant levels.

Mitigation Measure 5.2.A-6a: Inventory existing wells.

EBMUD and its project partners shall inventory existing wells within the areas of the affected basins where studies indicate that drawdown effects could be observed and/or where water levels could rise above the ground surface in response to injections. The inventory shall include collection of information regarding existing use, screened intervals, total depth and depth of pump. The information collected shall be used to predict drawdown and drawup (mounding) at each well location and identify wells that could be affected by groundwater recharge and extraction operations.

Mitigation Measure 5.2.A-6b: Monitor wells and modify groundwater operations.

EBMUD and its project partners shall regularly monitor water levels in key zones that could experience flowing (artesian) conditions or be rendered inoperable as a result of changes in water levels resulting from EBMUD and its partner's proposed groundwater operations as part of the Preferred Portfolio components. Information from the monitoring shall be used to modify groundwater operations (e.g., decrease or cease injection/extraction as needed) and/or modify the affected wells in coordination with the existing well owner (e.g., install pressure-resistant well caps, reset pumps). Groundwater operations shall be modified until adverse effects to existing wells have been addressed.

Mitigation Measure 5.2.A-6c: Destroy abandoned or inactive wells.

For abandoned or inactive wells located in areas where predicted water levels may rise above the ground surface or where a potential conduit for contamination migration could occur as a result of the proposed groundwater operations, EBMUD and its project partners shall work with the property owners to destroy their wells in accordance with State and County standards.

Impact Significance After Mitigation: Less than Significant

Impact 5.2.A-7: Potential alteration of the existing drainage pattern or contribution to existing local or regional flooding.

The general discussion presented below addresses the following Preferred Portfolio components:

- Recycled Water;
- Northern California Water Transfers;
- Bayside Groundwater Phase 2;
- Sacramento Basin Groundwater Banking and Exchange;

- Regional Desalination;
- Enlarge Pardee and Lower Bear Reservoirs; and
- IRCUP / San Joaquin Groundwater Banking and Exchange.

Facilities developed as part of these components could be located within 100-year floodplains and would likely create new paved and impermeable surfaces. Without proper management, conversion of bare, open ground to impermeable surfaces could increase runoff volumes and pollutant loading to surface waters. Because the locations of proposed facilities have not been identified and the amount of added impermeable surfaces is not currently known, impacts are considered ***potentially significant***. Implementation of Mitigation Measure 5.2.A-7 would reduce potential impacts to less-than-significant levels.

Pipelines would be installed within existing roadways or rights-of-way, to the extent possible, and connected to existing pipelines. Ground cover or surface pavement above installed pipelines and facilities would be restored after construction is completed to maintain existing drainage patterns. Storm drainage conditions would not be expected to change substantially from those locations where the area would be restored to pre-project conditions. Therefore, potential impacts from pipelines would be considered ***less than significant***.

Sediment deposition occurring in or obstructing water flow to storm drains could also cause localized flooding. In addition, storm drains may be overwhelmed when run-off or when purge water is discharged to storm drains during well development. These impacts would be ***potentially significant***. Implementation of Mitigation Measure 5.2.A-7 would reduce potential impacts to less-than-significant levels through compliance with well-established best construction practices to prevent significant increases in storm water runoff.

Mitigation Measure 5.2.A-7: Comply with NPDES general construction permit requirements including preparation and implementation of an SWPPP with Best Practices for control of storm water runoff.

Impact Significance After Mitigation: Less than Significant

Impact 5.2.A-8: Potential permanent land subsidence from groundwater withdrawals.

The general discussion presented below addresses the following Preferred Portfolio components:

- Northern California Water Transfers;

- Bayside Groundwater Phase 2;
- Sacramento Basin Groundwater Banking and Exchange; and
- IRCUP / San Joaquin Groundwater Banking and Exchange.

Groundwater within aquifers and aquitards helps support the weight of the overlying sediments. When groundwater extraction occurs, water pressure in the aquifers and pore spaces of saturated sediments decreases, and in some cases, causes a lowering of ground surface elevations in a process called land subsidence. The degree of subsidence that occurs as a result of groundwater pumping depends on the sediments present in the basin, the extent of groundwater pumping and the resulting change in internal water pressure. Under some conditions, the land subsidence can reverse when groundwater is replenished. This process is known as elastic or temporary subsidence and often occurs when aquifers are made up of coarser-grained materials. Inelastic subsidence that is permanent and non-recoverable can occur when the water pressure in finer-grained sediments is reduced below its historic, natural lows, resulting in a permanent change in the intergranular structure of the sediments. Direct measurements of changes in thickness, by land surveys or high-resolution sensors called extensometers, are typically required to detect the compression of subsurface sediments. Historically, subsidence due to excessive groundwater pumping has occurred in the Bay Area and in the San Joaquin Valley. Land subsidence has been less evident in the Sacramento Valley.

In designing the Preferred Portfolio components noted above, EBMUD and its project partners would site wells so as to minimize interference with each other and existing well sites or to create large sustained cones of depression. In locating and designing the wells, the proximity of existing wells, current groundwater extraction rates and volumes, aquifer properties, and the planned operation of the new wells will be considered. For projects that may promote the increased use of groundwater in lieu of surface water supplies, extractions will be managed in a similar manner to minimize the creation of new sustained cones of depression or the sustained enlargement of existing cones of depression. By preventing the development of large cones of depressed groundwater levels and restoring and/or maintaining water levels above historic lows, consolidation of overlying sediments, and therefore land subsidence, will be minimized.

Even with the precautions identified above, proposed wells could be situated such that interference with existing wells occurs. Accordingly, the risk of subsidence from the proposed project operations would be considered ***potentially significant***. Implementation of Mitigation Measures 5.2.A-8a and 5.2.A-8b would reduce potential impacts to less-than-significant levels.

Mitigation Measure 5.2.A-8a: Monitor for permanent land subsidence and implement corrective actions as necessary.

This mitigation measure applies to the Bayside Groundwater Phase 2.

The land subsidence monitoring program for the Bayside Groundwater Phase 1 shall extend to include Phase 2 of the project. If inelastic subsidence is detected through monitoring, EBMUD shall implement corrective actions, such as reducing pumping rates or ceasing extractions until the adverse effects have been fully evaluated and modifications made to groundwater operations to minimize further subsidence.

Mitigation Measure 5.2.A-8b: Monitor for permanent land subsidence and implement corrective actions as necessary.

This mitigation measure applies to the following affected components: Northern California Water Transfers, Sacramento Basin Groundwater Banking / Exchange and IRCUP / San Joaquin Groundwater Banking / Exchange Project.

Monitoring shall be coordinated with statewide monitoring programs for land subsidence. Monitoring shall be implemented incrementally to allow observations of the response of the groundwater system and surrounding soils to project operations. If any inelastic or permanent land subsidence is detected through monitoring, EBMUD and its project partners shall implement corrective actions, such as reducing pumping rates or ceasing extractions.

Impact Significance After Mitigation: Less than Significant.

Impact 5.2.A-9: Potential impacts to Sacramento and Delta downstream water users.

The discussion presented below addresses the following Preferred Portfolio components:

- Sacramento Basin Groundwater Banking / Exchange; and
- IRCUP / San Joaquin Groundwater Banking / Exchange.

Sacramento Basin Groundwater Banking / Exchange

Effects on Downstream Sacramento River Water Users

The FRWP's intake facility is located on the Sacramento River, approximately 10 miles downstream of the confluence with the American River, in an area confined by levees maintained by the U.S. Army Corps of Engineers. The 100-year flood event flow in the Sacramento River at Freeport is about 130,000 cubic feet per second (cfs) and is fully contained by the levees (FRWA, 2003). Depending on the water source, changes to the

Lower Sacramento River hydrologic conditions from increased diversions at Freeport, or new diversions elsewhere along the river associated with the Sacramento Basin Groundwater Banking / Exchange may create impacts to downstream water users. Impacts could include reduced downstream flows leading to limitations on downstream diversions and/or changes in water quality (i.e. temperature) resulting from the additional diversions, which potentially could impact aquatic resources. While the specific impacts resulting from these hydrologic changes have not been evaluated, diversions at the FRWP intake would likely be small in comparison to the background flow rates and therefore would likely produce no discernible differences in the overall distribution of river flow with the project operations. In addition, legal requirements applicable to the transfers of water would reduce any potential impacts to water users or fish and wildlife.

Given that the exact parameters of this component are unknown and the potential impacts have not been modeled or evaluated in detail under either current or potential future conditions, impacts for the purposes of this programmatic analysis would be considered ***potentially significant***. No mitigation measures can be identified for this program-level impact analysis at this time given the uncertainty of the transactions and the future situation regarding river conditions. Potential impacts will be further evaluated as part of future project-level environmental analysis to confirm the level of significance and identify opportunities for mitigation.

Effects on Downstream Delta Water Users

Northern California drainage basins join together in an area officially designated as the Sacramento River-San Joaquin River Delta. The Delta is defined by the approximate extent of tidal action within the river channels. The Sacramento River at Freeport lies within the defined Delta area.

CVP and SWP water deliveries are conveyed through Delta channels to the respective Federal and State pumping plants that provide water for exports to the San Joaquin Valley and Southern California areas. The Contra Costa Water District diversion diverts water at points at Old River and Rock Slough and other water users also have diversions in the Delta.

As noted above, the Sacramento Basin Groundwater Banking / Exchange component is anticipated to provide up to 4.2 MGD (approximately 4.7 TAFY) of surface water from the river during average or wet years. This quantity is not anticipated to be significant in relation to current diversions from the watershed. In addition, sources at this point are unknown and likely could consist of water that would otherwise be consumptively used further upstream. As this component has not been designed and its potential impacts have not been modeled or evaluated under either current or potential future water conditions, impacts would be considered ***potentially significant***. No mitigation measures can be identified for this program-level impact analysis given the uncertainties of future situations. Impacts will be further evaluated in future project-level environmental analysis to confirm the level of significance and identify opportunities for mitigation.

IRCUP / San Joaquin Groundwater Banking and Exchange

The Mokelumne River flows from the Sierra Nevada foothills, with its lower reaches crossing the Central Valley and proceeding westward through the City of Lodi before meeting the San Joaquin River and flowing to the Delta. Therefore, while Mokelumne River contribution to the Delta is relatively small, additional uses of Mokelumne River water may impact downstream Delta uses, depending on the timing and nature.

As proposed, using either existing water right entitlements, new rights consistent with existing regulations, or assignments of State-filed applications, the IRCUP project would divert an additional 17.4 MGD (approximately 19.5 TAFY) of Mokelumne River water in normal and/or wet years. As the Mokelumne River ultimately terminates in the Delta, the additional diversions from the Mokelumne River have the potential to impact downstream flows to the Delta. Water exports from the Delta are described in above sections for the Sacramento Groundwater Banking / Exchange Project. While the additional water to be diverted by the IRCUP project from the Mokelumne River is likely not substantial relative to the overall volume of Delta inflow, existing questions regarding the future operation of Delta diversions, combined with the fact that the project has not been designed or evaluated in detail, make impacts of this component ***potentially significant***. No mitigation measures can be identified for this program-level impact analysis given the uncertainty of the nature of the project, but existing legal and regulatory protections would assist in minimizing impacts. This impact will be further evaluated in future project-level environmental analysis to confirm the level of significance and identify opportunities for mitigation.

Impact Significance: Potentially Significant

Impact 5.2.A-10: Potential effects on other intakes and outfalls from operation of the Regional Desalination intake.

Regional Desalination

Operation of the desalination facility intake would potentially affect neighboring intakes and outfalls. For example, localized flow patterns around the new intake could alter flow patterns around existing intakes such that the rate of intake decreases and/or the quality of water diverted changes. Impacts would be considered ***potentially significant***. Implementation of Mitigation Measure 5.2.A-10 below would reduce potential impacts to less-than-significant levels.

Mitigation Measure 5.2.A-10: Conduct modeling and incorporate the results into the design for the Regional Desalination component.

EBMUD and its partners shall conduct numerical modeling as part of the desalination facility design. Modeling shall take into account local intakes and outfalls within a certain distance from the facility that may affect the project or, in turn, be affected by the project, in terms of both hydraulics and water quality. (The specific distance would be defined during the project's environmental review stage.) The results of the numerical modeling shall be used in the design to minimize both impacts from the project on existing intakes/outfalls, and from these sources on the project's intake structure.

In addition, implement Mitigation Measure 5.2.A-2 above.

Impact Significance After Mitigation: Less than Significant

Impact 5.2.A-11: Potential changes in Mokelumne River basin hydrologic conditions from enlarged reservoirs.

The discussion presented below addresses the Enlarge Pardee and Lower Bear Reservoirs components.

Enlarge Pardee and Lower Bear Reservoirs

In general, construction of an enlarged Pardee Reservoir and/or Lower Bear Reservoir could temporarily impact Mokelumne River flows, although operations at Camanche Reservoir, including the continued release of the Joint Settlement Agreement flows to the lower Mokelumne River, would minimize disruptions to the lower Mokelumne River from Pardee construction.

Construction of the Enlarge Pardee Reservoir component would consist of building a new dam and spillway downstream of the existing facilities. Once constructed, the old structures would be removed and/or breached such that they no longer serve as an impounding/operational feature. The Enlarge Lower Bear Reservoir component would consist of modifications to an existing embankment and spillway. Construction sequencing and planning for either project would include a determination of the means and methods by which stream flow would be managed to maintain minimum required downstream flow release requirements and to provide needed flood control. Storage available within upstream and downstream facilities (such as Camanche Reservoir) could be utilized as a component of the flow management strategy to be developed. For both projects, construction impacts would be of a temporary nature.

Long-term impacts to the Mokelumne River hydrology from enlarging Pardee Reservoir or Lower Bear Reservoir could be *potentially significant*. Either project includes the creation of more on-river storage via reservoir enlargement, and would enable additional capture of flows when available. Any increase in capture above the existing entitlements would be subject to legal and regulatory proceedings, which would include protections to other users. This would assist in minimizing hydrology impacts, and implementation of Mitigation Measure 5.2.A-11 below would also reduce these potential impacts to less-than-significant levels.

Mitigation Measure 5.2.A-11: Modify reservoir operations.

EBMUD (and in the case of the Enlarge Lower Bear Reservoir component, EBMUD and its project partners) shall modify and manage the future operations of the reservoirs both during and following construction to meet flow requirements as established by the Joint Settlement Agreement (JSA) and as needed to meet all environmental and downstream appropriator and riparian rights obligations.

Impact Significance After Mitigation: Less than Significant

Impact 5.2.A-12: Potential impacts to downstream Mokelumne River water users.

The following discussion addresses the IRCUP / San Joaquin Groundwater Banking / Exchange component. For impacts to downstream Mokelumne River water users from the enlarged reservoir projects, see Impact 5.2.A-11 above.

IRCUP / San Joaquin Groundwater Banking / Exchange

Changes to the lower Mokelumne River hydrologic conditions from new diversions along the river may create impacts to downstream water users. Specifically, the volume of water available for diversion at certain times may decrease and/or the quality of water available for diversion may change, all of which have the potential to affect the ability of downstream users to divert water when needed to meet demands and/or interfere with their ability to treat water via existing systems and meet demands. While the specific impacts resulting from these hydrologic changes have not been evaluated, general impacts can be determined by comparing the overall anticipated size of the IRCUP project (17.4 MGD or approximately 19.5 TAFY) to existing diversions from the river, assuming diversion would occur at Pardee Reservoir, Camanche Reservoir or on the lower Mokelumne River immediately below Camanche Reservoir.

With an anticipated maximum diversion of 17.4 MGD (approximately 19.5 TAFY) occurring only in average or wet years, the IRCUP project would represent an equivalent of approximately 2.4 percent of the total maximum Mokelumne River diversions listed in Table 4.2.A-1 in Section 4.2.A, Hydrology, Groundwater, and Water Quality. Projects would also be undertaken with a recognition of California water law requirements and higher priority rights. Because changes in Mokelumne River hydrology during the times of usage of these components would not be not substantial, potential impacts would be ***less than significant***.

Impact Significance: Less than Significant

Impact 5.2.A-13: Potential for flooding along the Mokelumne River Basin as posted by the potential for dam failure.

The following discussion addresses the Enlarge Pardee and Lower Bear Reservoirs components.

Enlarge Pardee and Lower Bear Reservoirs

EBMUD operates its existing reservoirs (Pardee and Camanche Reservoirs) such that they provide a flood control element in addition to water supply storage. The Corps regulates their flood storage aspects. Flood storage space requirements are based on forecast snowmelt runoff.

While new and/or enlarged dams constructed as part of the Enlarge Pardee Reservoir component and/or the Enlarge Lower Bear Reservoir component have the potential to result in flooding due to dam failure, the potential for flooding from dam failure is already present with the existing dams and reservoirs and is minimal. The dams meet existing safety standards and dam failure is presently unlikely. In addition, any likelihood of dam failure may decrease with the construction of one or more of these components because they could offer improved integrity and would comply with updated DSOD requirements. Therefore, this impact would be ***less than significant***.

Impact Significance: Less than Significant

Impact 5.2.A-14: Potential for inundation by tsunamis, seiches, or mudflows.

The general discussion presented below addresses the following Preferred Portfolio components:

- Recycled Water;
- Bayside Groundwater Phase 2;
- Regional Desalination; and
- Enlarge Pardee and Lower Bear Reservoirs.

Facilities located adjacent to San Francisco Bay may be susceptible to damage from tsunamis. For example, a 100-year tsunami would be expected to have a 4.4-foot run-up along the San Leandro shoreline (San Leandro, 2002). The run-up would be expected to be smaller the further inland. Because proposed facilities would not be located on the Pacific Ocean coastline and any effect from a tsunami event would be greatly attenuated inland from the ocean, impacts related to inundation from tsunamis are ***less than significant***.

Seiches are standing waves that have been observed in enclosed or partially enclosed bodies of waters, such as lakes, reservoirs, bays and seas. Seiches are typically unnoticeable, except in calm weather, and typically mild, causing no damage on adjacent shorelines. However, seismically-induced seiches can be larger and have the potential to cause damage. Two components of the preferred portfolio, Enlarge Pardee Reservoir and Enlarge Lower Bear Reservoir, involve the broadening of reservoirs which may increase the potential to develop seiches capable of causing damage such as shoreline or embankment erosion and the potential for structural overtopping/dam failure. However, based on existing watershed development (which is minimal), the reservoir pool area, and the nature of the embankment materials (concrete), it is expected that the damage would be minimial and hence unlikely to pose a structural (dam failure) risk. Further, the risk resulting from the new projects is equivalent to that currently posed by the existing reservoirs for seiche-induced damage, which is minimal. Therefore, impacts related to inundation from seiches would be considered ***less than significant.***

Mudflows are the rapid, downhill movement of large masses of mud formed from loose earth and water. Mudflows often occur during heavy rains on lands that have been denuded of plant matter and are therefore lacking in soil anchoring. For portfolio components located in relative flat areas, the likelihood of inundation from mudflows is minimal. For portfolio components located in the foothills, proper construction and use of BMPs, such as revegetation following construction, would reduce the potential impacts related to inundation from mudflows to less-than-significant levels.

Impact Significance: Less than Significant

Table 5.2.A-1: Summary of Potential Hydrology, Groundwater and Water Quality Impacts Resulting from the WSMP 2040 Preferred Portfolio

IMPACT	RATIONING (10%)	CONSERVATION (LEVEL D)	RECYCLED WATER (LEVEL 3)	NORTHERN CALIFORNIA WATER TRANSFERS	BAYSIDE GROUNDWATER PHASE 2	SACRAMENTO BASIN GROUNDWATER BANKING / EXCHANGE	REGIONAL DESALINATION	ENLARGE PARDEE RESERVOIR	ENLARGE LOWER BEAR RESERVOIR	IRCUP/ SAN JOAQUIN GROUNDWATER BANKING / EXCHANGE
5.2.A-1: Potential to degrade water quality from construction	--	--	LTSM	LTSM	LTSM	LTSM	LTSM	LTSM	LTSM	LTSM
5.2.A-2 Potential to degrade water quality from waste discharge	--	--	LTS	LTS	LTS	LTS	LTSM	B	B	LTS
5.2.A-3: Potential to violate water quality standards and waste discharge requirements for the land application of recycled water	--	--	LTSM	--	--	LTSM	--	--	--	--
5.2.A-4: Potential to degrade groundwater and drinking water quality from the direct introduction of non-local water into native groundwater basins	--	--	--	--	LTSM	LTSM	--	--	--	LTSM
5.2.A-5: Potential for saltwater intrusion from the operation of groundwater wells	--	--	--	--	LTSM	--	--	--	--	LTSM

Table 5.2.A-1: Summary of Potential Hydrology, Groundwater and Water Quality Impacts Resulting from the WSMP 2040 Preferred Portfolio (continued)

IMPACT	RATIONING (10%)	CONSERVATION (LEVEL D)	RECYCLED WATER (LEVEL 3)	NORTHERN CALIFORNIA WATER TRANSFERS	BAYSIDE GROUNDWATER PHASE 2	SACRAMENTO BASIN GROUNDWATER BANKING / EXCHANGE	REGIONAL DESALINATION	ENLARGE PARDEE RESERVOIR	ENLARGE LOWER BEAR RESERVOIR	IRCUP/ SAN JOAQUIN GROUNDWATER BANKING / EXCHANGE
5.2.A-6: Potential effects on groundwater supplies and production of existing wells from recharge and/or extraction operations	--	--	--	LTSM	LTSM	LTSM	--	--	--	LTSM
5.2.A-7: Potential alteration of the existing drainage pattern or contribution to existing local or regional flooding	--	--	LTSM	LTSM	LTSM	LTSM	LTSM	LTSM	LTSM	LTSM
5.2.A-8: Potential permanent land subsidence from groundwater withdrawals	--	--	--	LTSM	LTSM	LTSM	--	--	--	LTSM
5.2.A-9: Potential impacts to Sacramento and Delta downstream water users	--	--	--	--	--	PS	--	--	--	PS
5.2.A-10: Potential effects on other intakes and outfalls from operation of the Regional Desalination intake	--	--	--	--	--	--	LTSM	--	--	--

Table 5.2.A-1: Summary of Potential Hydrology, Groundwater and Water Quality Impacts Resulting from the WSMP 2040 Preferred Portfolio (continued)

IMPACT	RATIONING (10%)	CONSERVATION (LEVEL D)	RECYCLED WATER (LEVEL 3)	NORTHERN CALIFORNIA WATER TRANSFERS	BAYSIDE GROUNDWATER PHASE 2	SACRAMENTO BASIN GROUNDWATER BANKING / EXCHANGE	REGIONAL DESALINATION	ENLARGE PARDEE RESERVOIR	ENLARGE LOWER BEAR RESERVOIR	IRCUP/ SAN JOAQUIN GROUNDWATER BANKING / EXCHANGE
5.2.A-11: Potential changes in Mokelumne River basin hydrologic conditions from enlarged reservoirs	--	--	--	--	--	--	--	LTSM	LTSM	--
5.2.A-12: Potential impacts to downstream Mokelumne River water users	--	--	--	--	--	--	--	--	--	LTS
5.2.A-13: Potential for flooding along the Mokelumne River Basin as posted by the potential for dam failure	--	--	--	--	--	--	--	LTS	LTS	--
5.2.A-14: Potential for inundation by tsunamis, seiches, or mudflows	--	--	LTS	--	LTS	--	LTS	LTS	LTS	--

5.2.B Geology, Soils, and Seismicity

5.2.B.1 Significance Criteria

In accordance with Appendix G of the CEQA Guidelines, a significant impact on geology, soils, and seismicity would occur if the WSMP 2040 Preferred Portfolio would:

- Expose people or structures to potential substantial adverse effects, including the risk of loss, injury, or death involving:
- Rupture of a known earthquake fault, as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map issued by the State Geologist for the area or based on other substantial evidence of a known fault;
- Strong seismic ground shaking;
- Seismic-related ground failure, including liquefaction;
- Landslides;
- Result in substantial soil erosion or the loss of topsoil;
- Be located on a geologic unit or soil that is unstable, or that would become unstable as a result of the project, and potentially result in on- or off-site landslide, lateral spreading, subsidence, liquefaction or collapse;
- Be located on expansive soil, as defined in Table 18-1-B of the Uniform Building Code (1994), creating substantial risks to life or property; or
- Have soils incapable of adequately supporting the use of septic tanks or alternative waste water disposal systems where sewers are not available for the disposal of waste water;
- Result in the loss of availability of a known mineral resource that would be of value to the region and the residents of the State; or
- Result in the loss of availability of a locally-important mineral resource recovery site delineated on a local general plan, specific plan or other land use plan.

5.2.B.2 Components That Would Not Result in Geology, Soils, and Seismicity Impacts

The following Preferred Portfolio components were evaluated for their potential to cause geology, soils or seismicity impacts, and no impacts were identified.

Water Rationing and Conservation

Rationing would not involve construction or expansion of any new or existing facilities. Besides limited improvements, such as installation of water efficient appliances, water conservation would not involve construction of any new or expansion of existing infrastructure. As such, these components would not result in the exposure of people or structures to potential substantial adverse effects related to geology, soils, or seismicity. In addition, these components would not result in any soil erosion or loss of topsoil.

5.2.B.3 Issues Dismissed from Further Analysis

The WSMP 2040 Preferred Portfolio components would not involve the use of septic tanks or alternative waste disposal systems. As such, proposed components would not result in soils incapable of supporting such tanks or systems. In addition, proposed Preferred Portfolio water components would not involve the loss of any mineral resource. As such, no impacts related to these issues would occur.

5.2.B.4 Potential Geology, Soils, and Seismicity Impacts

Impact 5.2.B-1: Potential exposure of people or structures to geologic and seismic hazards.

The general discussion below addresses the following Preferred Portfolio components:

- Recycled Water;
- Northern California Water Transfers;
- Bayside Groundwater Phase 2;
- Sacramento Basin Groundwater Banking / Exchange;
- Regional Desalination;
- Enlarge Pardee and Lower Bear Reservoirs; and
- IRCUP / San Joaquin Groundwater Banking / Exchange.

Proposed facilities developed as part of the above components include treatment plants, wells, pump stations, recharge ponds, dam-related facilities and pipelines. These facilities would be located in a variety of urban and rural settings. Site-specific impacts related to geologic and seismic hazards would depend upon selection of the sites and design of the facilities. State laws require that the design and construction of facilities include incorporating appropriate practices for identification of adverse geologic hazards and seismic conditions and implementation of appropriate engineering measures compatible with relevant seismic zones.

The locations of most of the proposed facilities relative to known faults cannot be determined at this time, as they have not yet been identified. All proposed facilities would be subject to the risk of groundshaking from earthquakes on nearby faults. Strong seismic shaking associated with earthquakes could cause liquefaction, lateral spreading, trigger slope failures, or cause settlement of poorly compacted fill or consolidation of very soft natural deposits, if facilities are located in areas susceptible to these conditions. Similar damage to structures or harm to people could be the consequence of secondary seismic hazards.

EBMUD maintains an earthquake preparedness and emergency response program intended to inform and train EBMUD personnel in proper procedures to inspect, respond, and repair their facilities following an earthquake. As part of the program, EBMUD conducts practice drills of emergency response procedures annually, using simulated earthquake scenarios. Site selection and design of new EBMUD facilities will require identification of geologic and seismic hazards.

Non-seismic-related hazards include conditions resulting in landslides that could also damage proposed facilities if they were located in areas exposed to such hazards (e.g., steep slopes). In addition, unstable subsurface materials, such as artificial fill or soft bay mud deposits are common in the EBMUD service area and could be prone to settlement. Corrosive or expansive soils could damage and lead to the failure of unprotected concrete or steel pipelines. For the Bayside Groundwater Phase 2 site, the risk of corrosion to concrete and steel is high due to the predominance of Reyes clay soils.

Hazards such as fault rupture, strong ground shaking, secondary seismic effects (earthquake-induced slope failure, liquefaction, lateral spreading), landslides, soft-ground, and expansive or corrosive soil could damage proposed facilities and have the potential to result in injury or harm to people, if damage occurs to structures where people work. Impacts related to geology, soils, and seismicity would be considered ***potentially significant***. Implementation of Mitigation Measures 5.2.B-1a and 5.2.B-1b would reduce potential impacts to less-than-significant levels.

Mitigation Measure 5.2.B-1a: Complete project-specific geologic and geotechnical studies and implement recommendations.

EBMUD shall retain California-licensed geologists and geotechnical engineers to conduct engineering geologic and geotechnical studies for proposed facilities. These studies shall identify the presence of the hazards or conditions, as appropriate, including fault rupture hazard, soft-ground conditions, slope stability and landslides, strong seismic shaking, liquefaction and lateral spreading, settlement, and corrosive or expansive soil to affect concrete and steel. These studies shall identify corrective actions to avoid the hazard or support the design of engineering control measures. EBMUD shall document compliance with this measure prior to the final project design. The report shall document the investigations and detail the specific design support alternatives and protection measures that will be implemented.

In addition, EBMUD shall consult with DSOD and California Geological Survey during the project-specific geotechnical investigation phase for the Enlarge Pardee and Lower Bear Reservoirs components to determine if additional requirements are needed.

Mitigation Measure 5.2.B-1b: Update the EBMUD earthquake preparedness and emergency response program.

EBMUD shall update its earthquake preparedness and emergency response program to include new facilities.

Impact Significance After Mitigation: Less than Significant

Impact 5.2.B-2: Potential erosion and loss of topsoil during construction.

The general discussion below addresses the following Preferred Portfolio components:

- Recycled Water;
- Northern California Water Transfers;
- Bayside Groundwater Phase 2;
- Sacramento Basin Groundwater Banking / Exchange;
- Regional Desalination;
- Enlarge Pardee and Lower Bear Reservoirs; and
- IRCUP / San Joaquin Groundwater Banking / Exchange.

Locally, construction of the proposed facilities would require earthmoving activities, which could cause soil erosion. Some types of soils in the Preferred Portfolio Study Area are more susceptible to erosion. The effects of erosion are related to water quality degradation, as described in Section 5.2.A Hydrology, Groundwater, and Water Quality. Impacts associated with erosion and loss of topsoil would be ***potentially significant***. Implementation of Mitigation Measure 5.2.B-2 below would reduce potential impacts to less-than-significant levels.

Mitigation Measure 5.2.B-2: Implement Stormwater Pollution Prevention Plan (SWPPP).

Implement Mitigation Measure 5.2.A-1a.

Impact Significance After Mitigation: Less than Significant

Table 5.2.B-1: Summary of Potential Geology, Soils and Seismicity Impacts Resulting from the WSMP 2040 Preferred Portfolio

IMPACT	RATIONING	CONSERVATION	RECYCLED WATER	NORTHERN CALIFORNIA WATER TRANSFERS	BAYSIDE GROUNDWATER PHASE 2	SACRAMENTO BASIN GROUNDWATER BANKING / EXCHANGE	REGIONAL DESALINATION	ENLARGE PARDEE RESERVOIR	ENLARGE LOWER BEAR RESERVOIR	IRCUP / SAN JOAQUIN GROUNDWATER BANKING / EXCHANGE
5.2.B-1: Potential exposure of people or structures to geologic and seismic hazards	--	--	LTSM	LTSM	LTSM	LTSM	LTSM	LTSM	LTSM	LTSM
5.2.B-2: Potential erosion and loss of topsoil during construction	--	--	LTSM	LTSM	LTSM	LTSM	LTSM	LTSM	LTSM	LTSM
-- = No Impact, LTS = Less than Significant, LTSM = Less than Significant with Mitigation, PS = Potentially Significant, B = Beneficial										

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5.2.C Biological Resources

5.2.C.1 Significance Criteria

In accordance with Appendix G of the CEQA Guidelines, a significant impact on biological resources would occur if the WSMP 2040 Preferred Portfolio would:

- Have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special status species in local or regional plans, policies, or regulations, or by the California Department of Fish and Game (CDFG) or U.S. Fish and Wildlife Service (USFWS);
- Have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, regulations or by the CDFG or USFWS;
- Have a substantial adverse effect on federally protected wetlands as defined by Section 404 of the Clean Water Act (including, but not limited to, marsh, vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption, or other means;
- Interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites;
- Conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance; and
- Conflict with the provisions of an adopted Habitat Conservation Plan (HCP), Natural Community Conservation Plan, or other approved local, regional, or state habitat conservation plan.
- CEQA Guidelines Section 15380 further provides that a plant or animal species may be treated as “rare or endangered” for purposes of environmental review even if it is not on one of the official lists if, for example, it is likely to become endangered in the foreseeable future.

5.2.C.2 Components That Would Not Result in Biological Resources Impacts

Water Rationing and Conservation

The Rationing and Conservation components are strictly related to reduction of water use by customers. No infrastructure or facilities would be required as part of their implementation. As such, no facilities are proposed, and no impacts to aquatic habitats, vegetation, or wildlife are anticipated from these components.

5.2.C.3 Potential Biological Resources Impacts

Impact 5.2.C-1: Potential temporary and permanent impacts to sensitive natural communities or wetlands or waters falling under the jurisdiction of the Corps and the State of California.

The general discussion presented below addresses the following Preferred Portfolio components:

- Recycled Water;
- Northern California Water Transfers;
- Bayside Groundwater Phase 2;
- Sacramento Basin Groundwater Banking / Exchange;
- Regional Desalination;
- Enlarge Pardee and Lower Bear Reservoirs; and
- IRCUP / San Joaquin Groundwater Banking / Exchange.

Proposed facilities developed as part of the above components include treatment plants, wells, pump stations, recharge ponds, dam-related facilities, and pipelines. Construction of these facilities would involve activities such as excavation, grading, vegetation removal, and trenching, which have the potential to increase erosion and/or contribute sediment to wetlands and/or waters of the U.S. that may be present within the project areas for the various components. Types of wetlands that may occur within the component project areas include coastal brackish marsh, northern coastal salt marsh, coastal and valley freshwater marsh, and vernal pools. These habitats are considered sensitive natural communities and may fall under the jurisdiction of the U.S. Army Corps of Engineers (Corps), CDFG, and the appropriate Regional Water Quality Control Board (RWQCB). If individual project areas include state and/or federally jurisdictional wetlands or waters, the proposed project(s) could have a ***potentially significant*** impact. Implementation of Mitigation Measures 5.2.C-1a and 5.2.C-1b would reduce this potential impact to a less-than-significant level. Further site-specific analysis would be conducted prior to implementation of individual Preferred Portfolio components once precise designs for facilities are completed and locations are identified.

Mitigation Measure 5.2.C-1a: Conduct wetlands determination.

Prior to implementation of any project where wetlands and/or waters of the U.S. may be present, a formal jurisdictional determination conducted according to Corps guidelines (Environmental Laboratory 1987) shall be completed by a qualified biologist and submitted to the Corps for verification and to assess potential impacts. The extent of waters of the State as defined under CDFG Code and the RWQCB under the Porter Cologne Act and Section 401 of the Clean Water Act shall also be delineated.

To the extent feasible, implementation of any specific project shall be designed and constructed to avoid and minimize adverse effects to waters of the United States or jurisdictional waters of the State of California within the project area. Local plans and policies regarding wetland buffers shall be reviewed for each project and incorporated into the project design to the extent feasible.

Mitigation Measure 5.2.C-1b: Acquire permits and implement all permit conditions.

For impacts to jurisdictional wetlands and waters that cannot be avoided, a Section 404 permit and Section 401 certification of waste discharge requirements for fill of jurisdictional wetlands shall be sought from the Corps and the RWQCB, respectively. In addition, a Section 1600 Streambed Alteration Agreement shall be obtained from the CDFG. Mitigation shall conform with the Corps "no-net-loss" policy and the Corps Regulatory Guidance Letter No. 02-2 establishing policies and guidance on appropriate mitigation for impacts to jurisdictional waters. Mitigation for impacts to both federal and state jurisdictional waters shall be addressed using these guidelines.

Impact Significance After Mitigation: Less the Significant

Impact 5.2.C-2: Potential temporary disturbance to or permanent loss of special-status plant species, sensitive plant communities, or protected trees.

The general discussion presented below addresses the following Preferred Portfolio components:

- Recycled Water;
- Northern California Water Transfers;
- Bayside Groundwater Phase 2;
- Sacramento Basin Groundwater Banking / Exchange;
- Regional Desalination;
- Enlarge Pardee and Lower Bear Reservoirs; and
- IRCUP / San Joaquin Groundwater Banking / Exchange.

Several special-status plants, sensitive natural communities, and/or protected trees have the potential to occur within the various component project areas (Table 5.2.C-1). Sensitive natural communities include serpentine bunchgrass, northern maritime chaparral, vernal pools, valley needlegrass grassland, great valley riparian forest, freshwater marsh, seasonal wetland, coastal brackish marsh, northern salt marsh habitat, valley oak woodland, alkali meadows, alkali seep, alkali grassland, elderberry savannah, Ione chaparral, and big tree forest/montane hardwood. Protected or heritage trees are defined by Contra Costa County and Alameda County ordinances. Excavation, grading, vegetation removal, and trenching during construction would potentially disturb, impact, or eliminate special-status plants, protected trees, and/or sensitive plant communities.

Table 5.2.C-1: Special-Status Plants and Sensitive Natural Communities Potentially Occurring within the Component Project Areas

WSMP PREFERRED PORTFOLIO COMPONENT	SPECIAL-STATUS PLANTS AND SENSITIVE NATURAL COMMUNITIES POTENTIALLY OCCURRING IN THE COMPONENT PROJECT AREA
Recycled Water (Level 3)	Northern maritime chaparral, serpentine bunchgrass, valley needlegrass grassland, great valley riparian forest, valley oak woodland
Bayside Groundwater Phase 2	Special-status plants
Northern California Water Transfers	Special-status plants, valley needlegrass, serpentine bunchgrass, alkali meadow, seep, grassland, elderberry savannah, northern maritime and Ione chaparral, great valley riparian forest, big tree forest, montane hardwood
Sacramento Basin Groundwater Banking/Exchange	Special-status plants, valley needlegrass, serpentine bunchgrass, alkali meadow, seep, grassland, elderberry savannah, northern maritime and Ione chaparral, great valley riparian forest, big tree forest, montane hardwood
Regional Desalination Project	Special-status plants, alkali meadow, seep or grassland
Enlarge Pardee Reservoir	Special-status plants, Ione chaparral, upland habitats
Enlarge Lower Bear Reservoir	Ione chaparral, valley oak woodland, big tree forest, montane hardwood
IRCUP/San Joaquin Groundwater Banking/Exchange	Special-status plants, alkali seep, serpentine bunch grass, coastal brackish marsh, freshwater marsh, elderberry savannah, vernal pool, seasonal wetland, perennial wetland, chaparral, valley oak woodland

If individual project areas include special-status plants, sensitive natural communities and/or protected trees, the proposed project(s) could have a ***potentially significant*** impact. Implementation of Mitigation Measures 5.2.C-2a through 5.2.C-2e below would reduce potential impacts to less-than-significant levels.

Mitigation Measure 5.2.C-2a: Conduct habitat assessment.

Prior to the implementation of any project where special-status plants may be present, a habitat assessment shall be conducted by a qualified botanist to determine potential for special-status plants species to occur.

If suitable habitat is found within the project area, surveys for special-status plants shall be conducted during the appropriate blooming period for each target species by a qualified biologist. At least one season of surveys shall be conducted for all areas supporting potential habitat when the target species are detectable in the field. If special-status plant species are not found, no further mitigation is required.

Mitigation Measure 5.2.C-2b: Delineate special-status plant species and sensitive plant communities.

Prior to the implementation of any project where sensitive natural communities may be present, a habitat assessment shall be conducted by a qualified botanist to determine potential for sensitive natural communities to occur. Any sensitive natural communities identified within the project area shall be delineated.

Mitigation Measure 5.2.C-2c: Conduct tree survey.

Prior to the implementation of any project where protected and/or heritage trees may be present, a certified arborist shall conduct a tree survey to determine if protected and/or heritage trees are present within the project area.

Mitigation Measure 5.2.C-2d: Design and construct facilities to avoid and/or minimize impacts.

Avoidance of any special-status plant species, sensitive plant communities, and protected and/or heritage trees present shall be exercised to the extent feasible.

Mitigation Measure 5.2.C-2e: Consult regulatory agencies and comply with their requirements.

If avoidance is not feasible, additional mitigation measures may include:

- Revegetation with native and/or special-status plant species by means of harvesting and relocation of plants or seed, which shall be permanently preserved either in the project area, or at an equivalent off site location that may be permanently preserved through a conservation easement or other similar method;
- Preparation of a Mitigation and Monitoring Plan (MMP) that provides a detailed plan for habitat creation/enhancement and guidance on managing and monitoring the mitigation habitat;

- Habitat compensation with respective ratios of vegetation replacement determined based on habitat function and value and coordinated with the appropriate agencies;
- Participation in an in-lieu fee program, purchase of the required acreage in an approved mitigation bank, or implementation of an approved HCP; and
- Prevention of noxious/exotic weed proliferation.

Impact Significance After Mitigation: Less than Significant

Impact 5.2.C-3: Potential disturbance to or loss of special status invertebrates or their habitats.

The general discussion presented below addresses the following Preferred Portfolio components:

- Recycled Water;
- Northern California Water Transfers;
- Bayside Groundwater Phase 2;
- Sacramento Basin Groundwater Banking / Exchange;
- Regional Desalination;
- Enlarge Pardee and Lower Bear Reservoirs; and
- IRCUP / San Joaquin Groundwater Banking / Exchange.

Special-status invertebrate species, including several species of butterfly, harvestman, beetles, vernal pool branchipods, bees and snails have the potential to occur in the WSMP 2040 Preferred Portfolio Study Area. If any special-status invertebrates occur within the project area(s), proposed projects could have a ***potentially significant*** impact. Implementation of Mitigation Measures 5.2.C-3a through 5.2.C-3c below would reduce potential impacts to less-than-significant levels.

Mitigation Measure 5.2.C-3a: Conduct habitat assessment.

Prior to the implementation of any project where special-status invertebrates may be present, a habitat assessment shall be conducted by a qualified biologist to determine potential for special-status invertebrate species to occur.

Mitigation Measure 5.2.C-3b: Conduct focused surveys for special-status invertebrates.

If suitable habitat for special-status invertebrates is found within the project area, focused surveys shall be conducted by a qualified biologist, to determine presence of any special-status invertebrates. Wherever applicable, focused surveys shall be conducted according to USFWS or CDFG protocols.

Mitigation Measure 5.2.C-3c: Avoid occupied habitat for special-status invertebrates or implement measures to minimize impacts.

To the extent feasible, implementation of the project shall be designed and constructed to avoid adverse effects to special-status invertebrates and their habitat. If avoidance of occupied or potential habitat is not feasible, additional mitigation measures shall be implemented, and may include the following:

- Replacement of habitat at a location approved by the appropriate jurisdictional agency which may include the CEQA lead agency, CDFG, and/or USFWS depending on the species. The habitat in the amount specified above shall be acquired, permanently protected, and enhanced through management for the benefit of the species, to compensate for the loss of habitat.;
- An MMP describing the mitigation and monitoring requirements and performance standards if habitat is preserved or acquired for special-status invertebrates; and
- Participation in an in-lieu fee program, purchase of the required acreage in an approved mitigation bank, or implementation of an HCP.

Impact Significance After Mitigation: Less than Significant

Impact 5.2.C-4: Potential disturbance to or loss of special-status reptiles and amphibians, and their habitat or critical habitat.

The general discussion presented below addresses the following Preferred Portfolio components:

- Recycled Water;
- Northern California Water Transfers;
- Bayside Groundwater Phase 2;
- Sacramento Basin Groundwater Banking / Exchange;
- Regional Desalination;
- Enlarge Pardee and Lower Bear Reservoirs; and
- IRCUP / San Joaquin Groundwater Banking / Exchange.

Special-status reptiles and/or amphibians and their habitat and/or critical habitat have been identified as having potential to occur within the WSMP 2040 Preferred Portfolio Study Area. Special-status reptiles and amphibians with the potential to occur in the Study Area include Alameda whipsnake, San Joaquin whipsnake, giant garter snake, western/northwestern pond turtle, western spadefoot toad, Yosemite toad, Sierra yellow-legged frog, California red-legged frog, foothill yellow-legged frog, silvery legless lizard, coast (California) horned lizard, Mt. Lyell salamander, and California tiger salamander. If special-status reptiles and/or amphibians, their habitat and/or critical habitat occur in areas where construction would occur, the proposed projects would have a ***potentially significant*** impact. Implementation of Mitigation Measures 5.2.C-4a through 5.2.C-4c would reduce potential impacts to less-than-significant levels. Additional measures may be identified at the project level.

Potential impacts could also result from operation of Preferred Portfolio components. For example, under the Northern California Water Transfers component, it is possible that water may be transferred from rice farms within the Sacramento Valley that provide habitat for the giant garter snake, a Federally- and State-listed threatened species. If rice farms are taken out of production as a result of a water transfer, then the flooded rice fields that provide habitat for the giant garter snake would dry up. This impact on giant garter snake habitat would be ***potentially significant.*** Implementation of Mitigation Measures 5.2.C-4a through 5.2.C-4c would reduce this potential impact to less-than-significant levels. Additional measures may be identified at the project level. Potential impacts on giant garter snake habitat as well as habitat for other special-status species that may be present in areas from which water would be transferred will be evaluated as part of project-level CEQA environmental review after the sources of water are identified.

Mitigation Measure 5.2.C-4a: Conduct habitat assessment.

Prior to the implementation of any project where special-status reptiles and/or amphibians may be present, a habitat assessment shall be conducted by a qualified biologist to determine potential for special-status reptiles and/or amphibians to occur.

Mitigation Measure 5.2.C-4b: Conduct pre-construction surveys.

If suitable habitat is present, a qualified biologist shall conduct pre-construction surveys for special-status reptiles and amphibians prior to initiation of construction activities.

Mitigation Measure 5.2.C-4c: Avoid critical habitat and areas with special-status reptiles and amphibians, or implement measures to minimize impacts.

If special-status reptiles and/or amphibians are found within the project area, or the project area is within designated critical habitat, these areas shall be avoided. If avoidance of occupied habitat or designated critical habitat is not feasible, consultation with the USFWS and CDFG under the federal Endangered Species Act (FESA) and

California Endangered Species Act (CESA), respectively, shall occur to determine mitigation measures. Measures that may be required as mitigation actions by the USFWS and/or CDFG include, but are not limited to, the following:

- Focused surveys, including trapping surveys;
- Development and implementation of a protection and mitigation and monitoring plan, that is approved by the CEQA lead agency, USFWS, and CDFG;
- Relocation of special-status reptiles and amphibians;
- Limitation of construction activities within or adjacent to potential habitat;
- Develop and implement a protection, mitigation, and monitoring plan including a detailed plan for habitat mitigation, preconstruction surveys and/or trapping surveys, as well as a construction monitoring program to prevent harm to special-status reptiles and amphibians that may be present during construction;
- Exclusion fencing installation around the project area to prevent special-status reptiles and amphibians from entering the project sites;
- Construction monitoring for special-status reptiles and amphibians by a qualified biologist;
- Contractor education program implementation;
- Prevention of exotic species proliferation; and
- Revegetation of the project site based upon with guidelines for restoration, monitoring, and employment of criteria evaluations for success.

Impact Significance After Mitigation: Less than Significant

Impact 5.2.C-5: Potential disturbance to or loss of nesting birds.

The general discussion presented below addresses the following Preferred Portfolio components:

- Recycled Water;
- Northern California Water Transfers;
- Bayside Groundwater Phase 2;
- Sacramento Basin Groundwater Banking / Exchange;
- Regional Desalination;
- Enlarge Pardee and Lower Bear Reservoirs; and
- IRCUP / San Joaquin Groundwater Banking / Exchange.

Several special-status and common bird species have the potential to nest in existing structures or vegetation, including trees, shrubs, irrigated pastures, ruderal habitats, emergent aquatic vegetation, saltmarsh, bank stabilization treatments, or grassland within the WSMP 2040 Preferred Portfolio Study Area. Any removal of such vegetation, buildings, bridges or other structures, grading, or construction activities in the vicinity of active passerine or non-passerine land bird nests, or active raptor nests, or western burrowing owl burrows could result in nest abandonment, nest failure, or premature fledging. Further, removal of historic nest trees should be avoided, especially in the Central Valley/Delta where trees are scarce. Raptors tend to cycle through different nest trees each year, which helps reduce the build up of parasites.

Destruction or disturbance of active nests would be in violation of the Migratory Bird Treaty Act (MBTA) and CDFG Code. Such disturbance would be considered a ***potentially significant*** impact. Implementation of Mitigation Measures 5.2.C-5a through 5.2.C-5d below would reduce potential impacts to less-than-significant levels.

Mitigation Measure 5.2.C-5a: Conduct habitat assessment and surveys.

Prior to the implementation of any project where nesting birds may be present, a qualified biologist shall do the following:

- Conduct a habitat assessment for birds protected under the FESA including California clapper rail, California least tern, and western snowy plover. If potential habitat is present, consultation with the USFWS shall be completed;
- Conduct a habitat assessment and focused surveys for western burrowing owl, according to CDFG and the California Burrowing Owl Consortium, to determine if burrowing owls are present. If potential burrowing owl habitat or burrowing owls are detected by sign or direct observation, mitigation measures shall be developed as per CDFG guidelines and the California Burrowing Owl Consortium and in coordination with CDFG; and
- Conduct a nesting bird survey prior to any construction related activities that will occur during the potential nesting season (December 15 through August 31).

Mitigation Measure 5.2.C-5b: Avoid construction during nesting season or conduct additional surveys.

The removal of any buildings, trees, emergent aquatic vegetation, or shrubs shall occur outside of the nesting season. If removal of buildings, trees, emergent aquatic vegetation, or shrubs occurs, or construction begins between February 1 and August 31 (nesting season for passerine or non-passerine land birds) or December 15 and August 31 (nesting season for raptors), a nesting bird survey shall be performed by a qualified biologist within 14 days prior to the removal or disturbance of a potential nesting structure, trees, emergent aquatic vegetation, grassland, or shrubs, or the initiation of other construction activities. The survey shall be repeated if construction is phased or if construction activities lapse more than 14 days. During this survey, a qualified biologist shall inspect all potential nesting habitat (trees, shrubs, structures, grasslands, pastures, emergent aquatic vegetation, etc.) within 250 feet of the impact areas for nests, to the extent feasible.

Mitigation Measure 5.2.C-5c: Establish a buffer zone around nests during construction.

All vegetation and structures with active nests shall be flagged, and an appropriate non-disturbance buffer zone shall be established around the nest site. The size of the buffer zone shall be determined by a qualified biologist, in consultation with CDFG, and will depend on the species involved, site conditions, and type of work to be conducted in the area. Construction education shall be completed to ensure that nest sites and non-disturbance buffers are avoided.

Mitigation Measure 5.2.C-5d: Monitor active nests for bird activity.

A qualified biologist shall monitor any active nests to determine when the young have fledged and are feeding on their own. The project biologist and CDFG shall be consulted for clearance before construction activities resume in the vicinity of active nests.

Impact Significance After Mitigation: Less than Significant

Impact 5.2.C-6: Potential disturbance to or loss of special-status bat species and roosting habitat.

The general discussion presented below addresses the following Preferred Portfolio components:

- Recycled Water;
- Sacramento Basin Groundwater Banking / Exchange;
- Regional Desalination;
- Enlarge Pardee and Lower Bear Reservoirs; and
- IRCUP / San Joaquin Groundwater Banking / Exchange.

Existing buildings, other structures such as bridges, and mature trees and snags located in the WSMP 2040 Preferred Portfolio Study Area provide potential roosting habitat for special-status bat species. If special-status bats are found roosting within the proposed project(s), destruction or disturbance of roosting sites could have a ***potentially significant*** impact. Implementation of Mitigation Measures 5.2.C-6a through 5.2.C-6d below would reduce potential impacts to less-than-significant levels.

Mitigation Measure 5.2.C-6a: Conduct pre-construction surveys.

A pre-construction survey for roosting bats shall be performed by a qualified biologist within 30 days prior to any removal of trees or structures on the site. If the roost has a history of bat use, an exclusion device should be installed to prevent bats from occupying the site during the post survey period. If no active roosts are found, then no further action would be warranted. If either a maternity roost or hibernacula (structures used by bats for hibernation) is present, the following mitigation measures shall be implemented.

Mitigation Measure 5.2.C-6b: Avoid active maternity roosts.

If active maternity roosts or hibernacula are found in trees or structures which will be removed as a result of implementation of a component, EMBUD shall, to the extent feasible, redesign the component to avoid the loss of the tree or structure occupied by the roost. If an active maternity roost is located and the project cannot be redesigned to avoid removal of the occupied tree or structure, demolition may commence before maternity colonies form (i.e., prior to March 1) or after young are volant (flying) (i.e., after July 31). Disturbance-free buffer zones as determined by a qualified biologist in coordination with CDFG shall be observed during the maternity roost season (March 1 - July 31).

Mitigation Measure 5.2.C-6c: Evict bats prior to demolition activities.

If a non-breeding bat hibernacula is found in a tree or structure scheduled for removal, the individuals shall be safely evicted, under the direction of a qualified biologist (as determined by a Memorandum of Understanding with CDFG), by opening the roosting area to allow airflow through the cavity. Demolition can then follow at least one night after initial disturbance of airflow. This action should allow bats to leave during darkness, thus increasing their chance of finding new roosts with a minimum of potential predation during daylight. Trees or structures with roosts that must be removed shall first be disturbed at dusk, just prior to removal that same evening, to allow bats to escape during the darker hours.

Mitigation Measure 5.2.C-6d: Create replacement roosts.

If special-status bats are found roosting within trees or structures on site that require removal, EBMUD shall create appropriate replacement roosts at a suitable location on or off-site, in coordination with a qualified biologist and CDFG.

Impact Significance After Mitigation: Less than Significant

Impact 5.2.C-7: Potential disturbance to or loss of other special-status mammals.

The general discussion presented below addresses the following Preferred Portfolio components:

- Recycled Water;
- Northern California Water Transfers;
- Bayside Groundwater Phase 2;
- Sacramento Basin Groundwater Banking / Exchange;
- Regional Desalination;
- Enlarge Pardee and Lower Bear Reservoirs; and
- IRCUP / San Joaquin Groundwater Banking / Exchange.

Suitable habitat for special-status mammals may be present within the WSMP 2040 Preferred Portfolio Study Area. Special-status mammals include the San Francisco dusky-footed woodrat, riparian brush rabbit, riparian woodrat, salt marsh harvest mouse, American badger, California wolverine, Humbolt marten, Pacific fisher, San Joaquin pocket mouse, Yosemite pika, western white-tailed jackrabbit, Sierra Nevada red fox, San Joaquin kit fox, San Pablo vole, Suisun shrew, salt-marsh wandering shrew, and Alameda Island mole. If suitable habitat is present within the proposed project(s), destruction or disturbance of this habitat could have a ***potentially significant*** impact. Implementation of Mitigation Measures 5.2.C-7a through 5.2.C-7c below would reduce potential impacts to less-than-significant levels.

Mitigation Measure 5.2.C-7a: Conduct a habitat assessment.

Prior to the implementation of any project where special-status mammals may be present, a habitat assessment shall be conducted by a qualified biologist to determine potential for special-status mammals to occur.

Mitigation Measure 5.2.C-7b: Conduct pre-construction surveys.

If suitable habitat for special-status mammals is identified in the Preferred Portfolio Study Area, a qualified biologist shall conduct pre-construction surveys, or focused surveys as applicable according to USFWS or CDFG protocols, prior to initiation of construction activities.

Mitigation Measure 5.2.C-7c: Avoid special-status mammal habitat; if avoidance is not feasible, then consult with USFWS and CDFG to determine mitigation measures.

If special-status mammals are found within the project area, or the project area is within designated critical habitat, these areas shall be avoided. If avoidance of occupied habitat or designated critical habitat is not feasible, consultation with the USFWS and CDFG under the FESA and CESA, respectively, shall occur to determine mitigation measures. Measures that may be required as mitigation actions by the USFWS and/or CDFG include, but are not limited to, the following:

- Focused surveys, including trapping surveys, if appropriate;
- Development and implementation of a protection and mitigation and monitoring plan, that is approved by the CEQA lead agency, USFWS, and CDFG;
- Relocation of special-status mammals;
- Limitation of construction activities within or adjacent to potential habitat;
- Develop and implement an MMP;
- Exclusion fencing installation around the project area to prevent special-status mammals from entering the project sites;
- Construction monitoring for special-status mammals by a qualified biologist; and
- Contractor education program implementation.

Impact Significance After Mitigation: Less than Significant

Impact 5.2.C-8: Potential loss of or impacts to fish and aquatic habitats.

The general discussion presented below addresses the following Preferred Portfolio components:

- Recycled Water;
- Northern California Water Transfers;
- Bayside Groundwater Phase 2;
- Sacramento Basin Groundwater Banking / Exchange;
- Regional Desalination;
- Enlarge Pardee and Lower Bear Reservoirs; and
- IRCUP / San Joaquin Groundwater Banking / Exchange.

Construction associated with proposed facilities developed as part of the above components include treatment plants, desalination plant, wells, pump stations, recharge ponds, dam-related facilities, and pipelines have the potential to impact aquatic habitats. Specifically, the temporary construction impacts from the enlargement of the Pardee and Lower Bear Reservoirs (construction of new dams, spillways, powerhouse, saddle dams, tunnels, pipelines, new and modified treatment facilities, and the installation of new wells, as well as relocated recreation areas, roads, bridges, and power transmission lines) could disturb sediments and soils adjacent to waterways. Any resulting erosion or disturbance of sediments and soils could temporarily increase turbidity and sedimentation downstream of the construction sites if soils are transported in river flows or stormwater runoff. Construction-related increases in sediments, turbidity, water temperature, and contaminants could temporarily impact nearby aquatic habitats and fish populations in the vicinity of project construction activities.

Any adverse effects to fish species and aquatic habitats would be a ***potentially significant*** impact. Implementation of Mitigation Measures 5.2.C-8a through 5.2.C-8b below would reduce potential impacts to less-than-significant levels.

Mitigation Measure 5.2.C-8a: Comply with State NPDES general construction permit.

Prior to the implementation of any project where fish species and aquatic habitats could be adversely affected, a Stormwater Pollution Prevention Plan (SWPPP) shall be prepared and implemented to minimize the potential contamination of surface waters, and comply with applicable federal regulations concerning construction activities (see Mitigation Measure 5.2.A-1a [Comply with State National Pollutant Discharge Elimination System [NPDES] General Construction Permit] in Section 5.2.A, Hydrology, Groundwater, and Water Quality).

Mitigation Measure 5.2.C-8b: Implement a spill prevention and control plan.

Prior to the implementation of any project where fish species and aquatic habitats could be impacted, a spill prevention control and countermeasures plan shall be prepared and implemented (see Mitigation Measure 5.2.J-1 [Enforce On-site Hazardous Materials Handling Rules] in Section 5.2.J, Hazards).

Impact Significance After Mitigation: Less than Significant

Impact 5.2.C-9: Potential entrainment of special-status fish into pumps/intake pipes.

The general discussion presented below addresses the following Preferred Portfolio components:

- Regional Desalination; and
- IRCUP / San Joaquin Groundwater Banking / Exchange.

Diversions from rivers and water bodies have the potential to entrain fish eggs, larvae, juveniles, and adults, including special-status species. Losses to diversions depend on the timing, size, design, and location (geographically and position in the channel) of individual diversions relative to the seasonal and diurnal distribution and abundance of fish. Egg, larval, and juvenile life stages are most susceptible to entrainment. Potential entrainment of fish, including special-status species, into pumps and intake pipes would be a ***potentially significant*** impact. Implementation of Mitigation Measure 5.2.C-9 below would reduce this potential impact to a less-than-significant level.

Mitigation Measure 5.2.C-9: Install fish screens.

Fish screens shall be designed and installed over any potential new diversion intake(s). The fish screen shall be designed consistent with CDFG and the National Marine Fisheries Service (NMFS) criteria for screen mesh size, water velocity approach, etc.

Impact Significance After Mitigation: Less than Significant

Impact 5.2.C-10: Potential reduction of surface water quality.

The discussion presented below addresses the following Preferred Portfolio components:

- Recycled Water; and
- Bayside Groundwater Phase 2.

Recharge and/or recovery operations could negatively affect the water quality in surface water bodies, and associated aquatic habitats, through the introduction of disinfection chemicals, contaminants and/or from the intrusion of salt water. This impact would occur if degraded water flows to the surface and spills over into surface water bodies directly without filtering through soils and sediments (see Impact 5.2.A-6 in the Hydrology, Groundwater, and Water Quality section). This impact would be ***potentially significant***. Implementation of Mitigation Measure 5.2.C-10 below would reduce this potential impact to a less-than-significant level.

Mitigation Measure 5.2.C-10: Implement a groundwater monitoring plan.

A groundwater monitoring plan shall be implemented by EBMUD as part of the Bayside Groundwater Phase 2 to monitor the impact of operations on groundwater levels and water quality. For a full discussion, see Mitigation Measure 5.2.A-4 in Section 5.2.A, Hydrology, Groundwater, and Water Quality.

Impact Significance After Mitigation: Less than Significant

Impact 5.2.C-11: Potential disruption of downstream flow releases.

The discussion presented below addresses the following Preferred Portfolio components:

- Enlarge Pardee and Lower Bear Reservoirs.

Pardee Reservoir would continue to operate normally during the majority of the construction period. However, cessation of releases from the existing dam would potentially occur for about 1 month when the Mokelumne River is temporarily rerouted from its usual course, and again when the river is restored to its natural course toward the end of construction. Other contingencies may require occasional reductions or shutdown of releases. EBMUD would continue to make required JSA and other downstream releases to the lower Mokelumne River from Camanche Reservoir, according to a pre-defined plan of operation to ensure that Camanche has adequate water supply during this temporary outage. The river course rerouting likely cannot be done in fall due to the resulting in-stream temperature and water level impacts.

For the Lower Bear Reservoir, changes to flow are not known at this time, but it is likely that a similar, temporary re-routing of the river course to accommodate construction would be necessary. This impact would be ***potentially significant***. Implementation of Mitigation Measure 5.2.C-11 below would reduce this potential impact to a less-than-significant level.

Mitigation Measure 5.2.C-11: Develop and implement a reoperation plan.

Prior to the onset of construction, a reoperation plan will be developed to ensure that adequate water is available in Camanche Reservoir to maintain required downstream releases to the lower Mokelumne River during construction. The reoperation plan shall note specifically those seasonal restrictions on construction-related outages that cannot be accommodated due to inadequate capacity in Camanche Reservoir to maintain habitat-sensitive flow and temperature regimes.

Impact Significance After Mitigation: Less than Significant

Table 5.2.C-2: Summary of Potential Biological Resources Impacts Resulting from the WSMP 2040 Preferred Portfolio

IMPACT	RATIONING	CONSERVATION	RECYCLED WATER	NORTHERN CALIFORNIA WATER TRANSFERS	BAYSIDE GROUNDWATER PHASE 2	SACRAMENTO BASIN GROUNDWATER BANKING / EXCHANGE	REGIONAL DESALINATION	ENLARGE PARDEE RESERVOIR	ENLARGE LOWER BEAR RESERVOIR	IRCUP / SAN JOAQUIN GROUNDWATER BANKING / EXCHANGE
5.2.C-1: Potential temporary and permanent impacts to sensitive natural communities or wetlands or waters falling under the jurisdiction of the Corps and the State of California	--	--	LTSM	LTSM	LTSM	LTSM	LTSM	LTSM	LTSM	LTSM
5.2.C-2: Potential temporary disturbance to or permanent loss of special-status plant species, sensitive plant communities, or protected trees	--	--	LTSM	LTSM	LTSM	LTSM	LTSM	LTSM	LTSM	LTSM
5.2.C-3: Potential disturbance to or loss of special status invertebrates or their habitats	--	--	LTSM	LTSM	LTSM	LTSM	LTSM	LTSM	LTSM	LTSM
5.2.C-4: Potential disturbance to or loss of special-status reptiles and amphibians, and their habitat or critical habitat	--	--	LTSM	LTSM	LTSM	LTSM	LTSM	LTSM	LTSM	LTSM
5.2.C-5: Potential disturbance to or loss of nesting birds	--	--	LTSM	LTSM	LTSM	LTSM	LTSM	LTSM	LTSM	LTSM

Table 5.2.C-2: Summary of Potential Biological Resources Impacts Resulting from the WSMP 2040 Preferred Portfolio (continued)

IMPACT	RATIONING	CONSERVATION	RECYCLED WATER	NORTHERN CALIFORNIA WATER TRANSFERS	BAYSIDE GROUNDWATER PHASE 2	SACRAMENTO BASIN GROUNDWATER BANKING / EXCHANGE	REGIONAL DESALINATION	ENLARGE PARDEE RESERVOIR	ENLARGE LOWER BEAR RESERVOIR	IRCUP / SAN JOAQUIN GROUNDWATER BANKING / EXCHANGE
5.2.C-6: Potential disturbance to or loss of special-status bat species and roosting habitat	--	--	LTSM	--	--	LTSM	LTSM	LTSM	LTSM	LTSM
5.2.C-7: Potential disturbance to or loss of other special-status mammals	--	--	LTSM	LTSM	LTSM	LTSM	LTSM	LTSM	LTSM	LTSM
5.2.C-8: Potential loss of or impacts to fish and aquatic habitats	--	--	LTSM	LTSM	LTSM	LTSM	LTSM	LTSM	LTSM	LTSM
5.2.C-9: Potential entrainment of fish into pumps/intake pipes	--	--	--	--	--	--	LTSM	--	--	LTSM
5.2.C-10: Potential reduction of surface water quality	--	--	LTSM	--	LTSM	--	--	--	--	--
5.2.C-11: Potential disruption of downstream flow releases	--	--	--	--	--	--	--	LTSM	LTSM	--
-- = No Impact, LTS = Less than Significant, LTSM = Less than Significant with Mitigation, PS = Potentially Significant, B = Beneficial										

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5.2.D Land Use and Recreation

5.2.D.1 Significance Criteria

In accordance with Appendix G of the CEQA Guidelines, a significant impact on land use would occur if the WSMP 2040 Preferred Portfolio would:

- Physically divide an established community;
- Conflict with any applicable land use plan, policy, or regulation of an agency with jurisdiction over the project (including, but not limited to the general plan, specific plan, local coastal program, or zoning ordinance) adopted for the purpose of avoiding or mitigating an environmental effect;
- Convert Prime Farmland, Unique Farmland, or Farmland of Statewide Importance (Farmland), as shown on the maps prepared pursuant to the Farmland Mapping and Monitoring Program of the California Resources Agency, to non-agricultural use;
- Conflict with existing zoning for agricultural use, or a Williamson Act contract;
- Involve other changes in the existing environment which, due to their location or nature, could result in conversion of Farmland, to non-agricultural use;
- Impair recreation facilities and activities;
- Increase the use of existing neighborhood and regional parks or other recreational facilities such that substantial physical deterioration of the facility would occur or be accelerated; or
- Require the construction or expansion of recreational facilities which might have an adverse physical effect on the environment.

5.2.D.2 Issues Dismissed from Further Analysis

New facilities proposed under the Preferred Portfolio would be developed in areas that are generally compatible with existing facilities (e.g., enlarged reservoirs occur at the existing reservoirs; treatment facilities would be co-located with existing EBMUD facilities to the extent possible, or would be sited in industrial areas; pipelines would be buried). As such, proposed facilities would not physically divide established communities.

Additionally, the WSMP 2040 Preferred Portfolio components would not increase the use of existing parks or other recreational facilities such that substantial physical deterioration of the facility would occur or be accelerated, nor would they involve the construction or expansion of recreational facilities which might have an adverse physical effect on the environment.

No further discussion of these issues is required.

5.2.D.3 Components That Would Not Result in Land Use Impacts

The following Preferred Portfolio components were evaluated for their potential to cause land use and recreation impacts, and no impacts were identified.

Rationing and Conservation

Implementation of the Rationing and Conservation components would not conflict with any land use plans, policies, or regulations; adversely affect agricultural operations; or substantially affect recreation facilities or activities. Rationing would involve mandatory customer cutbacks of water consumption during certain dry water years. While rationing at the proposed 10 percent rationing level may affect ornamental landscaping, public recreation fields (e.g., baseball and soccer fields, golf courses) would continue to be irrigated to support recreation uses. Rationing would not alter land use patterns (e.g., residential, commercial, industrial, open space uses) identified by cities and counties in their adopted general plans or in specific development plans approved by these jurisdictions.

Conservation would increase water use efficiency through the implementation of specific improvements or actions implemented primarily at the individual level, on a voluntary basis. As such, no land use or recreation changes would result from the Conservation component.

5.2.D.4 Consistency with Relevant Plans, Policies, and Regulations

Affected jurisdictions have plans and policies that guide development within their boundaries for the protection of environmental resources. Appendix B summarizes the relevant goals and policies from general plans for jurisdictions that would be potentially affected by the WSMP 2040 Preferred Portfolio. It is expected that the Preferred Portfolio would generally conform to general plan policies; however, as locations for many of the proposed facilities have not yet been determined, further site-specific environmental review will be required to determine whether any conflicts to goals, policies, and programs of affected jurisdictions would occur.

5.2.D.5 Potential Land Use and Recreation Impacts

Impact 5.2.D-1: Potential reduction of agricultural productivity and conversion of farmland to non-agricultural uses.

The general discussion presented below addresses the following Preferred Portfolio components:

- Recycled Water;
- Northern California Water Transfers;

- Sacramento Basin Groundwater Banking / Exchange;
- Enlarge Pardee and Lower Bear Reservoirs; and
- San Joaquin / IRCUP Groundwater Banking / Exchange.

As noted in Section 4.2.D, the Bayside Groundwater Phase 2 and Regional Desalination components would not involve construction of new facilities in agricultural areas.

Proposed facilities, including new well and pumping sites, recharge ponds, and pipelines, would be constructed in areas with a variety of land uses, including but not limited to agricultural lands. Depending on the specific sites of these facilities, disruption to agricultural operations, including the conversion of Prime Farmland, Farmland of Statewide Importance, or Unique Farmland to non-agricultural uses, may occur. Disruption of such operations would potentially lead to a reduction in agricultural productivity.

Pipeline installation would potentially cause short-term disruption of agricultural operations due to the presence of equipment, trucks, and materials onsite, and from dewatering activities (i.e., dewatering of the pipeline trench could affect drainage in the area adjacent to the pipeline alignment). The duration of disturbance would depend on the construction schedules for the various facilities, and could exceed one season.

Long-term impacts would result from potential conversion of State-designated farmlands to non-agricultural uses associated with the siting of above-ground structures. The percentage of lands converted to non-agricultural uses relative to the county where such facilities are located would depend on both the total acreage that would be converted and the acreage of such lands in the county. As the specific locations of facilities associated with the Preferred Portfolio components are unknown, the relative loss of farmlands cannot be determined at this time; therefore, this impact would be ***potentially significant***. Implementation of Mitigation Measures 5.2.D-1a and 5.2.D-1b would reduce potential impacts to less-than-significant levels. Subsequent project-level environmental review would be needed to assess the potential for this impact to occur once locations of facilities are identified.

Discussion of Specific Components

The following Preferred Portfolio components allow for more specific discussion and are presented below.

Northern California Water Transfers

This component includes the potential transfer of SWP and CVP water from entities in the Sacramento watershed (Yuba, Colusa, Glenn, and Plumas) to EBMUD.

The potential change in SWP and CVP water deliveries could be temporary or permanent, depending on the agreements established by EBMUD and trading partners. Because large areas of these counties consist of agricultural uses, it is most likely that water that would be transferred from areas that currently support agriculture. The water available for transfer may be considered surplus if it is derived from water conserved through existing fallowing, conversions of land, or improved irrigation or other water conservation practices. The water is not considered surplus if the supply is used for irrigation and other agricultural practices.

Upon initiation of water transfers, individual water users would have varying responses to changes in water supply. If the water is not considered surplus, then the users' responses could include ceasing agricultural operations, changing crop patterns, increasing irrigation efficiencies or accepting reduced yields, acquiring water from other sources, water conservation, and/or increased groundwater pumping. Water transfers may or may not result in a loss of agricultural production, depending on the steps individual water users take, the actual amount of water transferred, the duration of the transfer, the original use of the transferred water, and the farming practices implemented to compensate for the transfer.

The temporary loss of agricultural production (e.g., if landowners decide to fallow land) potentially resulting from short-term water transfers is not expected to have long-term adverse effects on agricultural operations, as these lands would be used for agricultural production in subsequent years when water transfers to EBMUD cease. Long-term water transfers have the potential to not only disrupt agricultural production both temporarily or permanently but also indirectly lead to the conversion of important farmlands (as defined by the California Department of Conservation) to non-agricultural uses. As discussed above, individual water users have independent responses to changes in water supply and it should also be noted that water transfers are conducted on a willing seller and buyer basis. It is likely that farmers would manage their lands to minimize effects on agricultural production if they intend to approve such transfers and maintain their lands in agricultural production. However, it is possible that long-term reduction in landowners' water supply could lead to conversion of State-designated important farmlands (i.e., prime farmland, farmland of statewide importance, farmland of local importance, and unique farmland) to other non-agricultural uses (e.g., urban uses), which would potentially result in a permanent loss of these important farmlands.
In addition, because some of the converted farmlands may be under the Williamson Act contract, the nullification of such contracts may hinder the overall preservation of agricultural uses on lands in the affected counties.

As the sources and amount of water transfers and the responses of the water users are not known, potential impacts associated with the reduction of water supply to existing water rights holders cannot be determined. For the purposes of this program-level assessment, potential impacts associated with the loss of State-designated important farmlands, the permanent reduction in agricultural production, and conflict with Williamson Act contracts would be ***potentially significant***. Subsequent environmental review would be needed when this component is further defined, water transfer partners are solidified, and affected farmlands are identified.

Enlarge Pardee and Lower Bear Reservoirs

EBMUD allows grazing for fire suppression purposes around Pardee Reservoir. Enlargement of the reservoirs would increase their inundation areas, which in turn would reduce the amount of grazing land owned by EBMUD. Other landowners also allow grazing on adjacent lands, and these lands would not be affected by the enlargement of the reservoir. No Prime Farmland, Farmland of Statewide Importance, or Unique Farmland exists within the area potentially affected by the enlargement of Pardee Reservoir or Lower Bear Reservoir. Therefore, this impact would be ***less than significant.***

Mitigation Measure 5.2.D-1a: Avoid siting proposed facilities within State-designated important farmlands.

EBMUD shall avoid siting recharge ponds, well sites, and other above- and below-ground facilities within State-designated farmlands (including Prime Farmland, Farmland of Statewide Importance, and Unique Farmland). If avoidance is not possible, EBMUD shall site these facilities at the edge of existing farms to the extent possible.

Mitigation Measure 5.2.D-1b: Restore agricultural lands to pre-project conditions.

If avoidance of State-designated important farmlands cannot be taken, then the District shall implement the following actions to the extent feasible to support the continued productive use of Prime Farmland and Farmland of Statewide Importance:

- To the extent feasible, ensure that existing drainage systems at the proposed sites that are needed for agricultural uses are functioning as necessary so that agricultural uses are not disrupted;
- Minimize the disturbance of Prime Farmland, Farmland of Statewide Importance, and Unique Farmland to continuing agricultural operations during construction activities by locating construction access and staging areas in areas that are fallow and using existing roads to access construction areas to the extent possible;
- Perform soil density monitoring during backfill and ripping to minimize excessive compaction and minimize effects on future agricultural land use. Remove topsoil prior to excavation in fields and return it to top of fields to avoid detrimental inversion of soil profiles. Avoid excessive compaction of trench backfill. Rip excessively compacted soils to prevent adverse compaction effects. Control

compaction to minimize changes to lateral groundwater flow which could affect both irrigation and internal drainage; and

- Coordinate construction scheduling as feasible and practicable so as to minimize disruption of agricultural operations.

Impact Significance After Mitigation: Less than Significant for Sacramento Basin Groundwater Banking / Exchange, Enlarge Pardee and Lower Bear Reservoirs, and San Joaquin / IRCUP Groundwater Banking / Exchange components

Potentially Significant for Northern California Water Transfers

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Impact 5.2.D-2: Potential impairment of recreation facilities and activities.

The general discussion presented below addresses the following Preferred Portfolio components:

- Recycled Water;
- Northern California Water Transfers;
- Bayside Groundwater Phase 2;
- Sacramento Basin Groundwater Banking / Exchange;
- Regional Desalination;
- Enlarge Pardee and Lower Bear Reservoirs; and
- IRCUP / San Joaquin Groundwater Banking / Exchange

Depending on the location of the proposed facilities (e.g., treatment plants, wells, pipelines, intertie, pump stations, and recharge ponds), recreation may be affected. Pipelines would likely be located within existing roadways and easements to the extent possible, particularly in urban areas. Because the exact locations of facilities have not yet been identified for many of the above components, construction could cross or occur at existing recreational facilities and disrupt recreation activities. Such impacts on recreational resources would be considered ***potentially significant***. Implementation of Mitigation Measure 5.2.D-2a would reduce potential impacts to less-than-significant levels. In the event disturbance to existing recreational facilities is required, temporary restriction to or closure of the recreational facilities would be needed during the duration of construction to ensure public safety. Recreational facilities may also be damaged during the course of pipeline installation. If recreational facilities are not repaired and reopened upon completion of the work activity, then short-term effects could become long-term significant impacts.

Discussion of Specific Components

The following Preferred Portfolio components allow for more specific discussion and are presented below.

Regional Desalination

Water-related recreational opportunities in Suisun Bay (e.g., recreational boating and fishing) could be temporarily affected by in-water construction activities for the desalination plant intake. These disturbances may include boating traffic restrictions, noise, navigation hazards from dredging equipment, and temporary increases in water turbidity that disrupts the fishery. These temporary effects would displace some boaters and anglers to other areas of the Delta, or other water bodies affording a similar experience. In the long-term, the presence of the desalination plant intake and pipeline would not affect recreational uses in the area. Therefore, the potential impacts of constructing and operating the intake would be ***less than significant***.

Enlarge Pardee and Lower Bear Reservoirs

Construction activities and operation could temporarily restrict access to existing recreation areas and facilities, or permanently require the closure and relocation of such facilities. Recreational facilities are present around both reservoir sites.

Enlargement of the Pardee and Lower Bear Reservoirs would increase the overall areas of inundation around the reservoirs, resulting in the flooding of existing recreational facilities (e.g., campgrounds, marina, day use areas, and trails) and their relocation. The removal, relocation, and temporary disturbance of recreational facilities and activities would be ***potentially significant***. Implementation of Mitigation Measures 5.2.D-2a and 5.2.D-2b would reduce potential impacts to less-than-significant levels.

Additionally, the Enlarge Pardee Reservoir component would inundate the Electra Whitewater Run, as shown in Figures 3-9 and 3-10 in Chapter 3. As stated in Section 3.2.5, EBMUD would operate the reservoir so that the high water level above the Electra Whitewater Run would only occur during winter storms, and water levels would be lowered to expose the Whitewater Run in time for rafting in the spring and summer months. Implementation of Mitigation Measure 5.2.D-2b would reduce potential impacts on the Electra Whitewater Run to less-than-significant levels.

Mitigation Measure 5.2.D-2a: Repair and reopen affected recreational facilities.

EBMUD shall include the following requirement in construction specifications:

- Repair recreational facilities damaged by project construction.

Mitigation Measure 5.2.D-2b: Replace inundated recreational features.

EBMUD or its contractors shall implement the following measures for the Enlarge Pardee and Lower Bear Reservoirs components:

- Replace recreational features displaced by enlargement of reservoirs; and
- Implement an operations plan for the enlarged Pardee Reservoir that preserves the Electra whitewater run during the summer months.

Impact Significance After Mitigation: Less than Significant

Table 5.2.D-1: Summary of Potential Land Use and Recreation Impacts Resulting from the WSMP 2040 Preferred Portfolio

IMPACT	RATIONING	CONSERVATION	RECYCLED WATER	NORTHERN CALIFORNIA WATER TRANSFERS	BAYSIDE GROUNDWATER PHASE 2	SACRAMENTO BASIN GROUNDWATER BANKING / EXCHANGE	REGIONAL DESALINATION	ENLARGE PARDEE RESERVOIR	ENLARGE LOWER BEAR RESERVOIR	IRCUP / SAN JOAQUIN GROUNDWATER BANKING / EXCHANGE
5.2.D-1: Potential reduction of agricultural productivity as a result of indirect disruptions on agricultural operations, and conversion of State-designated farmlands to non-agricultural uses	--	--	LTSM	PS	--	LTSM	--	LTSM	LTSM	LTSM
5.2.D-2: Potential impairment of recreation facilities and activities	--	--	LTSM	LTSM	LTSM	LTSM	LTSM	LTSM	LTSM	LTSM
-- = No Impact, LTS = Less than Significant, LTSM = Less than Significant with Mitigation, PS = Potentially Significant, B = Beneficial										

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5.2.E Transportation

5.2.E.1 Significance Criteria

In accordance with Appendix G of the CEQA Guidelines, a significant impact on transportation would occur if the WSMP 2040 Preferred Portfolio would:

- Cause an increase in traffic which is substantial in relation to the existing traffic load and capacity of the street system (i.e., result in a substantial increase in either the number of vehicle trips, the volume to capacity ratio on roads, or congestion at intersections);
- Exceed, either individually or cumulatively, a level of service standard established by the county congestion management agency for designated roads or highways;
- Result in a change in air traffic patterns, including either an increase in traffic levels or a change in location that results in substantial safety risks;
- Substantially increase hazards due to a design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., increasing traffic in rural areas with slow-moving farm vehicles);
- Result in inadequate emergency access;
- Result in inadequate parking capacity; or
- Conflict with adopted policies, plans, or programs supporting alternative transportation (e.g., bus turnouts, bicycle racks).

5.2.E.2 Issues Dismissed from Further Analysis

The WSMP 2040 Preferred Portfolio components would involve the construction of a variety of facilities (e.g., above-ground structures for housing wells, pump stations, and treatment facilities; recharge ponds and dams; and buried pipelines). These facilities are not expected to change air traffic patterns, even if located in proximity to airports. Facilities located within public rights-of-way would be buried (i.e., pipelines), and as such would not include any design features that would increase hazards. In addition, components would not have any long-term conflict with any policies, plans, or programs supporting alternative transportation (please see Appendix B for a summary of general plans and policies). No further discussion of the above issues will be provided.

5.2.E.3 Components That Would Not Result in Transportation Impacts

The following Preferred Portfolio components were evaluated for their potential to cause transportation impacts, and no impacts were identified.

Rationing and Conservation

Rationing would involve mandatory customer cutbacks of water consumption during certain dry water years and is not related to transportation. As such, no impacts related to transportation would occur from implementation of rationing at 10 percent. Under the Conservation component, EBMUD would encourage its customers to voluntarily implement conservation measures to reduce water use. These measures would not affect transportation, and therefore, no impacts related to transportation would occur. No further discussion of this issue is required for these components.

5.2.E.4 Potential Transportation Impacts

Impact 5.2.E-1: Potential reduction of the number or available width of travel lanes on roads from construction, resulting in temporary disruption of traffic flows, increases in traffic congestion, and access to adjacent land uses for both general and emergency access.

The general discussion below addresses the following Preferred Portfolio components:

- Recycled Water;
- Northern California Water Transfers;
- Bayside Groundwater Phase 2;
- Sacramento Basin Groundwater Banking / Exchange;
- Regional Desalination;
- Enlarge Pardee and Lower Bear Reservoirs; and
- IRCUP / San Joaquin Groundwater Banking / Exchange.

Construction of facilities developed as part of the above components would require the installation of above-ground structures and buried pipelines. Section 5.1.3 describes typical construction methods associated with such facilities. Above-ground structures would likely be constructed within existing EBMUD property away from public road rights-of-way and as such, would not directly affect nearby traffic patterns. Installation of pipelines would occur within road rights-of-way, which could lead to short-term traffic delays for vehicles traveling past construction zones, as well as temporarily limit access to adjacent land uses.

Pipeline installation would likely occur within public roadways that extend through a variety of land uses, including residential, commercial, and industrial uses. Because pipeline construction would require space to accommodate open trenches/pits and staging areas for materials and equipment, the travel width of roadways would likely be reduced, thus resulting in potential traffic delays within construction zones. To the extent feasible, two-way traffic would be maintained on all roadways. However, on roadways with restricted travel widths, alternate one-way travel may be required. If sufficient road width is not available, complete closure of roads may be required.

Depending on the location and timing of construction, impacts associated with traffic delays and lane or road closures (although temporary) could be significant. In commercial areas where traffic volumes are high, such closures during peak-hour traffic would result in ***potentially significant*** impacts. Further investigation of the impacts on area roadways would be conducted at the project level once the pipeline alignments are identified.

Lane blockages or street closures during pipeline installation could also reduce curb parking, delay emergency access, or limit access to adjacent land uses. In addition, the reduction in travel lanes could result in a shift in traffic circulation patterns to adjacent and parallel streets. For the purposes of this analysis, impacts associated with traffic delays and restrictions to adjacent uses would be considered ***potentially significant***.

Implementation of Mitigation Measure 5.2.E-1 below would reduce these potential impacts to less-than-significant levels.

Discussion of Specific Components

The following Preferred Portfolio component allows for more specific discussion and is presented below.

Enlarge Pardee Reservoir and Lower Bear Reservoir

The Enlarge Pardee and Lower Bear Reservoirs components would require the relocation of recreation areas, bridges and roads (e.g., SR 49 and Stony Creek Road in the vicinity of Pardee Reservoir). The relocation of these facilities would temporarily disrupt traffic patterns in the area. The duration of construction activities has not yet been determined at these locations; therefore, the disruption to traffic is not yet known. However, traffic patterns would be restored following implementation. The temporary disruption of traffic flows and patterns, as well as limitations to adjacent land uses (including the recreation area) would be considered ***potentially significant***. Implementation of Mitigation Measure 5.2.E-1 would reduce potential impacts to less-than-significant levels.

Mitigation Measure 5.2.E-1: Prepare and implement a traffic control plan.

EBMUD shall prepare a detailed traffic control plan for the affected roadways and intersections for the selected pipeline alignments. The traffic control plan shall be prepared in accordance with professional traffic engineering standards and in compliance with the requirements of the affected jurisdiction’s encroachment permit requirements. The traffic control plan shall include, but be limited to, the following:

- Identify specific methods for maintaining traffic flows for affected streets. This shall include identifying roadway locations where special trenching techniques (e.g., trenchless construction) would be used to minimize impacts to traffic flow and operations;
- Identify areas where construction would be limited to non-peak hours to reduce traffic flow restrictions, in compliance with the encroachment permit;
- Maintain the maximum amount of travel lane capacity during non-construction periods and provide flagger control at sensitive construction sites to manage traffic control and flows;
- To the extent feasible, limit the construction work zone to a width that, at a minimum, maintains alternate one-way traffic flow past the construction zone;
- Coordinate construction activities (time of year and duration) to minimize traffic disturbances adjacent to schools and commercial areas;
- Post advanced warning of construction activities to allow motorists to select alternative routes in advance;
- Require appropriate warning signage and lighting for construction zones;
- Identify appropriate and safe detour routes if closure of a roadway is required, and install signage warning of road closure and detour routes; and
- Maintain steel trench plates at construction sites to restore access across open trenches to minimize disruption of access to driveways and adjacent land uses. Construction trenches in street shall not be left open after work hours.

The traffic control plan shall be reviewed for appropriateness and approved by the governing public works department.

Impact Significance After Mitigation: Less than Significant

Impact 5.2.E-2: Potential short-term increases in vehicle trips during construction.

The general discussion below addresses the following Preferred Portfolio components:

- Recycled Water;
- Northern California Water Transfers;
- Bayside Groundwater Phase 2;
- Sacramento Basin Groundwater Banking / Exchange;
- Regional Desalination;

- Enlarge Pardee and Lower Bear Reservoirs; and
- IRCUP / San Joaquin Groundwater Banking / Exchange.

Construction-generated traffic would be temporary and, therefore, would not result in any long-term degradation of operating conditions or level of service on any project roadways. The primary off-site impacts from the movement of construction trucks would include short-term and intermittent lessening of roadway capacities due to slower movements and larger turning radii of the trucks compared to passenger vehicles. The number of construction-related truck trips that would be generated from the Preferred Portfolio components has not yet been determined. Truck trips would be associated with the delivery of equipment, import/export of material, and worker commutes to and from the construction sites. Truck trips would be dispersed throughout the day, and would follow the designated haul routes of affected jurisdictions. For the Regional Desalination component, construction activities would occur along Willow Pass Road / West 10th Street, Port Chicago Highway, and Waterfront Road, although the number of trips that would be generated has not yet been determined.

The distances between the construction sites and major freeways would vary. Construction traffic occurring during the early morning and late afternoon would coincide with peak-period traffic (which differs with geography and corresponds to the commute hours) and would have the greatest potential to impede traffic flow on local roads and highways. For the purposes of this program-level analysis, impacts associated with short-term increases in construction-related vehicle trips would be ***potentially significant***, absent information on the amount of construction traffic that would be generated during peak traffic hours. Implementation of Mitigation Measure 5.2.E-2 below would reduce this potential impact to a less-than-significant level.

Operation of Preferred Portfolio components is expected to result in minor increases in workers, as existing EBMUD employees would likely maintain proposed facilities as part of existing workloads; as such, the increase in traffic volumes associated with new employees is not expected to result in substantial long-term degradation of operating conditions or levels of service on roadways. Therefore, potential traffic impacts would be ***less than significant***.

Discussion of Specific Components

The following Preferred Portfolio components allow for more specific discussion and are presented below.

Enlarge Pardee Reservoir and Lower Bear Reservoir

The Enlarge Pardee and Lower Bear Reservoirs components would generate a substantial number of truck trips to transport materials and equipment to and from construction sites. The anticipated number of truck trips has not yet been determined but would likely be several magnitudes greater than other WSMP 2040 Preferred Portfolio components. Because the reservoirs offer recreational amenities, traffic could be high during certain periods, including weekends during the summer and fall seasons, as well as long weekends with public holidays. During those peak recreational periods, traffic congestion may occur. As such, impacts associated with construction vehicular trips would be considered ***potentially significant***. Implementation of Mitigation Measure 5.2.E-2 below would reduce this potential impact to a less-than-significant level.

Mitigation Measure 5.2.E-2: Schedule construction truck trips to avoid peak traffic hours.

EBMUD shall include in construction plans and specifications a requirement that contractors schedule construction-related truck trips, specifically deliveries of fill and equipment, outside of weekday AM and PM peak commute traffic hours and peak recreational periods such as holiday weekends.

Impact Significance After Mitigation: Less than Significant

Impact 5.2.E-3: Potential to generate demand for parking spaces for worker vehicles.

The general discussion below addresses the following Preferred Portfolio components:

- Recycled Water;
- Northern California Water Transfers;
- Bayside Groundwater Phase 2;
- Sacramento Basin Groundwater Banking / Exchange;
- Regional Desalination; and
- IRCUP / San Joaquin Groundwater Banking / Exchange.

Although the precise locations of facilities associated with the components above have not yet been determined, construction activities would generally occur at the proposed treatment locations and along pipeline alignments. There would likely be sufficient space at existing treatment plants to accommodate staging and worker vehicle parking.

Pipeline installation along roadways could displace available parking spaces in the construction zone. Worker vehicles could also displace additional parking spaces in the vicinity of construction zones. The number of displaced parking spaces cannot be determined at this time. Within residential areas, construction activities would occur during the day when residents are most likely at work, and therefore sufficient parking to accommodate the public and worker vehicles would likely be available on nearby streets. Within industrial areas, sufficient on-street parking spaces are typically available.

However, in commercial areas where parking spaces are limited, adequate space for public and worker vehicles might not be available. In this case, the public and workers may have to park outside the immediate area of affected streets. While the increased walking distance from a parking space to the work site would be an inconvenience, this would be a ***less-than-significant*** impact.

Operation of Preferred Portfolio components is expected to result in minor increase in workers. Adequate parking at the recycled water project locations would likely be available to accommodate new staff. As such, operational impacts related to parking would be ***less than significant***.

Impact Significance: Less than Significant

Impact 5.2.E-4: Potential increase in wear and tear on designated haul routes from construction vehicles.

The general discussion below addresses the following Preferred Portfolio components:

- Recycled Water;
- Northern California Water Transfers;
- Bayside Groundwater Phase 2;
- Sacramento Basin Groundwater Banking / Exchange;
- Regional Desalination;
- Enlarge Pardee and Lower Bear Reservoirs; and
- IRCUP / San Joaquin Groundwater Banking / Exchange.

The use of heavy trucks to transport equipment and material to and from work sites could affect road conditions on designated haul routes by increasing the rate of road wear. The degree to which this impact would occur depends on the design (pavement type and thickness) and existing condition of the road, as well as the number of vehicle trips generated by a particular component (which is not yet known). Major arterials and collectors are designed to accommodate a mix of vehicle types, including heavy trucks; potential impacts are expected to be negligible on such roads.

Residential roads are generally not built with a pavement thickness intended to withstand substantial truck traffic volumes. Although these roads would be avoided to the extent feasible, residential roadways could be used to access selected pipeline installation sites. In addition, construction vehicles would access Pardee and Lower Bear reservoirs via local roadways whose pavement thickness may not withstand the substantial increase in the number of truck trips that would occur during construction. Impacts related to damaged roadways would be considered ***potentially significant***. Implementation of Mitigation Measure 5.2.E-4 below would reduce these potential impacts to less-than-significant levels.

Mitigation Measure 5.2.E-4: Conduct pre-construction survey of road conditions.

EBMUD shall incorporate into contract specifications a requirement to conduct pre-construction surveys of road conditions on key access routes to project sites. The pavement conditions of local streets and designated roads judged to be in good condition for use by heavy truck traffic shall be monitored. Any roads damaged by construction shall be repaired to a condition equal to or better than that which existed prior to construction activity.

Impact Significance After Mitigation: Less than Significant

Impact 5.2.E-5: Potential to temporarily disrupt bus service along proposed pipeline corridors during construction.

The general discussion below addresses the following Preferred Portfolio components:

- Recycled Water;
- Northern California Water Transfers;
- Bayside Groundwater Phase 2;
- Sacramento Basin Groundwater Banking / Exchange;
- Regional Desalination; and
- IRCUP / San Joaquin Groundwater Banking / Exchange.

Bus routes occur throughout the EBMUD service area. While the precise locations of all facilities associated with Preferred Portfolio components are not known, pipeline alignments associated with the Bayside Groundwater Phase 2 would occur along Bus Route 93, which traverses Grant Avenue. Similarly, pipeline alignments associated with the Regional Desalination component may occur along Bus Routes 387 and 394, which travel along Willow Pass Road and West 10th Street. Other bus routes may be affected as a result of other pipeline alignments associated with these and other Preferred Portfolio components. Construction activities, especially installation of pipelines, have the potential to temporarily affect transit operations by limiting access to bus stations, thereby requiring relocation of bus stops. If entire roadways are closed, then bus route detours may be necessary. The relocation of bus stations or detour of routes would last only as long as construction activities, but would be a ***potentially significant*** impact.

Implementation of Mitigation Measure 5.2.E-5 below would reduce this potential impact to a less-than-significant level.

Mitigation Measure 5.2.E-5: Relocate bus stops or detour bus routes.

If pipeline installation would require closure of a lane where a bus stop is located, EBMUD shall, in coordination with the local transit service, temporarily relocate the bus stop. EBMUD shall determine the necessity of roadway closure once pipeline alignments are selected. If complete closure is necessary where a bus line traverses, then EBMUD shall coordinate with the local transit service to identify detour bus routes.

Impact Significance After Mitigation: Less than Significant

Impact 5.2.E-6: Potential to affect rail operations.

The general discussion below addresses the following Preferred Portfolio components:

- Recycled Water;
- Northern California Water Transfers;
- Bayside Groundwater Phase 2;
- Sacramento Basin Groundwater Banking / Exchange;
- Regional Desalination; and
- IRCUP / San Joaquin Groundwater Banking / Exchange.

Railroad tracks occur throughout the EBMUD service area. Pipeline alignments have not yet been selected for the Preferred Portfolio components, but they may be placed in roadways that cross existing railroad tracks. Construction activities would affect rail operations if open-trench construction were used to install pipelines across the railroad tracks. Under this circumstance, railroad operations could be disrupted, delaying trains from accessing destinations in a timely manner.

The placement of a pipeline along railroad tracks could also affect rail operations, depending on the placement distance from the rails. Railroad easements vary in width, and may not have adequate space to accommodate additional pipelines. Sufficient space is needed to ensure setback distances for both the railroad entity and EBMUD to operate and maintain their respective facilities without potential conflicts or hazards. Any disruption to railroad operations from project implementation would be ***potentially significant***. Implementation of Mitigation Measures 5.2.E-6-a and 5.2.E-6b below would reduce potential impacts to less-than-significant levels.

Mitigation Measure 5.2.E-6a: Implement trenchless construction techniques.

EBMUD shall implement trenchless construction techniques for the crossing of rail tracks.

Mitigation Measure 5.2.E-6b: Coordinate with the railroad entity.

If pipelines were to be installed along a railroad corridor, EBMUD shall coordinate with the railroad entity to determine the necessary setback from the railroad tracks for placement of the pipeline along the railroad easement.

Impact Significance After Mitigation: Less than Significant

Table 5.2.E-1: Summary of Potential Transportation Impacts Resulting from the WSMP 2040 Preferred Portfolio

IMPACT	RATIONING	CONSERVATION	RECYCLED WATER	NORTHERN CALIFORNIA WATER TRANSFERS	BAYSIDE GROUNDWATER PHASE 2	SACRAMENTO BASIN GROUNDWATER BANKING / EXCHANGE	REGIONAL DESALINATION	ENLARGE PARDEE RESERVOIR	ENLARGE LOWER BEAR RESERVOIR	IRCUP / SAN JOAQUIN GROUNDWATER BANKING / EXCHANGE
5.2.E-1: Potential reduction of the number of, or the available width of, travel lanes on roads from construction, resulting in temporary disruption of traffic flows, increases in traffic congestion, and access to adjacent land uses for both general and emergency access	--	--	LTSM	LTSM	LTSM	LTSM	LTSM	LTSM	LTSM	LTSM
5.2.E-2: Potential short-term increases in vehicle trips by construction vehicular activities and construction workers	--	--	LTSM	LTSM	LTSM	LTSM	LTSM	LTSM	LTSM	LTSM
5.2.E-3: Potential to generate demand for parking spaces for worker vehicles	--	--	LTS	LTS	LTS	LTS	LTS	--	--	LTS
5.2.E-4: Potential increase in wear and tear on designated haul routes from construction vehicles	--	--	LTSM	LTSM	LTSM	LTSM	LTSM	LTSM	LTSM	LTSM
5.2.E-5: Potential to temporarily disrupt bus service along proposed pipeline corridors during construction	--	--	LTSM	LTSM	LTSM	LTSM	LTSM	--	--	LTSM
5.2.E-6: Potential to affect rail operations			LTSM	LTSM	LTSM	LTSM	LTSM	--	--	LTSM
-- = No Impact, LTS = Less than Significant, LTSM = Less than Significant with Mitigation, PS = Potentially Significant, B = Beneficial										

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5.2.F Air Quality

5.2.F.1 Significance Criteria

For the purpose of this analysis, the following thresholds of significance, as identified by the State CEQA Guidelines (Appendix G), have been used to determine whether implementation of the proposed project would result in significant impacts to air quality. Based on Appendix G of the State CEQA Guidelines, an air quality impact is considered significant if implementation of the WSMP 2040 Preferred Portfolio would:

- Conflict with or obstruct implementation of the applicable air quality plan;
- Violate any air quality standard or contribute substantially to an existing or projected air quality violation;
- Result in a cumulatively considerable net increase of any criteria pollutant for which the project region is non-attainment under an applicable national or State ambient air quality standard (including releasing emissions which exceed quantitative thresholds for ozone precursors);
- Expose sensitive receptors to substantial pollutant concentrations; or
- Create objectionable odors affecting a substantial number of people.

Components of the Preferred Portfolio would occur in four separate air basins, which are regulated by four separate local air districts (i.e., Bay Area Air Quality Management District [BAAQMD], San Joaquin Valley Air Pollution Control District [SJVAPCD], Sacramento Metropolitan Air Quality Management District [SMAQMD], and Amador County Air Pollution Control District [ACAPCD]), as discussed in Section 4.2.F. Construction and operational activities associated with a given component would occur within areas under the jurisdiction of one of the four air districts. Prior to development of each component, a project-level analysis would be performed according to the recommended methodologies of the applicable air district to determine the significance of specific air quality impacts associated with implementation. However, for this analysis, detailed emissions calculations were not performed, and the Preferred Portfolio components were evaluated at the program level. For informational purposes, detailed significance thresholds for the applicable air districts where project components may occur are summarized below.

Bay Area Air Quality Management District

Certain Preferred Portfolio components would occur within the EBMUD service area, which is entirely within the San Francisco Bay Area Air Basin (SFBAAB) under the jurisdiction of BAAQMD. In 1999, the BAAQMD prepared the *BAAQMD CEQA Guidelines* that recommend analytical methodologies and provide evaluation criteria for determining the level of significance of project impacts. BAAQMD's evaluation criteria for determining impact significance consist of defined screening thresholds for pollutant emissions. BAAQMD has separate screening thresholds for short-term construction-generated emissions and long-term operational emissions, as discussed further below.

Short-Term Construction-Generated Emissions

Particulate matter with an aerodynamic diameter of 10 micrometers or less (PM_{10}) is the pollutant of greatest concern with respect to construction activity. Construction emissions of PM_{10} can vary greatly depending upon the level of activity, number and type of construction equipment, local soil types and weather conditions, among other factors. Most PM_{10} emissions are in the form of fugitive dust during earth movement activities, such as grading. As a result, the *BAAQMD CEQA Guidelines* specify that "[t]he District's approach to CEQA analyses of construction impacts is to emphasize implementation of effective and comprehensive control measures rather than detailed quantification of emissions" (BAAQMD 1999). Therefore, when analyzing construction-generated emissions, the determination of significance should be based on a consideration of the implementation of dust control measures. If all applicable control measures for PM_{10} indicated in the *BAAQMD CEQA Guidelines* are implemented, then air pollutant emissions from construction activities would be considered less than significant. If a project would not implement all applicable control measures, construction emissions may be considered to result in a significant impact. BAAQMD does not have a pound-per-day (lb/day) threshold for construction-generated emissions of other criteria air pollutants (CAPs), including the ozone precursors of reactive organic gases (ROG) and oxides of nitrogen (NO_x).

Long-Term Operational Emissions

BAAQMD considers projects that generate operational emissions to be a significant impact to air quality if they exceed any of the lb/day thresholds summarized in Table 5.2.F-1 (BAAQMD 1999).

Table 5.2.F-1: BAAQMD Thresholds of Significance for Operational Emissions

CRITERIA AIR POLLUTANT OR PRECURSOR	SIGNIFICANCE THRESHOLD (LB/DAY)
ROG	80
NO_X	80
PM_{10}	80
Source: BAAQMD 1999.	

Operational emissions include both those that are emitted on the project site by stationary sources (e.g., backup diesel generators) or the on-site use of mobile equipment and mobile-source emissions resulting from vehicle miles traveled (VMT) and trips generated by the project (but generally are emitted off site).

San Joaquin Valley Air Pollution Control District

It is anticipated that some Preferred Portfolio components would be located in the San Joaquin Valley Air Basin (SJVAB) or the "Central Valley," in which air quality is regulated by SJVAPCD. In 2002, the SJVAPCD revised its *Guide for Assessing and Mitigating Air Quality Impacts*, which recommends mass emission thresholds for the significance determination of ozone precursor emissions (i.e., ROG and NO_X) generated by a project. SJVAPCD's recommended mass emission thresholds are summarized in Table 5.2.F-2 and apply to both project construction and operations. Projects that emit ozone precursors and/or PM_{10} in excess of these levels are considered to have a significant impact on regional air quality. Note that SJVAPCD's mass emission thresholds are expressed in tons per year (tons/yr).

Table 5.2.F-2: SJVAPCD Thresholds of Significance

CRITERIA AIR POLLUTANT OR PRECURSOR	ANNUAL THRESHOLD (TONS/YEAR)
ROG	10
NO_X	10
PM_{10}	15
Source: SJVAPCD 2002 and 2008.	

Sacramento Metropolitan Air Quality Management District

For the purposes of this analysis, the definition of "Central Valley" also includes portions of the Sacramento Valley Air Basin (SVAB). SMAQMD is responsible for regulating air quality within Sacramento County, where some Preferred Portfolio components may be located. In 2004, SMAQMD published the *Guide to Air Quality Assessment in Sacramento County*, which provides methodologies for the review of air quality impacts from development projects. *SMAQMD's Guide* includes screening approaches and specific methods and techniques to quantify air pollutant emissions in order to determine whether a project would have a significant adverse impact on air quality. A proposed project would result in a significant impact to regional air quality if it would exceed any of the mass emission thresholds summarized in Table 5.2.F.3. As shown in Table 5.2.F.3, SMAQMD has separate mass emission thresholds for short-term construction-generated and long-term operational emissions.

Amador County Air Pollution Control District

ACAPCD is responsible for attaining and maintaining State and national ambient air quality standards within Amador County. ACAPCD does not have published guidance or established quantitative thresholds for analyzing air quality impacts in CEQA documents (Harris, pers. comm., 2008). Project-level CEQA analyses shall be conducted in consultation with ACAPCD staff.

Table 5.2.F-3: SMAQMD Thresholds of Significance

CRITERIA AIR POLLUTANT OR PRECURSOR	SIGNIFICANCE THRESHOLD (LB/DAY)
Construction Emissions	
NO_X	85
Operational Emissions	
ROG	65
NO_X	65
Source: SMAQMD 2004.	

5.2.F.2 Components That Would Not Result in Air Quality Impacts

It is anticipated that all components of the WSMP 2040 Preferred Portfolio that involve infrastructural improvements and/or modifications, or construction of new facilities, would cause an impact on regional air quality. However, two of the Preferred Portfolio components–Rationing and Conservation–would not involve construction or operation of any new facilities or modifications to existing infrastructure. These components are discussed below and are not addressed further in this air quality impact analysis.

Rationing

Implementation of the Rationing component of the Preferred Portfolio would not have any adverse effects on air quality in the EBMUD service area. Rationing would involve actions taken by individual customers to reduce their daily water consumption. EBMUD would provide information to existing EBMUD customers on rationing goals and tips for reducing water usage. No infrastructural improvements or construction of new facilities are involved with this component of the proposed project. The required actions by EBMUD (i.e., conveying information and offering incentives) and existing customers (i.e., reducing water consumption) would not result in an increase in air pollutant emissions in the region. Therefore, the Rationing component would have no impact on air quality in the region, and no further discussion of this component is required.

Conservation

Implementation of the Conservation component of the Preferred Portfolio would involve water conservation programs from both the supply and demand sides. Supply-side measures would include a leak detection and repair program for the water distribution system. Demand-side programs would focus on educating and encouraging customers to implement long-term water reduction practices. EBMUD would provide incentives for residential and non-residential customers, educational and outreach activities, and support activities, such as water-use surveys. The proposed conservation programs would encourage customers to change their water use habits and install water-efficient hardware (e.g., low-flow toilets, showerheads, and faucets). However, these actions are not enforceable by EBMUD and would occur on a customer-by-customer basis. This component would not involve the construction or operation of any new facilities or modification to any existing EBMUD infrastructure. Therefore, the Conservation component would not be anticipated to generate any new air pollutant emissions and would have no impact on regional air quality. No further discussion of this component is required.

5.2.F.3 Consistency with Relevant Plans, Policies, and Regulations

As discussed above in the significance criteria, this PEIR evaluates the Preferred Portfolio's impacts according to the checklist questions of Appendix G of the CEQA Guidelines. Detailed analysis of each component's impact with respect to the significance thresholds of the applicable air district(s) will be performed during the project-level environmental analysis that will be prepared when more detailed information is available. Locations for many of the proposed facilities have not yet been determined; therefore, further site-specific environmental review will be required to determine whether each component is consistent with the goals and policies of the applicable local general plan. In addition, site-specific analyses will determine whether each Preferred Portfolio component is consistent with applicable air district rules and regulations.

5.2.F.4 Potential Air Quality Impacts

Impact 5.2.F-1: Potential to conflict with, or obstruct implementation of, applicable air quality plans.

The general discussion below addresses the following Preferred Portfolio components:

- Recycled Water;
- Northern California Water Transfers;
- Bayside Groundwater Phase 2;
- Sacramento Basin Groundwater Banking / Exchange;
- Regional Desalination;
- Enlarge Pardee and Lower Bear Reservoirs; and
- IRCUP / San Joaquin Groundwater Banking / Exchange

The State Implementation Plan (SIP) describes how the State will achieve the national ambient air quality standards by specified dates. This SIP is a broad-level air quality plan based on population growth levels and distribution identified in local community plans combined with the cumulative impacts from approved and proposed development projects. Some of the Preferred Portfolio components would involve the operation of pumping stations, extraction wells, injection wells, and a large desalination plant.

Because these facilities are typically electric-powered and have back-up diesel generators that are only operated during emergencies and for periodic testing, they would not regularly generate emissions on-site. Permits to operate and test the backup generators would be required by the respective air district and, therefore, the emissions produced by each generator would be accounted for in the emissions inventory of the local air basin. Moreover, because backup generators are only operated during emergencies and for periodic testing, their addition to the emissions inventory would be nominal.

In addition, it is expected that implementation of the WSMP 2040 Preferred Portfolio would be consistent with the existing land use designations of the surrounding communities and would not directly result in an increase in population, employment, or VMT beyond that already assumed and approved for development, and accounted for in the emissions budgets of the SIP. Thus, there would not be a substantial increase in VMT or associated mobile-source emissions that would result in a significant adverse incremental effect on the region's ability to attain or maintain State and national ambient air quality standards.

Thus, implementation of the WSMP 2040 Preferred Portfolio would not conflict with or obstruct implementation of the applicable air quality efforts of the BAAQMD, SJVAPCD, SMAQMD, or ACAPCD. As a result, this impact would be ***less than significant***.

Impact Significance: Less than Significant

Impact 5.2.F-2: Potential to violate an air quality standard or contribute substantially to an existing or projected air quality violation.

The general discussion below addresses the following Preferred Portfolio components:

- Recycled Water;
- Northern California Water Transfers;
- Bayside Groundwater Phase 2;
- Sacramento Basin Groundwater Banking / Exchange;
- Regional Desalination;
- Enlarge Pardee and Lower Bear Reservoirs; and
- IRCUP / San Joaquin Groundwater Banking / Exchange.

The components of the Preferred Portfolio listed above include the construction and operation of new facilities, which would result in emissions of CAPs (e.g., PM_{10}) and ozone precursors. These activities and their associated emissions are discussed separately below.

Short-Term Construction-Generated Emissions of Criteria Air Pollutants and Ozone Precursors

Construction emissions are described as "short term" or temporary in duration and have the potential to represent a significant impact with respect to air quality. Construction-related activities would result in emissions of PM_{10} and fine particulate matter with an aerodynamic diameter of 2.5 micrometers or less ($PM_{2.5}$) from site preparation, earth movement, grading, and hauling of earthen material. Fugitive PM_{10} dust emissions vary as a function of such parameters as soil silt content, soil moisture, wind speed, acreage of disturbance area, and VMT by construction vehicles on- and off-site. Fugitive PM_{10} dust emissions from construction activities can lead to adverse health effects as well as nuisance concerns, such as reduced visibility and soiling of exposed surfaces.

Emissions of ozone precursors (ROG and NO_X), oxides of sulfur (SO_x), and carbon monoxide (CO) are primarily associated with gas and diesel equipment exhaust from heavy-duty construction equipment, material transport, and worker commute trips.
In addition, off-gas emissions of ROG would be associated with asphalt paving and the application of architectural coatings. With respect to the Preferred Portfolio, construction of the various facilities associated with its components would result in the temporary generation of ROG, NO_X, and PM_{10} emissions from site preparation (e.g., demolition, excavation, grading, and clearing), material transport and employee commute trips, laying of concrete foundations, paving, frame erection, equipment installation, finishing, cleanup, and other miscellaneous activities. Construction of these facilities is anticipated to begin as early as 2010 and occur over a 30-year period.

Without implementation of applicable dust control measures or emission reduction measures recommended by the local air district, fugitive PM_{10} dust emissions and exhaust emissions of ROG, NO_x, and PM_{10} from construction activities could potentially exceed the applicable mass emission thresholds of the applicable local air district. Thus, construction-generated emissions could violate air quality standards or contribute substantially to an existing or projected air quality violation. As a result, this would be a ***potentially significant*** impact. Further site-specific analysis would be required to estimate the mass emission levels associated with the construction of each component to determine the proposed facilities' potential effects on air quality.

Implementation of Mitigation Measures 5.2.F-2a and 5.2.F-2b below would result in approximate reductions of 75 percent, 5 percent, 20 percent, and 45 percent in fugitive PM_{10} dust, and exhaust emissions of ROG, NO_x, PM_{10}, respectively. However, if short-term construction-generated emissions of CAPs and ozone precursors cannot be reduced to levels below the applicable thresholds of the local air district through mitigation, then the construction-generated emissions would be potentially significant and unavoidable. This outcome is unlikely to occur for most components unless the construction activity would require a substantial number of off-road diesel-powered equipment; involve an exceedingly large amount of earth movement or a substantially large number of truck trips (such as the delivery of 1.5 million cubic yards of concrete for the construction of a replacement dam to enlarge Pardee Reservoir); and/or occur over an extended period of time.

Long-Term Operation-Related (Regional) Emissions of Criteria Air Pollutants and Ozone Precursors

As stated under Impact 5.2.F-1, none of the components would regularly generate emissions on site, as they would be electric powered, but they may include backup diesel generators for wells and pumps. It is anticipated that most of the components would not generate a substantial number of vehicle trips, as their operation would not be anticipated to require a large number or workers.

However, detailed information about the operations of each component was not available when this PEIR was prepared. For instance, the size and number of required extraction wells, injection wells, and pump stations have not yet been established for the various components. Similarly, it is unknown whether the enlargement of Pardee and Lower Bear Reservoirs would result in increased vehicle trips. Because both components would result in an expanded reservoir and replace existing recreational facilities with new ones, it is possible that they could draw higher levels of recreational use and associated vehicle trips and/or boat activity. Therefore, without implementation of reduction measures for operational emissions pursuant to the requirements of the local air district, operational emissions of CAPs and ozone precursors could potentially exceed the applicable mass emission thresholds of the local air district. Thus, operational emissions could violate air quality standards or contribute substantially to an existing or projected air quality violation. The CAP emissions associated with the operation of each component could exceed the significance thresholds established by the local air district. As a result, this would be a ***potentially significant*** impact. Further site-specific analysis would be needed to estimate the operational emissions associated with each component to determine the proposed facilities' potential effects on air quality.

Implementation of Mitigation Measure 5.2.F-2c below would reduce this potential impact. However, the individual reduction measures would vary for each component, both in terms of their administrative and economic feasibility and the reductions they would provide. Thus, if operational emissions of CAPs and ozone precursors cannot be reduced to levels below the applicable thresholds of the local air district through mitigation, then the long-term operational emissions would be potentially significant and unavoidable.

Mitigation Measure 5.2.F-2a: Implement control measures to reduce fugitive PM_{10} dust emissions during site preparation, grading, material hauling, and other construction activities.

Mitigation measures shall include all dust control practices required by the rules and regulations of the applicable air district. Project-specific analysis would be required for each Preferred Portfolio component to estimate the associated mass emissions of PM_{10} fugitive dust and to identify the specific dust abatement requirements required by the applicable air district at the time the construction is performed and determine the need for additional measures. These measures may include, but are not limited to, the following:

- Water all active construction areas at least twice daily. Watering shall be sufficient to prevent airborne dust from leaving the site. Increased watering frequency may be necessary whenever wind speeds exceed 15 miles per hour (mph). Reclaimed water shall be used whenever possible;
- Cover all trucks hauling soil, sand, and other loose materials or require all trucks to maintain at least two feet of freeboard (i.e., the minimum required space between the top of the load and the top of the trailer);
- Pave, apply water three times daily (or as sufficient to prevent dust from leaving the site), or apply (non-toxic) soil stabilizers on all unpaved access roads, parking areas, and staging areas at construction sites;
- Sweep daily or as appropriate (with water sweepers using reclaimed water if possible) all paved access roads, parking areas, and staging areas at construction sites. Also sweep all visible soil and material that is carried onto adjacent public streets;
- Hydroseed or apply (non-toxic) soil stabilizers to inactive construction areas (previously graded areas inactive for ten days or more);
- Limit traffic speeds on unpaved roads to 15 mph;
- Install sandbags or other erosion control measures to prevent silt runoff to public roadways;
- Replant vegetation in disturbed areas as quickly as possible;
- Install wheel washers for all exiting trucks, or wash off the tires or tracks of all trucks and equipment leaving the site;
- Limit the area subject to excavation, grading and other construction activity at any one time;
- Submit a dust control plan to the local air district and obtain approval of the plan prior to issuance of the grading permit. The dust control plan shall specifically

identify measures that will demonstrate that earthmoving activities in areas of the site will comply with all of the requirements of local air district; and

- Require the contractor to ensure that all demolished material, soil piles, or disturbed ground surface be wetted at an adequate frequency during demolition and during any subsequent disturbance of material sufficient to prevent visible dust emissions from leaving the project site.

Mitigation Measure 5.2.F-2b: Implement measures to reduce exhaust emissions of ozone precursors (ROG, NO_x, and PM_{10}) from heavy-duty off-road construction equipment and on-road mobile sources associated with material delivery and worker commute trips.

Project-specific analysis would be required for each Preferred Portfolio component to estimate the associated mass emissions of ozone precursors and to identify the specific emission control requirements for reducing those emissions pursuant to the requirements of the applicable air district at the time the construction is performed. This may include participation in an Indirect Source Review and Fee Program which allows new projects to offset their emissions by paying an in-lieu fee that is used to implement emission reductions in another part of the applicable air basin. Other measures may include, but are not limited to, the following:

- Use construction equipment that complies with the requirements and compliance schedule of the adopted California Air Resources Board (ARB) Regulation for In-Use Off-Road Diesel Vehicles in effect at the time of use;
- Develop a Construction Traffic Emission Management Plan to minimize emissions from vehicles; and
- Comply with all applicable air district requirements to reduce emissions of ozone precursors.

Mitigation Measure 5.2.F-2c: Implement measures to reduce emissions of CAPs and ozone precursors if such emissions would otherwise exceed the significance thresholds established by the local air district.

Project-specific analysis shall be required for each component to estimate the associated operational emissions of CAPs and to identify the specific reduction measures pursuant to the requirements of the applicable air district at the time the component is designed and permitted. These reduction measures may include, but are not limited to, use of electrically powered generators, landscape maintenance equipment, and operational equipment; and measures to increase energy efficiency of proposed buildings.

As part of the project-level environmental review for each component, EBMUD shall estimate the long-term operational emissions of CAPs and ozone precursors. This analysis shall determine whether the operational emissions would exceed the applicable mass emission thresholds of the applicable local air district.

If these operational emissions are less than the applicable thresholds of the local air district or are reduced to levels below these thresholds with implementation of project-specific mitigation measures, then project operations would not result in a significant impact to air quality.

Impact Significance After Mitigation: Potentially Significant

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Impact 5.2.F-3: Potential for a cumulatively considerable net increase of criteria pollutants for which the region is in nonattainment under an applicable national or State ambient air quality standard.

The general discussion below addresses the following Preferred Portfolio components:

- Recycled Water;
- Northern California Water Transfers;
- Bayside Groundwater Phase 2;
- Sacramento Basin Groundwater Banking / Exchange;
- Regional Desalination;
- Enlarge Pardee and Lower Bear Reservoirs; and
- IRCUP / San Joaquin Groundwater Banking / Exchange.

As explained above in Impact 5.2.F-2, both construction-generated and operational emissions associated with the Preferred Portfolio components would potentially exceed the mass emission thresholds established by the applicable local air districts to help achieve or maintain attainment of State and national ambient air quality standards. Thus, emissions levels that exceed these thresholds, whether construction-generated or operational, would result in a cumulatively considerable contribution to the nonattainment status of those respective CAPs. As described in the Air Quality Regional Setting (Section 4.2.F), the Preferred Portfolio components would be located in areas that are currently nonattainment with respect to State and national ambient air quality standards for ozone and PM_{10}, and, in some areas, $PM_{2.5}$. Therefore, these components would result in a ***potentially significant*** impact. Further site-specific analysis would be required to estimate the contribution of construction-related and operational emissions to the nonattainment status with respect to State and national ambient air quality standards.

Construction-generated and operational emissions associated with development of the Preferred Portfolio have the potential to exceed the applicable mass emission thresholds of the applicable local air districts and thereby represent a cumulatively considerable net increase of a CAP for which the project region is in nonattainment. Implementation of Mitigation Measure 5.2.F-3 would reduce construction and operational emissions. However, further site-specific analysis is required to determine if mitigation measures would prevent these emissions from exceeding local thresholds.

Mitigation Measure 5.2.F-3: Implement Mitigation Measures 5.2.F-2a, 5.2.F-2b, and 5.2.F-2c.

As part of the project-level environmental review for each Preferred Portfolio component, EBMUD shall estimate the emission levels of CAPs associated with the construction and operation of the associated facilities. This analysis shall determine whether the construction and operational emissions would result in a cumulatively considerable contribution to the nonattainment status of the region.

If these emissions do not represent a cumulatively considerable net increase of any CAP for which the region is nonattainment, then the Preferred Portfolio components would not result in significant impacts to air quality.

However, if these emissions do represent a cumulatively considerable net increase of any CAP for which the region is nonattainment, then the construction-generated emissions would be considered significant and unavoidable.

Impact Significance After Mitigation: Potentially Significant

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Impact 5.2.F-4: Potential exposure of sensitive receptors to substantial pollutant concentrations.

Potential impacts are discussed for following Preferred Portfolio components:

- Recycled Water;
- Northern California Water Transfers;
- Bayside Groundwater Phase 2;
- Sacramento Basin Groundwater Banking / Exchange;
- Regional Desalination;
- Enlarge Pardee and Lower Bear Reservoirs; and
- IRCUP / San Joaquin Groundwater Banking / Exchange.

This discussion addresses whether implementation of the Preferred Portfolio components would potentially expose sensitive receptors, such as residences, schools, and hospitals, to substantial concentrations of CAPs that exceed State or national ambient air quality standards and/or toxic air contaminants (TACs) that may cause or contribute to an increase in mortality or serious illness, or that may pose a hazard to human health. It is anticipated that some components of the Preferred Portfolio would be located near sensitive receptors, which may be exposed to substantial concentrations of CAPs and TACs. Emissions of fugitive dust, asbestos, diesel particulate matter (diesel PM), and CO are discussed separately below.

Construction-Generated Fugitive Dust Emissions

Construction-related activities would result in fugitive PM_{10} and $PM_{2.5}$ dust emissions from site preparation, earth movement, grading, and hauling of earthen material. Fugitive dust emissions vary as a function of such parameters as soil silt content, soil moisture, wind speed, acreage of disturbance area, and VMT by construction vehicles on- and off-site. While the fugitive dust emissions generated by all of these activities may contribute to ambient background concentrations of PM_{10} and $PM_{2.5}$ in the region, they also may directly result in localized concentrations of PM_{10} and $PM_{2.5}$ that exceed the ambient air quality standards at nearby sensitive receptors. Exposure to levels of PM_{10} and $PM_{2.5}$ that exceed State and national ambient air quality standards can lead to adverse health effects and nuisance concerns. As a result, this would be a ***potentially significant*** impact. Implementation of Mitigation Measure 5.2.F-4a below would reduce potential impacts. However, further site-specific analysis would be needed to estimate potential for nearby sensitive receptors to be exposed to concentrations of PM_{10} and $PM_{2.5}$ that exceed State and national ambient air quality standards.

Construction-Generated Emissions of Diesel Particulate Matter

The Preferred Portfolio components would not be expected to include the operation of any stationary sources of TACs. Nonetheless, pursuant to established rules of the applicable local air districts, all sources with the potential to emit TACs are required to obtain air district permits. Permits may be granted to these operations if they are constructed and operated in accordance with applicable regulations. For example, for TAC sources under SJVAPCD jurisdiction, these regulations would include Rule 2201 (New and Modified Stationary Source Review Rule), Rule 4001 (New Source Performance Standards), and Rule 4002 (National Emissions Standards for Hazardous Air Pollutants). Given that compliance with applicable standards is required for the development and operation of facilities that may emit TACs, emissions from the routine use of TACs, both on- and off-site, are expected to be within established standards. Thus, no significant impact would result from individual stationary sources of TACs.

As discussed in Impact 5.2.F-1, construction-related activities would result in temporary, short-term project-generated emissions of diesel PM from the exhaust of off-road heavy-duty diesel equipment for site preparation (e.g., demolition, excavation, grading, and clearing); paving; application of architectural coatings; and other miscellaneous activities. Construction of the proposed facilities would result in the generation of diesel

PM emissions from the use of off-road diesel equipment required for site grading and excavation, paving, and other construction activities. According to ARB, the potential cancer risk from the inhalation of diesel PM, as discussed below, outweighs the potential non-cancer health impacts (ARB 2003).

The different local air districts have various standards and recommended methodologies for determining whether those levels are considered to represent a human health hazard, including guidance concerning when a full-scale Health Risk Assessment shall be prepared to estimate exposure levels. In general, however, the dose to which receptors are exposed is the primary factor used to determine health risk (i.e., potential exposure to TAC emission levels that exceed applicable standards). Dose is a function of the concentration of a substance or substances in the environment and the duration of exposure to the substance. Dose is positively correlated with time, meaning that a longer exposure period would result in a higher exposure level for the maximally exposed individual. Thus, the risks estimated for a maximally exposed individual are higher if a fixed exposure occurs over a longer period of time. According to the Office of Environmental Health Hazard Assessment, health risk assessments, which determine the exposure of sensitive receptors to TAC emissions, should be based on a 70-year exposure period; however, such assessments should be limited to the duration of activities associated with the project (Salinas, pers. comm., 2004).

Construction of some components, such as the Regional Desalination Plant and the enlargement of Pardee and Lower Bear Reservoirs, could involve a large number of equipment, movement of large quantities of earthen material, and a high volume of haul truck trips, and could occur over an extended period. These activities could potentially expose sensitive receptors to substantial concentrations of diesel PM emissions. Even some of the less-intensive construction activities associated with the other components would potentially occur in close proximity to or immediately upwind of nearby sensitive receptors. For these reasons, this would be a ***potentially significant*** impact. Implementation of Mitigation Measure 52.F-4b below would reduce potential impacts. However, further site-specific analysis would be needed to estimate the exposure levels at nearby sensitive receptors in accordance with the recommended methodologies of the applicable local air districts.

Fugitive Asbestos Dust Emissions

Asbestos is listed as a TAC by ARB. Asbestos is of special concern because it occurs naturally in surface deposits of several types of ultramafic minerals in some areas. Asbestos emissions can result from ground disturbance activities such as grading and excavation. As discussed above, construction associated with the Preferred Portfolio would occur within four different air basins. Most of the Preferred Portfolio components would involve soil disturbance for site preparation, trenching, or earthmoving. It is possible that construction and soil disturbance activities could occur in areas that contain naturally occurring asbestos (NOA).

The Department of Conservation's Mines and Geology Division published a map of California highlighting areas likely to contain NOA in *A General Location Guide for Ultramafic Rocks in California–Areas More Likely to Contain Naturally Occurring Asbestos* (Churchill and Hill 2000). Although the exact location of each Preferred Portfolio component has not yet been determined, only two components would be located in the general vicinity of NOA according to the Department of Conservation's map. The existing Pardee Reservoir and proposed enlargement is in an area identified as being likely to contain NOA, and the proposed Bayside Groundwater Phase 2 site is located in the vicinity of NOA. The remaining Preferred Portfolio components would not be sited near any areas that contain NOA. Nevertheless, further site-specific examination of all proposed sites is necessary to determine the presence or absence of asbestos material.

Also, existing buildings or facilities that would be demolished at some of the sites may include asbestos-containing material, particularly due to the relatively old age of the structures. Temporary fugitive emissions of asbestos associated with demolition of these facilities would not result in levels that could cause detrimental human health effects if the project includes preventative measures to avert exposure. Failure to remove asbestos-containing materials prior to demolition could potentially expose receptors to increased health risk.

In addition, fugitive asbestos dust emissions could also be generated by vehicle travel along unpaved roads that would provide access to the new recreational facilities developed as part of the enlarged Pardee Reservoir. As stated above, this component would be located in an area identified as being likely to contain NOA. Both off-road vehicle activity and the use of unpaved roads in this area could expose workers and/or users of the recreational facilities to airborne asbestos.

Typically, local air districts have established rules and regulations that provide guidance, fees, and/or control measures that address asbestos. As discussed above, implementation of the Preferred Portfolio would comply with all applicable rules and regulations. Therefore, all necessary precautionary measures would be implemented during soil disturbance and demolition activities to avoid exposing construction workers or near-by receptors to NOA emissions, which would reduce any potential impacts to a less-than-significant level. If no rules and regulations pertaining to asbestos are required by the local air district or other local jurisdiction, implementation of project-specific precautionary measures for preventing exposure to asbestos would be necessary. Please refer to the discussion of Regional Regulations in Appendix D for a listing of regional asbestos rules and regulations.

Because some components in the Preferred Portfolio would involve ground disturbance in areas of NOA and/or include demolition of structures that potentially contain asbestos materials, this would be a ***potentially significant*** impact. Implementation of Mitigation

Measure 52.F-4c below would reduce potential impacts. However, further site-specific analysis would then be required to estimate the likelihood of exposing workers and nearby receptors to asbestos, in accordance with the recommended methodologies of the applicable local air districts.

Mitigation Measure 5.2.F-4a: Implement Mitigation Measure 5.2.F-2a.

The different local air districts recommend various methodologies for determining whether sensitive receptors would be exposed to concentrations of PM_{10} and $PM_{2.5}$ that exceed State and national ambient air quality standards. As part of the project-level environmental review for each component, EBMUD shall employ the methodology recommended by the applicable local air district.

If these analyses determine that sensitive receptors would not be exposed to concentrations of PM_{10} and $PM_{2.5}$ that exceed State and national ambient air quality standards with implementation of project-specific mitigation measures, then the project would not result in a significant impact to air quality.

However, if a project-level analysis determines that PM_{10} and $PM_{2.5}$ concentrations at sensitive receptors could not be reduced to levels below State and national ambient air quality standards through mitigation, then the construction-generated PM_{10} and $PM_{2.5}$ emissions would be ***potentially significant***. This outcome would be most likely when substantial levels of earth movement would occur over short periods of time.

Mitigation Measure 5.2.F-4b: Implement measures to reduce construction-related emissions of diesel PM exhaust from heavy-duty off-road construction equipment.

Project-specific analysis would be required for each Preferred Portfolio component to estimate the associated exposure of nearby receptors to diesel PM emissions and, as necessary, to identify the specific emission control requirements for reducing exposure levels pursuant to the requirements of the applicable air district at the time the analysis is performed. These requirements may include, but are not limited to, the following:

- Construction equipment shall be staged as far as possible from any sensitive receptors to the extent feasible;
- Haul truck routes shall be designated so as not to pass by sensitive receptors to the extent feasible; and
- Before construction contracts are issued, EBMUD shall perform a review of new technology, as it relates to heavy-duty equipment, to determine what (if any) advances in emissions reductions are available for use and are economically feasible. Construction contract and bid specifications shall require contractors to utilize the available and economically feasible technology on an established percentage of the equipment fleet. It is anticipated that in the near future that

PM_{10} control equipment will be available (as well as NO_x controls); the applicable local air district shall be consulted.

As part of the project-level environmental review for each component in accordance with the recommended methodologies of the applicable local air district, EBMUD shall estimate the diesel PM exposure levels at affected receptors. This analysis shall determine whether the diesel PM exposure level would exceed the applicable threshold of the local air district.

If the estimated exposure levels are less than the applicable threshold of the local air district or are reduced to levels below these thresholds with implementation of project-specific mitigation measures, then the project would not result in a significant impact to air quality. The effectiveness of project-specific mitigation measures will vary for each component according to factors such as the spatial layout of the project site relative to nearby receptors, equipment types, emission rates, number hours of construction work each day, and meteorological conditions.

However, if short-term construction-generated exposure to diesel PM emissions cannot be reduced to levels below the applicable thresholds of the local air district through mitigation, then the construction-generated emissions would be considered significant and unavoidable.

Impact Significance After Mitigation: Potentially Significant

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Mitigation Measure 5.2.F-4c: Implement measures to prevent exposure to airborne asbestos pursuant to the requirements of the local air district and/or other local jurisdictions.

As part of the project-level environmental review for each Preferred Portfolio component, in accordance with the recommended methodologies of the applicable local air district, EBMUD shall determine the likelihood of exposure to airborne asbestos. If all required and necessary precautionary measures are implemented to prevent exposure to airborne asbestos, then the Preferred Portfolio component would not result in a significant impact to air quality.

If the local air district or local jurisdiction does not have rules and regulations pertaining to ground disturbance in areas likely to contain NOA or the demolition of structures that may contain asbestos materials, then project-specific precautionary measures for preventing exposure to asbestos shall be developed and implemented.

Impact Significance After Mitigation: Potentially Significant

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Impact 5.2.F-5: Potential exposure of sensitive receptors to substantial CO concentrations.

Potential impacts are discussed for the following Preferred Portfolio components:

- Recycled Water;
- Northern California Water Transfers;
- Bayside Groundwater Phase 2;
- Sacramento Basin Groundwater Banking / Exchange;
- Regional Desalination;
- Enlarge Pardee and Lower Bear Reservoirs; and
- IRCUP / San Joaquin Groundwater Banking / Exchange.

CO concentration is a direct function of motor vehicle activity, particularly during peak commute hours, and meteorological conditions. Under specific meteorological conditions, CO concentrations may reach unhealthy levels with respect to local sensitive receptors. As a result, air districts recommend analysis of CO emissions at a local rather than a regional level. Because none of the Preferred Portfolio components would be anticipated to result in heavy traffic congestion on area roadways and because increased CO concentrations are usually associated with roadways that are congested and with heavy traffic volume, project-generated long-term operational local mobile-source emissions of CO would not result in or substantially contribute to emissions concentrations that exceed the 1-hour ambient air quality standard of 20 ppm or the 8-hour standard of 9 ppm, respectively. Thus, none of the Preferred Portfolio components are expected to expose sensitive receptors to substantial CO concentrations. As a result, this impact would be ***less than significant***.

Impact Significance: Less than Significant

Impact 5.2.F-6: Potential creation of objectionable odors affecting a substantial number of people.

Potential impacts are discussed for the following Preferred Portfolio components:

- Recycled Water;
- Northern California Water Transfers;
- Bayside Groundwater Phase 2;
- Sacramento Basin Groundwater Banking / Exchange;

- Regional Desalination;
- Enlarge Pardee and Lower Bear Reservoirs; and
- IRCUP / San Joaquin Groundwater Banking / Exchange.

The occurrence and severity of odor impacts depend on numerous factors, including the nature, frequency, and intensity of the source; wind speed and direction; and the presence of sensitive receptors. Although offensive odors rarely cause any physical harm, they can still be unpleasant, leading to considerable distress, and often generating citizen complaints to local governments and regulatory agencies. Odors associated with the Preferred Portfolio components include exhaust odors generated by construction equipment and process emissions from operation of EBMUD facilities. Depending on the location of nearby receptors, project-related odors could potentially affect a substantial number of people. Conversely, Preferred Portfolio components located near major odor sources, such as wastewater treatment plants, landfills, composting facilities, petroleum refineries and/or manufacturing plants, could expose project employees to objectionable odors.

Construction Odors

Heavy-duty construction equipment would generate diesel PM emissions. Diesel PM exhaust, as well as off-gas emissions associated with asphalt paving and the application of architectural coatings, may be considered offensive to some individuals. These types of odor exposure would occur during construction activities associated with the Preferred Portfolio components. Due to the temporary nature of construction activities and the rapid dispersal of the exhaust emissions, construction-generated odors would not be expected to result in odor complaints. Furthermore, compliance with local air district rules (i.e., regarding nuisances, architectural coatings, asphalt paving) would ensure that short-term construction-generated emissions do not generate objectionable odors that affected a substantial number of people.

Operational Odors

As discussed above, major sources of odors include wastewater treatment plants. Odiferous compounds generated from wastewater treatment plants typically include anaerobic compounds such as hydrogen sulfide (H_2S), which has a rotten egg smell that is generally offensive to most sensitive receptors. However, none of the Preferred Portfolio components would treat wastewater or include anaerobic digesters. Thus, odors normally associated with anaerobic digestion would not be a concern with respect to the proposed facilities.

Enlargement of Pardee and Lower Bear Reservoirs could generate odors due to the increase of inundated surface area. Operation of the reservoirs, as well as any detention basins, may generate sulfuric-type odors (i.e., H_2S) associated with stagnant water and anaerobic activity when water levels are low. H_2S odors from reservoirs are primarily generated due to contamination by cyanobacteria (also called blue-green algae) and actinomycetes bacteria (USGS 2003). Contaminated reservoirs could generate a range of odors, depending on the specific bacteria, that range from fishy, earthy, woody, musty, or hay-like odors. These types of odor events have not occurred at the Pardee and Lower Bear Reservoirs.

As discussed above, local air district rules and general plan policies regulating the generation of odors would apply to the Preferred Portfolio components. Best management practices to avoid the generation of odiferous compounds from reservoirs would be implemented as part of the Preferred Portfolio. Further site- and facility-specific studies may be required to determine the potential odor impacts of the Preferred Portfolio components. However, due to nature of the proposed facilities (i.e., pre-water treatment plants and reservoir expansions), it is anticipated that the Preferred Portfolio components would not expose a substantial amount of people to objectionable odors. As a result this impact would be ***less than significant***.

Impact Significance: Less than Significant

Table 5.2.F-4: Summary of Potential Air Quality Impacts Resulting from the WSMP 2040 Preferred Portfolio

IMPACT	RATIONING	CONSERVATION	RECYCLED WATER	NORTHERN CALIFORNIA WATER TRANSFERS	BAYSIDE GROUNDWATER PHASE 2	SACRAMENTO BASIN GROUNDWATER BANKING / EXCHANGE	REGIONAL DESALINATION	ENLARGE PARDEE RESERVOIR	ENLARGE LOWER BEAR RESERVOIR	IRCUP/ SAN JOAQUIN GROUNDWATER BANKING / EXCHANGE
5.2.F-1: Potential to conflict with, or obstruct implementation of, applicable air quality plans	--	--	LTS	LTS	LTS	LTS	LTS	LTS	LTS	LTS
5.2.F-2: Potential to violate an air quality standard or contribute substantially to an existing or projected air quality violation	--	--	PS	PS	PS	PS	PS	PS	PS	PS
5.2.F-3: Potential for a cumulatively considerable net increase of criteria pollutants for which the region is in nonattainment under an applicable national or State ambient air quality standard	--	--	PS	PS	PS	PS	PS	PS	PS	PS
5.2.F-4: Potential exposure of sensitive receptors to substantial pollutant concentrations	--	--	PS	PS	PS	PS	PS	PS	PS	PS
5.2.F-5: Potential exposure of sensitive receptors to substantial CO concentrations	--	--	LTS	LTS	LTS	LTS	LTS	LTS	LTS	LTS
5.2.F-6: Potential creation of objectionable odors affecting a substantial number of people	--	--	LTS	LTS	LTS	LTS	LTS	LTS	LTS	LTS
-- = No Impact, LTS = Less than Significant, LTSM = Less than Significant with Mitigation, PS = Potentially Significant, B = Beneficial										

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5.2.G Noise

5.2.G.1 Significance Criteria

In accordance with Appendix G of the CEQA Guidelines, significant impacts related to noise would occur if the WSMP 2040 Preferred Portfolio would:

- Expose people to or generate noise levels in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies;
- Result in a substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project;
- Result in a substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project;
- Expose people to or generate excessive groundborne vibration or groundborne noise levels;
- Expose people residing or working in the project area to excessive noise levels for a project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project expose; or
- Expose people residing or working in the project area to excessive noise levels for a project within the vicinity of a private airstrip.

Components That Would Not Result in Noise Impacts

The following Preferred Portfolio components were evaluated for their potential to cause noise impacts, and no impacts were identified. As such, no further discussion of these issues for these components is required.

Rationing

Rationing would involve mandatory customer cutbacks of water consumption during certain dry water years. Rationing would not introduce new noise sources (e.g., construction, truck traffic, operational sources) identified by cities and counties in their adopted general plans or specific development plans approved by these jurisdictions.

Conservation

Conservation would increase water use efficiency through the implementation of specific improvements or actions implemented primarily at the individual level. As such, no noise changes would result from the Conservation component.

5.2.G.2 Potential Noise Impacts

Impact 5.2.G-1: Potential exposure of sensitive receptors to noise levels in excess of the applicable noise standards and/or result in a noticeable increase in ambient noise levels from short-term construction activities.

The general discussion below addresses the following Preferred Portfolio components:

- Recycled Water;
- Northern California Water Transfers;
- Bayside Groundwater Phase 2;
- Regional Desalination;
- Sacramento Basin Groundwater Banking / Exchange;
- Enlarge Pardee and Lower Bear Reservoirs; and
- IRCUP / San Joaquin Groundwater Banking / Exchange.

Proposed facilities developed as part of the above components include treatment plants, wells, pump stations, recharge ponds, a desalination plant, dam expansion, spillways, pipelines and ancillary facilities. They would be located in a variety of urban and rural settings. The exact locations of many of these facilities have not been identified. To the extent possible, recycled water facilities would be co-located with existing treatment plants, and pipelines would be located along existing roadways and easements.

Construction requirements have not yet been developed for the above components. Such effects would be short-term and last only for the duration of construction activities. Noise levels attributable to short-term construction would fluctuate depending on the particular type, number, and duration of usage for various types of equipment. The effects of construction noise largely depends on the type of construction activities occurring on any given day, noise levels generated by those activities, distances to noise sensitive receptors, and the existing ambient noise environment in the receptor's vicinity. Construction generally occurs in several discrete stages, with each operation varying the equipment requirements, and the associated noise characteristics. These stages alter the characteristics of the noise environment generated on a project site and in the surrounding community for the duration of the construction process.

The site preparation phase typically generates the most substantial noise levels due to on-site equipment grading, compacting, and excavating, which often utilizes the noisiest construction equipment. Erection of large structural elements and mechanical systems could require the use of a crane for placement and assembly tasks which could also generate noise levels. Although a detailed construction equipment list is not currently available for the proposed project, it is anticipated that the primary sources of noise would be from site preparation equipment, including backhoes, compressors, bulldozers, excavators, and other related equipment. Table 5.2.G-1 shows the noise levels generated by various types of construction equipment.

Table 5.2.G-1: Noise Emission Levels from Construction Equipment

EQUIPMENT TYPE	TYPICAL NOISE LEVEL (dB) @ 50 FEET
Air Compressor	78
Asphalt Paver	77
Backhoe	78
Compactor	83
Concrete Breaker	82
Concrete Pump	81
Concrete Saw	90
Crane, Mobile	81
Dozer	82
Front-end Loader	79
Generator	81
Grader	85
Hoe Ram Extension	90
Jack Hammer	89
Pneumatic Tools	85
Pile Driver	101
Rock Drill	81
Scraper	84
Trucks	74–81
Water Pump	81

Notes:
dB = A-weighted decibels.
All equipment is fitted with a properly maintained and operational noise control device, per manufacturer specifications. Noise levels listed are manufacture specified noise levels for each piece of heavy construction equipment.
Source: Bolt Beranek and Newman Inc. 1981, FTA 2006, Data Compiled by EDAW 2008.

To assess noise levels associated with the various equipment types and operations, construction equipment can be considered to operate in two modes: mobile and stationary. Mobile equipment sources (e.g., loaders, graders, and dozers) move around a construction site, performing tasks in a recurring manner. Stationary equipment (e.g., generators, compressors, rock crushers, and cement mixers) operates in a given location for an extended period of time to perform continuous or periodic operations. Therefore, determining the location of stationary sources during specific phases, or the effective acoustical center of operations for mobile equipment during various phases of the construction process is necessary. Operational characteristics of heavy construction equipment are additionally typified by short periods of full power operation followed by extended periods of operation at lower power, idling, or powered off conditions.

As indicated in Table 5.2.G-1, operational noise levels for typical construction activities would range from 74 to 101 dB at a distance of 50 feet. Continuous combined noise levels generated by the simultaneous operation of the loudest pieces of equipment would result in noise levels of 101 dB at 50 feet. Accounting for the usage factor of individual pieces of equipment, topographical shielding and absorption effects, construction activities could result in hourly average noise levels of 95 dB Leq, at a distance of 50 feet. Maximum noise levels generated by construction activities are not predicted to exceed 101 dB L_{max} at 50 feet.

Noise from localized point sources (e.g., construction sites) typically decreases by 6 dB to 7.5 dB with each doubling of distance from source to receptor. Conservatively assuming an attenuation rate of 6 dB per doubling of distance, construction operations and related activities would have the potential to generate exterior hourly noise levels exceeding 55 dB Leq (e.g., typical non-transportation noise source standard) at receptors located within approximately 4,000 feet of the acoustical center of construction operations.

As described above, the locations of many of the proposed facilities have not yet been determined. For the purposes of this analysis, if an area is designated as noise-sensitive and is in close proximity of proposed construction areas, then the potential exists for the construction of the proposed Preferred Portfolio components to expose sensitive receptors to noise levels in excess of the applicable daytime and nighttime noise standards and/or result in a noticeable increase in ambient noise levels. As a result, construction noise impacts would be ***potentially significant***. While implementation of Mitigation Measures 5.2.G-1a and 5.2.G-1b would reduce potential impacts, it is not known whether these measures would reduce potential impacts to less-than-significant levels. Further site-specific analysis would be needed to determine the potential effects of noise at the noise-sensitive land uses in close proximity to proposed construction areas.

Mitigation Measure 5.2.G-1a: Avoid siting proposed construction activities in close proximity to noise-sensitive land uses.

EBMUD shall avoid siting construction activities in close proximity to noise-sensitive land uses. If avoidance is not possible, EBMUD shall site these construction activities as far from noise-sensitive land uses as possible.

Mitigation Measure 5.2.G-1b: Implement measures to reduce short-term construction noise levels.

If locating short-term construction activities in close proximity to noise-sensitive land uses cannot be avoided, then the District shall implement the following actions, to the extent feasible, to reduce noise levels at noise-sensitive land uses:

- Construction equipment shall be properly maintained per manufacturers' specifications and fitted with the best available noise suppression devices (e.g., mufflers, silencers, wraps). All impact tools shall be shrouded or shielded, and all intake and exhaust ports on power equipment shall be muffled or shielded;
- Construction operations and related activities associated with the Preferred Portfolio shall comply with the operational hours outlined in local plans and ordinances where construction activities occur;
- Construction equipment shall not idle for extended periods of time near noise-sensitive receptors; and
- Fixed/stationary equipment shall be located as far as possible from noise-sensitive receptors.

Additional mitigation measures may be needed to reduce construction noise to acceptable levels (e.g., installation of temporary sound barriers, predrilling of pile holes, a noise disturbance coordinator to manage complaints, etc.). The need for additional mitigation measures will be determined as part of the project-level environmental review for each Preferred Portfolio component.

The majority of the jurisdictions where construction activities could take place have noise ordinance exemptions. For jurisdictions that do not enforce noise ordinances (Amador, Calaveras, Colusa, Contra Costa, and Plumas counties), noise due to construction is generally exempt from codified exterior noise level standards defined in general plan noise elements during the daytime hours. Implementation of the above mitigation measures would reduce the exposure of sensitive receptors to project-generated construction source noise levels, but would still result in a substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project, thus impacts would be potentially significant and unavoidable.

Impact Significance After Mitigation: Potentially Significant

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Impact 5.2.G-2: Potential exposure of noise-sensitive receptors to noise levels in excess of the applicable noise standards and/or result in a noticeable increase in ambient noise levels from long-term operational activities.

The general discussion below addresses the following Preferred Portfolio components:

- Recycled Water;
- Northern California Water Transfers;
- Bayside Groundwater Phase 2;
- Regional Desalination;
- Sacramento Basin Groundwater Banking / Exchange;
- Enlarge Pardee and Lower Bear Reservoirs; and
- IRCUP / San Joaquin Groundwater Banking / Exchange.

Some of the proposed facilities (e.g., treatment plants and pumping stations) could generate operational-related noise levels. Buried pipelines and recharge ponds would not likely result in any long-term operational noise impacts. Noise sources could take the form of fans, pumps, air compressors, chillers, turbines, or cooling towers. Noise levels from proposed facility operational equipment may vary significantly depending on unit efficiency, size, and location. Noise levels associated with proposed facility operations is expected to generally range from 45 dB to 80 dB Leq at a distance of 50 feet (USEPA 1971).

Operational requirements have not yet been developed for the above components. As stated above, some stationary sources could generate a noise level of 80 dB Leq at a distance of 50 feet. Existing receptors may be located within 50 feet of proposed stationary source activities that could exceed non-transportation noise standards (e.g., 50 dB Leq for daytime and 45 dB Leq for nighttime) at receptor locations.

As described above, the locations of many of the proposed facilities have not yet been determined. For the purposes of this analysis, if an area is designated as noise sensitive and is in close proximity to proposed noise-generating operational facilities, then the potential exists for the proposed operations of the components to expose sensitive receptors to noise levels in excess of the applicable noise standards and/or result in a noticeable increase in ambient noise levels. As a result, operational stationary noise impacts would be ***potentially significant***. While implementation of Mitigation Measures 5.2.G-2a and 5.2.G-2b would reduce potential impacts, it is not known whether these measures would reduce potential impacts to less-than-significant levels. Further site-specific analysis would be needed to determine the potential effects of operational noise at the noise-sensitive land uses in close proximity of proposed facilities.

Mitigation Measure 5.2.G-2a: Avoid siting proposed facilities in close proximity to noise-sensitive land uses.

EBMUD shall avoid siting proposed facilities in close proximity to noise-sensitive land uses. If avoidance is not possible, EBMUD shall site these facilities as far from noise-sensitive land uses as possible.

Mitigation Measure 5.2.G-2b: Implement measures to reduce long-term operational related noise levels.

The majority of the jurisdictions where proposed facilities could be placed have noise standards for non-transportation (stationary) noise sources. For jurisdictions that do not have performance standards for non-transportation noise sources (Amador, Calaveras, Colusa, Contra Costa, and Plumas counties), noise due to proposed facility operations would be evaluated using codified exterior noise level standards. Implementation of the measures listed below would reduce the exposure of sensitive receptors to project-generated operational source noise levels, but would still result in a substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project. Therefore, impacts would be potentially significant and unavoidable.

- During individual portfolio component review, EBMUD shall determine if the proposed use would likely generate noise levels adversely affecting the adjacent noise-sensitive uses. If a Preferred Portfolio component has the potential to generate or expose noise-sensitive uses to noise levels exceeding the local exterior noise standards or result in a substantial (3 dB or greater) permanent increase in ambient noise levels, EBMUD shall prepare a site-specific acoustical analysis. The acoustical analysis shall be conducted in accordance with local general plan requirements;
- All long-term operational machinery shall be located in mechanical equipment rooms, wherever possible; and
- Localized noise barriers or rooftop parapets shall be constructed around the HVAC, cooling towers, and mechanical equipment to block line-of-site to the noise source from the property line of the noise-sensitive receptors.

Impact Significance After Mitigation: Potentially Significant

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Impact 5.2.G-3: Potential for noticeable increase in traffic noise (3 dB or greater) along roadways designated for hauling construction materials.

The general discussion below addresses the following Preferred Portfolio components:

- Recycled Water;
- Northern California Water Transfers;
- Bayside Groundwater Phase 2;
- Regional Desalination;
- Sacramento Basin Groundwater Banking / Exchange;
- Enlarge Pardee and Lower Bear Reservoirs; and
- IRCUP / San Joaquin Groundwater Banking / Exchange.

Construction-generated traffic volumes would depend on material requirements and availability and project phase. As such, all materials would be transported over designated haul routes on the local roadway network, thus increasing traffic volumes along affected roadway segments. Existing traffic volumes on local roadway networks will vary depending on individual portfolio component construction locations. For urban areas, local roadway networks would be expected to consist of high existing traffic volumes, resulting in high existing traffic noise levels. In these instances, an increase of daily traffic volumes due to construction traffic would not be expected to result in a substantial increase in existing traffic noise levels. Typically, a doubling of traffic volumes would be required to increase existing traffic noise levels by 3 dB due to construction traffic.

Rural areas generally have lower existing traffic volumes, resulting in lower existing traffic noise levels. Individual component construction-related traffic increases would be expected to increase existing traffic noise levels; however, increases would be site specific and require specific traffic analysis when details are available.

For the purposes of this analysis, if noise-sensitive uses are on a local roadway, adjacent to the designated haul route, then the proposed construction-related traffic volume increases may expose noise-sensitive receptors to a noticeable increase in ambient noise levels. As a result, construction-related traffic noise impacts would be ***potentially significant***. Further site-specific analysis would be needed to determine the potential effects of increased traffic noise at the noise-sensitive land uses. Implementation of Mitigation Measures 5.2.G-3a and 5.2.G-3b below would reduce these potential impacts to less-than-significant levels.

Mitigation Measure 5.2.G-3a: Avoid designating construction haul routes on local roadways with adjacent noise-sensitive land uses.

EBMUD shall avoid designating construction haul routes on local roadways with adjacent noise-sensitive land uses. If avoidance is not possible, EBMUD shall designate construction haul routes with the fewest possible adjacent noise-sensitive land uses.

Mitigation Measure 5.2.G-3b: Implement measures to reduce construction-generated traffic noise levels at existing noise-sensitive receptors.

As discussed previously, urban areas are not expected to be exposed to a substantial increase in traffic noise levels due to construction-related traffic. However, for rural areas, further site-specific analysis would be required to determine the potential effects of increased traffic noise at noise-sensitive land uses adjacent to proposed construction haul routes. Implementation of the measures listed below would reduce the exposure of sensitive receptors to increased project-generated traffic source noise levels; therefore, potential impacts would be ***less than significant***.

- Operating speeds of construction-related traffic shall be reduced; and
- Where construction-related traffic increases result in an increase of existing traffic noise levels exceeding 3 dBA, temporary barriers shall be installed.

Impact Significance After Mitigation: Less than Significant

Impact 5.2.G-4: Potential exposure of sensitive receptors to excessive ground-borne noise and vibration levels (e.g., exceed FTA, Caltrans, and local guidelines).

The general discussion below addresses the following Preferred Portfolio components:

- Recycled Water;
- Northern California Water Transfers;
- Bayside Groundwater Phase 2;
- Regional Desalination;
- Sacramento Basin Groundwater Banking / Exchange;
- Enlarge Pardee and Lower Bear Reservoirs; and
- IRCUP / San Joaquin Groundwater Banking / Exchange.

Construction activities associated with the Preferred Portfolio components would have the potential to result in varying degrees of temporary ground-borne vibration, depending on the specific construction equipment used and operations involved. Ground-borne vibration levels associated with various types of construction equipment are summarized in Table 5.2.G-2. Based on the representative vibration levels identified for various construction equipment types, sensitive receptors located in close proximity to construction activities could be exposed to ground-borne vibration levels exceeding the recommended FTA and Caltrans guidelines of 80 VdB and 0.2 in/sec PPV, respectively.

These ground-borne noise and vibration levels could result in annoyance or architectural/structural damage.

Table 5.2.G-2: Representative Vibration Source Levels for Construction Equipment

EQUIPMENT		PPV AT 25 FEET (IN/SEC)[1]	APPROXIMATE L_V (VdB) AT 25 FEET[2]
Pile Driver (impact)	Upper range	1.518	112
	Typical	0.644	104
Pile Driver (sonic)	Upper range	0.734	105
	Typical	0.170	93
Large Bulldozer		0.089	87
Caisson Drilling		0.089	87
Trucks		0.076	86
Jackhammer		0.035	79
Small Bulldozer		0.003	58

Notes:
1 Where PPV is the peak particle velocity.
2 Where L_v is the RMS velocity expressed in vibration decibels (VdB), assuming a crest factor of 4.
Source: FTA 2006

For the purposes of this analysis, if a vibration-sensitive use is located in close proximity to vibration-induced construction activities, the proposed construction activities may expose people to excessive ground-borne vibration or ground-borne noise levels. As a result, construction induced vibration impacts would be ***potentially significant***. While implementation of Mitigation Measures 5.2.G-4a and 5.2.G-4b would reduce potential impacts, it is not known whether these measures would reduce potential impacts to less-than-significant levels. Further site-specific analysis would be needed to determine the potential effects of increased ground-borne vibration levels at the vibration-sensitive land uses.

Mitigation Measure 5.2.G-4a: Avoid siting proposed construction activities in close proximity to vibration-sensitive land uses.

EBMUD shall avoid siting construction activities in close proximity to vibration-sensitive land uses. If avoidance is not possible, EBMUD shall site these construction activities as far from vibration-sensitive land uses as possible.

Mitigation Measure 5.2.G-4b: Implement measures to reduce construction-generated vibration levels from construction activities at existing vibration-sensitive receptors.

The amount and duration of vibration-induced construction activities have not been determined. However, it is expected that construction activities would expose people to or generate excessive ground-borne vibration or noise levels at vibration-sensitive receptors in close proximity to proposed construction areas. Implementation of reduction measures (which may include, but are not limited to, designating a preservation director to manage complaints; recording the pre-existing condition of all buildings in close proximity to construction activities; conducting vibration monitoring during pile-driving operations; providing protective coverings for nearby historic features; and using alternative pile-driving methods) would reduce the exposure of sensitive receptors to project-generated vibration levels; however, potential impacts would be ***potentially significant***.

Impact Significance After Mitigation: Potentially Significant

Table 5.2.G-3: Summary of Potential Noise Impacts Resulting from the WSMP 2040 Preferred Portfolio

IMPACT	RATIONING	CONSERVATION	RECYCLED WATER	NORTHERN CALIFORNIA WATER TRANSFERS	BAYSIDE GROUNDWATER PHASE 2	SACRAMENTO BASIN GROUNDWATER BANKING / EXCHANGE	REGIONAL DESALINATION	ENLARGE PARDEE RESERVOIR	ENLARGE LOWER BEAR RESERVOIR	IRCUP / SAN JOAQUIN GROUNDWATER BANKING / EXCHANGE
5.2.G-1: Potential exposure of sensitive receptors to noise levels in excess of the applicable noise standards and/or result in a noticeable increase in ambient noise levels from short-term construction activities	--	--	PS	PS	PS	PS	PS	PS	PS	PS
5.2.G-2: Potential exposure of noise-sensitive receptors to noise levels in excess of the applicable noise standards and/or result in a noticeable increase in ambient noise levels from long-term operational activities	--	--	PS	PS	PS	PS	PS	PS	PS	PS
5.2.G-3: Potential for noticeable increase in traffic noise (3 dB or greater) along roadways designated for hauling construction materials	--	--	LTSM	LTSM	LTSM	LTSM	LTSM	LTSM	LTSM	LTSM
5.2.G-4: Potential exposure of sensitive receptors to excessive ground-borne noise and vibration levels (e.g., exceed FTA, Caltrans, and local guidelines)	--	--	PS	PS	PS	PS	PS	PS	PS	PS
-- = No Impact, LTS = Less than Significant, LTSM = Less than Significant with Mitigation, PS = Potentially Significant, B = Beneficial										

5.2.H Cultural Resources

5.2.H.1 Significance Criteria

According to Appendix G of the State CEQA Guidelines, a cultural resources impact is considered significant if implementation of the WSMP 2040 Preferred Portfolio would do either of the following:

- Cause a substantial adverse change in the significance of a unique archaeological resource or an historical resource as defined in Section 21083.2 of CEQA and Section 15064.5 of the State CEQA Guidelines, respectively; or
- Disturb any human remains, including those interred outside of formal cemeteries.

The State CEQA Guidelines (CCR Section 15064.5) define "substantial adverse change" as physical demolition, destruction, relocation, or alteration of the resource or its immediate surroundings.

Further identification of cultural resources will occur as part of the project-level analysis for subsequent WSMP 2040 projects. Study of potential impacts of a project on historical resources and the formulation of feasible mitigation measures to reduce the impacts will require:

- Identification of the character-defining features that help convey the significance of the cultural resource or historic venue;
- Identification of an appropriate study area for the potential cultural resource(s) that could be affected by the project; and
- Application of evaluative criteria such as those for resources under the National Register, California Register, or other local landmarks criteria as appropriate to the character and context identification.

These subsequent project-level analyses will survey for direct, indirect, and cumulative impacts. The programmatic discussion in this chapter lays the foundation for these project-level analyses.

Under the National Historic Preservation Act (NHPA), if it is determined that historic properties may be affected by an undertaking, the agency must proceed with the Section 106 process to assess adverse effects. According to the criteria found in Section 800.5(a)(1) of NHPA regulations, an adverse effect may occur when the integrity of a historic property may be diminished by an undertaking, through alteration of the characteristics that qualify the property for the National Register of Historic Places (NRHP). Such alteration may result directly from the undertaking, or indirectly, as a consequence. The criteria of adverse effect state:

An adverse effect is found when an undertaking may alter, directly or indirectly, any of the characteristics of a historic property that qualify the property for inclusion in the National Register in a manner that would diminish the integrity of the property's location, design, setting, materials, workmanship, feeling, or association. Consideration shall be given to all qualifying characteristics of a historic property, including those that may have been identified subsequent to the original evaluation of the property's eligibility for the National Register. Adverse effects may include reasonably foreseeable effects caused by the undertaking that may occur later in time, be farther removed in distance or be cumulative.

Adverse effects on historic properties include, but are not limited to the following:

- Physical destruction of or damage to all or part of the property;
- Alteration of a property, including restoration, rehabilitation, repair, maintenance, stabilization, hazardous material remediation, and provision of handicapped access, that is not consistent with *The Secretary of Interior's Standards for the Treatment of Historic Properties* (36 CFR part 68) and applicable guidelines;
- Removal of the property from its historic location;
- Change of the character of the property's use or of physical features within the property's setting that contribute to its historic significance;
- Introduction of visual, atmospheric, or audible elements that diminish the integrity of the property's significant historic features;
- Neglect of a property that causes its deterioration, except where such neglect and deterioration are recognized qualities of a property of religious and cultural significance to an Indian tribe or Native Hawaiian organization; and
- Transfer, lease, or sale of property out of Federal ownership or control without adequate and legally enforceable restrictions or conditions to ensure long-term preservation of the property's historic significance.

5.2.H.2 Components That Would Not Result in Cultural Resources Impacts

Water Rationing and Conservation

Water rationing is voluntary and mandatory reduction of water consumption during droughts or emergencies, thereby offsetting demands on water supply sources. Water conservation is increased water use efficiency through implementation of specific improvements or actions implemented primarily at the individual level. No large scale infrastructure or facilities would be required for implementation of these programs, and thus no impacts to cultural resources would result.

5.2.H.3 Potential Cultural Resources Impacts

Impact 5.2.H-1: Potential to alter or damage known or unrecorded cultural resources, including human remains, during construction.

The general discussion below addresses the following Preferred Portfolio components:

- Recycled Water;
- Northern California Water Transfers;
- Bayside Groundwater Phase 2;
- Sacramento Basin Groundwater Banking / Exchange;
- Regional Desalination;
- Enlarge Pardee and Lower Bear Reservoirs; and
- IRCUP / San Joaquin Groundwater Banking / Exchange.

Construction of new or expanded facilities (including treatment plants, pumping stations, wells, recharge ponds, dam-related facilities, pipelines), would require excavation and grading that could create indirect or direct physical impacts to prehistoric or historic cultural resources. Much of the WSMP 2040 Preferred Portfolio Study Area has not been surveyed for the presence of cultural resources, and buried or previously unidentified cultural resources are likely to be discovered during construction. The placement of proposed facilities in areas already urbanized and considered disturbed could minimize potential impacts to cultural resources, but would not necessarily avoid them.

Construction of proposed facilities could alter or damage known cultural resources that have been identified during previous archaeological inventory efforts or as-yet undiscovered cultural resources. Alteration or damage could result in the loss of integrity of cultural deposits, loss of information, and alterations of site settings. Prehistoric resources include artifacts, stone, bone, shell, or rock art. Historic resources include historic debris, buildings, structures, objects, and developed landscapes. If cultural resources, including those that appear to be eligible for listing to the NRHP and/or California Register of Historic Resources (CRHR), or human remains are discovered during construction, then impacts to these resources from construction would be ***potentially significant***. Implementation of Mitigation Measures 5.2.H-1a through 5.2.H-1d below would reduce potential impacts to less-than-significant levels.

Discussion of Specific Components

The following Preferred Portfolio components allow for more specific discussion and are presented below.

Enlarge Pardee and Lower Bear Reservoirs

Potential impacts to cultural resources associated with the Enlarge Pardee and Lower Bear Reservoirs components may occur with inundation resulting from the expansion of the existing reservoirs. Any resources at or below the maximum flood level would potentially be subject to this impact. Fluctuation of the reservoir elevation would have the greatest potential impact on archaeological sites, such as those in the vicinity of Lower Bear and Pardee reservoirs. Site disturbance can include weathering erosion and displacement of artifacts. The proposed enlargement of Pardee Reservoir would potentially have impacts on Pardee Dam (JRP 1994 as cited in FRWA 2003) since construction of a new dam could require breaching and flooding the existing dam. This component would also have potential impacts on Middle Bar Bridge since raising the reservoir level could require removing the structure. Both are historic properties listed on the NRHP. Impacts would be considered ***potentially significant***. Implementation of Mitigation Measures 5.2.H-1a through 5.2.H-1d below would reduce potential impacts to less-than-significant levels.

Mitigation Measure 5.2.H-1a: Perform a record search at the appropriate information center and cultural and architectural resource surveys, and document results.

Prior to construction, EBMUD shall retain a qualified professional archaeologist to perform a cultural resources record search at the appropriate information center or other repositories, such as local historical societies. The archaeologist shall use the results of the record search to design and complete an appropriate cultural resources inventory and preliminary assessment program for the applicable components. As necessary, a qualified professional architectural historian shall also be retained to assess impacts to the built environment.

The inventory efforts shall be documented and shall include appropriate treatment measures for identified resources, as well as a plan for dealing with unanticipated finds during construction. Treatment of known sites shall be completed prior to construction whenever feasible. A copy of the inventory report and any new or updated site records shall be sent to the information center.

Mitigation Measure 5.2.H-1b: Develop a plan to manage the discovery of as-yet unknown cultural resources.

EBMUD shall develop a plan to manage the discovery of as-yet unknown cultural resources. If cultural resources—such as chipped or ground stone, historic debris, building foundations, or human bone—are inadvertently discovered during construction activities, the construction contractor should adhere to the following:

- Stop work immediately within 100 feet of the find;
- Notify relevant agencies; and

- Retain a qualified archaeologist to assess the significance of the find and, if necessary, to develop appropriate treatment measures in consultation with the Most Likely Descendant (see Mitigation Measure 5.2.H-1c in the event human remains are discovered).

Mitigation Measure 5.2.H-1c: Avoid disturbance to human remains.

The archaeologist retained shall use the results of the record search to identify known burial sites in construction areas. To the greatest extent possible, this information should be used to design project elements in such a way as to avoid impacts to known cemeteries. The inventory efforts shall be documented and shall include appropriate treatment measures for identified burial sites.

In accordance with the California Health and Safety Code, if human remains are uncovered during ground-disturbing activities, the contractor and/or EBMUD shall immediately halt potentially damaging excavation in the area of the burial and shall notify the County Coroner and a professional archaeologist to determine the nature of the remains. The coroner is required to examine all discoveries of human remains within 48 hours of receiving notice of a discovery on private or State lands (Health and Safety Code Section 7050.5[b]). If the coroner determines that the remains are those of a Native American, he or she must contact the Native American Heritage Commission (NAHC) by phone within 24 hours of making that determination (Health and Safety Code Section 7050[c]). Following the coroner’s findings, the property owner, contractor or EBMUD, an archaeologist, and the NAHC-designated Most Likely Descendant (MLD) shall determine the ultimate treatment and disposition of the remains and take appropriate steps to ensure that additional human interments are not disturbed.
The responsibilities for acting upon notification of a discovery of Native American human remains are identified in California Public Resources Code (PRC) Section 5097.9.

Upon the discovery of Native American remains, the landowner shall ensure that the immediate vicinity (according to generally accepted cultural or archaeological standards and practices) is not damaged or disturbed by further development activity until consultation with the MLD has taken place. The MLD shall have 48 hours to complete a site inspection and make recommendations after being granted access to the site.
A range of possible treatments for the remains, including nondestructive removal and analysis, preservation in place, relinquishment of the remains and associated items to the descendants, or other culturally appropriate treatment may be discussed. PRC Section 5097.9 suggests that the concerned parties may extend discussions beyond the initial 48 hours to allow for the discovery of additional remains. The following is a list of site protection measures that the landowner shall employ:

- Record the site with the NAHC or the appropriate information center; and
- Use an open space or conservation zoning designation or easement.

If the NAHC is unable to identify a MLD, or if the MLD fails to make a recommendation within 48 hours of being granted access to the site, the landowner or landowner's authorized representative shall rebury the Native American human remains and associated grave goods with appropriate dignity on the property in a location not subject to further subsurface disturbance. The landowner or authorized representative may also reinter the remains in a location not subject to further disturbance if he or she rejects the recommendation of the MLD and mediation by the NAHC fails to provide measures acceptable to the landowner.

Adherence to these procedures and other provisions of the California Health and Safety Code will reduce potential impacts on human remains to a less-than-significant level. EBMUD shall be required to implement any mitigation for the protection of the burial remains. If burials are identified during construction, construction work in the vicinity of the burials shall not resume until the mitigation is completed. This measure shall be included in all grading and improvement plans for all phases of implementation.

Mitigation Measure 5.2.H-1d: Prepare a Data Recovery Plan.

This mitigation measure applies to the following components: Enlarge Pardee and Lower Bear Reservoirs and IRCUP / San Joaquin Groundwater Banking / Exchange Project.

EBMUD shall develop and implement a Data Recovery Plan and prepare Historic American Engineering Record Documentation on Pardee Dam, Middle Bar Bridge. Where avoidance to structures is impossible, typical mitigation to reduce the impact would be to develop and implement a data recovery plan including preparation of Historic American Engineering Record (HAER) documentation. Pardee Dam was previously documented (HAER Survey Number CA-168, CA-168-A, CA-168-B, CA-168-C, CA-168-D). Prior to any potential impact to Pardee Dam, an update to the original HAER documentation may be needed. Additional elements of the data recovery plan may include an interpretive display at the site with historic photos of the original dam, along with textual displays on the history and significance of the site. Also, significant architectural features of the new dam could reflect the original dam. The name of a new dam should be differentiated from Pardee Dam.

Mitigation for removing Middle Bar Bridge would also include development and implementation of a data recovery plan including HAER documentation. Middle Bar Bridge has not been previously HAER-documented. An interpretive display in the vicinity of the bridge may also be a component of the data recovery plan to reduce the impact to this resource. This mitigation would apply for both CEQA and NHPA compliance, reducing these impacts to a less-than-significant level and resolving the potential adverse effects to this historic property.

In addition, in the event that other historic resources are located at other proposed sites, EBMUD shall develop and implement a Data Recovery Plan and prepare HAER documentation on any other resources where appropriate. Copies of all documentation shall be sent to the appropriate repositories.

Impact Significance After Mitigation: Less than Significant

Table 5.2.H-1: Summary of Potential Cultural Resources Impacts Resulting from the WSMP 2040 Preferred Portfolio

IMPACT	RATIONING	CONSERVATION	RECYCLED WATER	NORTHERN CALIFORNIA WATER TRANSFERS	BAYSIDE GROUNDWATER PHASE 2	SACRAMENTO BASIN GROUNDWATER BANKING / EXCHANGE	REGIONAL DESALINATION	ENLARGE PARDEE RESERVOIR	ENLARGE LOWER BEAR RESERVOIR	IRCUP / SAN JOAQUIN GROUNDWATER BANKING / EXCHANGE
5.2.H-1: Potential to alter or damage known or unrecorded cultural resources, including human remains, during construction	--	--	LTSM	LTSM	LTSM	LTSM	LTSM	LTSM	LTSM	LTSM
-- = No Impact, LTS = Less than Significant, LTSM = Less than Significant with Mitigation, PS = Potentially Significant, B = Beneficial										

5.2.I Visual Resources

5.2.I.1 Significance Criteria

In accordance with Appendix G of the CEQA Guidelines, a significant impact on visual resources would occur if the WSMP 2040 Preferred Portfolio would:

- Have a substantial adverse effect on a scenic vista;
- Substantially damage scenic resources, including, but not limited to, trees, rock outcroppings, and historic buildings within a State scenic highway;
- Substantially degrade the existing visual character or quality of the site and its surroundings; or
- Create a new source of substantial light or glare which would adversely affect day or nighttime views in the area.

5.2.I.2 Potential Visual Resources Impacts

Impact 5.2.I-1: Potential to adversely affect the existing visual character and scenic vistas or resources.

The general discussion presented below addresses the following Preferred Portfolio components:

- Recycled Water;
- Northern California Water Transfers;
- Bayside Groundwater Phase 2;
- Sacramento Basin Groundwater Banking / Exchange;
- Regional Desalination; and
- IRCUP / San Joaquin Groundwater Banking / Exchange.

The precise location, design and layout of each of the proposed facilities have not yet been determined. Proposed facilities include above-ground structures (e.g., treatment plants, pump stations, and other facilities), as well as pipelines that would be buried underground. Because pipeline construction would occur for a relatively short period of time in any given area, potential impacts on visual character or scenic views and resources would be limited in duration. Some above-ground facilities may be located in residential or open space areas where their industrial appearance would potentially contrast with adjacent uses and alter the existing aesthetic character of the project sites and environs.

The extent of potential effects on views and visual character from permanent structures and temporary construction activities cannot be determined without specific information concerning each facility's location and design. Therefore, for the purposes of this PEIR, impacts on views and visual character would be ***potentially significant.*** Implementation of Mitigation Measure 5.2.I-1 would visually integrate above-ground structures with surrounding uses and reduce impacts to less-than-significant levels. Once specific sites are selected and individual facilities are designed, additional project-level environmental review would be conducted to identify the potential effects on the existing visual character of the project sites and surrounding areas as well as to identify any scenic vistas or resources that would potentially be affected.

Discussion of Specific Components

The following Preferred Portfolio components allow for more specific discussion and are presented below.

Rationing

Rationing would result in physical changes to irrigated landscapes and would potentially degrade the visual quality of public and private yards, parks, gardens and other irrigated areas. In general, water rationing by customers would result in drying of irrigated landscaped areas. Any aesthetic alteration of individual yards and gardens would occur gradually, growing in intensity as rationing extends from one season to the next. While these changes would potentially alter the appearance of landscaped areas, their visual character would not be substantially affected (e.g., suburban areas would exhibit the same character).

Changes in the visual landscape would primarily affect short-range views at the street level. These changes would be seasonal, with visual changes to landscapes dependent on irrigation visible primarily in the summer and fall. In addition, the reduction in supplies would have a greater effect on the East of Hills subregion of the EBMUD service area due to the dryer climate and larger irrigated landscaped areas. For long-range views, such as from scenic vistas on elevated hillsides, the visual change would be visible only on large landscaped areas that currently use potable water (e.g., golf courses). Changes in the visual quality of landscaped areas may not be noticeable given the numerous competing and dominant visual elements in any urban landscape (e.g., structures, pavement, etc.). Within rural landscapes, changes at the parcel level may be visually compatible with the existing, surrounding grasslands that change color on an annual basis.

While dried-out landscapes would be visible during the dry season, these changes would not substantially alter or degrade the existing visual character nor would they affect scenic vistas or resources. Therefore, potential impacts would be ***less than significant***. Under the Preferred Portfolio, rationing would be implemented at the 10 percent level, which is substantially less than the EBMUD's current authority to impose 25 percent rationing (see Section 2.4.7 in Chapter 2, Background, for further discussion of EBMUD's existing Water Supply Availability and Deficiency Policy). Consequently, potential impacts on existing visual character and scenic views under the proposed 10 percent rationing level would potentially be less adverse than the impacts that would result under the current 25 percent rationing level.

Conservation

The Conservation component would increase water use efficiency through the implementation of specific improvements or actions implemented primarily at the individual level on a voluntary basis. These actions would include activities within a customer's home or yard (e.g., installation of water-efficient appliances and metering devices) or education programs that would potentially alter the visual character of irrigated outdoor landscaped areas. These actions are not expected to substantially alter the existing visual character or affect scenic views or resources. Therefore, potential impacts would be ***less than significant.***

Northern California Water Transfers

Implementation of the Northern California Water Transfers component would potentially affect the visual character of lands in the counties from which water would be transferred. While water transfer partners have not been identified, it is expected that water obtained through transfers would otherwise be used for agricultural irrigation.

Short-term fallowing of land would have the potential to change the seasonal appearance of affected agricultural lands from typical flooded rice fields or row-crop fields to one devoid of plants and dominated by dried, brown soil. Because farmers occasionally implement land fallowing to increase fertility of the soils, fallowed land is a common visual feature in agricultural areas. Fallowed lands would not result in any incongruent shapes, forms, or colors in the overall visual landscape and would retain their flat terrain, and as such they would continue to exhibit a rural visual character.

Long-term transfers may result in the permanent conversion of land from agricultural production to other uses. If lands were permanently converted to non-agricultural uses, specifically, new development, then the overall landscape could change substantially. Given the flat terrain, expansiveness of agricultural areas, and uniformity of the viewscape, any new development would result in a visual break in the horizon that may appear incongruous with the surrounding landscape, particularly if the development would involve large acreages and would be located far away from other similar uses. In such instances, this type of land conversion would potentially alter the existing visual character of the area as well as views of the area.

The potential conversion of agricultural land to other uses that may result from water transfers would potentially affect scenic views and resources. Views from SR 160, an officially-designated State scenic highway (a portion of which is also a County-designated scenic highway), would potentially be affected.

As stated above, it is not known which lands would be potentially affected by this component, nor is it known how those lands would be used following water transfers. For the purposes of this program-level analysis, impacts on visual character and scenic views and resources would be ***potentially significant*** because the extent of the impacts cannot be determined. Additional project-level analysis of visual impacts would be needed once water transfer partners are identified to assess the potential changes in the visual character of the affected lands and surrounding areas as well as to identify any scenic vistas or resources that would potentially be affected.

Sacramento Basin Groundwater Banking / Exchange

New facilities proposed as part of the Sacramento Basin Groundwater Banking / Exchange component—which include a pump station, wells, treatment facilities and pipelines—would have less-than-significant impacts on existing visual character and scenic views and resources with implementation of Mitigation Measure 5.2.I-1, as noted in the general discussion above.

In addition to these new facilities, 39 acres of ponds would be constructed to facilitate groundwater recharge. The precise locations of these ponds have not yet been identified; they could occur anywhere in the Sacramento basin, most likely within an existing agricultural area. Conversion of agricultural land to ponds would not be expected to substantially alter the existing visual character because ponds and water bodies are common features in agricultural areas, and the sites would continue to exhibit a rural visual character.

Additionally, the recharge ponds would not be expected to adversely affect scenic views or resources since no new structures would be introduced that would result in striking visual contrast with the surrounding areas. Due to their extensive acreage, the recharge ponds would potentially alter views from SR 160, a State-designated scenic highway, and/or from other scenic vistas or vantage points. Due to the generally flat and expansive terrain of agricultural lands, the ponds are likely to be visible only in short-range views or from elevated viewpoints, which are limited in the Sacramento basin. For the purposes of this program-level analysis, these impacts are considered ***less than significant***.

Enlarge Pardee and Lower Bear Reservoirs

Construction activities associated with the enlargement of the Pardee and Lower Bear Reservoirs would potentially introduce heavy equipment and vehicles, including cranes, bulldozers, graders, scrapers, and trucks into the viewsheds of public roadways, recreational areas and facilities, and open space areas. Construction equipment and activities would potentially degrade scenic views of the reservoirs and surroundings in the short term, due to the presence of equipment in an otherwise natural and uniform landscape. Construction would likely be phased, which may limit the extent of construction affecting viewsheds at any one time. As stated in the general discussion above, construction activities would be temporary and would have less-than-significant impacts on existing visual character and scenic views and resources with implementation of Mitigation Measure 5.2.I-1.

Over the long term, enlargement of the reservoirs would not result in any incongruent shapes, forms, or colors in the overall visual landscape that would substantially alter the existing visual character of the reservoir sites.

Enlargement of the reservoirs and construction of associated facilities would potentially affect views of the reservoirs and surrounding areas. In general, the increases in water elevation from enlargement would likely be difficult to notice for most viewers within or immediately adjacent to the lakes, due to the size and scale of the reservoirs. At ground or water level, it would be difficult to ascertain changes in reservoir water elevation. In addition, the views of forested areas above the elevated reservoir levels would be maintained as vegetated landscapes.

The changes in short- and mid-range views would not likely be visually intrusive for most viewers because they would be similar to existing views of the reservoirs. Viewers from within and adjacent to the lakes would continue to notice a light-colored, unvegetated ring around the water's edge, which is caused by fluctuations in the reservoir water level. However, as these rings currently exist at the reservoirs, views would be not substantially affected.

Long-range views of the enlarged reservoirs and associated facilities, including the dams, would be altered, as the reservoirs would appear larger and facilities may be situated in different locations. However, long-range views of the reservoirs and facilities would likely be limited, as the natural topography often obstructs views of the landscape. Although the views may be altered, the enlarged reservoirs would generally retain their form and quality (i.e., reservoirs with associated dam structures and spillways surrounded by natural vegetation). However, designs for the enlarged reservoirs and new facilities are not currently available, so impacts on scenic views and resources cannot be determined. Views from SR 49 and SR 88, State-designated scenic highways, would potentially be affected. Similarly, the larger inundation area may degrade scenic resources in the area. Consequently, impacts associated with the enlarged reservoirs would be considered ***potentially significant***.

Mitigation Measure 5.2.I-1: Integrate above-ground structures with the surrounding landscape.

EBMUD shall use design elements to enhance visual integration of above-ground facilities with their surroundings. These elements may include but are not limited to the painting of structural façades to blend with the surrounding land uses, or installing berms and/or landscaping around the facility.

Impact Significance After Mitigation: Less than Significant for Recycled Water, Bayside Groundwater Phase 2, Sacramento Basin Groundwater Banking / Exchange, Regional Desalination and IRCUP / San Joaquin Groundwater Banking / Exchange

Potentially Significant for Northern California Water Transfers and Enlarge Pardee and Lower Bear Reservoirs

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Impact 5.2.I-2: Potential to increase light and glare.

The discussion presented below addresses the following Preferred Portfolio components:

- Recycled Water;
- Northern California Water Transfers;
- Bayside Groundwater Phase 2;
- Sacramento Basin Groundwater Banking / Exchange;
- Regional Desalination;
- Enlarge Pardee and Lower Bear Reservoirs; and
- IRCUP / San Joaquin Groundwater Banking / Exchange.

New facilities associated with proposed Preferred Portfolio components may include exterior lighting, which may be visible from, or dispersed to create glare on, surrounding uses. The introduction of a new light source, particularly in an area not already illuminated, or an increase in ambient light or glare would be considered a ***potentially significant*** impact. Implementation of Mitigation Measure 5.2.I-2 below would reduce this potential impact to a less-than-significant level. Additional project-level visual analysis would be conducted once specific sites are selected and individual design is determined, to identify light and glare effects.

Mitigation Measure 5.2.I-2: Incorporate design elements to reduce light and glare.

EBMUD shall provide project specifications for construction of facilities to reduce lighting intrusion and glare on surrounding uses. Highly reflective building materials and/or finishes shall not be used in the design of proposed structures. Landscaping shall be maintained to minimize off-site light and glare.

Impact Significance After Mitigation: Less than Significant

Table 5.2.I-1: Summary of Potential Visual Resources Impacts Resulting from the WSMP 2040 Preferred Portfolio

IMPACT	RATIONING	CONSERVATION	RECYCLED WATER	NORTHERN CALIFORNIA WATER TRANSFERS	BAYSIDE GROUNDWATER PHASE 2	SACRAMENTO BASIN GROUNDWATER BANKING / EXCHANGE	REGIONAL DESALINATION	ENLARGE PARDEE RESERVOIR	ENLARGE LOWER BEAR RESERVOIR	IRCUP / SAN JOAQUIN GROUNDWATER BANKING / EXCHANGE
5.2.I-1: Potential to alter the existing visual character of project sites and affect scenic vistas or resources	LTS	LTS	LTSM	PS	LTSM	LTSM	LTSM	PS	PS	LTSM
5.2.I-2: Potential to increase light and glare	--	--	LTSM	LTSM	LTSM	LTSM	LTSM	LTSM	LTSM	LTSM
-- = No Impact, LTS = Less than Significant, LTSM = Less than Significant with Mitigation, PS = Potentially Significant, B = Beneficial										

5.2.J Hazards

5.2.J.1 Significance Criteria

In accordance with Appendix G of the CEQA Guidelines, a significant impact related to hazards would occur if the WSMP 2040 Preferred Portfolio would:

- Create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials;
- Create a significant hazard to the public or the environment through reasonably foreseeable upset and accident conditions involving the release of hazardous materials into the environment;
- Emit hazardous emissions or handle hazardous or acutely hazardous materials, substances, or waste within one-quarter mile of an existing or proposed school;
- Create a significant hazard to the public or the environment for a project located on a site which is included on a list of hazardous materials sites compiled pursuant to Government Code Section 65962.5;
- Result in a safety hazard for people residing or working in the project area for a project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport;
- Result in a safety hazard for people residing or working in the project area for a project within the vicinity of a private airstrip;
- Impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan; or
- Expose people or structures to a significant risk of loss, injury or death involving wildland fires, including where wildlands are adjacent to urbanized areas or where residences are intermixed with wildlands.

5.2.J.2 Components That Would Not Result in Hazard-Related Impacts

The following Preferred Portfolio components were evaluated for their potential to cause hazardous materials or fire hazard impacts, and no impacts were identified.

Water Rationing and Conservation

Water rationing would involve voluntary and mandatory customer cutbacks of water consumption during certain dry water years, and would not require the construction or operation of new facilities. Water conservation would increase water use efficiency through the implementation of specific improvements or actions implemented primarily at the individual level through behavioral changes and modifications (e.g., installation of appliances). Large infrastructure or facilities are not required to implement conservation programs. As such, neither rationing nor conservation would create a significant risk of exposure of the public or the environment to hazardous materials or hazardous conditions. Similarly, the Rationing and Conservation components would not limit individual fire departments' ability to fight fires nor impair or interfere with an emergency response or evacuation plan. In addition, EBMUD would implement rationing in a planned effort that would balance the daily demands placed upon its public water supply with the requirement to maintain a sufficient water supply to meet the long term needs that may be placed upon the public water supply agency during a period of water shortage or drought emergency.

5.2.J.3 Potential Hazards Impacts

Impact 5.2.J-1: Potential exposure to uncontrolled releases of hazardous materials.

The general discussion below addresses the following Preferred Portfolio components:

- Recycled Water;
- Northern California Water Transfers;
- Bayside Groundwater Phase 2;
- Sacramento Basin Groundwater Banking / Exchange;
- Regional Desalination;
- Enlarge Pardee and Lower Bear Reservoirs; and
- IRCUP / San Joaquin Groundwater Banking / Exchange.

Construction

Uncontrolled release of substances such as fuels, oils, and lubricants, paints and chemicals used or stored during construction of proposed facilities have the potential to expose workers and the public to contamination. In addition, where construction activities are adjacent to a waterway, accidental release of these materials could degrade water quality. Because the exact locations of many of these facilities have not been identified, the number of schools within one-quarter mile of the facilities cannot be determined. The potential for exposure of workers and the public to hazardous materials from accidental spills would be ***potentially significant***. Implementation of Mitigation Measure 5.2.J-1 would reduce this potential impact to a less-than-significant level.

Operation

Operation of certain Preferred Portfolio facilities would involve the storage, use, and transport of hazardous materials. Improper use, handling, and storage of these substances pose risks to workers and the public. The potential risk of exposure of workers and the public to uncontrolled release of hazardous substances during construction or project operation would be ***potentially significant***. Implementation of Mitigation Measure 5.2.J-1 would reduce this potential impact to a less-than-significant level.

Mitigation Measure 5.2.J-1: Enforce on-site hazardous materials handling rules.

As described in Section 4.2.J.3, a comprehensive array of regulations is in place to ensure that risks associated with hazardous substances are carefully managed. Specific design features of chemical storage containment that increase the safe handling of hazardous substances would be determined at the project level and may include the following, as examples:

- Separate secondary containment for each chemical storage system;
- Proper separation of incompatible chemicals; and
- Design of all chemical handling facilities to minimize or eliminate the risk of damage from earthquakes or other natural disasters.

Use and storage of hazardous materials in quantities that exceed certain regulatory thresholds will require a hazardous material business plan, which would include an inventory of chemicals and amounts, as well as emergency response plans in the event of an uncontrolled release, to ensure adequate response to an accidental chemical release.

EBMUD shall incorporate into contract specifications the requirement that the contractor(s) enforce strict on-site handling rules to prevent exposure of workers and the public to hazardous material releases and degradation of receiving water quality. These rules may include the following:

- A construction site plan, including delineation of hazardous materials and hazardous waste storage areas, access and egress routes, drainage paths, emergency assemble areas, and temporary hazardous waste storage areas;
- Materials Safety Data Sheets for all chemicals used and stored at the construction sites;
- Spill prevention procedures, including employee spill prevention/response training;
- An inventory list of emergency equipment;
- Off-loading, safety, and handling procedures for each chemical;
- Notification and documentation procedure;
- Refueling of equipment only within designated areas of the construction staging area; and
- Regular inspection of all construction vehicles for releases.

Compliance with required laws and regulations through the project design and construction specifications would ensure that potential impacts associated with the transport, use, storage, and disposal of hazardous materials would be reduced to less-than-significant levels.

Impact Significance After Mitigation: Less than Significant

Impact 5.2.J-2: Potential exposure of construction workers to contaminated soil and water.

The general discussion below addresses the following Preferred Portfolio components:

- Recycled Water;
- Bayside Groundwater Phase 2;
- Sacramento Basin Groundwater Banking / Exchange;
- Regional Desalination;
- Enlarge Pardee and Lower Bear Reservoirs;
- IRCUP / San Joaquin Groundwater Banking / Exchange; and
- Northern California Water Transfers.

Construction of most new Preferred Portfolio component facilities would involve excavation and dewatering. Known or undocumented soil contamination could be encountered during earthmoving activities. Because the locations of proposed facilities have not been determined, the potential for encountering hazardous materials during construction activities and the subsequent exposure of workers and the public to contaminated groundwater and soils would be *potentially significant*. Implementation of Mitigation Measure 5.2.J-2 below would reduce this potential impact to a less-than-significant level.

Discussion of Specific Components

The following Preferred Portfolio components allow for more specific discussion and are presented below.

Enlarge Pardee and Lower Bear Reservoirs

The areas around Pardee and Lower Bear Reservoirs include open space lands and recreational uses that have not been subject to urban, industrial or intensive agricultural uses. However, potential sources of contaminants may be related to historic mine sites in the Mokelumne Watershed. Typically, mine spoils, tailings and waste piles contain arsenic, mercury and acids. The potential to expose workers and the public to contamination associated with historic mine spoils, tailings, and waste would be considered ***potentially significant***. Implementation of Mitigation Measure 5.2.J-2 below would reduce this potential impact to a less-than-significant level.

Seepage from the rock fill that comprises the Lower Bear River Reservoir Dam may contain metal concentrations that exceed the California Toxic Rule aquatic toxicity criteria. The source of the metals may be natural minerals in the dam's rock fill. Elevated copper was first noted in the year 2000, during annual water quality monitoring for the FERC Mokelumne River Project. During further testing in 2004, other metals were also identified as elevated in the seepage (PG&E 2006). The seepage to the reservoir water was determined to be from natural background levels of copper. The potential to expose workers and the public to contamination associated with contaminated seepage would be considered ***potentially significant***. Implementation of Mitigation Measure 5.2.J-2 below would reduce this potential impact to a less-than-significant level.

Mitigation Measure 5.2.J-2: Conduct environmental site assessments and remediation.

Upon finalization of proposed locations, EBMUD shall conduct due diligence reviews of the selected sites, as needed, to ensure that known hazardous materials contamination will be avoided. This shall include performance of a Phase 1 Hazardous Materials Site Assessment by a qualified professional (e.g., a California Registered Environmental Assessor) in conformance with American Society for Testing and Materials standards. If the Phase I Environmental Site Assessment indicates that a release of hazardous materials could have affected soil or groundwater quality at the site, then EBMUD shall retain a qualified environmental professional to conduct a Phase II Environmental Site Assessment to determine the presence and extent of contamination at the site, in conformance with State and local guidelines and regulations. If the results of a Phase II assessment indicate the presence of hazardous materials, alteration of facility design or site remediation shall be included in project specifications.

EBMUD shall require that its contractors comply with the requirements of its Trench Spoils Field Management Practices Program for worker safety during excavation and trenching activities in the presence of contaminated soils.

Compliance with required laws and regulations through the project design and construction specifications would ensure that potential impacts associated with contaminated soils or dewatering effluent would be reduced to less-than-significant levels.

Impact Significance After Mitigation: Less than Significant

Impact 5.2.J-3: Potential exposure to risk of wildland fires.

The general discussion below addresses the following Preferred Portfolio components:

- Recycled Water;
- Northern California Water Transfers;
- Regional Desalination;
- Enlarge Pardee and Lower Bear Reservoirs; and
- IRCUP / San Joaquin Groundwater Banking / Exchange.

Preferred Portfolio facilities may be located within or near wildland areas with high potential for fire during dry seasons. Operation of equipment used to construct proposed facilities, such as bulldozers, tractors, transportation vehicles, welders, and grinders, could increase the potential for fire. Additionally, workers at proposed sites could increase the risk of accidental fires from the careless disposal of cigarettes, off-road vehicle travel, and other incidental activities. Wildland fire could result in significant effects on human safety, loss and injury to livestock and wildlife, damage to buildings, loss of sensitive habitat, among others. Therefore, the potential for igniting wildfires during construction-related activities would be ***potentially significant***, particularly during the fire season. Implementation of Mitigation Measures 5.2.J-3a and 5.2.J-3b below would reduce this potential impact to a less-than-significant level.

Mitigation Measure 5.2.J-3a: Implement fire control plans.

Prior to the start of construction, EBMUD and/or its contractors shall develop and implement fire control plans containing fire management procedures. These plans shall be consistent with EBMUD's FMP. The fire control plans would require consultation with the affected jurisdictions and appropriate agencies responsible for fire protection at proposed project sites. The plans shall include fire precaution, presuppression, and suppression measures consistent with the policies and standards in the affected jurisdictions and in compliance with all fire regulations (e.g., fire code and special State wildland safety regulations). EBMUD shall coordinate fire protection needs during project construction with local fire protection agencies.

Mitigation Measure 5.2.J-3b: **Implement EBMUD's Fire Management Plan.**

EBMUD shall include in project construction specifications the requirement to comply with EBMUD's Fire Management Plan, where it applies, and coordinate fire prevention actions with fire protection agencies.

Impact Significance After Mitigation: Less than Significant

Table 5.2.J-1: Summary of Potential Hazards Impacts Resulting from the WSMP 2040 Preferred Portfolio

IMPACT	RATIONING	CONSERVATION	RECYCLED WATER	NORTHERN CALIFORNIA WATER TRANSFERS	BAYSIDE GROUNDWATER PHASE 2	SACRAMENTO BASIN GROUNDWATER BANKING / EXCHANGE	REGIONAL DESALINATION	ENLARGE PARDEE RESERVOIR	ENLARGE LOWER BEAR RESERVOIR	IRCUP / SAN JOAQUIN GROUNDWATER BANKING / EXCHANGE
5.2.J-1: Potential exposure to uncontrolled releases of hazardous materials	--	--	LTSM	LTSM	LTSM	LTSM	LTSM	LTSM	LTSM	LTSM
5.2.J-2: Potential exposure of construction workers to contaminated soil and water	--	--	LTSM	LTSM	LTSM	LTSM	LTSM	LTSM	LTSM	LTSM
5.2.J-3: Potential exposure to risk of wildland fires	--	--	LTSM	LTSM	--	--	LTSM	LTSM	LTSM	LTSM
-- = No Impact, LTS = Less than Significant, LTSM = Less than Significant with Mitigation, PS = Potentially Significant, B = Beneficial										

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5.2.K Public Services, Utilities and Energy

5.2.K.1 Significance Criteria

In accordance with Appendix G of the CEQA Guidelines, a significant impact on public services, utilities, and/or energy would occur if the WSMP 2040 Preferred Portfolio would:

- Result in substantial adverse physical impacts associated with the provision of new or physically altered governmental facilities, need for new or physically altered governmental facilities, the construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios, response times or other performance objectives for public services (e.g., fire and police protection, schools);
- Exceed wastewater treatment requirements of the applicable Regional Water Quality Control Board;
- Require or result in the construction of new water or wastewater treatment facilities or expansion of existing facilities, the construction of which could cause significant environmental effects;
- Require or result in the construction of new storm water drainage facilities or expansion of existing facilities, the construction of which could cause significant environmental effects;
- Have sufficient water supplies available to serve the project from existing entitlements and resources, or are new or expanded entitlements needed;
- Result in a determination by the wastewater treatment provider which serves or may serve the project that it has adequate capacity to serve the project's projected demand in addition to the provider's existing commitments;
- Be served by a landfill with sufficient permitted capacity to accommodate the project's solid waste disposal needs;
- Comply with Federal, State, and local statutes and regulations related to solid waste;
- Result in the wasteful, inefficient, or unnecessary consumption of energy;
- Require the construction of additional energy infrastructure facilities; or
- Increase reliance on energy resources that are not renewable.

5.2.K.2 Issues Dismissed from Further Analysis

The WSMP 2040 Preferred Portfolio components would involve the construction of a variety of facilities (e.g., above ground structures housing wells, pump stations, treatment facilities; recharge ponds, dams; and buried pipelines); however, it would not increase the population or induce the need for additional public services such as wastewater treatment (see Chapter 7, Growth Inducement). The components and associated facilities would therefore not exceed wastewater treatment requirements of the applicable Regional Water Quality Control Board and would not result in additional wastewater treatment capacity requirements on the wastewater treatment provider. In addition, the WSMP 2040 Preferred Portfolio components would not require or result in the construction of new wastewater treatment facilities. As such, no environmental impacts related to the construction of these facilities would occur. Similarly, the Preferred Portfolio components would not result in the construction of new storm water drainage facilities or expansion of existing facilities, and therefore would not result in environmental impacts related to the construction of such facilities.

No further discussion of these issues is provided.

5.2.K.3 Components that would not result in Public Services, Utilities and Energy Impacts

The following Preferred Portfolio components were evaluated for their potential to cause public services, utilities, and energy impacts, and no impacts were identified.

Rationing and Conservation

Rationing would not require the construction/expansion of facilities associated with public services or utilities that would result in a physical effect on the environment. In addition, water rationing would not require the disposal of solid waste and therefore, it would comply with Federal, State, and local statutes and regulations related to solid waste. Rationing would not require additional energy and would therefore not result in the wasteful, inefficient, or unnecessary consumption of energy, require the construction of additional energy infrastructure facilities, or increase reliance on energy resources that are not renewable. In addition, rationing would temporarily reduce energy usage associated with pumping and heating of water, as a smaller quantity of water would be conveyed and utilized during times of rationing.

The Rationing and Conservation components would not result in impacts related increase in short-term demand for police and fire protection services, as no construction would be required for these components.

Besides limited improvements, such as installation of water efficient appliances, the Conservation component would not involve construction of any new or expansion of existing infrastructure. Conservation would increase water use efficiency through the implementation of specific improvements or actions implemented primarily at the individual level. As such, construction/expansion of utilities and associated facilities would not occur from the implementation of the Conservation component.

In addition, Conservation would not require additional energy and would therefore not result in the wasteful, inefficient, or unnecessary consumption of energy, require the construction of additional energy infrastructure facilities, or increase reliance on energy resources that are not renewable. Water efficient appliances are often more energy efficient and therefore would not require additional energy infrastructure facilities.
In their analysis of water system energy requirements, the NRDC and Pacific Institute divided the water supply/use/disposal chain into five stages: providing a source of water and conveying it to the point of use, water treatment, distribution, end use, and wastewater treatment (NRDC and Pacific Institute 2004). Based on a San Diego case study, the NRDC concluded that end uses of water (especially clothes washing and taking showers) consume more energy than any other part of the urban water conveyance and treatment cycle (56 percent of the total energy usage in San Diego). Of the total energy usage, providing source water and conveyance of the water accounted for 30 percent, wastewater treatment accounted for 8 percent, distribution accounted for 5 percent, and water treatment accounted for 1 percent.

Conservation planned as part of the WSMP 2040 Preferred Portfolio would save substantial amounts of energy, not only by reducing the amount of energy consumed by end-users, but also by reducing the amount of water requiring conveyance and treatment as well as the volume of wastewater requiring treatment. These measures include implementation of plumbing code changes for more efficient water use, continuation of existing conservation practices, and varying levels of additional conservation measures, depending on the customer type.

Conservation would require disposal of solid waste in some cases (e.g., inefficient appliances such as cloths washers, fixtures, and toilets). Disposal of inefficient appliances would take place throughout the EBMUD service area in Contra Costa and Alameda Counties over the course of the WSMP 2040. However, effects on landfill capacity are considered to be minor.

5.2.K.4 Potential Public Services, Utilities and Energy Impacts

Impact 5.2.K-1: Potential temporary damage to or disruption of existing regional and local public utilities and impacts related to the relocation of utilities.

The general discussion below addresses the following Preferred Portfolio components:

- Recycled Water;
- Northern California Water Transfers;
- Bayside Groundwater Phase 2;
- Sacramento Basin Groundwater Banking / Exchange;
- Regional Desalination;

- Enlarge Pardee and Lower Bear Reservoirs; and
- IRCUP / San Joaquin Groundwater Banking / Exchange.

Implementation of the above components would result in new construction of or improvements to pipelines, pump stations, storage tanks, wells, recharge ponds, dams, and treatment facilities. Pump stations and treatment facilities are not anticipated to affect utilities because they would likely be located on private properties. Construction activities associated with facilities developed as part of the above components could result in unintentional utility service disruptions, including water, sewer, storm drain, and natural gas pipelines, and electricity, telephone, and television cable service.

The open-cut or cut-and-cover construction methods for pipeline installation would have the greatest potential for disrupting existing utility services. Depending on the location of the proposed alignment and any associated construction staging areas, construction activities could disrupt utility services. Both regional and local utility lines are located throughout the WSMP 2040 Preferred Portfolio Study Area and many of these utility corridors generally include multiple utility lines (i.e., natural gas, water, and sewer lines). If the specific locations of existing utilities are not identified prior to the start of construction, temporary disruption of utility services could occur.

As a condition of approval for either a utility excavation permit or an encroachment permit, EBMUD would prepare a detailed engineering and construction plan that would identify construction methods and protective measures to minimize impacts on utilities. All utility lines that could be disrupted during pipeline construction would be identified during the design phase.

The proposed components would include the construction of new pump stations. Construction activities could disrupt established utility lines and services, which would adversely affect utility customers. Construction would be scheduled to minimize or avoid interruption of utility services to customers.

Facilities developed as part of the above components would require construction of new tertiary treatment facilities and/or expansion or upgrades to existing treatment facilities. Any upgrades at existing treatment plants would occur within the property boundaries and would not affect offsite utility services. Potential impacts associated with utility requirements would depend on the specific site locations in relation to established utility lines. Construction would be scheduled to minimize or avoid interruption of utility services to customers.

Some of the proposed components would require enlargement of existing reservoirs and dams. During enlarge of these water storage facilities, interruptions in water service to EBMUD customers are not expected. Construction would be scheduled such that service to customers could be maintained without interruption and as necessary, EBMUD would plan for alternative water service during construction. Thus, the level of service during a planned outage would remain unchanged from existing conditions.

Proposed components have the potential to traverse or encroach on existing utility corridors. Construction activities associated with the facilities developed as part of the above components may affect utility infrastructure by requiring the relocation of existing facilities. This would be a ***potentially significant*** impact. Implementation of Mitigation Measures 5.2.K-1a through 5.2.K-1e below would reduce potential impacts to less-than-significant levels. The extent of utility relocation cannot be determined at this time, but would be identified during the pre-design and permitting stages for each component.

Discussion of Specific Components

The following Preferred Portfolio component allows for more specific discussion and are presented below.

Enlarge Pardee Reservoir

The Enlarge Pardee Reservoir component would require construction of new facilities (i.e., replacement dam, saddle dams; relocating recreation facilities; refurbishing the existing Pardee intake structure and intake tunnel; replacing the Pardee powerhouse and transmission lines; and relocating several roads by Pardee Reservoir). Numerous utility lines of varying sizes could be located in construction areas. All utility lines and cables that could be disrupted during construction of facilities would be identified during the preliminary design phase. In addition, some roads would be inundated during the construction of an enlarged Pardee Reservoir. As part of this component, relocation of Pardee Dam Road; relocation of Stony Creek Road; replacement of the SR 49 Bridge; removal of the Middle Bar Bridge; and the construction of a new access road to the powerhouse on the south side of the Mokelumne River would be required. Utilities are typically located along roadways and therefore, would need to be relocated. This would be a ***potentially significant*** impact. Implementation of Mitigation Measures 5.2.K-1a through 5.2.K-1e below would reduce potential impacts to less-than-significant levels.

Mitigation Measure 5.2.K-1a: Notify neighbors of potential utility service disruption.

As part of the neighborhood notice, the EBMUD shall notify residents and businesses in areas of potential utility service disruption two to four days in advance of construction.

Mitigation Measure 5.2.K-1b: Locate utility lines and confirm utility line information prior to excavation and reconnect utilities promptly.

Prior to excavation, EBMUD or its contractors shall locate overhead and underground utility lines, such as natural gas, electricity, sewer, telephone, fuel, and water lines, that may be encountered during excavation work prior to opening an excavation. EBMUD or its contractors shall find the exact location of underground utilities by safe and acceptable means. Information regarding the size, color, and location of existing utilities must be confirmed before construction activities commence.

EBMUD or its contractors shall promptly reconnect any disconnected utility lines.

Mitigation Measure 5.2.K-1c: Safeguard employees from potential accidents related to underground utilities.

While any excavation is open, EBMUD or its contractors shall protect, support, or remove underground utilities as necessary to safeguard employees.

Mitigation Measure 5.2.K-1d: Prepare and implement an emergency response plan.

EBMUD or its contractors shall develop an emergency response plan in the event of a leak or explosion prior to commencing construction activities. EBMUD or its contractors shall notify local fire departments any time damage to a gas utility results in a leak or suspected leak, or whenever damage to a utility results in a threat to public safety.

Mitigation Measure 5.2.K-1e: Coordinate final construction plans with affected utilities.

EBMUD or its contractors shall coordinate final construction plans and specifications with affected utilities.

Impact Significance After Mitigation: Less than Significant

Impact 5.2.K-2: Potential to increase short-term demand for police and fire protection services.

The general discussion below addresses the following Preferred Portfolio components:

- Recycled Water;
- Northern California Water Transfers;
- Bayside Groundwater Phase 2;
- Sacramento Basin Groundwater Banking / Exchange;
- Regional Desalination;
- Enlarge Pardee and Lower Bear Reservoirs; and
- IRCUP / San Joaquin Groundwater Banking / Exchange.

Construction of the facilities developed as part of the above components has the potential to generate a short-term increase in demand for police and fire services if an accident were to occur as a result of the project. Construction-related hazards include traffic congestion and rough road conditions, open trenches, and operation of heavy construction equipment. Construction activities could also result in interference with high-pressure pas lines and other high-voltage lines. Such activities may require response from fire units. The increased accident potential, however, would result in a limited, short-term demand for increased police or fire services and only on an as-needed and emergency basis that would occur only during the period of work activities. There would be no long-term increases in demand for police or fire services associated with the proposed components.

Facilities developed as part of the above components have the potential to generate a short-term increase in demand for police and fire services due to construction-related increase in accident potential. This short-term increase would be expected to be accommodated by the service providers in the area. Construction activities would likely be scattered throughout various jurisdictions and would not occur at the same time, and as such, service providers would be expected to accommodate increased demand, if any, associated with accidents. Therefore, impacts would be ***less than significant***.

Impact Significance After Mitigation: Less than Significant

Impact 5.2.K-3: Potential temporary adverse effect on solid waste landfill capacity.

The general discussion below addresses the following Preferred Portfolio components:

- Recycled Water;
- Northern California Water Transfers;
- Bayside Groundwater Phase 2;
- Sacramento Basin Groundwater Banking / Exchange;
- Regional Desalination;
- Enlarge Pardee and Lower Bear Reservoirs; and
- IRCUP / San Joaquin Groundwater Banking / Exchange.

Construction of the facilities developed as part of the above components could result in the generation of a large volume of waste materials. If all construction waste materials were disposed of in local landfills, these materials could potentially exceed the daily tonnage limit of these landfills and/or adversely affect landfill capacity. These waste materials include construction debris, demolition materials, and excavated spoils. The largest potential source of solid waste would be excavated soil. Each of the landfills listed in Table 4.2.K-1 is permitted to accept construction/demolition waste, including clean soil. Two landfills in Alameda County (Altamont Landfill and Resource Recovery and Vasco Road Sanitary Landfill in Alameda County) one landfill in San Joaquin County (Forward Landfill, Inc.), and one landfill in Yuba County (Ostrom Road Landfill) are permitted to accept contaminated soil.

As specific components have not yet been selected, the amount of waste to be disposed of is not known. The specific quantity and quality of solid waste to be disposed would be determined during a condition assessment for each component. Due to the economic value of clean excavated soil and the cost of landfill disposal, this analysis assumes at least 50 percent of excavation/spoils would be diverted from landfills and reused as landfill or agricultural cover, backfilled onsite, or recycled. This rate of diversion from landfills would be consistent with the California Integrated Waste Management Act of 1989, which requires all California cities and counties to implement programs to reduce, recycle, and compost at least 50 percent of wastes by the year 2000 and divert at least 75 percent by 2010.

Since the exact quantity and quality of disposed material and the daily disposal rates have not yet been determined for each project, the impacts on permitted landfill capacity are considered ***potentially significant***. Implementation of Mitigation Measure 5.2.K-3 would reduce this potential impact to a less-than-significant level.

The California Integrated Waste Management Board (CIWMB) found that although some of the jurisdictions within the WSMP 2040 Preferred Portfolio Study Area achieved the 50 percent solid waste diversion goal in 2004, many of the jurisdictions did not achieve the goal or did not report their diversion rate (CIWMB 2008a). If all of the waste generated during construction of these components were disposed of in local landfills, daily tonnage limits of these landfills could be exceeded. In addition, the quantity of waste materials could lower overall diversion rates as calculated for compliance with the California Integrated Waste Management Act. The exact quantity of waste materials that would require disposal in nearby landfills would not be known until each component undergoes a detailed evaluation as part of separate, project-level CEQA review. In the absence of exact disposal quantities, compliance with local plans, policies, programs, and ordinances regarding solid waste management cannot be determined. Therefore, impacts related to compliance with Federal, State, and local statutes would be ***potentially significant***. Implementation of Mitigation Measure 5.2.K-3 would reduce this impact to a less-than-significant level.

Discussion of Specific Components

The following Preferred Portfolio components allow for more specific discussion and are presented below.

Enlarge Pardee and Lower Bear Reservoirs

Although some construction materials would be disposed on in local landfills, onsite disposal for most of the component spoils may also be used for both the Enlarge Pardee and Lower Bear Reservoirs components. In that case, excavated materials would not be disposed of in local landfills and would not impact landfill capacity. However, since the exact quantity and quality of disposed material and the daily disposal rates have not yet been determined, the impacts on permitted landfill capacity are considered ***potentially significant***. Implementation of Mitigation Measure 5.2.K-3 would reduce this impact to a less-than-significant level.

Mitigation Measure 5.2.K-3: Waste Reduction Measures.

The following requirements shall be incorporated into contract specifications for each of the proposed components:

The contractor(s) shall obtain any necessary waste management permits prior to construction and shall comply with conditions of approval attached to project implementation. As part of the waste management permit process, the contractor(s) shall submit a solid waste recycling plan to the affected agencies. Elements of the plan will likely include, but are not necessarily limited to, the following:

- Identification of the types of debris that would be generated by the project and identify how all waste streams would be handled;
- Actions to reuse or recycle construction debris and clean excavated soil to the extent possible; and
- Actions to divert at least 50 percent of inert solids (asphalt, brick, concrete, dirt, fines, rock, sand, soil, and stone) from disposal in a landfill.

Impact Significance After Mitigation: Less than Significant

Impact 5.2.K-4: Potential for construction-related energy use and potential to increase long-term energy use during operation.

The general discussion below addresses the following Preferred Portfolio components:

- Recycled Water;
- Northern California Water Transfers;
- Bayside Groundwater Phase 2;
- Sacramento Basin Groundwater Banking / Exchange;

- Regional Desalination;
- Enlarge Pardee and Lower Bear Reservoirs; and
- IRCUP / San Joaquin Groundwater Banking / Exchange.

Construction energy expenditures would include both direct and indirect use of energy. Combustion of petroleum products needed to operate construction equipment would be part of the direct energy use. Electricity consumed by construction power equipment such as power tools would also be a direct energy use; however, it would be relatively minimal. The energy consumed through mining and extraction of raw materials, manufacturing, and transportation to make the steel and all other materials used in construction would be part of the indirect energy use. Indirect energy typically represents over three-quarters of total construction energy, while direct energy represents less than one-quarter (Hannon 1978). Though construction energy would be consumed only during the construction period, it would represent irreversible consumption of finite natural energy resources. Energy consumed during construction would primarily be in the form of fuel (primarily gas, diesel, and motor oil) and would not have a significant effect on PG&E's energy resources.

Construction of the facilities developed as part of the above components would require the use of fuels for a variety of construction activities, including excavation, grading, demolition, material transport, as well as construction worker vehicle travel to and from the construction sites. Fuel use for construction worker commute trips would be minor compared to the fuel required for operation of construction equipment. Excessive idling and other inefficient site operations could result in the wasteful use of fuels. Therefore, impacts related to the wasteful use of fuels during construction would be ***potentially significant***. Implementation of exhaust control measures specified in Section 5.2.F, Air Quality (Mitigation Measures 5.2.F-2b and 5.2.F-2c), would ensure that fuels are not used in a wasteful manner and would reduce this impact to a less-than-significant level.

Based on available information, energy requirements by component in units of kilowatts hours of energy per million gallons of water produced (kWh/MG) are provided in Table 5.2.K-1. In addition, the overall component yield is also displayed, which was used to calculate the total amount of energy required for component operation per day (kWh/day). Depending on the component, some would be operated continuously throughout the planning period (i.e., Recycled Water and the Enlarge Pardee and Lower Bear Reservoirs components) while other components would only be fully operated during dry years (i.e., the Sacramento Basin and IRCUP / San Joaquin Groundwater Banking / Exchange components and Regional Desalination). With the Recycled Water component, the total of 11 MGD of capacity would not be completely realized until 2035, so the amount of energy required for operations would ramp up over the WSMP 2040 planning period of 2010-2040.

The estimated energy requirements for the above components includes energy required for water treatment to get the water to the standard necessary for its intended use, energy required for pumping, as well as energy required to convey the water to treatment plants and subsequently to its intended users. The amount of energy required would depend on the equipment used, the degree of treatment required, and the proximity of the treatment plant to the location of the source water.

The average California household consumes 6,500 kWh of energy annually (CEC 2003; NRDC and Pacific Institute 2004). Based on these assumptions, the individual components included in the Preferred Portfolio would consume the equivalent energy of between 375 (the Enlarge Lower Bear Reservoir component) and 12,354 (the Regional Desalination component) households per year (see Table 5.2.K-1). The hourly demand for the components ranges from 0.28 kW (for Enlarge Lower Bear Reservoir) to 9.17 kW (for Regional Desalination) (see Table 5.2.K-1), compared to PG&E's generation capacity of 8,255 mW (PG&E 2002) or the State's capacity of 63,213 mW (EIA 2006). The actual energy use of new facilities proposed under each component will be confirmed at the project design stage and will depend on facility design and the use of emerging technologies that may increase energy efficiency. Because the actual energy use of the components is not known, and the new facilities would come online over the course of the 30-year planning period, impacts on energy use would be ***potentially significant.*** However, incorporation of energy efficiency measures (Mitigation Measure 5.2.K-4) would reduce this impact to a less-than- significant level. Impacts on energy use would be evaluated as part of project-level CEQA documentation.

Discussion of Specific Components

The following Preferred Portfolio component allows for more specific discussion and is presented below.

Recycled Water

Energy uses involved in recycled water use include the incremental costs to treat the wastewater to the standard necessary for its intended use, and the cost of energy required to convey the water to its intended users. Recycled water projects would be operated in all years, so energy use associated with these projects would be continuous. The amount of energy required would depend on the equipment used, the degree of treatment required, and the proximity of the treatment plant to the location where the recycled water would be used.

Table 5.2.K-1: Energy Use by Component

COMPONENT	COMPONENT YIELD (MGD)	TOTAL DRY YEAR ENERGY USE[1] (kWh/MG)	ENERGY USE (kWh/DAY)	EQUIVALENT NUMBER OF HOUSEHOLDS OF ENERGY USE[3]	HOURLY ENERGY DEMAND (kW)
Recycled Water	11	3,688[2]	40,568	2,278	1.69
Northern California Water Transfers	4.5-28.5	5,217	23,477-148,685	1,318-8,349	0.98-6.20
Bayside Groundwater Phase 2	9	4,719	42,471	2,385	1.77
Sacramento Basin Groundwater Banking / Exchange	4.2	8,895	37,359	2,098	1.56
Regional Desalination	20	11,000	220,000	12,354	9.17
Enlarge Pardee Reservoir	51.2	2,021[4]	51,420[5]	2,887[5]	2.14[5]
Enlarge Lower Bear Reservoir	2.2	3,038	6,684	375	0.28
IRCUP / San Joaquin Groundwater Banking / Exchange	17.4	7,919	137,791	7,737	5.74

Notes:

1 Total energy is presented on a dry-year yield basis. That is, the total energy use is computed over the life of the component and then spread over the expected yields in dry years only. As described in Section 2.1, the WSMP 2040 is intended to address long-term dry-year water supply needs. Since some components would not be operated in normal and wet years, energy use for the dry year scenario is presented here.

2 Variable Energy Use was calculated for the recycled water projects. This energy use is an average of the energy use for the individual recycled water projects considered for Recycled Water Level 3 (11 MGD).

3 A typical California household consumes 6,500 kWh of energy annually (CEC 2003).

4 Total Dry Year Energy Use for the Enlarge Pardee Reservoir component does not include an offset for the amount of energy that would be produced by the increase in hydroelectricity generated by the component.

5 Energy Use, Equivalent Number of Households of Energy Use, and Hourly Energy Demands for the Enlarge Pardee Reservoir component include an offset for the amount of energy that would be produced by the increase in hydroelectricity generated by the component (19 GWh/year).

NA = These values were not able to be determined at this time, as energy use would vary depending on the amount of water being treated which varies based on which component or combination of components are included.

Source: EBMUD 2008.

Based on available information, the Recycled Water component would require 3,688 kW an hour of energy per million gallons of water produced in dry years (kWh/MG). Eleven MGD of recycled water was selected as the goal for the Preferred Portfolio, so a total of 40,568 kWh per day of energy would be required for operation, which is anticipated to occur continuously. However, the full capacity of the Recycled Water component (11 MGD) would not be completely realized until 2035, so the amount of energy required for operations would ramp up over the WSMP 2040 planning period of 2010-2040. Based on the assumption that a typical California household consumes 6,500 kWh annually (CEC 2003), recycled water projects included in the Preferred Portfolio would consume roughly the same amount of electricity as 2,278 households per year.

The hourly demand for the Recycled Water component is 1.69 kW, compared to the PG&E's generation capacity of 8,255 mW (PG&E 2002) and the State's capacity of 63,213 mW (EIA 2006). The actual energy use of new facilities proposed under this component will be confirmed at the project design stage and will depend on facility design and the use of emerging technologies that may increase energy efficiency. Because the actual energy use of the Recycled Water component is not known, and the new facilities would come online over the course of the 30-year planning period, impacts on energy use would be ***potentially significant***. However, incorporation of energy efficiency measures (Mitigation Measure 5.2.K-4) would reduce this impact to a less-than- significant level. Impacts on energy use would be evaluated as part of project-level CEQA documentation.

Northern California Water Transfers

Energy required for the Northern California Water Transfers component would only be related to pumping and local (in-District) treatment. Energy would be required for pumping water through the Freeport intake and eventually through the Mokelumne Aqueducts. The amount of energy required for pumping depends on quantity of water being conveyed.

Based on available information, the Northern California Water Transfers component would require 5,217 kWh/MG in dry years. The expected yield of this component is between 4.5 and 28.5 MGD, so a total of between 23,477 and148,685 kWh per day of energy would be required for operation. The Northern California Water Transfers component is only anticipated to be operational during dry years. Based on the assumption that a typical California household consumes 6,500 kWh annually (CEC 2003), this component would consume roughly the same amount of electricity as between 1,318 (for 4.5 MGD) and 8,349 (for 28.5 MGD) households per year.

The hourly demand for the Northern California Water Transfers component ranges from 0.98 kW for 4.5 MGD of water transfers and 6.20 kW for 28.5 MGD of water transfers, compared to the PG&E's generation capacity of 8,255 mW (PG&E 2002) and the State's capacity of 63,213 mW (EIA 2006). The actual energy use of new facilities proposed under this component will be confirmed at the project design stage and will depend on facility design and the use of emerging technologies that may increase energy efficiency. Because the actual energy use of the Northern California Water Transfers component is not known, and the new facilities would come online at a yet to be determined time during the 30-year planning period, impacts on energy use would be ***potentially significant***. However, incorporation of energy efficiency measures (Mitigation Measure 5.2.K-4) would reduce this impact to a less-than- significant level. Impacts on energy use would be evaluated as part of project-level CEQA documentation.

Bayside Groundwater Phase 2

During dry years, the production of groundwater requires energy to pump the groundwater from the wells and convey it to a water treatment system. The amount of energy required depends on the efficiency of the pumping equipment, the depth to groundwater, and the distance to the treatment facility. Since the water injected is “treated” water, the extracted water would only need “partial” re-treatment. The implementation of the Bayside Groundwater Phase 2 component would lead to an increase in energy needs associated with the conveyance of recharge water through the Mokelumne Aqueducts, retrieval of accumulated water in the South East Bay Plain (SEBP) Groundwater Basin, and water treatment. Treated water would be injected into the ground and then re-treated upon extraction.

Based on available information, the Bayside Groundwater Phase 2 component would require 4,719 kWh/MG in dry years for water extraction and treatment. The expected yield of this component is 9 MGD, so a total of 42,471 kWh per day of energy would be required for operation, which is anticipated to occur only during dry years. Based on the assumption that a typical California household consumes 6,500 kWh annually (CEC 2003), this component would consume roughly the same amount of electricity as 2,385 households per year.

The hourly demand for the Bayside Groundwater Phase 2 component is 1.77 kW, compared to the PG&E’s generation capacity of 8,255 mW (PG&E 2002) and the State’s capacity of 63,213 mW (EIA 2006). The actual energy use of new facilities proposed under this component will be confirmed at the project design stage and will depend on facility design and the use of emerging technologies that may increase energy efficiency. Because the actual energy use of the Bayside Groundwater Phase 2 component is not known, and the new facilities would come online at a yet to be determined time during the 30-year planning period, impacts on energy use would be ***potentially significant***. However, incorporation of energy efficiency measures (Mitigation Measure 5.2.K-4) would reduce this impact to a less-than- significant level. Impacts on energy use would be evaluated as part of project-level CEQA documentation.

Sacramento Basin Groundwater Banking / Exchange

During dry years, the production of groundwater requires energy to pump the groundwater from the wells and convey it to a water treatment system for treatment. The amount of energy required depends on the efficiency of the pumping equipment, the depth to groundwater, the distance to the treatment facility, and the degree of treatment required. Delivery of recharge water to the Sacramento Basin in wet years would require use of the Freeport pipeline. Water extracted from the Sacramento Basin in dry years would be transported to the Mokelumne Aqueduct via the Freeport pipeline for distribution to the District’s existing WTPs for treatment. The implementation of the Sacramento Basin Groundwater Banking / Exchange component would lead to an increase in energy needs associated with conveyance of water through the Mokelumne and Freeport pipelines, the retrieval of accumulated water in the Sacramento Basin, and water treatment.

Based on available information, the Sacramento Basin Groundwater Banking / Exchange component would require 8,895 kWh/MG in dry years. The expected yield of this component is 4.2 MGD, so a total of 37,359 kWh per day of energy would be required for operation, which is anticipated to occur only during dry years. Based on the assumption that a typical California household consumes 6,500 kWh annually (CEC 2003), this component would consume roughly the same amount of electricity as 2,098 households per year.

The hourly demand for the Sacramento Basin Groundwater Banking / Exchange component is 1.56 kW, compared to the PG&E's generation capacity of 8,255 mW (PG&E 2002) and the State's capacity of 63,213 mW (EIA 2006). The actual energy use of new facilities proposed under this component will be confirmed at the project design stage and will depend on facility design and the use of emerging technologies that may increase energy efficiency. Because the actual energy use of the Sacramento Basin Groundwater Banking / Exchange component is not known, and the new facilities would come online at a yet to be determined time during the 30-year planning period, impacts on energy use would be ***potentially significant***. However, incorporation of energy efficiency measures (Mitigation Measure 5.2.K-4) would reduce this impact to a less-than- significant level. Impacts on energy use would be evaluated as part of project-level CEQA documentation.

Regional Desalination

During dry years, the desalination process requires energy to treat water from San Francisco Bay and convey it to a water treatment system. During wet years, it is assumed that the desalination plant would only operate at 20 percent in order to maintain the integrity of the reverse osmosis (RO) membranes. The desalinated water would be transported to the Mokelumne Aqueducts via a pump station and a 3-mile-long, 4-foot-diameter pipeline. A new pipeline would tie into the Mokelumne Aqueducts between the Delta and the Walnut Creek Pump Station. Water distributed through the Mokelumne Aqueducts would undergo downstream treatment. The amount of energy required for desalinating water from San Francisco Bay by Pittsburg, transporting it to EBMUD WTPs, and re-treating it would depend on the equipment used, the degree of treatment required, and the proximity of the treatment plant to the location where the water would be used. In general, energy use requirements for desalination plants are relatively high (see Table 5.2.K-1 above).

Based on available information, the Regional Desalination component would require 11,000 kWh/MG in dry years. The expected yield of this component is 20 MGD, so a total of 220,000 kWh per day of energy would be required for operation, which is anticipated to occur only during dry years. During wet years, it is assumed that this component would only be operated at approximately 20 percent of capacity. Based on the assumption that a typical California household consumes 6,500 kWh annually (CEC 2003), in dry years, this component would consume roughly the same amount of electricity as 12,354 households per year.

The hourly demand for the Regional Desalination component is 9.1.7 kW, compared to the PG&E's generation capacity of 8,255 mW (PG&E 2002) and the State's capacity of 63,213 mW (EIA 2006). The actual energy use of new facilities proposed under this component will be confirmed at the project design stage and will depend on facility design and the use of emerging technologies that may increase energy efficiency. Because the actual energy use of the Regional Desalination component is not known, and the new facilities would come online at a yet to be determined time during the 30-year planning period, impacts on energy use would be ***potentially significant***. However, incorporation of energy efficiency measures (Mitigation Measure 5.2.K-4) would reduce this impact to a less-than- significant level. Impacts on energy use would be evaluated as part of project-level CEQA documentation.

Enlarge Pardee and Lower Bear Reservoirs

Energy for these components would be required to pump water from these enlarged reservoirs to the EBMUD service area, and for treatment. During much of the year, pumping is not required as gravity is sufficient to transport water to the EBMUD service area. Pumping is only necessary during the high demand periods such as summer.

The additional increment of energy required to convey and treat water released from the Enlarge Pardee and Lower Bear Reservoirs components would be partially offset by increased hydroelectric generation capacity. The Enlarge Pardee Reservoir component would generate an additional 19 GWh/year of electrical energy during a year of average runoff. Dry-year energy use for the Enlarge Pardee Reservoir component is estimated at 2,021 kWh/MG. With the expected yield of 51.2 MGD and taking the hydroelectricity generated by the component into account as an offset, the net energy use would total 51,420 kWh per day. The Enlarge Lower Bear Reservoir component would require 3,038 kWh/MG. With the expected yield of this component at 2.2 MGD, a total of 6,684 kWh per day of energy would be required for operation. Based on the assumption that a typical California household consumes 6,500 kWh annually (CEC 2003), the Enlarge Pardee and Lower Bear Reservoirs components would consume roughly the same amount of electricity as 2,887 and 375 households per year, respectively.

The hourly demand for the Enlarge Pardee Reservoir and Enlarge Lower Bear Reservoir components is 2.14 kW and 0.28 kW, respectively, compared to the PG&E's generation capacity of 8,255 mW (PG&E 2002) and the State's capacity of 63,213 mW (EIA 2006). The actual energy use of new facilities proposed under this component will be confirmed at the project design stage and will depend on facility design and the use of emerging technologies that may increase energy efficiency. Because the actual energy use of the Enlarge Pardee Reservoir and Enlarge Lower Bear Reservoir components is not known, and the new facilities would come online at a yet to be determined time during the 30-year planning period, impacts on energy use would be ***potentially significant***. However, incorporation of energy efficiency measures (Mitigation Measure 5.2.K-4) would reduce this impact to a less-than- significant level. Impacts on energy use would be evaluated as part of project-level CEQA documentation.

IRCUP / San Joaquin Groundwater Banking / Exchange

During dry years, the production of groundwater requires energy to pump the groundwater from the wells and to convey it via the Mokelumne Aqueducts to a water treatment system. The Mokelumne Aqueducts would also be used in wet years for delivery of recharge water to the San Joaquin Basin. The amount of energy required depends on the efficiency of the pumping equipment, the depth to groundwater, the distance to the treatment facility, and the degree of treatment required. The implementation of the IRCUP / San Joaquin Groundwater Banking / Exchange component would lead to an increase in energy needs associated with recharge water conveyance, the retrieval of accumulated water in the Eastern San Joaquin Groundwater Basin, conveyance through the Mokelumne Aqueducts, and water treatment.

Based on available information, the IRCUP / San Joaquin Groundwater Banking / Exchange component would require 7,919 kWh/MG in dry years. The expected yield of this component is 17.4 MGD, so a total of 137,791 kWh per day of energy would be required for operation, which is anticipated to occur only during dry years. Based on the assumption that a typical California household consumes 6,500 kWh annually (CEC 2003), this component would consume roughly the same amount of electricity as 7,737 households per year.

The hourly demand for the IRCPU / San Joaquin Groundwater Banking / Exchange component is 5.74 kW, compared to the PG&E's generation capacity of 8,255 mW (PG&E 2002) and the State's capacity of 63,213 mW (EIA 2006). The actual energy use of new facilities proposed under this component will be confirmed at the project design stage and will depend on facility design and the use of emerging technologies that may increase energy efficiency. Because the actual energy use of the IRCPU / San Joaquin Groundwater Banking / Exchange component is not known, and the new facilities would come online at a yet to be determined time during the 30-year planning period, impacts on energy use would be ***potentially significant***. However, incorporation of energy efficiency measures (Mitigation Measure 5.2.K-4) would reduce this impact to a less-than- significant level. Impacts on energy use would be evaluated as part of project-level CEQA documentation.

Mitigation Measure 5.4.K-4: Incorporate Energy Efficiency Measures.

EBMUD shall include energy efficient processes and equipment in the design specifications for the proposed facilities developed as part of the Preferred Portfolio. The potential for use of renewable energy resources (such as solar power) at facility sites shall be evaluated during project-specific design.

Impact Significance After Mitigation: Less than Significant

Table 5.2.K-2: Summary of Potential Public Services, Utilities and Energy Impacts Resulting from the WSMP 2040 Preferred Portfolio

IMPACT	RATIONING (10%)	CONSERVATION (LEVEL D)	RECYCLED WATER (LEVEL 3)	NORTHERN CALIFORNIA WATER TRANSFERS	BAYSIDE GROUNDWATER PHASE 2	SACRAMENTO BASIN GROUNDWATER BANKING / EXCHANGE	REGIONAL DESALINATION	ENLARGE PARDEE RESERVOIR	ENLARGE LOWER BEAR RESERVOIR	IRCUP / SAN JOAQUIN GROUNDWATER BANKING / EXCHANGE
5.2.K-1: Potential temporary damage to or disruption of existing regional and local public utilities and impacts related to the relocation of utilities	--	--	LTSM	--	LTSM	LTSM	LTSM	LTSM	LTSM	LTSM
5.2.K-2: Potential to increase short-term demand for police and fire protection services	--	--	LTS	--	LTS	LTS	LTS	LTS	LTS	LTS
5.2.K-3: Potential temporary adverse effect on solid waste landfill capacity	--	--	LTSM	--	LTSM	LTSM	LTSM	LTSM	LTSM	LTSM
5.2.K-4: Potential for construction-related energy use and potential to increase long-term energy use during operation.	--	--	LTSM	--	LTSM	LTSM	LTSM	LTSM	LTSM	LTSM
-- = No Impact, LTS = Less than Significant, LTSM = Less than Significant with Mitigation, PS = Potentially Significant, B = Beneficial										

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5.2.L Environmental Justice

5.2.L.1 Significance Criteria

Because CEQA does not require the evaluation of environmental justice effects, Federal regulations were used to determine potential impacts. Executive Order (EO) 12898 requires all Federal agencies to seek to achieve environmental justice by "…identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority and low-income populations." For this analysis, a significant impact related to environmental justice would occur if the WSMP 2040 Preferred Portfolio would:

- Have a substantial, demonstrable negative effect, including a negative effect disproportionately placed on densely populated minority and low-income communities.

The assessment of potential disproportionately negative effects on a densely populated minority or low-income community is based on a screening analysis. The purpose of screening is to determine first if a minority and/or low-income population exists within the potential affected area of the WSMP 2040 Preferred Portfolio. Minority and/or low-income populations, as defined by EPA's "Final *Guidance for Incorporating Environmental Justice Concerns in EPA's NEPA Compliance Analyses (1998)"*, are identified where either of the following occurs:

- The minority and/or low-income population of the affected area is greater than 50 percent of the affected area's general population; or
- The minority population percentage of the area is meaningfully greater than the minority population percentage in the general population or other appropriate unit of geographic analysis (census tracts are generally appropriate for this analysis).

Countywide statistics were reviewed to determine the percentages of the population classified as non-Caucasian and the percentage classified as Hispanic or Latino, and other representative minority groups. Using the county average for comparison, the WSMP 2040 Preferred Portfolio Study Area census tract data was evaluated to determine whether the minority population percentages were greater than 50 percent or the countywide average (see Section 4.2.L, Environmental Justice for a discussion of minority communities within the Study Area). If this criterion is met, then the area is considered an Environmental Justice Study Area (EJSA). The next step would be to determine whether the minority population would be disproportionately affected by project implementation.

The second criterion for an environmental justice analysis is income. Similar to the analysis of minority populations, countywide data was evaluated to determine the percentage of low-income households and then to compare this to the percentage of low-income households in Study Area census tracts (see Section 4.2.L, Environmental Justice for a discussion of low-income communities within the Study Area). If a census tract percentage exceeded the county average or 50 percent, then the affected area would be considered an EJSA, and the Study Area could then be evaluated for disproportional environmental justice effects on low-income populations from implementation of the WSMP 2040 Preferred Portfolio.

5.2.L.2 Components That Would Not Result in Environmental Justice Impacts

The following Preferred Portfolio components were evaluated for their potential to cause environmental justice impacts and no impacts were identified.

Rationing and Conservation

Rationing would involve voluntary and mandatory customer cutbacks of water consumption during certain dry water years. Conservation would increase water use efficiency through the implementation of specific improvements or actions implemented primarily at the individual level. Both the Rationing and Conservation components would be implemented across the entire EBMUD service area, irrespective of the distribution and location of minority or low-income communities. All racial groups and income classes would be affected. In this regard, there would not be a disproportionate impact on densely populated minority and low income communities. Therefore, no further discussion of these components is required.

Northern California Water Transfers

The transfer of water would occur on a willing seller-buyer basis, and would not be expected to result in disproportionately adverse effects to predominantly minority or predominantly low-income communities. No further discussion of this issue for this component is required.

Enlarge Pardee and Lower Bear Reservoirs

Pardee Reservoir is located in U.S. Census Tracts 5 and 2.10 (Amador and Calaveras counties). Lower Bear Reservoir is in U.S. Census Tract 1 (Amador County). These areas would not be considered EJSAs because minority populations in Census Tracts 5, 2.10, and 1 (8, 12 and 3 percent, respectively) would not exceed 50 percent of the total population of the respective census tracts. These respective areas are not predominantly minority communities.

In addition, the low-income populations of Census Tracts 5, 2.10 and 1 (44, 40, and 36 percent, respectively) would not exceed 50 percent, and would be equivalent to the percentages of these communities in the greater Amador and Calaveras County-wide areas (40, 42, and 40 percent, respectively). Because the Enlarge Pardee and Lower Bear Reservoirs components would not involve activities within EJSAs, disproportionate effects on minority and low-income communities would not occur. No further discussion of this issue for these components is required.

5.2.L.3 Potential Environmental Justice Impacts

Impact 5.2.L-1: Potential disproportionate impact to densely populated minority and low income communities.

The general discussion below addresses the following Preferred Portfolio components:

- Recycled Water;
- Bayside Groundwater Phase 2;
- Sacramento Basin Groundwater Banking / Exchange;
- Regional Desalination; and
- IRCUP / San Joaquin Groundwater Banking / Exchange.

As stated above, the Rationing, Conservation, Northern California Water Transfers and Enlarge Pardee and Lower Bear Reservoirs components are not expected to disproportionately affect minority or low income communities.

Proposed facilities developed as part of the above components include treatment plants, wells, pump stations, recharge ponds, and pipelines. They would be located in a variety of urban and rural settings. The exact locations of many of these facilities have not been identified, except for the Bayside Groundwater Phase 1 site at which a portion of Phase 2 facilities may be located, which is not within an EJSA. To the extent possible, recycled water facilities would be co-located with existing treatment plants, and pipelines would be located along existing roadways and easements. If construction and operation of proposed facilities were to occur in an EJSA, the potential exists for densely-populated minority or low-income communities to be disrupted from construction- and/or operation-related activities.

Construction requirements have not yet been developed for the above components. Construction-related activities would consist of earthmoving activities by heavy-duty equipment, including excavation, trenching and staging. Such actions would generate dust, noise, safety hazards (e.g., from transport, storage, or use of hazardous materials at the construction site), and traffic disruptions. Such effects would be short-term and would last only for the duration of construction activities. Some of the proposed facilities (e.g., treatment plants, pumping stations) would generate operational-related effects associated with increases in air pollutant emissions, noise, safety hazards (e.g., from transport, storage, or use of hazardous materials at treatment plants), and traffic disruptions that would be long-term. Buried pipelines and recharge ponds are not anticipated to result in any long-term operational effects.

As described above, the locations of many of the proposed facilities have not yet been determined. For the purposes of this Environmental Justice analysis, if an area is designated an EJSA, and technical analyses (e.g., for the following issue areas: air quality, noise, transportation, hazard) find that a project would result in significant adverse environmental impacts that cannot be mitigated to a less than significant level, then the potential exists for the proposed component to create a disproportionate adverse human health and environmental effects on minority or low-income populations and impacts would be ***potentially significant***. Implementation of Mitigation Measures 5.2.L-1a and 5.2.L-1b below would reduce potential impacts, however, further site-specific analysis would be required to determine the proposed facilities' potential effects on minority and low-income communities.

Discussion of Specific Components

The following Preferred Portfolio components allow for more specific discussion and are presented below.

Bayside Groundwater Phase 2

The Bayside Groundwater Phase 2 component would construct new facilities at the Bayside Groundwater Phase 1 site as well as at two other locations within the SEBPB between Oakland and San Leandro (see Figure 3-6 in Chapter 3). As noted above, the Phase 1 site is not within an ESJA. The precise locations of the additional two proposed facilities have not been identified but would be located within a potential area defined by multiple Census Tracts. The minority population comprises 29 to 86 percent of the total population within the SEBPB, compared to the estimated 51 percent estimate of racial minorities in the greater Alameda County-wide area. Most notably, Census Tracts 4073, 4088, 4090, 4091, 4092, 4325, 4332, and 4334 are estimated to have denser minority populations than the County-wide estimate (68%, 86%, 85%, 85%, 86%, 61%, 54%, and 62% respectively); as a result, these areas may be considered EJSAs. Based on Federal guidelines, 34 to 44 percent of the households within the above Census Tracts are defined as low income, compared to the County-wide estimate of 45 percent. Development of the Bayside Groundwater Phase 2 in the above Census Tracts would have the potential to create a disproportionate adverse human health and environmental effect on minority populations; as such, impacts would be considered ***potentially significant***. Further site-specific analysis would be required to determine the proposed facilities' potential effects on minority communities.

Regional Desalination

As stated in Section 3.2.5, while three locations are being considered for the Regional Desalination facility, this PEIR assumes it would most likely be constructed along the south shore of Suisun Bay in East Contra Costa County (see Figure 3-8 in Chapter 3). The precise location of the proposed facility has not been identified but would be located in a heavy industrial portion of Contra Costa County, where land uses include energy production, the former Concord Naval Weapons Station, petroleum and chemical processing plants, and petroleum product and natural gas pipelines.

The Regional Desalination component would be located within Census Tracts 3141.03, 3142, 3150, and 3200.01. Racial minorities comprise 24 to 40 percent of the total population within this area, compared to the estimated 35 percent estimate of racial minorities in the greater Contra Costa County-wide area. Because Census Tracts 3141.03 and 3142 are estimated to have denser minority populations than the County-wide estimate, this area may be considered an EJSA. Based on Federal guidelines, 30 to 44 percent of the households within the above Census Tracts are defined as low income, compared to the County-wide estimate of 29 percent. Development of a site in this area would have the potential to create a disproportionate adverse human health and environmental effect on minority and low-income populations; as such, impacts would be considered ***potentially significant***. Further site-specific analysis would then be required to determine the proposed facilities' potential effects on minority and low-income communities.

Mitigation Measure 5.2.L-1a: Implement mitigation measures regarding transportation, air quality, noise and hazards.

Mitigation Measures identified in Sections 5.2.E, Transportation; 5.2.F, Air Quality; 5.2.G, Noise; and 5.2.J, Hazards shall be implemented as needed within EJSAs to reduce impacts on minority and low-income communities to less than significant levels.

Mitigation Measure 5.2.L-1b: Conduct environmental justice screening analysis.

As part of the project-level environmental review for each component, EBMUD shall conduct an environmental justice screening analysis. This analysis will determine whether proposed facilities would be within an EJSA, and if so, whether any significant impacts would occur within an EJSA.

If proposed facilities are within an EJSA or would cause effects within an EJSA, and significant impacts (e.g., transportation, air quality, noise, hazards) can be reduced to less-than-significant levels with implementation of mitigation measures, then the project would not result in a disproportionately effect on minority and/or low-income communities, and no further action would be required.

However, if significant impacts within an EJSA cannot be reduced to less than significant levels, then EBMUD shall identify alternative locations to avoid causing adverse impacts within an EJSA. If alternative locations that avoid impacts within an EJSA cannot be identified, then potential effects would be potentially significant and unavoidable.

Impact Significance After Mitigation: Potentially Significant

Table 5.2.L-1: Summary of Potential Environmental Justice Impacts Resulting from the WSMP 2040 Preferred Portfolio

IMPACT	RATIONING (10%)	CONSERVATION (LEVEL D)	RECYCLED WATER (LEVEL 3)	NORTHERN CALIFORNIA WATER TRANSFERS	BAYSIDE GROUNDWATER PHASE 2	SACRAMENTO BASIN GROUNDWATER BANKING / EXCHANGE	REGIONAL DESALINATION	ENLARGE PARDEE RESERVOIR	ENLARGE LOWER BEAR RESERVOIR	IRCUP / SAN JOAQUIN GROUNDWATER BANKING / EXCHANGE
5.2.L-1: Potential disproportionate impact to densely populated minority and low income communities	--	--	PS	--	PS	PS	PS	--	--	PS
-- = No Impact, LTS = Less than Significant, LTSM = Less than Significant with Mitigation, PS = Potentially Significant, B = Beneficial										

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6 COMPARISON OF PREFERRED AND ALTERNATIVE PORTFOLIOS

6. Comparison of Preferred and Alternative Portfolios

The CEQA Guidelines specify a number of principles that characterize a complete analysis of project alternatives:

- Section 15126.6[a] requires that an EIR must describe and discuss "a range of reasonable alternatives to the project, or to the location of the project, which would feasibly attain most of the basic objectives of the project but would avoid or substantially lessen any of the significant effects of the project, and evaluate the comparative merits of the alternatives;"
- Section 15126.6[e] requires that the specific alternative of 'no project' shall also be evaluated along with its impact;
- Section (15126.6[e][2]) also requires that if the environmentally superior alternative is the 'no project' alternative, the EIR must identify an environmentally superior alternative among the other alternatives; and
- Section 15126.6[b]) requires that the discussion focus on alternatives to the project or its location which are capable of avoiding or substantially reducing significant effects of the project, even if these alternatives would impede to some degree the attainment of the project objectives, or would be more costly.

6.1 No Project Alternative

CEQA Guidelines Section 15126.6(e)(2) requires that the No Project Alternative represent existing conditions at the time the NOP 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. The No Project Alternative includes reasonably foreseeable projects that have undergone environmental review or received project approvals, and for which funding has been secured. For this PEIR, the No Project Alternative assumes that the EBMUD will carry out the following 1993 WSMP programs through the end of the 2020 planning period:

- Rationing: 25 percent Districtwide;
- Conservation: 35 MGD (22.5 MGD realized by 2008 plus 7.5 MGD realized through future natural replacement activity; additional 5 MGD realized through funded programs);
- Recycled Water: 14 MGD (9.3 MGD on-line by 2010; additional 4.7 MGD developed by 2020); and
- Supplemental Supply: 55.1 MGD (50.1 MGD on line by 2010 including FRWP and Bayside Groundwater Project Phase 1; 5 MGD additional capacity completed by 2020).

The certified EIR for the 1993 WSMP has already evaluated the effects of that plan through 2020. This PEIR evaluates the incremental effects of the No Project Alternative beyond 2020. Additional dry-year water shortage is expected and no components have been identified to address the shortage.

Ability of No Project Alternative to Meet WSMP 2040 Objectives

Under the No Project Alternative, the Preferred Portfolio would not be implemented. EBMUD would not obtain supplemental water supplies for use during drought or emergency conditions beyond those already in progress under the 1993 WSMP.

The No Project Alternative fails to meet two key objectives of the WSMP 2040: *Minimize the vulnerability and risk of disruptions*, and *Maximize the system's operational flexibility*. Without the use of supplemental water supplies beyond the programs already-in-progress, particularly during critical water shortages that would be likely to occur under droughts or emergency situations, the District would not be able to reliably meet water demand nor have the needed flexibility in operations to respond to changes in water supply conditions. Further, if future-year demand projections as described in this PEIR are realized, and if a multiple-year drought occurs, the risk of mandatory water rationing beyond the current 25 percent District-wide goal is very high.

The objective *Maximize regional partnerships and regional solutions* would be met, but not with as high a response as for the WSMP 2040 Portfolios A, B, and E where regional partnerships were key components. The District's ongoing relationships and discussions with other regional agencies would continue under the No Project Alternative.

The Economic objectives (*Minimize the financial cost to the District* and *Minimize customer water shortage costs*) both have a low response for the No Project Alternative. This Alternative's potential inability to reliably meet demand may shift the burden of water cutbacks and rationing to customers. Water shortage costs might include the loss of landscaping and plant material, loss in water for industries reliant upon water and loss in business productivity. In addition, the District may have greater costs due to water shortages due to an inability to rely on supplemental water supplies and the subsequent need to make short-term high-cost investments in water supplies, such as water transfers, to meet water demand.

The Public Health, Safety and Community objectives are all met under the No Project Alternative, but with a moderate response. (*Minimize potential adverse impacts to public health of District customers; Maximize use of water from the best available source; Minimize long-term adverse community impacts; Minimize adverse social effects;* and *Minimize conflicts with existing and planned facilities, utilities and transportation facilities*). The District would continue to rely on high-quality Mokelumne River Watershed water but with little to no back-up for additional alternate water supplies or contingency planning.

The Environmental objectives are addressed in further detail below, by specific resource areas.

Environmental Impacts of the No Project Alternative beyond 2020

Hydrology, Groundwater, and Water Quality

Water rationing and conservation would not cause any adverse environmental impacts related to hydrology, groundwater, and water quality, but rather, would provide benefits. The implementation of a 25 percent rationing level during drought periods would not, however, provide the District with any further contingency if the need for water exceeds current projections. While rationing beyond 25 percent has been previously mandated in the EBMUD service area, demand hardening makes it more difficult to achieve. The estimated cost burden of rationing levels of 20 percent and greater on customers has been calculated to be greater than $1 billion annually (Please refer to the Cost of Water Shortage Technical Memorandum).

Visual Resources

Rationing would result in physical changes to irrigated landscapes and would potentially degrade the visual quality of public and private yards, parks, gardens, and other irrigated areas. In general, water rationing by customers would result in drying of irrigated landscaped areas. These changes would potentially alter the appearance of landscaped areas, but the visual character would not be substantially affected.

For long-range views, such as from scenic vistas on elevated hillsides, the visual change would be visible only on large landscaped areas that currently use potable water (e.g., certain golf courses). While dried-out landscapes would be visible during the dry season, these changes would not substantially alter or degrade the existing visual character nor would they affect scenic vistas or resources. Therefore, potential impacts from the No Project Alternative beyond 2020 would be less than significant.

Conservation would increase water use efficiency through the implementation of specific improvements or actions implemented primarily at the individual level on a voluntary basis. These actions would include activities within a customer's home, business, or yard (e.g., installation of water-efficient appliances and metering devices) or education programs that would potentially alter the visual character of irrigated outdoor landscaped areas. These actions are not expected to substantially alter the existing visual character or affect scenic views or resources.

Biological Resources

Diversions of water from the Mokelumne River to the East Bay would be consistent with the Lower Mokelumne River Joint Settlement Agreement. As such, existing flow and other operational standards and aquatic habitat conditions below the Mokelumne River dams would be maintained and no direct impacts to Mokelumne River fisheries are anticipated due to the No Project Alternative.

The benefits of increased storage capacity in reservoirs, such as greater water management flexibility (including releases and increased cold water pool volumes), would not be realized with the No Project Alternative, and any potential benefits to local reservoirs also would not be realized.

Public Services, Utilities, and Energy

Water conservation measures have the potential to reduce the energy consumed by end-users as well as the amount of energy needed for water conveyance and treatment. The potential benefits of these energy savings gained by the conservation programs as planned in the Preferred Portfolio and Alternatives would not be realized under the No Project Alternative beyond 2020. However, some energy savings from conservation achieved under the 1993 WSMP will continue beyond 2020 due to permanent conversions, and those programs begun in the 2019-2020 final year.

Other Environmental Resource Areas

The failure to implement the project is not expected to result in impacts to Geology, Soils and Seismicity, Land Use and Recreation, Transportation, Air Quality, Noise, Cultural Resources, Hazards or Environmental Justice.

6.2 Alternative Portfolios

6.2.1 Portfolio A: Groundwater/Conjunctive Use and Water Transfers

Ability of Portfolio A to Meet Program Objectives

Portfolio A: Groundwater/Conjunctive Use and Water Transfers emphasizes water production through transfers and conjunctive use projects. These groundwater projects, which include banking projects in Sacramento County and San Joaquin County together with a Phase 2 expansion of the Bayside Groundwater Project, would be combined with 15 MGD of water transfers, 39 MGD of conservation, 5 MGD of recycled water, and a 10 percent rationing level (see Table 6-1).

This portfolio provides the District with a high degree of *operational flexibility* as water supply from both types of projects can be increased or decreased in response to need. To be successful, both also require partnerships on a regional scale. Portfolio A scored low on the other two objectives under Operations, Engineering, Legal & Institutional: *Minimize the vulnerability and risk of disruptions*, and *Minimize institutional and legal complexities and barriers*. Much of the District's water supply would still have to cross the Delta and would thus be vulnerable to disruption. In addition, the conjunctive use

Table 6-1: WSMP 2040 Primary Portfolios

PORTFOLIO DESIGNATION	PORTFOLIO THEMES / EMPHASIS	PORTFOLIO DESCRIPTION	COMPONENTS: Rationing		Conservation		Recycled Water		Supplemental Supply							
			10%	15%	Current Program Equivalent (C)	Current Program Equivalent +2 (D)	Recycled Water Level 2	Recycled Water Level 3	Northern California Water Transfers	Bayside Groundwater Project Phase 2	Sacramento Basin Groundwater Banking/Exchange [a]	Regional Desalination	Enlarge Pardee Reservoir	Enlarge Lower Bear Reservoir	IRCUP/San Joaquin Groundwater Banking/Exchange [b]	Buckhorn Canyon Reservoir
			22 MGD	32 MGD	UP TO 37 MGD	UP TO 39 MGD	UP TO 5 MGD	UP TO 11 MGD	UP TO 4.5-28.5 MGD	UP TO 9 MGD	UP TO 4.2 MGD	UP TO 20 MGD	UP TO 51.2 MGD	UP TO 2.2 MGD	UP TO 17.4 MGD	UP TO 42 MGD
Preferred Portfolio		Maximum Flexibility	●			●		●	●	●	●	●	●	●	●	
A	Groundwater/ Conjunctive Use & Water Transfers	Groundwater storage / recharge in multiple locations	●			●	●		●	●	●				●	
B	Regional Partnerships	All partnership projects & conservation	●		●		●		●		●	●		●	●	
C	Local System Reliance	West of delta surface storage		●	●		●									●
D	Lower Carbon Footprint	Pardee Reservoir enlargement & conservation		●	●		●						●			
E	Recycled Water & Water Transfers	Highest recycled water level	●		●			●	●	●	●					

Notes: [a] Sacramento Basin Groundwater Banking/Exchange component must be coupled with a transfer water component.
[b] IRCUP includes San Joaquin Basin Groundwater Banking/Exchange.

Table 6-2

Ability of Alternatives to Meet Program Objectives

Portfolio Number	Portfolio	Portfolio Theme	Operations, Engineering, Legal & Institutional				Economic		Public Health, Safety & Community		Environmental		Portfolio
			• Minimize the vulnerability & risk of disruptions (i.e., **reliability**).	• Maximize the system's **operational flexibility** .	• Minimize **institutional & legal complexities** & barriers.	• Maximize **partnerships** & regional solutions.	• Minimize the financial **cost** to the **District** of meeting customer demands for given level of system reliability.	• Minimize **customer** water shortage **costs** .	• Minimize potential adverse impacts to the **public health** of District customers. • Maximize use of water from the **best** available **source** .	• Minimize long-term adverse **community impacts** • Minimize adverse **social effects** . • Minimize conflicts with existing & planned facilities, utilities & transportation facilities.	• Minimize adverse **impacts** on the **environment** . • Minimize construction & operation effects on environmentally **sensitive resources** .	• Minimize short term & long term **greenhouse gas emissions** from construction. • Maximize **energy efficiency** associated with operations & maintenance. • Maximize contributions to **AB 32 goals.**	
		No Action	L-	L-	L	M	L	L	M	M	M	L	No Action
4	A	Groundwater / Conjunctive Use & Water Transfers	L	H	L	H	L	H	M	M	H	M	A
5	B	Regional Partnerships	H	M	L	H	M	H	L	M	M	L	B
6	C	Local System Reliance	H+	H+	M	L	H	L	M	L	L	M	C
10	D	Lower Carbon Footprint	L	H	M	M	M	M	H+	M	M	H	D
12	E	Recycled Water & Water Transfers	L	H	L	H	L	H	M	M	H	M	E

H = High Response to Evaluation Criteria; L = Low Response to Evaluation Criteria projects, while providing operational flexibility, may have significant legal and operational barriers to overcome for successful implementation. Portfolio A scored moderately on *cost to the District*.[1] The net present value cost was estimated as being between approximately $600 and $700 million. The portfolio scored well on *cost to customers*[2] because of the low rationing goal (of 10 percent), which was estimated to cost customers a median of approximately $100 million.

Under Public Health, Safety, and Community, Portfolio A scored moderately well on both objectives. Water quality would be maintained through the use of local EBMUD service area runoff and non-Mokelumne River water sources and construction impacts would be not be extensive (see Table 6-2).

Portfolio A meets the Environmental objectives, responding high to the objectives *Minimize adverse impacts to the environment* and *Minimize construction and operation effects on environmentally sensitive resources*. The water transfers, groundwater banking and recycled water components have relatively small footprints. Portfolio A scored moderately on *Minimize short term & long-term greenhouse gas emissions from construction*, *Maximize energy efficiency associated with operations & maintenance*, and *Maximize contributions to AB 32 goals*.

Environmental Impacts: Portfolio A compared to Preferred Portfolio

Portfolio A differs from the Preferred Portfolio in that it would have a lower goal for recycled water (5 MGD vs. 11 MGD) and it relies heavily on the successful implementation of water transfers and multiple groundwater projects.

Recycled Water (5 MGD)

Because the Preferred Portfolio proposes a great level of recycled water (11 MGD) and therefore includes larger and/or additional recycled water projects, all potentially significant environmental impacts from construction of recycled water facilities would likely be less for Portfolio A than for the Preferred Portfolio. In addition, most impacts identified as potentially significant (in Chapter 5) were reduced to less-than-significant levels with mitigation. These included water quality degradation from construction, alteration of drainage patterns, exposure of people or structures to geology, soils or seismic hazards, and potentially adverse impacts to biological resources, land use and recreation resources, transportation, cultural resources, visual resources, hazards, and public services, utilities and energy.

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[1] The *cost to the District* includes capital (planning, design and construction) costs and operation and maintenance costs associated with implementation of a portfolio.

[2] Water rationing imposes direct economic impacts to the District's customers. The *cost to the customer* for residential, institutional, and irrigation customer classes were estimated in terms of a customer's willingness-to-pay to avoid rationing while shortage costs to commercial and industrial customer classes were estimated in terms of losses in regional value added and employment resulting from water rationing.)

The impacts related to recycled water projects that were identified as potentially significant include the potential to exceed an air quality standard (Impact 5.2.F-2), the potential for a cumulatively considerable net increase of criteria pollutants for which the project region is in nonattainment under an applicable Federal or State ambient air quality standard (Impact 5.2.F-3), and potential exposure of sensitive receptors to substantial pollutant concentrations (Impact 5.2.F-4). There are also two potentially significant noise impacts: the exposure of sensitive receptors to noise levels in excess of applicable noise standards due to short-term and long-term construction activities (Impacts 5.2.G-1 and 5.2.G-2). There is also the potential for a disproportionate impact to densely populated minority and low-income communities. Further site-specific analysis would be required at the project level to definitely determine if recycled water facilities would have this impact.

Northern California Water Transfers

As discussed in Chapter 5, the Northern California Water Transfers component would have potentially significant impacts to air quality, noise and vibration, visual resources, and agricultural land uses, but most of these impacts would likely be reduced to less-than-significant levels with mitigation. Water agencies and other water rights holders could increase their use of groundwater to substitute for surface water that would be sold to EBMUD. This would potentially affect the quality and quantity of groundwater resources. Additionally, water transfers from the Sacramento Valley to the EBMUD service area could result in fallowing of agricultural lands. Fallowing of rice fields would reduce habitat for special-status species, including the giant garter snake. Further site-specific analysis at the project level would be required to definitely determine if water transfers would have this impact.

Groundwater Banking Exchange (Sacramento Basin), Bayside Groundwater Project Phase 2, and IRCUP/San Joaquin Banking/Exchange

Most impacts identified as potentially significant in Chapter 5 for these groundwater banking projects were reduced to less-than-significant levels with mitigation. These included water quality degradation from construction, alteration of drainage patterns, exposure of people or structures to geology, soils or seismic hazards, biological resources, land use and recreation resources, transportation, cultural resources, visual resources, hazards, and public services, utilities and energy.

The impacts that were identified as potentially significant include impacts to downstream users (Impact 5.2.A-9) (from Sacramento Groundwater and IRCUP). Impacts are associated with the potential for new diversions along the Lower Sacramento River, and the potential for reduction in downstream flows and changes in water quality (i.e., temperature). The IRCUP project would divert additional water from the Mokelumne River which ultimately terminates in the Delta. Given that neither the Sacramento Groundwater Banking project nor the IRCUP project has been designed, and the potential impacts have not yet been modeled or evaluated in detail, impacts are considered potentially significant at this stage of planning.

There is also potential for significant air quality impacts: the potential to violate an air quality standard (Impact 5.2.F-2), the potential for a cumulatively considerable net increase of criteria pollutants for which the project region is in nonattainment under an applicable Federal or State ambient air quality standard (Impact 5.2.F-3), and potential exposure of sensitive receptors to substantial pollutant concentrations (Impact 5.2.F-4). There are two potentially significant noise impacts: the exposure of sensitive receptors to noise levels in excess of applicable noise standards due to short-term and long-term construction activities (Impacts 5.2.G-1 and 5.2.G-2). There is also the potential for a disproportionate impact to densely populated minority and low-income communities. Further site-specific analysis at the project level would be required to definitely determine if the groundwater facilities would have this impact.

6.2.2 Portfolio B: Regional Partnerships

Ability of Portfolio B to Meet Program Objectives

<u>Portfolio B: Regional Partnerships</u> consists of 37 MGD of conservation, 5 MGD of recycled water, a small water transfer, 10 percent rationing, and is uniquely characterized by its use of all available partnership projects: a mix of groundwater projects, regional desalination, and enlargement of Lower Bear Reservoir. The emphasis on regional partnerships increases the chance of success for larger projects such as regional desalination that would otherwise be difficult for any one agency to build.

Due to this emphasis, Portfolio B scores very well on *Minimize the vulnerability and risk of disruptions* and *Maximize regional partnerships and regional solutions*. The Portfolio provides *operational flexibility* due its diversity in the types and locations of components, but would likely have challenging *institutional and legal complexities* to overcome.

Portfolio B scored moderately on the *cost to the District* with the net present value cost estimated between approximately $600 and $700 million. The portfolio scored well on *cost to customers* because the low rationing goal was estimated to cost customers a median of approximately $110 million.[3]

Under Public Health, Safety, and Community, Portfolio B scored low on *Minimize potential adverse impacts to public health of District customers* and *Maximize use of water from the best available source* because of reliance on water sources other than Mokelumne River (i.e., groundwater and desalination). The objectives *Minimize long-term adverse community impacts*, *Minimize adverse social effects*, and *Minimize*

[3] The terms “cost to the District” and “cost to customers” are defined above in Section 6.2.1, Portfolio A: Groundwater/Conjunctive Use and Water Transfers, in the footnotes on page 6-7.

conflicts with existing and planned facilities, utilities and transportation facilities were met but with a moderate ranking primarily due to short-term construction impacts.

Portfolio B responds moderately to the Environmental objectives *Minimize adverse impacts to the environment* and *Minimize construction and operation effects on environmentally sensitive resources*. This is primarily due to the desalination component and the associated brine discharge and intake concerns. In addition, the Enlarge Lower Bear reservoir component would result in an increased inundation area and potentially impact special-status plant species and habitat.

Environmental Impacts: Portfolio B compared to Preferred Portfolio

Portfolio B differs from the Preferred Portfolio in that it would have a lower goal for conservation (37 MGD vs. 39 MGD), a lower goal for recycled water (5 MGD vs. 11 MGD), and it does not include the Bayside Groundwater Project Phase 2. Otherwise, all components within Portfolio B are included in the Preferred Portfolio, although the emphasis is on regional partnerships.

Recycled Water (5 MGD)

As described above for Portfolio A, all potentially significant environmental impacts from construction of recycled water facilities would likely be less for Portfolio B than for the Preferred Portfolio because Portfolio B includes 5 MGD as compared to the 11 MGD of recycled water proposed in the Preferred Portfolio. In addition, most impacts identified as potentially significant (in Chapter 5) were reduced to less-than-significant levels with mitigation. These included water quality degradation from construction, alteration of drainage patterns, exposure of people or structures to geology, soils or seismic hazards, biological resources, land use and recreation resources, transportation, cultural resources, visual resources, hazards, and public services, utilities and energy.

The impacts related to recycled water projects that were identified as potentially significant include the same air quality, noise and environmental justice impacts as described above for Portfolio A.

Northern California Water Transfers

The impacts related to the Northern California Water Transfers component that were identified as potentially significant include the same groundwater, biological resources and land use impacts as described above for Portfolio A.

6.2.3 Portfolio C: Local System Reliance

Ability of Portfolio C to Meet Program Objectives

Portfolio C: Local System Reliance emphasizes service reliability by providing a new increment of water storage west of the Delta. This portfolio consists of a 15 percent rationing level, 37 MGD of conservation, 5 MGD of recycled water, and a single supplemental supply project: development of Buckhorn Canyon Reservoir.

Portfolio C responded very highly to *Minimize the vulnerability and risk of disruptions* and the highest *operational flexibility* because of the water storage west of the Delta. The Portfolio scored moderately on *Minimize institutional and legal complexities and barriers* because of the challenges that would need to be overcome to implement Buckhorn Reservoir. Portfolio B does not *maximize regional partnerships and regional solutions* as it is centered on a water supply solution within the EBMUD service area.

Portfolio C scored high on the *cost to the District* with the net present value cost estimated between approximately $400 and $500 million. The portfolio scored low on *cost to customers* because the 15 percent rationing goal was estimated to cost customers a median of approximately $350 million.

Under Public Health, Safety, and Community, Portfolio C scored moderately well on the objectives *Minimize potential adverse impacts to public health of District customers* and *Maximize use of water from the best available source* because of reliance on local runoff water sources and continued use of Mokelumne River water. The Portfolio scored low on the objectives *Minimize long-term adverse community impacts*, *Minimize adverse social effects*, and *Minimize conflicts with existing and planned facilities, utilities and transportation facilities* because Buckhorn Canyon Reservoir has significant local opposition and would require entirely new construction.

Portfolio C had a low response to *Minimize adverse impacts to the environment* and *Minimize construction and operation effects on environmentally sensitive resources* because of the reservoir construction. The objectives *Minimize short-term & long-term greenhouse gas emissions from construction*, *Maximize energy efficiency associated with operations & maintenance*, and *Maximize contributions to AB 32 goals* scored moderately well.

Environmental Impacts: Portfolio C compared to Preferred Portfolio

Portfolio C differs from the Preferred Portfolio in that it would have higher rationing goal (15 percent vs. 10 percent), a lower goal for conservation (37 MGD vs. 39 MGD), a lower goal for recycled water (5 MGD vs. 11 MGD), and includes the Buckhorn Canyon Reservoir project.

Rationing (15 percent)

As described previously, greater rationing would result in physical changes to irrigated landscapes and would potentially degrade the visual quality of public and private yards, parks, gardens, and other irrigated areas. In general, water rationing by customers would result in drying of irrigated landscaped areas. These changes would potentially alter the appearance of landscaped areas, but the visual character would not be substantially affected by a rationing level of 15 percent.

Recycled Water (5 MGD)

As described above for Portfolio A, all potentially significant environmental impacts from construction of recycled water facilities would likely be less for Portfolio C than for the Preferred Portfolio because Portfolio C includes 5 MGD as compared to the 11 MGD of recycled water proposed in the Preferred Portfolio. In addition, most impacts identified as potentially significant (in Chapter 5) were reduced to less-than-significant levels with mitigation. These included water quality degradation from construction, alteration of drainage patterns, exposure of people or structures to geology, soils or seismic hazards, biological resources, land use and recreation resources, transportation, cultural resources, visual resources, hazards, and public services, utilities and energy.

The impacts related to recycled water projects that were identified as potentially significant include the same air quality, noise and environmental justice impacts as described above for Portfolio A.

Northern California Water Transfers

The impacts related to the Northern California Water Transfers component that were identified as potentially significant include the same groundwater, biological resources and land use impacts as described above for Portfolio A.

Buckhorn Canyon Reservoir

As described in Section 3.3.4, the Buckhorn Canyon Reservoir component would involve constructing an earth fill dam, north of the Castro Valley community. It would be located below the confluence of Buckhorn and Kaiser Creeks on the water-filled northeastern arm of Upper San Leandro (USL) Reservoir. In addition to the main earthfill dam structure, two concrete dikes, an approximately 1,600-foot long spillway, stilling basin, inlet and outlet tower, access roads, and a pumping plant would be required. A connection would be established between Buckhorn Reservoir and the existing Moraga Aqueduct by a new Buckhorn Aqueduct which would consist of 23,000 feet of hurried pipeline and 6,000 feet of tunnel.

The capacity of a new reservoir in Buckhorn Canyon (similar in layout and concept to a project as originally conceived in the 1980s) is 143,000 AF. This component would increase water supply reliability in dry years through additional storage and would significantly improve emergency standby storage by adding additional storage in the District’s terminal system west of the Delta.

Most of the 1,124-acre inundation area for the Buckhorn Canyon Reservoir component is owned by EBMUD which would facilitate construction of the component. The reservoir would inundate known habitat for several species as well as result in a short-term increase in traffic, noise, and air emissions. The inundation area provides known habitat for the State and Federally listed threatened Alameda whipsnake, sensitive fish species, potential habitat for several Federal candidate species, potential habitat for several special status plant species, and approximately 40 acres of waters of the United States. Approximately 7 miles of stream would be inundated. Other rare species that have been observed in the project area include the Northern California black walnut, black-shouldered kite, northern harrier, and Cooper's hawk. The reservoir would eliminate nesting and hunting habitats for the black-shouldered kite and the Cooper's hawk and would likely increase habitat for the northern harrier. Suitable habitat for the Western leatherwood tree, white fritillaria, and stink bells occurs throughout the project area. The reservoir component would also inundate most of the Chase oaks in the area (Quercus x chasei). Table 6-3 provides a summary of the habitat losses by habitat type that would result from reservoir inundation.

The reservoir would inundate all but approximately 1,000 feet (or approximately 3 to 4 percent) of the total rainbow trout spawning habitat available to the Buckhorn and Kaiser Creek watersheds. The dam would effectively isolate the fish populations in the Buckhorn Canyon Reservoir from USL Reservoir and would preclude the use of remaining spawning areas in the Buckhorn and Kaiser watersheds by fish from the USL reservoir. This would eliminate one of the more protected spawning areas in the USL reservoir watershed.

This component would also inundate a small portion of the Rocky Ridge Trail as well as a transmission line.

Table 6-3: Habitat Loss Due to Reservoir Inundation

HABITAT TYPE	HABITAT LOSS (ACRES)
Willow Riparian	14
Alder Riparian	20
Scrub	22
Grassland	520
Oak Woodland	350
Oak Woodland/Scrub	168
Water	30
Source: EBMUD 1988	

Impacts to traffic would primarily occur during reservoir and pipeline construction and would include truck trips and construction workers commuting to the job site. Access to the project site from the south would be through Castro Valley via I-580, Castro Valley Boulevard, and Redwood Road. Access from the north would be from SR 24, via Moraga Way or Moraga Road, connecting to Canyon Road and then Camino Pablo

(EBMUD 1988). Increased truck trips would likely be a serious concern to adjacent residences.

Impacts identified for the Buckhorn Canyon Reservoir component in the 1988 Draft Environmental Impact Report for the Water Supply Management Program are summarized in Table 6-4.

Table 6-4: Summary of Impacts of the Buckhorn Canyon Reservoir Component

	IMPACTS OF THE BUCKHORN CANYON RESERVOIR COMPONENT
Land Use	• Inundate 1,200 acres of ranch land. • Acquisition of 1,100 additional acres of land.
Hydrology & Water Quality	• Potential impacts to water quality during construction, from erosion and spills.
Geology & Soils	• Potential for increased soil erosion during construction. • Exposure of dam and pipelines to seismic hazards.
Biological Resources	• Loss of 34 acres of riparian vegetation. • Loss of spawning habitat for a sub-species of steelhead rainbow trout.
Traffic & Transportation	• Dam construction would add 120 truck trips daily for 2.5 to 3 years. • Pipeline construction would disrupt traffic within Moraga and add 120 truck trips daily for 10 months.
Noise	• Approximately 155 residences, 1 college, 1 library, and 3 schools lie within 100 feet of the pipeline route and would be disrupted by short-term construction noise.
Air Quality	• Vehicular emissions and dust generation at all construction sites. Most affected would be the 155 residences, college, library, and schools within 100 feet of pipeline construction. Effects would be short-term.
Cultural Resources	• Inundation of 2 sites of potential archaeological interest.
Visual Quality	• Change in landscape from open space to water storage, but visible to few people because of remote location. • Relocated transmission towers would also be visible.
Public Safety	• Very low risk of dam failure; however, failure of Buckhorn Dam would likely lead to the failure of Upper San Leandro and Chabot Dams. Thus, inundating approximately ½ square miles in Moraga, 1 golf course, and 9,900 acres of urbanized land and 38 schools below Lake Chabot.
Source: EBMUD 1988	

Community and environmental interest groups expressed opposition to Buckhorn Reservoir during the WSMP 2040 PEIR scoping process. Even if community concerns about the project could be satisfied, the permitting process would be longer and more complex than envisioned in the past, due to added environmental protections and in consideration of the multiplicity of jurisdictions. Impacts to biological resources in and around the project site would require detailed study and potentially extensive mitigation. Moreover, as noted above in the discussion on how Portfolio C meets the WSMP 2040 Program objectives, this portfolio would not provide significant opportunities for EBMUD to partner with other water interests.

Buckhorn Canyon Reservoir does provide a potentially significant benefit to EBMUD's ability to meet customer demand in that it would extend EBMUD's standby storage capacity well beyond its 6 month target level (approximately 359 days of standby from May through October, and 378 days from November through April), and locate a significant portion of supplemental water west of the vulnerabilities of the Sacramento Delta.

6.2.4 Portfolio D: Lower Carbon Footprint

Ability of Portfolio D to Meet Program Objectives

Portfolio D: Lower Carbon Footprint seeks to reduce energy consumption and greenhouse gas emissions. Dry-year water demand would be substantially reduced by setting the District-wide rationing to 15 percent (29 MGD). This portfolio also would include 37 MGD of conservation, 5 MGD of recycled water, enlargement of Pardee Reservoir, and implementation of the Bayside Groundwater Project Phase 2.

Portfolio D scores low on *Minimize the vulnerability and risk of disruptions* because of its reliance on water from Pardee Reservoir, and the disruption risks of water crossing the Delta. Portfolio D provides high *operational flexibility* due to the increased reservoir capacity. The Portfolio scored moderately on *Minimize institutional and legal complexities and barriers* and *Maximize regional partnerships and regional solutions* – a successful Pardee Reservoir project is dependent on regional partnerships and agreements.

Portfolio D scored moderately on both the *cost to the District* and *cost to customers*. The net present value cost was estimated to be between approximately $600 and $700 million, while the cost to customers of a 15 percent rationing goal is estimated as a median of approximately $200 million.

Under Public Health, Safety, and Community, Portfolio D scored very highly on the objectives *Minimize potential adverse impacts to public health of District customers* and *Maximize use of water from the best available source* because of continued use of Mokelumne River water. The Portfolio scored moderately on the *objectives Minimize long-term adverse community impacts*, *Minimize adverse social effects*, and *Minimize conflicts with existing and planned facilities, utilities and transportation facilities* because of the construction impacts of Enlarging Pardee Reservoir.

Portfolio D had a moderate response to *Minimize adverse impacts to the environment* and *Minimize construction and operation effects on environmentally sensitive resources* because of the reservoir construction. The objectives *Minimize short-term & long-term greenhouse gas emissions from construction, Maximize energy efficiency associated with operations & maintenance,* and Maximize *contributions to AB 32 goals* scored very high. The enlargement of Pardee Reservoir would increase hydroelectric generation capability and thus provide a positive impact on reducing greenhouse gas emissions overall.

Environmental Impacts: Portfolio D compared to Preferred Portfolio

Portfolio D differs from the Preferred Portfolio in that it would have higher rationing goal (15 percent vs. 10 percent), a lower goal for conservation (37 MGD vs. 39 MGD), and a lower goal for recycled water (5 MGD vs. 11 MGD). The portfolio's supplemental supply components, Bayside Groundwater Project Phase 2 and Enlarge Pardee Reservoir are also part of the Preferred Portfolio. The Enlarge Pardee Reservoir component would generate hydroelectricity and offset some of Portfolio D's energy requirements.

Rationing (15 percent)

As described previously, greater rationing would result in physical changes to irrigated landscapes and would potentially degrade the visual quality of public and private yards, parks, gardens, and other irrigated areas. In general, water rationing by customers would result in drying of irrigated landscaped areas. These changes would potentially alter the appearance of landscaped areas, but the visual character would not be substantially affected by a rationing level of 15 percent.

Recycled Water (5 MGD)

As described above for Portfolio A, all potentially significant environmental impacts from construction of recycled water facilities would likely be less for Portfolio D than for the Preferred Portfolio because Portfolio D includes 5 MGD as compared to the 11 MGD of recycled water proposed in the Preferred Portfolio. In addition, most impacts identified as potentially significant (in Chapter 5) were reduced to less-than-significant levels with mitigation. These included water quality degradation from construction, alteration of drainage patterns, exposure of people or structures to geology, soils or seismic hazards, biological resources, land use and recreation resources, transportation, cultural resources, visual resources, hazards, and public services, utilities and energy.

The impacts related to recycled water projects that were identified as potentially significant include the same air quality, noise and environmental justice impacts as described above for Portfolio A.

Northern California Water Transfers

The impacts related to the Northern California Water Transfers component that were identified as potentially significant include the same groundwater, biological resources and land use impacts as described above for Portfolio A.

6.2.5 Portfolio E: Recycled Water and Water Transfers

Ability of Portfolio E to Meet Program Objectives

Portfolio E: Recycled Water and Water Transfers provides a high level of recycled water projects and water transfers, and includes no surface water projects.

Portfolio E scores low on *Minimize the vulnerability and risk of disruptions* and *Minimize institutional and legal complexities and barriers* because of its lower conservation goal and reliance on water transfers which may be difficult to implement in a manner that is highly responsive to water needs. The Portfolio provides high *operational flexibility* because water transfers and groundwater banking could be scaled up or down to match water need. The Portfolio *maximizes regional partnerships and regional solutions* through water transfers and groundwater banking and exchange projects.

Portfolio E responded moderately to the objective to *Minimize cost to the District* - the net present value cost was estimated to be between approximately $600 and $700 million. Because of the low rationing goal of 10 percent, the portfolio's response to the objective to *Minimize cost to customers* was better, with an estimated median cost of approximately $110 million.

Under Public Health, Safety, and Community, Portfolio E scored moderately on all objectives. The water quality of sources other than Mokelumne River water (water transfers, groundwater) may not be as high.

Portfolio E had a high response to *Minimize adverse impacts to the environment* and *Minimize construction and operation effects on environmentally sensitive resources* because of its emphasis on solutions other than surface water storage and lower need for additional infrastructure. The objectives *Minimize short term & long-term greenhouse gas emissions from construction*, *Maximize energy efficiency associated with operations & maintenance*, and *Maximize contributions to AB 32 goals* scored moderately well, largely due to the energy required for groundwater pumping.

Environmental Impacts: Portfolio E compared to Preferred Portfolio

Portfolio E differs from the Preferred Portfolio in that it would have a lower conservation goal (37 MGD vs. 39 MGD). The portfolio's supplemental supply components, Groundwater Banking/Exchange (Sacramento Basin), Northern California Water Transfers, and Bayside Groundwater Project Phase 2 are also part of the Preferred Portfolio.

Portfolio E includes a set list of projects, as described above, while the Preferred Portfolio includes a longer list of potential supplemental supply component of which only some would be implemented (see Table 6-1). Although the Preferred Portfolio has the potential to construct the same set of components included in Portfolio E, the Preferred Portfolio is flexible and may pursue other components instead if those other components gain traction more quickly (e.g., partnership agreements with other water agencies are completed, technical details such as pre-treatment options are confirmed, permit obstacles are minimal, public support is evident and strident, etc.).

Northern California Water Transfers

The impacts related to the Northern California Water Transfers component that were identified as potentially significant include the same groundwater, biological resources and land use impacts as described above for Portfolio A.

7 GROWTH INDUCEMENT

7. Growth Inducement

7.1 Introduction

Section 15126.2(d) of the CEQA Guidelines requires that an Environmental Impact Report (EIR) "… discuss the ways in which a project could foster economic or population growth, or the construction of additional housing either directly or indirectly, in a surrounding environment." Projects which could remove obstacles to population growth must also be considered in this discussion.

Growth inducement "may tax existing community service facilities, requiring construction of new facilities that could cause significant environmental effects" (CEQA Guidelines Section 15126.2[d]). Other potential environmental impacts related to growth include increased traffic, air emissions, and noise; degradation of water quality; and conversion of agricultural or open space to accommodate development.

Typically, the growth-inducing potential of a project or program would be considered significant if it encourages growth or a concentration of population in excess of what is assumed in appropriate master plans, land use plans, or in projections made by regional planning agencies. Significant growth impacts could also occur if the project provides infrastructure or service capacity to accommodate or accelerate growth beyond the levels projected by local or regional plans and policies.

7.1.1 Growth Projections within the EBMUD Ultimate Service Boundary

Development of the WSMP 2040 Preferred Portfolio included an assessment of current and projected water demands (referred to as the 2040 Demand Study). The primary objective of the 2040 Demand Study was to project average annual water demands of the distribution system to 2040 to be used for various District system and supply planning purposes, including the WSMP 2040 Preferred Portfolio. The methodology used to project water demands relied on the development of a spatial geographic information system (GIS) land use database, and the determination of land use unit demands (LUDs) in gallons per day per acre (gpd/ac) which were then applied to acreages of land uses.

The study area for the 2040 Demand Study was the District's Ultimate Service Boundary (USB), which is similar to the District's Sphere of Influence (SOI) with the exception of large areas of watershed lands and rural hilly areas that are outside of the SOI but within the USB. An SOI is also established for each city within the service area by the respective Local Agency Formation Commission (LAFCO) of Alameda and Contra Costa counties. The formulation of each SOI has previously undergone public review and CEQA analysis. Lands within a city SOI but outside of the District USB were not included in the 2040 Demand Study. The study area was divided into 11 Demand Model

Regions based on grouped pressure zones which reflect similar climate and historical spatial designations. Demands were projected for each of the regions.

The database of existing land uses was built from the GIS database from the previous 2000 Demand Study. The database includes mapped polygons encompassing similar land uses, which were updated using 2005 aerial photographs. Future planned land uses reflect the most current general plan land uses provided by the planning agencies. Meetings were held with most of the city and county planning agencies to confirm existing land uses, confirm general plan land use designations for future development, identify redevelopment areas, and identify phasing of future development in five year increments to 2030 plus 2040.

The development of LUDs started with the identification of base year (2005) consumption which is geographically referenced to meter locations. Metered consumption was "normalized" to reflect consumption under average water year conditions and production requirements for use as base year demands. Unmetered water requirements were added to reflect total production demands. Base year LUDs were created by dividing each region's water demands by the land use acreage.

Future demands were calculated by applying adjustment factors to base year LUDs and multiplying the modified LUD by the acreage of planned land uses - either new development or redevelopment of existing uses (usually at higher densities). This process was conducted by the Demand Model, created for the 2040 Demand Study, for each of 36 land use categories, for 11 regions, and for six planning periods. The Demand Model automates the calculation of many steps including applying LUDs to acreages of planned land uses to calculate future demands. These average annual demands (called unadjusted system input) were further adjusted to incorporate the WSMP 2040 Preferred Portfolio for cumulative conservation and non-potable water projections to arrive at adjusted projections. The results are presented in Table 7-1.

Table 7-1: 2040 District-wide Demand Projections

	DEMAND PROJECTIONS (MGD)						
	2005	2010	2015	2020	2025	2030	2040
System Input [a] (unadjusted)	238	251	266	280	291	304	312
Cumulative Conservation	-18	-25	-32	-40	-47	-55	-62
Cumulative Non-Potable Water	-6	-10	-17	-19	-20	-20	-20
System Input [a] (adjusted)	214	216	217	221	224	229	230

Source: 2040 Demand Study, EBMUD, February 2009.

[a] System Input is the quantity of water that enters the distribution system from treatment plant production and groundwater inflow, with adjustments made for distribution storage.

As presented in Table 7-1, Preferred Portfolio assumptions regarding conservation and non-potable usage programs result in projected 2040 demands reduced by an additional 44 MGD for conservation savings above 2005 levels (62 MGD in 2040 minus 18 MGD at 2005) and an additional 14 MGD for non-potable usage (20 MGD at 2040 minus 6 MGD at 2005). This results in a total reduction of demands of 82 MGD (the difference between unadjusted and adjusted). Demands tend to nearly level off after 2030. This is due primarily to the planning agency staff anticipating that most planned land uses will be developed by 2030 and all planned land uses developed by 2040, regardless of the hypothetical buildout date associated with each general plan.

The 2040 Demand Study projects a shift in demand growth since the 2000 Demand Study from the development of new lands east of the Oakland Hills to infill and redevelopment of lands west of the Oakland Hills. The greatest regional increase in demands is associated with the Oakland/Alameda region due to dynamic changes occurring and planned for by the cities.

7.2 Regulatory Framework

7.2.1 Urban Water Management Planning Act

Every large urban water supplier is required to prepare an urban water management plan (UWMP) for the purpose of "actively pursu[ing] the efficient use of available supplies"[1] The Urban Water Management Planning Act encourages urban water suppliers, as part of their long-range planning activities, to ensure reliability in their water service to meet the needs of their customers during normal, dry, and multiple dry water years (Water Code Section 10610 et seq.). In preparing the UWMP, the water supplier is required, to the extent practicable, to coordinate with other appropriate agencies in the area, including other water suppliers that share a common source, water management agencies, and relevant public agencies. Upon receiving notification from a city or county their proposed adoption of, or substantial amendment to a general plan, the water supplier is required to provide the planning agency with the current version of the adopted UWMP, the current version of the water supplier's capital improvement program or plan, and other specified information about the system's sources of water supply.[2]

7.2.2 Senate Bills 221 and 610

In 2001, the California legislature adopted two bills that enhanced coordination between land use and water supply planning and decision-making. Under amendments to the Subdivision Map Act contained in Senate Bill (SB) 221[3], a local land use agency may not approve a tentative map or a development agreement for a subdivision of 500 or more dwelling units without a written verification that sufficient water supplies are available to support the proposed development. Written verification must be supported by

[1] Water Code, Section 10610.4.
[2] Government Code Section 65352.5.
[3] Business and Professional Code Section 65867.5 and Government Code Sections 66455.3 and 66473.7.

substantial evidence, which may include, but is not limited to, the public water system's most recently adopted UWMP or other water supply planning documents such as this water supply management plan.

Under amendments to the Water Code contained in SB 610[4], the CEQA review for most large projects must include an assessment of water supply. Water supply assessments are provided by EBMUD upon request of the lead agency. SB 610 applies to large residential, retail, office, hotels and motels, industrial, and mixed-use projects, and specifies the size (in terms of area and/or number of units) of projects in each category to which the requirement applies.

7.2.3 Planning, Zoning and Development Law

All cities and counties are required to adopt a comprehensive, long-term general plan for the physical development of the jurisdiction.[5] The general plan is a statement of development policies within its prescribed land use, circulation, housing, conservation, open space, noise, and safety elements.

The land use element designates the proposed distribution, location, and extent of land uses and includes a statement of the standards of population density and building intensity recommended for lands covered by the plan, out to a prescribed time horizon. The city or county is required to prepare the water resources section of the conservation element in coordination with water purveyors that serve, control, or conserve water for that jurisdiction. The water section must discuss water supply and demand information contained in the urban water management plan that has been adopted by the water service provider.

7.2.4 EBMUD's Role in Water Supply and Land Use Planning

As discussed above, EBMUD is required by State law to make a reasonable effort to ensure the appropriate level of water service for the areas it serves. Also as described above, EBMUD's water demand projections are based on the development allowed under currently approved general plans and were developed in consultation with the land use planning agencies of the jurisdictions served.

7.3 Potential Growth-Inducing Impacts

The evaluation of growth inducement is focused on the EBMUD USB. While some of the WSMP 2040 Preferred Portfolio components would be located outside of the EBMUD service area in the Upcountry and Central Valley areas, EBMUD would not influence the growth potential of these regions because the District would not provide water service to communities in these areas.

[4] Water Code Sections 10631, 10656, 10910, 10911, 10912, and 10915.
[5] Government Code, Section 65300 *et seq*.

7.3.1 Significance Criteria

Growth-inducing impacts would be considered significant if implementation of the WSMP 2040 Preferred Portfolio would:

- Provide infrastructure or service capacity to accommodate growth beyond plans;
- Foster population growth or the construction of additional housing; or
- Be inconsistent with adopted general plans concerning population or housing growth.

7.3.2 Potential Growth-Inducing Impacts

Impact 7-1: Potential to encourage growth in excess of what has been assumed in land use plans, to provide infrastructure to accommodate growth beyond plans, to remove an obstacle to growth or be inconsistent with general plan policies concerning growth.

The WSMP 2040 Preferred Portfolio is intended to ensure sufficient water supply for EBMUD's customers in dry years. As part of the WSMP 2040 planning process, EBMUD conducted a robust study of water demand through 2040 that relied on adopted general plans of jurisdictions served by EBMUD for growth projections. Additionally, planning staff of jurisdictions within the EBMUD service area were consulted to identify future development trends beyond the general plans' projections. The Need for Water analysis used the Demand Study to conclude that sufficient water would be available to meet needs from existing customers and planned growth in normal and wet years. However, in dry years, particularly multiple dry years, there would be insufficient water to meet projected needs, even with conservation and rationing.

Development as proposed in the general plans is not constrained by water supply, not currently or in the future. As shown in the Need for Water analysis, there is adequate average annual supply to meet projected growth. However, supply adequacy comes into question during times of drought. Management of supply vs. demand during drought periods becomes increasingly problematic over the course of the WSMP 2040 planning horizon, and is exacerbated under prolonged drought conditions. If WSMP 2040 is not implemented, economic hardship could befall the EBMUD service area during drought periods. However that concept does not (and did not) drive land use decision-making for general plan purposes.

The WSMP Preferred Portfolio is a solution to meet EBMUD's dry-water needs through 2040. The Preferred Portfolio includes a variety of components, including water rationing and conservation, recycled water projects, and supplemental water supplies, that give EBMUD flexibility to respond to future uncertainties (e.g., timing of droughts, effects of global climate change, identifying partners for water transfers and regional water supply projects).

While the Preferred Portfolio would increase EBMUD's water supply, it is not intended to support unplanned growth. In fact, many of the Preferred Portfolio components would only provide additional water in dry years, and would not increase the average annual supply. For example, under the Sacramento Basin Groundwater Banking /Exchange and IRCUP / San Joaquin Groundwater Banking / Exchange components, water would be stored during wet years and then used during dry years. Similarly, the Regional Desalination component would be operated primarily during dry years. The incremental increase in surface storage created by the Enlarge Pardee and Lower Bear Reservoirs components would be used during dry years.

The Preferred Portfolio would be implemented over time, and it is inevitable that the supply would not exactly match the need for water throughout the planning period (through 2040). At any given time, EBMUD would likely have slightly more or less water than what is needed (see Figure 3-14 in Chapter 3, Preferred Portfolio and Alternative Portfolios). This situation cannot be avoided given the unpredictability of weather conditions, timing of droughts, and the length of time needed to plan, design and implement the various Preferred Portfolio components. As discussed in Chapter 3, the Preferred Portfolio components would be implemented in phases to ensure sufficient water supply in dry years over the course of the planning period.

Over the course of the WSMP 2040 planning period, WSMP updates may be needed to re-assess the Need for Water and projected demands, and EBMUD will make updates as needed. Updates will ensure that the solution is adjusted to match the Need for Water. The flexibility that is inherently built into the proposed implementation plan for WSMP 2040 allows that supply will not substantially exceed demand, nor will it substantially fall short of demand. The District recognizes that were either condition to occur, and the flexible implementation plan could not address these conditions, then the WSMP would need to be revised and a subsequent program-level CEQA document would be prepared. Therefore, potential growth-inducing impacts would be ***less than significant***.

Many of the WSMP 2040 Preferred Portfolio components, including the Sacramento Basin Groundwater Banking / Exchange, Regional Desalination, Enlarge Pardee and Lower Bear Reservoirs, and IRCUP / San Joaquin Groundwater Banking / Exchange components, would involve regional partners. With the exception of the Regional Desalination component (which would involve Contra Costa Water District, San Francisco Public Utilities Commission and Santa Clara Valley Water District), none of the potential partners for Preferred Portfolio components have been confirmed. EBMUD's partners would be required to prepare separate project-level CEQA documentation to assess the potential growth-inducing impacts associated with their share of the water supply and its uses.

Consistency with General Plan Policies

As described above, EBMUD's water demand projections are based on the amount of development allowed under currently approved general plans and were developed in consultation with planning agencies of the jurisdictions served. These planning documents determine the nature and intensity of land uses to be served by EBMUD and have already been subjected to environmental review under CEQA. In adopting the applicable general and specific plans, the local decision-making bodies have adopted measures to mitigate adverse impacts associated with the growth that will occur under the plans and have adopted statements of overriding considerations associated with impacts that cannot be reduced to an insignificant level. Because the WSMP 2040 planning horizon is longer than many of the adopted general plans, EBMUD consulted with staff of local land use planning agencies to identify future growth trends within the service area. Therefore, the WSMP 2040 Preferred Portfolio would be generally consistent with adopted plans concerning population and growth.

It is possible that development projected by the communities in the later years of the WSMP 2040 planning period, as described in the 2040 Demand Study, may occur sooner than anticipated, which could result in a change in the timing of demands, not the overall water demands. However, since the demand projections are based on general plan land uses and recorded in a spatial database, it is relatively easy to correlate projected demands with development proposals, as is required for SB 221 compliance. Changes to water demands resulting from unplanned growth, however, would occur only after general plan amendments, CEQA review, and updated analyses are conducted on the availability of water supply to meet demands beyond those currently planned.

Impact Significance: Less than Significant

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8 CUMULATIVE ANALYSIS

8. Cumulative Analysis

8.1 Introduction

The California Environmental Quality Act (CEQA) Guidelines Section 15355 defines a cumulative impact as “two or more individual effects which, when considered together, are considerable or which compound or increase other environmental impacts.” Individual effects “may be changes resulting from a single project or a number of separate projects. The cumulative impact from several projects is the change in the environment which results from the incremental impact of the project when added to other closely related past, present, and reasonably foreseeable probable future projects. Cumulative impacts can result from individually minor but collectively significant projects taking place over a period of time.”

Specifically, a cumulative impact is one that is created as a result of the combination of the project evaluated in the EIR together with other projects *causing related impacts* (CEQA Guidelines, Section 15130[a][1]). The CEQA Guidelines require a discussion of cumulative impacts when the project’s incremental effect is cumulatively considerable, as defined in Section 15065(a)(3).[1] This analysis conforms to Section 15130 of the Guidelines, which also includes the following:

(a) …Where a lead agency is examining a project with an incremental effect that is not “cumulatively considerable,” a lead agency need not consider that effect significant, but shall briefly describe its basis for concluding that the incremental effect is not cumulatively considerable.

(1) …An EIR should not discuss impacts which do not result in part from the project evaluated in the EIR.

(2) When the combined cumulative impact associated with the project’s incremental effect and the effects of other projects is not significant, the EIR shall briefly indicate why the cumulative impact is not significant and is not discussed in further detail in the EIR. A lead agency shall identify facts and analysis supporting the lead agency’s conclusion that the cumulative impact is less than significant.

(3) An EIR may determine that a project’s contribution to a significant cumulative impact will be rendered less than cumulatively considerable and thus is not significant. A project’s contribution is less than cumulatively considerable if the project is required to implement or fund its fair share of a mitigation measure or measures designed to alleviate the cumulative impact. The lead agency shall

[1] Cumulatively considerable” is defined as the incremental effects of an individual project are significant when viewed in connection with the effects of past projects, the effects of other current projects, and the effects of probable future projects.

identify facts and analysis supporting its conclusion that the contribution will be rendered less than cumulatively considerable.

The CEQA Guidelines Section 15130[b][1] identifies two methods for establishing the cumulative environment in which a project may be considered:

- A list of past, present, and probable future projects that may cause related or cumulative impacts; or
- Adopted projections from a General Plan or other regional planning document.

8.2 Methodology

8.2.1 Cumulative Impacts

The cumulative setting describes the past, present, and probable future cumulative projects and trends expected to occur over the next 30 years.

Many of the local, regional and State agencies identify projects in their planning documents. General plans of local jurisdictions normally cover a 20-year planning period. Most of the projects identified in the general plans would be implemented within 5 to 10 years. In some cases, long-term development or infrastructural projects within a city or county are identified in general plans. The land use designation maps included in each general plan also illustrate the development strategy within the city or county.

Other development projects are identified in lists of current projects maintained by the community development or planning departments of each local agency. These project lists are periodically updated. Public works and other infrastructural projects are typically identified in capital improvement plans (CIPs). CIPs identify projects likely to occur within a 5-year period based on the availability of funding.

As explained in Chapter 3, Preferred Portfolio and Alternative Portfolios, the WSMP 2040 Preferred Portfolio would consist of a series of components that would be implemented over a 30-year planning period, which is beyond the planning periods of most agencies. Due to the phased nature of the WSMP 2040 Preferred Portfolio, cumulative projects currently identified by local, regional, State, and Federal agencies may not be relevant by the time future phases are implemented (because other cumulative projects may either not occur concurrently or within the same geographic zone as the proposed WSMP 2040 Preferred Portfolio components). Due to the extended planning horizon of the WSMP 2040 Preferred Portfolio, and the anticipated changes to the agency project lists and/or CIPs, a list of cumulative projects based on these documents would not provide cumulative setting information for the entire 30-year planning period addressed in the program-level evaluation of cumulative impacts. Also, as future project-level phases of the WSMP 2040 Preferred Portfolio move forward, cumulative impact analyses would be conducted as part of the project-level CEQA compliance, as appropriate.

For the purpose of conservative evaluation of cumulative impacts and due to the uncertainty of the locations and timing of actual other cumulative projects, the cumulative analysis assumes that all categories of other cumulative projects could be implemented simultaneously with the WSMP 2040 Preferred Portfolio components. In evaluating cumulative effects, the analysis first considers whether cumulative, significant effects would occur if cumulative projects were constructed together. Then the WSMP 2040 Preferred Portfolio's contribution to cumulative effects is considered to determine if it is cumulatively considerable. This conclusion, as well as the cumulative impacts of all projects together, would be identified. No analysis is required of environmental topics if the WSMP 2040 Preferred Portfolio would not contribute to cumulative effects.

8.2.2 Global Climate Change Impacts

The cumulative analysis will also address the effects on global climate change, including:

- Effects resulting from Preferred Portfolio implementation on climate change; and
- Climate change effects on water resources and consequences to EBMUD water supply.

The primary purpose of this climate change impact evaluation is to assess whether there are reasonably foreseeable consequences of global climate change that would result in substantial adverse effects from and on the proposed project. There are no formally accepted methodologies nor are there presently any thresholds of significance for measuring greenhouse gas emissions or climate change impacts. While an agency must use its best efforts to find out and disclose all that it reasonably can about the potential adverse environmental effects of the project or on the project, it may not engage in speculation. Speculation of unspecified and uncertain future effects that cannot reasonably be evaluated serves no purpose and may mislead the reader. "If after a thorough investigation, an agency finds that a particular impact is too speculative for evaluation, the agency should note its conclusion and terminate discussion of the impact." (CEQA Guidelines Section 151145)

The analysis provided in this chapter is based on available information and projections applicable to estimating the types of effects that may occur. While some effects of global climate change are reasonably foreseeable, the extent to which many of these effects would manifest themselves, and the potential of other effects to occur, remains speculative. In the interests of fully informing the decision makers, many of the potential effects that are subject to a high degree of uncertainty are discussed in the evaluation though it would be too speculative to draw a conclusion as to their significance.

However, as stated above, cumulative impacts are the collective impacts of one or more past, present, and future projects, that, when combined, result in adverse changes to the environment. When the adverse change is substantial and the project's contribution to the impact is considerable, the cumulative impact is considered significant. The cumulative project list for this issue (global climate change) comprises anthropogenic (i.e., man-made) greenhouse gas (GHG) emission sources across the entire globe, and no project alone would reasonably be expected to contribute to a noticeable incremental change to the global climate. However, legislation and executive orders on the subject of climate change in California have established a statewide context for GHG emissions, and an enforceable statewide cap on GHG emissions. Given the nature of environmental consequences from GHGs and global climate change, CEQA requires that the evaluation of the cumulative impacts of GHGs, even relatively small (on a global basis) additions, need to be considered. Small contributions to this cumulative impact (from which significant effects are occurring and are expected to worsen over time) may be potentially considerable and therefore, significant.

8.3 Cumulative Setting

To characterize the cumulative setting, the regional plans and regulations were reviewed to understand the changes that are likely to occur in the region over the long term.
In addition, the cumulative setting considers the typical categories of projects that could occur in the WSMP 2040 Preferred Portfolio Study Area concurrent with the WSMP 2040 Preferred Portfolio components.

8.3.1 Population Projections

Population is expected to increase in all counties affected by the WSMP 2040 Preferred Portfolio. The U.S. Census projects the State's total population would increase from approximately 33.8 million (as reported in the 2000 census) to about 46.4 million by July 2030 (U.S. Census 2005), an increase of more than 35 percent. This increase would be distributed unevenly throughout various cities and counties in northern California, but is suggestive of the general trend that would be expected through the WSMP 2040 Preferred Portfolio's planning horizon. Estimated population increases are generally accompanied by physical development within a community associated with increasing demands for housing, public services, and other amenities. As such, with continuing population growth in the State, physical changes to the environment would be expected, potentially in the form of reduction of agricultural land in the rural area, loss of habitat for biological resources, or other environmental effects.

8.3.2 Other EBMUD Projects

EBMUD is working on a variety of water system improvements to meet projected water needs and to increase water reliability, as shown in Table 8-1.

Table 8-1: Other EBMUD Projects

PROJECT	HOST COMMUNITY AND DESCRIPTION	CONSTRUCTION SCHEDULE	PREFERRED PORTFOLIO COMPONENT WITH POTENTIAL OVERLAP	POTENTIAL CONSTRUCTION SCHEDULE OVERLAP (FROM FIG 3-13)
Berryman Reservoir Replacement	Berkeley Replacement storage tank within the former Berryman Reservoir basin.	2010 to 2011	Recycled Water – construction traffic; air emissions	2010
EBMUD-SFPUC-Hayward Intertie Project	Hayward, Castro Valley The Intertie Project will allow sharing of water deliveries (up to 30 MGD) among the parties (SFPUC, EBMUD and City of Hayward) during emergencies or planned outages.	Complete	None	
Moraga Road Pipeline Project	Moraga, Lafayette Water treatment and transmission improvements.	Complete in 2009	None	
Richmond Advanced Recycled Expansion (RARE)	Richmond Phase 1: 3.5 MGD to Chevron refinery. Phase 2: add 0.5 MGD capacity. Future Expansion: add 1.0 MGD capacity.	Complete Phase 1 in 2010; Phase 2 unknown	RARE Phase 2; Other recycled water projects – construction traffic; air emissions	2010- 2015
Round Hill Pressure Zone Improvement Project	Alamo 1.0 MGD pumping plant, and 1400 feet of 12-inch pipeline -- Livorna Road	2010-2011	None	
Water Treatment and Transmission Improvements Program	Lafayette, Orinda, Walnut Creek, San Leandro, El Sobrante Comprehensive program to construct new, updated or refurbished water treatment facilities, distribution pipelines, pumping plants and water storage tanks.	2010-2020	Bayside GWP Phase 2 – San Leandro only; construction traffic; air emissions; water quality	2015-2020
San Pablo Dam Seismic Upgrade Project	Orinda, El Sobrante Improve soil and enlarge downstream buttress to enhance seismic safety of San Pablo Dam.	2008-2010	None	
Schapiro Reservoir Replacement Project	Richmond, Contra Costa County Replace existing reservoir with smaller tank inside the existing basin.	2009-2011	RARE Phase 2 – construction traffic; air emissions	2010
Source: EBMUD, 2009				

8.3.3 Central Valley Project and State Water Project

The Central Valley Project (CVP) is a Federal water project undertaken by the United States Bureau of Reclamation (USBR) in 1935. It was designed to move some of the abundant water supply of the northern end of the Central Valley to the dry southern end. The goals of the CVP were water and hydroelectric power for farms, flood control, improved navigability of the Sacramento River, and the development of water supplies for cities and towns of the Central Valley. The CVP controls a share of the flow of both the Sacramento and San Joaquin Rivers and diverts the water out of the south Delta at the C.W. Jones Pumping Plant (formerly known as the Tracy Pumping Plant) into the Delta-Mendota Canal.

USBR administers long-term water supply contracts to its users (i.e., contractors), including water agencies and farmers. Water allocations to individual users are based on the water year type, with higher allocations during wet years. CVP contractors are granted the right to transfer temporarily or permanently their water supplies to other CVP contractors and non-CVP contractors. All transfers require USBR approval. Water transfers occur continuously and may occur during the life the WSMP 2040 Preferred Portfolio, concurrently with potential transfers involving EBMUD. As such, consideration of other water transfers is included in the cumulative setting.

The California State Water Project (SWP) is a water storage and delivery system of reservoirs, aqueducts, powerplants and pumping plants. Its main purpose is to store water and distribute it to 29 urban and agricultural water suppliers in Northern California, the San Francisco Bay Area, the San Joaquin Valley, the Central Coast, and Southern California. The SWP controls a share of the flow in the Sacramento River and diverts water out of the Sacramento-San Joaquin Delta at 2 points: the North Bay Aqueduct (for Napa and Solano counties water users) and at the Banks Pumping Plant in the south delta for water districts tied into the California Aqueduct.

8.3.4 OCAP Restrictions

On December 14, 2007, the United States District Court for the Eastern District of California issued an Interim Remedial Order in *Natural Resources Defense Council, et al. v. Kempthorne*, 1:05-cv-1207 OWW GSA (E.D. Cal. 2007), to provide additional protection of the Federally-listed delta smelt from impacts resulting from the operation of the CVP. The Interim Remedial Order remained in effect until the United States Fish and Wildlife Service (USFWS) issued a new Biological Opinion (BO) for the continued operation of the CVP and SWP. On December 15, 2008, the USFWS issued its BO addressing impacts to delta smelt and its designated critical habitat. See Section 8.3.5 for more information.

On April 16, 2008, the United States District Court for the Eastern District of California issued a Memorandum Decision and Order on the Cross-Motions for the Summary

Judgment filed in *Pacific Coast Federation of Fishermen Association, et al. v. Gutierrez*, 1:06-cv-245-OWW-GSA (E.D. Cal. 2008). The court found that the BO issued by the National Marine Fisheries Service (NMFS) in 2004 to cover CVP operations was invalid. NMFS is presently preparing a new BO which will be issued within the next several months.

8.3.5 Fish and Wildlife Service - Delta Smelt Biological Opinion

On December 15, 2008, the USFWS delivered its BO to USBR on the effects of the continued operation of the CVP and the SWP on the delta smelt and its designated critical habitat. The USFWS has determined that the continued operation of these two water projects as described in the Biological Assessment (BA) is likely to jeopardize the continued existence of the delta smelt and adversely modify its critical habitat. The BO is accompanied by a Reasonable and Prudent Alternative (RPA) intended to protect each life-stage and critical habitat of this federally protected species. USBR is currently reviewing the BO, including the RPA, to determine if the BO can be implemented in a manner that is consistent with the intended purpose of the action, is within the agency's legal authority and jurisdiction, and is economically and technologically feasible (USFWS 2008).

8.3.6 Sacramento – San Joaquin Delta Planning Efforts

A number of ongoing planning efforts to protect the Sacramento-San Joaquin Delta are important to consider within the cumulative context of the WSMP 2040 Preferred Portfolio due to the interrelated nature of water resources management in northern California and the location of one Preferred Portfolio component in the Delta. These efforts are at various stages of planning and may not have any physical changes to the environment within the planning horizon of the WSMP 2040 Preferred Portfolio.

Ongoing planning efforts include the following, described in further detail below:

- The CALFED Bay-Delta Program;
- Bay Delta Conservation Plan;
- Delta Vision; and
- Delta Risk Management Strategy.

CALFED Bay-Delta Program

CALFED involves collaboration between State and Federal agencies and stakeholders from key interest sectors created to address and resolve resource management issues in the Bay-Delta system. The mission of CALFED is to develop and implement a comprehensive plan that addresses resource problems in the Bay-Delta estuary related to fish and wildlife, water supply reliability, natural disasters, and water quality.
The CALFED Record of Decision (ROD) was signed in late 2000. The ROD directs that

a number of specific studies be implemented to address identified resource management issues. Several of these studies include feasibility studies of major water resources projects and programs that are relevant in the WSMP 2040 Preferred Portfolio cumulative context (e.g., Sites Reservoir, Shasta Lake enlargement, Los Vaqueros Reservoir Expansion Project, Environmental Water Account, etc.)

According to the Draft CALFED End of Stage 1 Report (November 2007), CALFED is nearing the end of Stage 1 implementation. Stage 1 covers the first 7 years of a 30-year program consisting of hundreds of actions. CALFED agencies have worked together to invest approximately $2.5 billion, and stakeholders have invested many billions more in a wide variety of actions within the Delta, in the upstream watersheds, and in the water service areas, including in the Bay Area.

Bay Delta Conservation Plan

The Bay Delta Conservation Plan (BDCP) is a Natural Community Conservation Planning effort to address water operations and facilities in the legal Delta. BDCP focuses primarily on aquatic ecosystems and natural communities. Among other things, the plan will:

- Provide for conservation and management of species impacted by the covered activities;
- Preserve, restore, and enhance aquatic, riparian and associated terrestrial habitats; and
- Provide authorization as well as clear expectations and regulatory assurances for Delta water operations and facilities (CVP, SWP, and Mirant Corporation).

The Draft BDCP is expected to be completed in October 2009.

Delta Vision

The Delta Vision initiative (Governor Schwarzenegger’s Executive Order S-17-06) is intended to identify a strategy for managing the Delta as a sustainable system for all of the environmental and economic services that it provides. The governor’s Blue Ribbon Task Force issued the Final Delta Vision in January 2008. Near-term actions identified therein focus on preparing for disasters in or around the Delta, protecting its ecosystem and water supply system from urban encroachment, and starting work soon on short-term improvements to both the ecosystem and the water supply system (Blue Ribbon Task Force 2008). These actions would be commitments made by the State Governor and government, local agencies, and other responsible agencies, and are not yet on-the-ground projects that could be implemented. The final Delta Vision Strategic Plan was released in October 2008 and culminates a 20-month-long process to develop a plan for long-term sustainability of the Sacramento-San Joaquin Delta.

EBMUD evaluated the hazards and risks of aqueduct failure in the Delta, prompted in part by the ongoing Delta Vision process and a potential reduction in protecting the Delta levee system. The findings of the evaluation identified the best long-term option is a tunnel below the Delta to enclose dual pipelines. This option would provide a high degree of protection against both flooding and seismic events and would cost approximately $650 million (2007). The tunnel would take several years to plan, design and construct. Accordingly, interim measures were also recommended to maintain the levees and provide greater operational flexibility. These interim measures include the installation of cross-connection piping and valves between the Mokelumne Aqueducts upstream and downstream of the Delta and construction of levee improvements and scour protection measures along the aqueduct alignment.

Bay-Delta Strategic Workplan

The Bay-Delta Strategic Workplan describes a suite of activities that the State Water Resources Control Board (SWRCB) will pursue over a five-year period beginning in 2008 to address water supply and environmental issues in the Delta. Workplan elements are responsive to direction from the governor and Delta Vision. Among its many elements, the Workplan proposes actions to address water use efficiency for urban and agricultural water users. It also requires a comprehensive review of the Water Quality Control Plan for the Delta estuary, as well as review of water rights and other measures implementing that plan.

Delta Risk Management Strategy

The 2000 CALFED ROD presented its Preferred Program Alternative that described actions, studies, and conditional decisions regarding the Delta. Included in the Preferred Program Alternative for Stage 1 implementation was the completion of a Delta Risk Management Strategy (DRMS) that would assess major risks to the Delta resources from floods, seepage, subsidence, and earthquakes. DRMS would also evaluate the consequences, and develop recommendations to manage the risk. The California Department of Water Resources (DWR) and Department of Fish and Game (CDFG) issued the Risks and Options to Reduce Risks to Fishery and Water Supply Uses of the Sacramento/San Joaquin Delta in January 2008.

8.3.7 Regional Projects / Activities

In addition to the plans specified above, specific known past, present and probable future, major projects in the WSMP 2040 Preferred Portfolio Study Area are discussed below.

Freeport Regional Water Project

The Freeport Regional Water Project (FRWP), which is described in Chapter 2, Background, is intended to meet future drinking water needs in central Sacramento County and also supplement EBMUD’s water supply during future drought periods.

FRWP includes construction of a new intake on the Sacramento River near Freeport, a new pipeline to convey water east to the Folsom South Canal, a future water treatment plant in Sacramento County, and facilities to transport water for EBMUD to the EBMUD service area. The project is authorized, funded, and all major environmental compliance steps have been completed, and it is scheduled for implementation in 2010.

FERC Licensing

Under the Federal Power Act, the Federal Energy Regulation Commission (FERC) is responsible for licensing hydroelectric power projects. FERC's hydroelectric licensing process involves consultation with State and Federal agencies, which may recommend license terms and conditions to FERC to protect and enhance water quality, fisheries resources, public recreation, renewable energy production, and other public interests to adequately mitigate project impacts. FERC is required to balance power and environmental values when making decisions on what protection, mitigation, and enhancement (PM&E) measures to include in a new license. PM&Es can range from requiring the licensee to develop a channel improvement program to support fish spawning and rearing, to implementation of conservation measures to protect vernal pool invertebrate habitat, to implementation of recreation management and historic properties management plans.

The license term for major hydroelectric projects, which are capable of generating more than 5 megawatts of electricity, is between 30 and 50 years. At least 5 years before a license expires, the licensee must file a notice of intent declaring whether or not it intends to seek a new license (relicense) for its project. At least 2 years before a license expires, the licensee must file an application for new license. FERC relicensing is accompanied by an Environmental Impact Statement (EIS) to assess the environmental and economic effects of the relicensing alternatives.

Several active FERC licenses and preliminary permit applications exist in the WSMP 2040 Preferred Portfolio Study Area (see Table 8-2). PG&E's Mokelumne River Project (FERC No. 137) hydroelectric facilities, which include the Lower Bear Reservoir, are located directly upstream and adjacent to EBMUD's Pardee Reservoir. The District's Pardee and Camanche dams, powerhouses and reservoirs are licensed as the Lower Mokelumne Project, FERC No. 2916.

8.3.8 City and County Development Projects

As noted above, local and regional agencies identify projects in their planning documents, CIPs, and development project lists. These projects are generally planned to be implemented in the near term (within approximately 5 to 10 years), depending on the availability of funding.

Table 8-2: FERC Projects in the WSMP 2040 Preferred Portfolio Study Area

FERC PROJECT NAME & ASSOCIATED RIVER	FERC PROJECT NUMBER	LICENSEE	DATE LICENSE ORDER WAS ISSUED	DATE LICENSE ORDER EXPIRES	EBMUD WSMP 2040 PREFERRED PORTFOLIO RELEVANT COMPONENTS	COUNTY WITHIN THE WSMP 2040 PREFERRED PORTFOLIO STUDY AREA
Mokelumne River Project (North Fork Mokelumne River)	137	PG&E	October 11, 2001	March 31, 2031	Enlarge Lower Bear Reservoir	Amador, Calaveras
Mokelumne Pumped Storage Project[b]	13221	PG&E	Preliminary Permit Application Accepted for Filing & Soliciting Comment, Motions to Intervene, & Competing Applications [July 10, 2008]	NA	Enlarge Lower Bear Reservoir	Amador, Calaveras
Tulloch Hydroelectric Project (Stanislaus River)	2067	South San Joaquin & Oakdale Irrigation Districts	February 16, 2006	December 31, 2046	Enlarge Pardee Reservoir	Calaveras
Stanislaus-Spring Gap Hydroelectric Project (Stanislaus River)	2130	PG&E	License Application submitted December 26, 2002	Anticipating New License	Enlarge Pardee Reservoir	Calaveras
Upper North Fork Feather River (UNFFR) Project (Upper North Fork Feather River)	2105	PG&E	License Application submitted October 2002 (License expired in October 2004)	Anticipating New License	Northern California Water Transfers	Plumas
Rock Creek-Cresta Project (North Fork Feather River)	1962	PG&E	October 24, 2001	33 year license effective the first day of the month in which it was issued	Northern California Water Transfers	Plumas
Bucks Creek Project (Bucks Creek, Grizzly Creek, Milk Ranch Creek & Tributaries to the North Fork Feather River)	619	PG&E	April 29, 1988 License Amendment extended the license term	2018	Northern California Water Transfers	Plumas

Table 8-2: FERC Projects in the WSMP 2040 Preferred Portfolio Study Area (continued)

FERC PROJECT NAME & ASSOCIATED RIVER	FERC PROJECT NUMBER	LICENSEE	DATE LICENSE ORDER WAS ISSUED	DATE LICENSE ORDER EXPIRES	EBMUD WSMP 2040 PREFERRED PORTFOLIO RELEVANT COMPONENTS	COUNTY WITHIN THE WSMP 2040 PREFERRED PORTFOLIO STUDY AREA

Notes:
[a] On January 3, 2007, Mokelumne River Water and Power Authority filed an application for a 3-year preliminary permit under Section 4(f) of the Federal Power Act (FPA) to study the feasibility of the proposed 6-megawatt Conjunctive Use Project. The project would be located on the Mokelumne River, in Calaveras and San Joaquin Counties, California. The applicant estimates that the average annual generation would be 15 gigawatt-hours (GWh), which would be sold to a local utility.
[b] On May 8, 2008, PG&E filed an application, pursuant to Section 4(f) of the FPA, proposing to study the feasibility of the Mokelumne Pumped Storage Project to be located in Amador and Calaveras Counties, California on private and Federal land managed by the U.S. Forest Service. The annual electrical production would be between 523 and 742 GWh.

Given the scale of the WSMP 2040 Preferred Portfolio and the geographic extent of the area considered in the cumulative impact evaluation, an exceedingly large number of projects would need to be considered. It is not reasonable to list all of these projects in this PEIR. Table 8-3 generally characterizes the types of near-term projects typically identified on project lists and CIPs of local jurisdictions where proposed WSMP 2040 Preferred Portfolio components would occur. The categories of projects shown in Table 8-3 are not meant to be exhaustive, but generally capture the types of activities that would require physical changes to the environment which could in turn result in environmental impacts. These projects range from residential development to street improvements. Examples of projects proposed by local jurisdictions are presented in the table for each category. These cumulative projects would be scattered throughout the Upcountry, Central Valley, and San Francisco Bay Area and range from urban to rural areas. The cumulative projects may be in various stages of planning (e.g., undergoing review by planning departments, preparing environmental documentation) while others are either under construction or recently completed. These cumulative projects vary in size and extent; some projects may be site-specific (i.e., improvements to a commercial property at a specific location), while others may extend over several miles (e.g., installation of pipelines).

Table 8-3: Other Cumulative Projects of Cities and Counties – by Types

CATEGORIES OF PROJECTS	DESCRIPTION
Residential	Projects include construction of accessory structures to private homes, residential developments (single- and multiple-family homes), subdivisions, and rezoning.
Commercial	Projects include conversion or construction of retail stores, restaurants, offices, parking structures, and gas stations.
Industrial	Projects include conversion or construction of industrial development, subdivisions, base closures / redevelopment.

Table 8-3: Other Cumulative Projects of Cities and Counties – by Types (continued)

CATEGORIES OF PROJECTS	DESCRIPTION
Mixed-use	Projects include mixed-use development consisting of housing units and commercial space.
Recreation	Projects include construction/improvement of creek trails, bicycle/pedestrian corridors and bridges, pools, park facilities, ADA improvements, and park landscape improvements.
Street/Traffic	Projects include road widening, intersection improvements, sidewalk/curb construction/repairs, streetscape improvements, traffic signal replacement/modification, bridge repairs, and railroad-related improvements.
Utilities	Projects include the replacement of water/sewer/stormdrain pipes and appurtenances, construction/replacement of solid waste facilities, construction of telecommunications facilities.
Public facilities	Projects include construction/renovation of fire stations, community centers, medical facilities, children's centers, transit centers, and libraries.
Places of Assembly	Projects include construction of churches and temples.

The local and regional agencies whose development projects may be considered in combination with the WSMP 2040 Preferred Portfolio components include the following:

- Alameda County;
- Alpine County;
- Amador County;
- Calaveras County;
- Colusa County;
- Contra Costa County;
- Glenn County;
- Sacramento County;
- San Joaquin County;
- Plumas County;
- Yuba County;
- Cities in Alameda and Contra Costa counties where recycled water projects and Bayside Groundwater Project Phase 2 would be located; and
- Cities in above counties where groundwater banking / exchange facilities would be located.

8.3.9 Other Agency Development Projects

Other agencies within the WSMP 2040 Preferred Portfolio Study Area with potential local cumulative projects include water and wastewater agencies and reclamation districts, park districts, and transit districts. Table 8-4 generally characterizes the types of projects identified on the project lists of these entities.

8.3.10 Other Related Projects

Other related projects include the Bayside Groundwater Project Phase 1 and the Freeport Regional Water Project described in Chapter 2, Background. These projects

Table 8-4: Other Cumulative Projects of Other Entities – By Types

CATEGORIES OF PROJECTS	DESCRIPTION
Treatment Plant Improvements	Projects include upgrades and / or expansion of existing treatment facilities.
Pipeline Improvements	Projects include replacement and / or rehabilitation of water and sewer pipes and appurtenances.
New Facilities	Projects include the construction of new facilities (e.g., dams, reservoirs, desalination plants, treatment facilities, pipelines, wells, etc.).
Conjunctive Use Projects	Projects that maximize both groundwater and surface water resources, including groundwater pumping and banking projects.
Park Improvements	Projects include expansion of park facilities.
Road and Transit Improvements	Projects include local road and highway widening, and transit and rail improvements.

are part of the CEQA baseline for this PEIR, but they are currently under construction and are scheduled to be online in 2010.

A number of desalination projects are proposed along the Pacific Coast. These projects are at various levels of planning and implementation. They would involve construction and operation of various capacities of desalination plants, open-water or beach intakes, and discharge into the Pacific Ocean. Operation of all plants would contribute to aquatic impacts and energy consumption.

8.4 Global Climate Change Setting

8.4.1 Greenhouse Effect

Certain gases in the earth's atmosphere, classified as GHGs, play a critical role in determining the earth's surface temperature. Solar radiation enters the earth's atmosphere from space. A portion of the radiation is absorbed by the earth's surface, and a smaller portion of this radiation is reflected back toward space. The absorbed radiation is then emitted from the earth, not as high-frequency solar radiation, but lower frequency (thermal) infrared radiation. The frequencies at which bodies emit radiation are proportional to temperature. The earth has a much lower temperature than the sun; therefore, the earth emits lower frequency (longer wavelength) radiation. Most solar radiation passes through GHGs; however, infrared radiation is selectively absorbed by GHGs. As a result, infrared radiation released from the earth that otherwise would have escaped back into space is instead "trapped" and emitted back toward Earth, resulting in a warming of the atmosphere. This phenomenon, known as the "greenhouse effect," is responsible for maintaining a habitable climate on Earth. Without the greenhouse effect, the Earth's average temperature would be approximately 18 degrees Celsius (°C)

(0° Fahrenheit [°F]) instead of its present 14°C (57 °F) (National Climatic Data Center 2008) and would not be able to support life as we know it.

8.4.2 Greenhouse Gases

Prominent GHGs contributing to the greenhouse effect are carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), and fluorinated compounds. Human-caused emissions of these GHGs in excess of natural ambient concentrations are responsible for intensifying the greenhouse effect and have led to a trend of unnatural warming of the earth's climate, known as global climate change or global warming. It is extremely unlikely that global climate change over the past 50 years can be explained without the contribution from human activities (IPCC 2007).

Climate change is a global problem. GHGs are global pollutants, unlike criteria air pollutants (CAPs) and toxic air contaminants (TACs), which are pollutants of regional and local concern. Whereas pollutants with localized air quality effects have relatively short atmospheric lifetimes (about 1 day), GHGs have long atmospheric lifetimes (1 year to several thousand years). GHGs persist in the atmosphere for long enough time periods to be dispersed around the globe. Although the exact lifetime of any particular GHG molecule is dependent on multiple variables and cannot be pinpointed, it is understood that more CO_2 is currently emitted into the atmosphere than is sequestered by ocean uptake, vegetation, and other forms of sequestration. Of the total annual human-caused CO_2 emissions, approximately 54 percent is sequestered through ocean uptake, uptake by northern hemisphere forest regrowth, and other terrestrial sinks within a year, whereas the remaining 46 percent of human-caused CO_2 emissions remains stored in the atmosphere (Seinfeld and Pandis 1998).

Similarly, impacts of GHGs are borne globally, as opposed to localized air quality effects of CAPs and TACs. The quantity of GHGs that it takes to ultimately result in climate change is not precisely known; suffice it to say that the quantity is enormous, and no single project would be expected to measurably contribute to a noticeable incremental change in the global average temperature, or to global, local, or micro climate.

Emissions of GHGs contributing to global climate change are attributable in large part to human activities associated with the industrial/manufacturing, utility, transportation, residential, and agricultural sectors (ARB 2008a). In California, the transportation sector is the largest emitter of GHGs, followed by electricity generation (ARB 2008a). Emissions of CO_2 are by-products of fossil fuel combustion. CH_4, a highly potent GHG, results from off-gassing (the release of chemicals from nonmetallic substances under ambient or greater pressure conditions) largely associated with agricultural practices and landfills. CO_2 sinks, or reservoirs, include vegetation and the ocean, which absorb CO_2 through photosynthesis and dissolution, respectively, 2 of the most common processes of CO_2 sequestration.

California is the 12th to 16th largest emitter of CO_2 in the world (CEC 2006a). California produced 480 million gross metric tons of CO_2 equivalent (CO_2e) in 2004 (ARB 2008a). CO_2e is a measurement used to account for the fact that different GHGs have different potential to retain infrared radiation in the atmosphere and contribute to the greenhouse effect. This potential, known as the global warming potential (GWP) of a GHG, is dependent in large part on the lifetime, or persistence, of the gas molecule in the atmosphere. For example, as described in Appendix C, "Calculation References," of the *General Reporting Protocol of the California Climate Action Registry* (CCAR) (CCAR 2008), 1 ton of CH_4 has the same contribution to the greenhouse effect as approximately 23 tons of CO_2. Therefore, CH_4 is a much more potent GHG than CO_2. Expressing emissions in CO_2e takes into account the GWP and emissions of each GHG and converts them to a single unit equivalent to the effect that would occur if only CO_2 were being emitted.

Combustion of fossil fuel in the transportation sector was the single largest source of California's GHG emissions during 2002-2004, accounting for 38 percent of total GHG emissions in the State (ARB 2008a). This sector was followed by the electric power sector (including both in-State and out-of-State sources) (23 percent) and the industrial sector (20 percent) (ARB 2008a). Figure 8-1 shows the percent GHG contribution of the major economic sectors in California. The Bay Area Air Quality Management District (BAAQMD) has also created a GHG inventory for the base year 2002 (BAAQMD 2006).

Within the BAAQMD, the transportation sector accounts for 51 percent of the total GHG emissions, while the industrial/commercial sector accounts for approximately 26 percent of the total GHG emissions. GHG emissions associated with electricity generation contribute approximately 7 percent of the total GHG emissions.

8.4.3 Greenhouse Gas Regulatory Setting

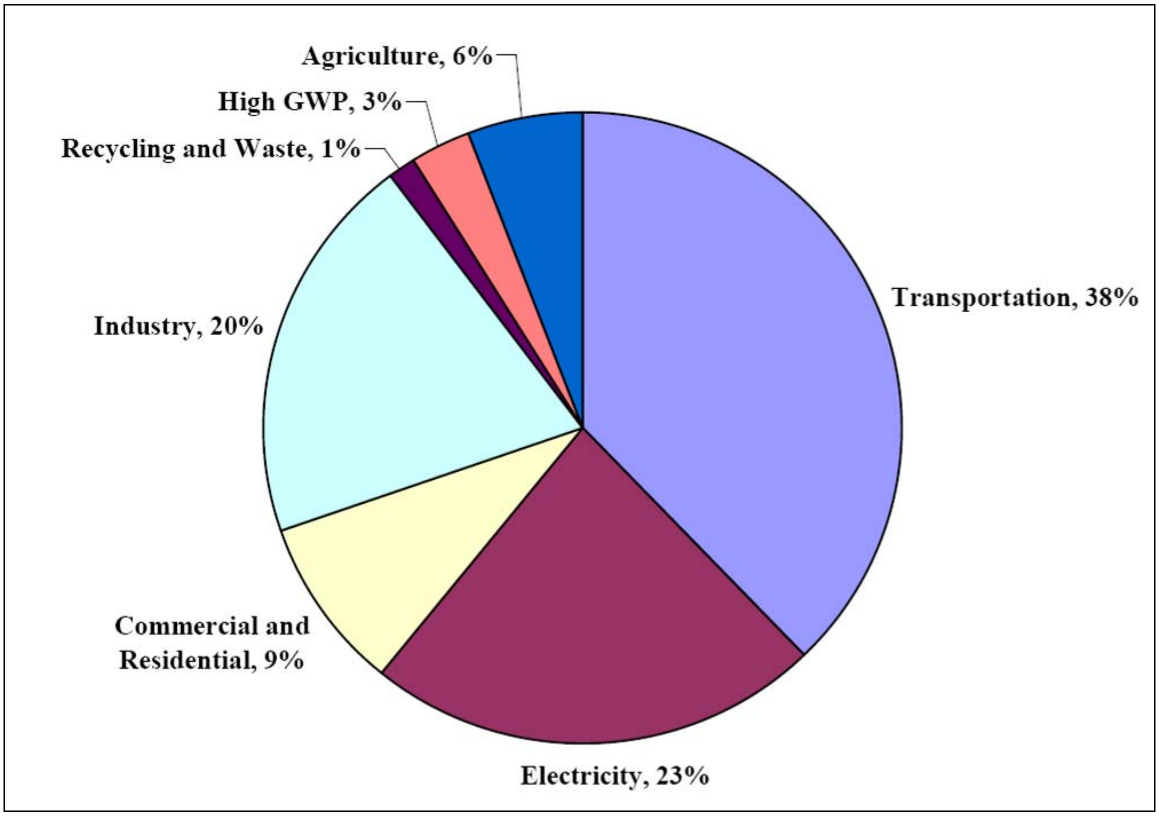
Federal Greenhouse Gas Programs

The U.S. Supreme Court ruled on April 2, 2007 that CO_2 is an air pollutant as defined under the Clean Air Act (CAA) and that US Environmental Protection Agency (USEPA) has the authority to regulate emissions of GHGs. However, at the time of writing this PEIR, no Federal regulations or policies regarding GHG emissions are applicable to the proposed project.

State Greenhouse Gas Programs

Various statewide and local initiatives to reduce the State's contribution to GHG emissions have raised awareness that, even though the various contributors to and consequences of global climate change are not yet fully understood, global climate change is occurring, and there is a real potential for severe adverse environmental, social, and economic effects in the long term. Because every nation emits GHGs and therefore makes an incremental cumulative contribution to global climate change,

Figure 8-1 California's Greenhouse Gas Emissions by Economic Sector (2002–2004 Average)



Source: ARB 2008b

cooperation on a global scale will be required to reduce the rate of GHG emissions to a level that can help to slow or stop the human-caused increase in average global temperatures and associated changes in climatic and environmental conditions.

Currently, there are no State regulatory standards on how to address and evaluate global climate change in the environmental review process. The State Office of Planning and Research issued an interim technical guidance on the role of CEQA in addressing climate change and greenhouse gas emissions on June 19, 2008. The advisory provides a recommended approach on the analysis of greenhouse gas emissions (GHG) emissions absent a statewide threshold of significance for GHG emissions. OPR has asked ARB to identify a recommended method for setting thresholds of significance for GHG emissions, to encourage consistency and uniformity in the CEQA analysis for GHG emissions. OPR also recently released preliminary draft CEQA Guidelines amendments for comment. Please refer to Section 4.2.F.3 for a discussion of State regulations that control air quality.

Assembly Bill 1493

In 2002, then-Governor Gray Davis signed Assembly Bill (AB) 1493 (Statutes 2002, Chapter 200) (amending Health & Safety Code, Section 42823 and adding Health & Safety Code, Section 43018.5). AB 1493 (also known as the Pavley Bill) requires that the California Air Resources Board (ARB) develop and adopt, by January 1, 2005, regulations that achieve "the maximum feasible reduction of greenhouse gases emitted by passenger vehicles and light-duty trucks and other vehicles determined by ARB to be vehicles whose primary use is noncommercial personal transportation in the State."

To meet the requirements of AB 1493, ARB approved amendments to the California Code of Regulations (CCR) in 2004 by adding GHG emissions standards to California's existing standards for motor vehicle emissions. Amendments to CCR Title 13, Sections 1900 and 1961 (13 CCR Section 1900, 1961), and adoption of Section 1961.1 (13 CCR Section 1961.1) require automobile manufacturers to meet fleet-average GHG emissions limits for all passenger cars, light-duty trucks within various weight criteria, and medium-duty passenger vehicle weight classes (i.e., any medium-duty vehicle with a gross vehicle weight rating less than 10,000 pounds that is designed primarily for the transportation of persons), beginning with the 2009 model year. Emissions limits are reduced further in each model year through 2016.

In December 2004, a group of car dealerships, automobile manufacturers, and trade groups representing automobile manufacturers filed suit against ARB to prevent enforcement of 13 CCR Sections 1900 and 1961 as amended by AB 1493 and 13 CCR 1961.1 (*Central Valley Chrysler-Jeep et al. v. Catherine E. Witherspoon, in Her Official Capacity as Executive Director of the California Air Resources Board, et al.*). The suit in the U.S. District Court for the Eastern District of California contended that California's implementation of regulations that, in effect, regulate vehicle fuel economy violates various Federal laws, regulations, and policies.

In January 2007, the judge hearing the case accepted a request from the State Attorney General's office that the trial be postponed until a decision is reached by the U.S. Supreme Court on a separate case addressing GHGs. In the Supreme Court case, *Massachusetts, et al., v. Environmental Protection Agency, et al.*, the primary issue in question was whether the CAA provides authority for USEPA to regulate CO_2 emissions. USEPA contended that the CAA does not authorize regulation of CO_2 emissions, whereas Massachusetts and 10 other states, including California, sued USEPA to begin regulating CO_2. As mentioned above, the U.S. Supreme Court ruled on April 2, 2007, that GHGs are "air pollutants" as defined under the CAA and USEPA is granted authority to regulate CO_2 (*Massachusetts v. U.S. Environmental Protection Agency* [2007] 549 U.S. 05-1120).

On December 12, 2007, the court found that if California receives appropriate authorization from USEPA (the last remaining factor in enforcing the standard), these regulations would be consistent with and have the force of Federal law, thus, rejecting the automakers' claim. This authorization to implement more stringent standards in California was requested in the form of a CAA Section 209, subsection (b) waiver in 2005. Since that time, USEPA failed to act on granting California authorization to implement the standards. Governor Schwarzenegger and Attorney General Edmund G. Brown filed suit against USEPA for the delay. USEPA denied California's request for the waiver to implement AB 1493 in late December 2007. The State of California has filed suit against USEPA for its decision to deny the CAA waiver, but the waiver is again being reconsidered by the new administration.

Executive Order S-3-05

Executive Order S-3-05, which was signed by Governor Schwarzenegger in 2005, proclaims that California is vulnerable to the impacts of climate change. It declares that increased temperatures could reduce the snowpack on the Sierra Nevada mountain range, further exacerbate California's air quality problems, and potentially cause a rise in sea levels. To address those concerns, the executive order established total GHG emission targets. Specifically, emissions must be reduced to the 2000 level by 2010, the 1990 level by 2020, and to 80 percent below the 1990 level by 2050.

The executive order directed the Secretary of the California Environmental Protection Agency (Cal/EPA) to coordinate a multiagency effort to reduce GHG emissions to the target levels. The secretary will also submit biannual reports to the governor and California Legislature describing the progress made toward reaching the emission targets, impacts of global warming on California's resources, and mitigation and adaptation plans to combat these impacts. To comply with the executive order, the Secretary of the Cal/EPA created the California Climate Action Team (CCAT) made up of members from various State agencies and commissions. CCAT released its first report in March 2006. The report proposed to achieve the targets by building on the voluntary actions of California businesses, local government, and communities and through State incentive and regulatory programs.

Assembly Bill 32, California Global Warming Solutions Act of 2006

In September 2006, Governor Arnold Schwarzenegger signed AB 32, the California Global Warming Solutions Act of 2006 (See Statutes 2006, Chapter 488, enacting Health & Safety Code, Section 38500–38599.) AB 32 establishes regulatory, reporting, and market mechanisms to achieve quantifiable reductions in GHG emissions and establishes a cap on statewide GHG emissions. AB 32 requires that statewide GHG emissions be reduced to 1990 levels by 2020. This reduction will be accomplished through an enforceable statewide cap on GHG emissions that will be phased in starting in 2012. To effectively implement the cap, AB 32 directs ARB to develop and implement regulations to reduce statewide GHG emissions from stationary sources. AB 32 specifies that regulations adopted in response to AB 1493 should be used to address GHG emissions from vehicles. However, AB 32 also includes language stating that if the

AB 1493 regulations cannot be implemented, then ARB should develop new regulations to control vehicle GHG emissions under the authorization of AB 32.

AB 32 requires that ARB adopt a quantified cap on GHG emissions representing 1990 emissions levels and disclose how it arrives at the cap; institute a schedule to meet the emissions cap; and develop tracking, reporting, and enforcement mechanisms to ensure that the State achieves the reductions in GHG emissions necessary to meet the cap. AB 32 also includes guidance to institute emissions reductions in an economically efficient manner and conditions to ensure that businesses and consumers are not unfairly affected by the reductions.

Senate Bill 1368

SB 1368 is the companion bill of AB 32 and was signed by Governor Schwarzenegger in September 2006. SB 1368 requires the California Public Utilities Commission (CPUC) to establish a GHG emission performance standard for base-load generation from investor-owned utilities by February 1, 2007. The California Energy Commission (CEC) must establish a similar standard for local publicly owned utilities by June 30, 2007. These standards cannot exceed the GHG emission rate from a base-load combined-cycle plant fired by natural gas. The legislation further requires that all electricity provided to California, including imported electricity, be generated from plants that meet the standards set by CPUC and CEC.

Executive Order S-1-07

Executive Order S-1-07, which was signed by Governor Schwarzenegger in 2007, proclaims that the transportation sector is the main source of GHG emissions in California, at over 40 percent of statewide emissions. It establishes a goal that carbon intensity of transportation fuels sold in California should be reduced by a minimum of 10 percent by 2020. This order also directed ARB to determine if this Low Carbon Fuel Standard (LCFS) could be adopted as a discrete early action measure after meeting the mandates in AB 32.

Senate Bill 97

SB 97, signed August 2007, acknowledges that climate change is a prominent environmental issue that requires analysis under the CEQA (Statutes 2007, Chapter 185, enacting Public Resources Code, Section 21083.05 and 21097.) This bill directs the Governor's Office of Planning and Research (OPR) to prepare, develop, and transmit to the California Resources Agency guidelines for the feasible mitigation of GHG emissions or the effects of GHG emissions, as required by CEQA, by July 1, 2009. The Resources Agency is required to certify and adopt those guidelines by January 1, 2010. This bill also removes, both retroactively and prospectively, the legitimacy of litigation for inadequate CEQA analysis of effects of GHG emissions associated with environmental review for projects funded by the Highway Safety, Traffic Reduction, Air Quality and Port

Security Bond Act of 2006, or the Disaster Preparedness and Flood Protection Bond Act of 2006 (Proposition 1B or 1E). This provision will be repealed by operation of law on January 1, 2010, at which time such projects, if any remain unapproved, will no longer be protected against litigation claims from failure to adequately address climate change issues. In the future, this bill will only protect a handful of public agencies from CEQA challenges on certain types of projects for a few years time.

Senate Bill 1078

SB 1078 addresses electricity supply and requires that retail sellers of electricity, including investor-owned utilities and community choice aggregators, provide a minimum 20 percent of their supply from renewable sources by 2017. SB 107 changed the target date to 2010.

Senate Bill 375

SB 375, signed in September 2008, aligns regional transportation planning efforts, regional GHG reduction targets, and land use and housing allocation. SB 375 requires Metropolitan Planning Organizations (MPOs) to adopt a Sustainable Communities Strategy (SCS) or Alternative Planning Strategy (APS), which will prescribe land use allocation in that MPO's Regional Transportation Plan (RTP). ARB, in consultation with MPOs, will provide each affected region with reduction targets for GHGs emitted by passenger cars and light trucks in the region for the years 2020 and 2035. These reduction targets will be updated every 8 years, but can be updated every 4 years if advancements in emissions technologies affect the reduction strategies to achieve the targets. ARB is also charged with reviewing each MPO's SCS or APS for consistency with its assigned targets. If MPOs do not meet the GHG reduction targets, transportation projects would not be eligible for funding programmed after January 1, 2012.

This bill also extends the minimum time period for the Regional Housing Needs Allocation (RNHA) cycle from 5 years to 8 years for local governments located within an MPO that meets certain requirements. City or County land use policies (including general plans) are not required to be consistent with the RTP (and associated SCS or APS). However, new provisions of CEQA would incentivize qualified projects that are consistent with an approved SCS or APS, categorized as "transit priority projects."

Climate Change Proposed Scoping Plan

In September of 2008 ARB published its *Climate Change Proposed Scoping Plan* (*Scoping Plan*), which is the proposed plan to achieve the requirements of AB 32 in terms of GHG reductions (ARB 2008b). The *Proposed Scoping Plan* contains the main strategies California will implement to achieve reduction of 169 million metric tons of CO_2e (MMT CO_2e), or approximately 30 percent, from the State's projected 2020 emission level of 596 MMT CO_2e under a business-as-usual scenario (this is a reduction of 42 MMT CO_2e, or almost 10 percent, from 2002-2004 average emissions). The

Proposed Scoping Plan also includes a breakdown of the amount of GHG reductions the ARB recommends for each emissions sector of the State's GHG inventory. The largest GHG reductions are recommended from improved vehicle emission standards (estimated reductions of 31.7 MMT CO_2e), a low-carbon fuel standard (15 MMT CO_2e), energy efficiency measures in buildings and appliances (26.3 MMT CO_2e), and a renewable portfolio standard for electricity production (21.3 MMT CO_2e). ARB also recommends that reductions be achieved through local government actions and regional GHG targets; however, the exact amount is still to be determined. The *Proposed Scoping Plan* acknowledges that land use change shall play an important role that affects various emission sectors including transportation, energy, water and wastewater, solid waste and recycling. The ultimate assignments to local governments to achieve GHG reductions will become known as ARB finalizes its scoping plan. Also noteworthy is the fact that the *Proposed Scoping Plan* does not include any direct discussion about GHG emissions generated by construction activity.

8.4.4 Effects of Climate Change on California

Climate change could affect environmental conditions in California through a variety of mechanisms. One is sea level rise. Sea levels rose worldwide approximately 7 inches during the last century (CEC 2006b), and it is predicted to rise an additional 7-22 inches by 2100, depending on the future levels of GHG emissions (IPCC 2007). However, the Governor-appointed Delta Vision Blue Ribbon Task Force has recommended the State plan for a scenario of 16 inches of sea level rise by 2050, and 55 inches by 2100 (California Resources Agency 2008). Resultant effects of sea level rise could include increased coastal flooding, saltwater intrusion (especially a concern in the low-lying Delta, where pumps delivering potable water could be threatened), and disruption of wetlands (CEC 2006b). Some low-lying populated areas throughout the Central Valley and Delta inundated by sea level rise could experience population displacement and economic disruption.

As the existing climate throughout California changes over time, the ranges of various plant and wildlife species could shift or be reduced, depending on the favored temperature and moisture regimes of each species. In the worst cases, some species would become extinct or be extirpated from the State if suitable conditions are no longer available. Additional concerns associated with climate change are a reduction in the snowpack, leading to less overall water storage in the mountains, the largest "reservoir" in the State, and increased risk of wildfire caused by changes in rainfall patterns and plant communities.

8.4.5 Adaptation to Climate Change

There is a strong scientific consensus that global warming/global climate change is occurring. However, there is less certainty as to the timing, severity, and potential consequences of the phenomena. Scientists have identified several ways in which global climate change could alter the physical environment in California (Kiparsky and Gleick 2005, Roos 2005, DWR 2006). Climate change effects on water supply and their consequences could include the following (NRDC 2007; DWR 2006):

- Rising temperatures could mean earlier snowmelts and outflows (and reduction in the State's average annual snowpack);
- Greater extremes in precipitation will challenge flood control and water storage;
- Reduced snowpack and earlier snowmelt disrupt streamflows;
- Increased evapotranspiration reduces total streamflows;
- A warmer climate increases the risks of fire;
- Sea level rise threatens water supply, water quality, and wetlands; and
- Changes in urban and agricultural water demand.

This section provides more details on the projections for some of the factors identified above.

Temperature and Precipitation Variations

Climate models consistently indicate a warmer future in the western U.S. (NRDC 2007). During the second half of the 20th century, winter temperatures in the Sierra Nevada have increased by 2 degrees Celsius (2°C). Under warmer conditions, snow shifts to rain in mid-range elevations.

As described in the Climate Change Analysis Technical Memorandum (2008), the effects of climate change impacts have already been directly observed on the Mokelumne River watershed. Regional air temperatures are expected to continue to increase in the future, which would likely result in an increase in water temperatures along the Mokelumne River and downstream in Pardee and Camanche Reservoirs. By the end of the century, most scientists agree there will be a 3°C to 5°C increase in temperature in the western United States. Projections for precipitation vary from 10 percent wetter to 20 percent drier.

Snowpack and Streamflow

California's annual snowpack, on average, has the greatest accumulations from November though the end of March. It typically melts from April though July. Snowmelt provides significant quantities of water to streams and reservoirs for several months after the annual storm season has ended. The length and timing of each year's period of snowpack accumulation and melting varies based on temperature and precipitation conditions (DWR 2006). California's snowpack is important to the State's annual water supply because of its volume and the time of year that it typically melts. Average runoff from melting snowpack is usually about 20 percent of the State's total annual natural runoff and roughly 35 percent of the State's total usable annual surface water supply.

Recent studies indicate that changes have already occurred in snowmelt and spring runoff throughout the western region of North America (NRDC 2007). Runoff indexes for both the Sacramento and San Joaquin rivers in California show a marked decline in flows during the critical April to July period over the past century. DWR (2006) shows that a 3°C rise in average annual temperature would likely cause snowlines to rise approximately 1,500 feet. This would result in an annual loss of approximately 5 MAF of water storage in snowpack. Simulations conducted by N. Knowles and D. R. Cayan (Knowles and Cayan 2002) project a loss in April snowpack in the Sierra Nevada of approximately 5 percent with a 0.6°C increase in average annual temperature, an approximately 33 percent loss with a 1.6°C rise, and an approximately 50 percent loss in April snowpack with a 2.1°C average annual temperature rise. Loss of snowpack was projected to be greater in the northern Sierra Nevada and the Cascades than in the southern Sierra Nevada because of the greater proportion of land at the low and mid-elevations in the northern ranges. With a temperature increase of 2.1°C, the northern Sierra Nevada and the Cascades were projected to lose 66 percent of their April snowpack, while the southern Sierra Nevada was projected to lose 43 percent of its April snowpack (Knowles and Cayan 2002). The projected loss of snowpack in the northern Sierra Nevada would affect spring runoff and streamflows for the Mokelumne River, which originates in the Sierra Nevada.

Detailed estimates of changes in runoff as a result of climate change have been produced for California using regional hydrologic models. By using anticipated, hypothetical, and/or historical changes in temperature and precipitation and models that include realistic small-scale hydrology, modelers have consistently seen substantial changes in the timing and magnitude of runoff resulting from projected changes in climatic variables (Kiparsky and Gleick 2005). Model results indicate that a declining proportion of total precipitation falls as snow as temperatures rise, more winter runoff occurs, and remaining snow melts sooner and faster in spring (Knowles and Cayan 2002).

Streamflows may also decrease with an increase in evapotranspiration associated with an increase in temperatures. Such a reduction has been noted in the Colorado River Basin (NRDC 2007).

Sea Level Rise

The IPCC Fourth Assessment Report projects that sea levels will rise by 7 to 23 inches by the year 2100 (NRDC 2007).

Although these projections are on a global scale, the rate of relative sea level rise experienced at many locations along California’s coast is relatively consistent with the worldwide average rate of rise observed over the past century. Therefore, it is reasonable to expect that changes in worldwide average sea level through this century will also be experienced by California’s coast (DWR 2006).

For California's water supply, the largest effect of sea level rise would likely be in the Sacramento-San Joaquin Delta. Increased intrusion of salt water from the ocean to the Delta could degrade the quality of the fresh water that is pumped out of the Delta for municipal, industrial and agricultural purposes. This could lead to increased releases of water from upstream reservoirs or reduced pumping from the Delta to maintain compliance with Delta water quality standards. Salt water intrusion could also degrade groundwater aquifers (DWR 2006). DWR has prepared a preliminary assessment of potential sea level rise impacts on the Delta. There is no analysis tool currently available to determine changes in system operations required to lessen the effects of increased salt water intrusion due to sea rise (DWR 2006). However, DWR utilized existing tools to quantify potential salt intrusion into the Delta for a 1-foot sea level rise with present system operations. According to DWR, the results do not include any operational changes that may be implemented to try to reduce the effects of salt water intrusion from sea level rise, and therefore the results by themselves are not sufficient for making management decisions (DWR 2006).

8.5 Cumulative Impacts and Mitigation Measures

8.5.1 Overview

The WSMP 2040 Preferred Portfolio could be implemented concurrently with other cumulative projects, thus contributing to local and regional cumulative impacts. A distinction is made between local and regional impacts because the geographic context for cumulative effects differs among the issue areas. For example, the regional context for air quality is the air basins; whereas for visual quality, the local environment of each individual component is considered for cumulative effects.

Construction effects represent a large proportion of potential project impacts. These effects, common to all projects requiring earthmoving activities and erection of structures, are primarily related to direct and indirect effects on land uses and biological resources (e.g., damage to or removal of habitat), increases in traffic, dust, and noise, degradation of water quality, and alteration of visual character of the environment. Construction effects are temporary in nature, and would cease upon completion of the activity. Operational impacts are not necessarily common to all projects. Often, they are potential adverse environmental effects unique to each project or types of project and as such cannot be generalized as readily. For example, urban development projects may result in long-term increases in traffic whereas pipeline installation projects would result in short-term effects occurring only during the duration of construction. Large subdivisions may result in the permanent conversion of agricultural resources, whereas utility projects would have temporary disturbance to agricultural operations. Where individual projects would contribute impacts to the individual resource areas, the cumulative projects combined with the WSMP 2040 Preferred Portfolio could result in significant cumulative effects.

8.5.2 Issues Eliminated from Cumulative Analysis

Some environmental issues are eliminated from the cumulative analysis because they are either site-specific in nature or they would not contribute to cumulative effects. In general, issues with a site-specific component are not considered within a cumulative context. In addition, according to CEQA Guidelines Section 15130(a)(1), an EIR should not discuss impacts which do not result in part from the project evaluated in the EIR. These issues, as well as a brief explanation of the reasons why they would not contribute to cumulative effects, are summarized below.

- Land Use and Planning: Land use compatibility is related to the designated uses and zoning of the applicable jurisdiction. Projects are required to conform to designated uses of the local jurisdiction's general plan and zoning ordinance prior to approval. Development projects in particular must go through the local jurisdiction's review process to determine conformity with designated uses, and if required, applicants must apply for a land use zoning amendment for the proposed development parcel prior to project approval and construction. Some cumulative projects may not conform to designated land uses or zoning, but proposed uses are typically compatible with surrounding land uses. Because projects generally need to either conform to the appropriate land use designations, cumulative land use impacts associated with other cumulative projects would be less than significant.
- Public Services: Service ratios of public services (e.g., police and fire protection, schools) are addressed by individual municipalities. The construction and implementation of the WSMP 2040 Preferred Portfolio components would not have any effects on parks or school services. As such, no further discussion of this topic is required.

8.5.3 Methodology and Cumulative Analysis

To determine overall cumulative impacts from the WSMP 2040 Preferred Portfolio in conjunction with other cumulative projects described above, the following framework is used for each environmental resource topic:

- Presentation of the cumulative context for the environmental resource;
- Discussion of the cumulative impacts from cumulative projects;
- Summary of the WSMP 2040 Preferred Portfolio impacts, and discussion of the WSMP 2040 Preferred Portfolio's contribution to overall cumulative impacts (whether it is "cumulatively considerable"); and
- Conclusion of the overall impacts of both the WSMP 2040 Preferred Portfolio concurrent with other cumulative projects.

Hydrology

The WSMP 2040 Preferred Portfolio includes projects in areas outside the District's service area, including the Sacramento Valley, northeastern San Joaquin County and the Mokelumne River watershed. Water agencies in these areas are also planning for future water supplies and in some cases are considering the same or similar projects (such as the IRCUP / San Joaquin Groundwater Banking/Exchange and Enlarge Lower Bear Reservoir components).

Currently, some surface water bodies have excess water in wet years; this water typically flows unimpeded to the Delta and eventually to the Pacific Ocean. As more agencies look to store water in wet years for use in dry years, there will be increased competition for wet-year water resources which could, in turn, return available water resources in those years for both the ecosystem and for natural groundwater recharge. Additionally, as more water agencies implement conjunctive use, there will be increased competition for subsurface storage space, and potential water quality impacts would result from the long-term introduction of treated surface water into the groundwater basins. Similarly, in dry years as water agencies extract banked water, larger cones of depression would occur that would affect local wells and potentially lead to permanent subsidence of the land surface. As multiple water agencies implement conjunctive use projects, water conveyance facilities would be used more frequently, which could result in additional environmental impacts on the Delta ecosystem, as well as on water purveyors whose water supplies depend on Delta intakes. This is a potentially significant impact of the WSMP 2040 Preferred Portfolio, and its contribution to cumulative impacts would be considerable for the purposes of this analysis. Overall cumulative impacts of other cumulative projects and the Preferred Portfolio would also be potentially significant.

Cumulative impacts may result from the shared enlargement of surface storage reservoirs. For example, in multiple dry-year scenarios, all project partners may opt to withdraw their stored water resources at the same time, overdrafting the reservoirs and disrupting the flow and temperature regime for downstream fisheries. These impacts may be mitigated to less-than-significant levels through the coordinated implementation of the projects by their proponents.

Finally, as more recycled water projects are implemented statewide, the water quality of both surface water and groundwater bodies could be degraded as a result of increased salt and/or nutrient applications. The cumulative impacts from the application of many recycled water irrigation projects may create conditions beyond the ability of the soil to treat percolated water and/or the assimilative capacity of the water body to adjust to the percolated water quality. Similarly, as increased wastewater streams are diverted for recycled water production, the remaining stream may become concentrated, challenging the local wastewater treatment systems' ability to treat the waste stream to concentrations required by discharge permits. These potential cumulative impacts can be mitigated at the local and State level through evaluation of cumulative impacts at the time of permitting and limitations on production and/or application rates to minimize impacts to be less than significant.

Geology, Soils, and Seismicity

Potential impacts associated with geology, soils and seismicity tend to be site-specific in nature, associated with damage to structures at individual locations or harm to people resulting from seismic events, slope stability, or other soil hazards. For example, because the entire Bay Area is susceptible to earthquakes, there is a potential for primary and secondary seismic hazards (e.g., ground shaking, liquefaction, etc.) to affect structures and people in the region. Cumulative projects (including residential and commercial projects) could expose people to earthquake hazards if structures are not designed properly, thereby resulting in significant cumulative impacts. In California, all structures must comply with the design parameters of the Uniform Building Code and the California Building Code. Because impacts related to geology, soils, and seismicity are site-specific in nature, cumulative impacts would be less than significant.

As described in Section 5.2.B, certain WSMP 2040 Preferred Portfolio components would be subject to risks from earthquakes and unstable soils. Mitigation measures proposed in this PEIR would reduce potential impacts associated with these risks to less-than-significant levels through the performance of relevant geological and geotechnical studies and implementation of recommendations from these studies to address groundshaking, secondary seismic effects, slope stability and unstable soils. As such, the WSMP 2040 Preferred Portfolio's contribution to cumulative effects would be less than considerable and cumulative impacts would be less than cumulatively significant.

Biological Resources

Implementation of the cumulative projects would involve construction and ground-disturbing activities (e.g., new buildings and water storage, treatment and distribution facilities). Depending on the locations of these facilities, sensitive biological habitat and associated special-status plants and wildlife could be temporarily affected or permanently removed, which would cause significant cumulative impacts.

There is insufficient data to characterize the potential effects on biological resources from other cumulative projects. For the purposes of this PEIR, cumulative impacts to biological resources would be considered potentially significant. Sensitive habitats and special-status species that could be adversely affected (directly or indirectly) by the WSMP 2040 Preferred Portfolio components are identified in Section 5.2.C, Biological Resources. The actual effects on these resources that would result from construction of the Preferred Portfolio components have not yet been quantified, because protocol-level surveys have not yet been conducted. However, implementation of mitigation measures identified in Section 5.2.C (e.g., preconstruction surveys, limitations on construction timing, and revegetation) would ensure that the Preferred Portfolio would reduce its incremental contribution to potential cumulative impacts to less-than-significant levels.

Land Use and Recreation

Development projects may result in the conversion of farmland (including Prime Farmland, Farmland of Statewide Importance, and Unique Farmland, and those that are under Williamson Act contracts), to non-agricultural uses. In addition, water transfers of other cumulative projects would result in deliveries of water away from its original destination, potentially leading to temporary or permanent loss of agricultural production. Conversion of State-designated farmlands, including those under Williamson Act intended to preserve this resource, on a collective basis would constitute a significant unavoidable impact due to the irreversible nature of the change. As such, cumulative projects are assumed to result in significant unavoidable cumulative impacts. The WSMP 2040 Preferred Portfolio would potentially contribute to reduction of State-designated farmlands associated with water transfers and groundwater / exchange projects. Its contribution to cumulative impacts would be considerable for the purposes of this analysis. Overall cumulative impacts of other cumulative projects and the WSMP 2040 Preferred Portfolio would also be potentially significant.

Cumulative projects, including other recreational projects, could temporarily disrupt recreation by closing or encroaching upon existing recreational facilities during construction activities. Recreation projects may also include expansion of existing facilities or creation of new features. Construction effects on recreational resources are temporary in nature and affected facilities are typically restored upon completion of the work. In addition, while use of one recreational resource might be disrupted during construction activities, other recreational facilities in the surrounding area would offer similar recreational experience. Cumulative impacts related to recreation are expected to be less than significant with implementation of project-specific mitigation measures that ensure restoration in disturbed recreation areas following construction.

As described in Section 5.2.D, Land Use and Recreation, the WSMP 2040 Preferred Portfolio components would in general have temporary effects on recreational facilities. Mitigation measures proposed in this PEIR would reduce the potential effects through relocation or restoration of existing recreational facilities. Therefore, the Preferred Portfolio's contribution to cumulative effects would be less than significant. In combination with other cumulative projects and in the context of the regional availability of recreation resources, potential cumulative impacts would be considered less than significant.

Transportation

The geographic context for cumulative traffic impacts includes the traffic network affected by the WSMP 2040 Preferred Portfolio components, including the streets that provide access to the construction sites, associated staging areas, and disposal areas (e.g., landfills). Many of the roadways have not yet been identified, due to the unknown locations of many of the components (e.g., groundwater banking/exchange) and because designated haul routes have not yet been determined. The major highways and some of the local roadways accessing the WSMP 2040 Preferred Portfolio components are identified in Section 4.2.E, Transportation. Cumulative projects (e.g., infrastructural projects, development projects, etc.) would generate traffic trips associated with construction and/or operation. Linear projects (e.g., pipeline repair and/or installation) may temporarily result in lane/road closures. Large residential, commercial, and industrial developments would increase the overall, long-term traffic volume in the region through the increase in people living/working in the area and their associated travel on local/regional roads. Because the number of construction- and operation-related truck trips is not known for the combination of cumulative projects and their locations are unknown, for the purposes of this analysis, it is assumed that implementation of cumulative projects would result in cumulatively significant traffic impacts because traffic issues typically extend beyond localized boundaries and become regional concerns.

The increase in construction- and operation-related truck traffic would also increase the wear and tear of local roadways; however, local jurisdictions typically include repaving of roadways as part of its regular road maintenance. As such, damage to roadways would be considered less than significant in the cumulative context. In addition, parking is expected to be less than significant as development projects would be built to accommodate anticipated parking needs.

As described in Section 5.2.E, Transportation, traffic levels associated with the WSMP 2040 Preferred Portfolio would increase during construction activities associated with the delivery of material/equipment and worker trips. This would be a short-term effect that would be limited to the construction phase only, and adverse effects on local peak traffic would be reduced with implementation of mitigation measures. Lane and road closures associated with construction of pipelines would also be temporary, and would be reduced with the implementation of mitigation (e.g., traffic control plan). In the long term, potential increases in traffic levels associated with the WSMP 2040 Preferred Portfolio components would be minimal and parking demand would be less than significant.
The Preferred Portfolio components would also increase the wear and tear of haul roads, necessitating the implementation of a mitigation to reduce potential impacts. The contribution of the Preferred Portfolio to cumulatively significant traffic impacts (increase in traffic on roadways, inadequate parking, and wear and tear of the roadway) would be less than considerable with the implementation of the mitigation measure for the short-term construction effects. Cumulative impacts associated with parking and damage to roadways would be mitigated to a level that is less than significant.

Air Quality

Cumulative impacts related to air quality are presented in Section 5.2.F, and cumulative impacts related to global climate change are presented in Section 8.6 below.

Noise

Other cumulative projects are distributed in various locations within the cities and counties where the WSMP 2040 Preferred Portfolio components would be located and may overlap in geographic location and schedule with the WSMP 2040 Preferred Portfolio components. Cumulative noise is an issue where there are nearby sensitive receptors that would be adversely affected by increases in noise levels, or where there are standards limiting such levels.

The precise locations and timing of other cumulative projects have not been determined at this time, but are expected to primarily occur at variable distances and timing relative to one another and the WSMP 2040 Preferred Portfolio components. Permanent, stationary noise sources are typically addressed by compliance with the standards established in noise ordinances of local jurisdictions.

For short-term construction activities, if exemptions are not provided for construction in noise ordinances, then such activities could result in significant impacts associated with increases in noise levels or vibration). Lead agencies typically identify mitigation measures (e.g., limiting construction activities to specific hours of the day, installation of noise reduction devices, use of alternate equipment, etc.) to reduce temporary noise effects to less-than-significant levels. Implementation of such mitigation measures may or may not reduce noise levels below relevant thresholds. As such, other cumulative projects are considered to result in significant temporary noise effects for the purposes of this analysis.

As described in Section 5.2.G, Noise, long-term operational noise from implementation of the proposed WSMP 2040 Preferred Portfolio components would be limited, either due to the remote locations of the component sites or because mitigation measures would require that proposed facilities be designed to meet the noise standards established by local jurisdictions. Noise impacts would primarily be associated with construction activities, including the use of equipment and trucks that generate noise. While implementation of mitigation measures would reduce exposure of nearby sensitive receptors to construction noise and groundbourne vibration, construction noise and vibration levels attributable to certain proposed activities would exceed applicable standards. As such, potential noise impacts resulting from the Preferred Portfolio would be significant, and the contribution to cumulatively significant noise levels would be considerable. Cumulative impacts would therefore be significant.

The geographic context for cumulative truck traffic noise includes the traffic network affected by the Preferred Portfolio. Traffic-related noise impacts on sensitive receptors occur when existing average daily traffic volumes are low and a project adds several hundred heavy truck and worker vehicles onto a roadway. Cumulative projects, including development projects generate traffic during both construction and operation. Because the precise number of construction-related vehicles generated by these projects is not known, for the purpose of this analysis, cumulative impacts are considered significant. As described in Chapter 5, heavy-duty truck travel associated with the WSMP 2040 Preferred Portfolio would potentially exceed the applicable transportation noise source standard of 60 dB Day-Night Sound Level (DNL) at existing nearby sensitive receptors with the implementation of mitigation measures. Because the potential for a 3 dB increase in local road traffic noise levels due to the project may still exist, the project contribution would be considerable, and overall impacts would be cumulatively significant.

Cultural Resources

The geographic context for cumulative cultural resources impacts includes the individual component sites within the WSMP 2040 Preferred Portfolio Study Area and their immediate surroundings. Excavation activities associated with the cumulative projects could encounter known or unknown historic or prehistoric cultural resources, including Native American burials. Damage of these resources could contribute to a reduction of unique and important cultural resources. The sponsors of the cumulative projects are required to take appropriate measures to protect or preserve cultural resources affected by their projects. Surrounding projects would be required to abide by standard mitigation measures regarding the protection of culturally sensitive resources. Therefore, compliance with standard mitigation measures would ensure that potential cumulative impacts would be reduced to less-than-significant levels.

As described Section 5.2.H, Cultural Resources, impacts to known cultural resources would be less than significant. Impacts to as-yet unknown cultural resources would be less than significant with the implementation of mitigation measures proposed as part or the project. Thus, the contribution of cumulative impacts from the Preferred Portfolio would be less than considerable. Cumulative projects would be less than significant.

Visual Resources

The geographic context for cumulative visual resources impacts includes the viewsheds of the WSMP 2040 Preferred Portfolio components. Construction activities for the other cumulative projects would result in visible changes to the environment. Some of these changes would be small in scale (e.g., certain recreational features) while other changes would be larger in scale (e.g., new structures associated with construction or reservoirs or new developments). These changes would be visible from different vantage points and from various distances (short-, medium-, and long-range). However, because it is not known whether other cumulative projects would obstruct views, or where facilities that could obstruct views would be constructed, the potential effects on views cannot be evaluated. For the purposes of this PEIR, impacts on visual resources resulting from the cumulative projects would be considered potentially significant.

As described in Section 5.2.I, Visual Resources, visual changes resulting from the WSMP 2040 Preferred Portfolio would be noticeable in short-, medium- and long-range views, depending on the component locations and facilities, and surrounding vista points and visual resources. The majority of the Preferred Portfolio components would be limited in scale and would be considered less than significant upon implementation of mitigation measures that ensure integration of the facilities with surrounding uses. However, for some components that would result in a significant visual change (e.g., enlargement of surface reservoirs), no mitigation would be available to reduce potential effects. Because the Preferred Portfolio would result in potentially significant impacts, its contribution to cumulative impacts would be potentially significant, and therefore cumulative impacts would be significant.

Hazards

Other cumulative projects could require the transport, storage, and use of chemicals, during either the construction or operational phase. If improperly stored or handled, accidental chemical spills could result in safety hazards to people and the environment that would constitute a potentially significant cumulative impact. All project sponsors with the potential to store and use hazardous materials must comply with applicable Federal, State, and local laws and regulations, including preparation of relevant plans that address issues such as proper storage and emergency procedures in the event of a spill. The U.S. Department of Transportation regulates the transportation of hazardous materials and enforces guidelines to protect human and environmental health. Compliance with these regulations would ensure that the cumulative projects would not result in significant cumulative impacts. No further discussion of cumulative impacts associated with hazards and hazardous materials is required.

Public Services, Utilities, and Energy

Construction activities for the other cumulative projects have the potential to damage or interfere with existing utility lines. This effect would be considered cumulatively significant if damages and disruptions occur for the same utility companies from multiple projects. Typical mitigation measures implemented to reduce significant impacts include identifying underground utilities and structures in advance of excavation and coordinating work activities with appropriate service agencies. With implementation of mitigation measures, other cumulative projects would result in less-than-significant cumulative impacts.

As described in Section 5.2.K, Public Services, Utilities and Energy, the WSMP 2040 Preferred Portfolio would result in potentially significant impacts from construction activities. However, with mitigation measures identified to reduce such effects, its contribution to cumulative impacts would be less than considerable. Overall impacts from the WSMP 2040 Preferred Portfolio and other cumulative projects would be less than significant.

As described in Section 5.2.K, implementation of the Preferred Portfolio would result in potentially significant impacts associated with energy use. However, with mitigation measures identified to reduce these effects, the Preferred Portfolio's contribution to cumulative impacts would be less than considerable. Furthermore, the Enlarge Pardee Reservoir component would generate 19 GWh/year of hydroelectricity that would offset some of the energy use associated with the Preferred Portfolio. Therefore, cumulative impacts from the WSMP 2040 Preferred Portfolio and other cumulative projects would be less than significant.

Environmental Justice

The geographic context for equity and Environmental Justice issues includes the areas surrounding the individual Preferred Portfolio components, rather than the entire WMSP 2040 Preferred Portfolio Study Area. Cumulative projects, including other development projects, could alter or change the character of an Environmental Justice Study Area (EJSA). The minority or low-income populations in the surrounding areas may expand, changing the demographic and economic profile of these communities. Construction effects on communities, irrespective of race of income level, are temporary in nature and affected resources are typically restored upon completion of the work. Permanent land conversion projects, however, may influence the economic character of an area, particularly related to property values, community aesthetics, housing affordability, job creation, etc. These influences may be positive or negative, depending on the type of projects that are built and operated. Some industrial facilities generate air pollutant emissions that may disproportionately affect minority or low-income neighborhoods. For the purposes of this program-level analysis, and because the types of cumulative projects are not known for the 30-year duration, cumulative impacts would be potentially significant. As described in Section 5.2.L, Environmental Justice, long-term physical environmental impacts (e.g., noise, traffic, and hazards) resulting from the WSMP 2040 Preferred Portfolio are expected to be less than significant with implementation of project-specific mitigation measures. However, air pollutant emissions would be potentially significant. Consequently, cumulative impacts of the other cumulative projects and the Preferred Portfolio would be potentially significant.

8.6 The Effects of the WSMP 2040 Preferred Portfolio on Climate Change

8.6.1 Threshold of Significance

At the time of this analysis, no local or State air quality regulatory agency in California, including ARB and local air districts, has identified a significance threshold for GHG emissions generated by a proposed project, or a methodology for analyzing impacts related to GHG emissions or global climate change. With adoption of AB 32 and SB 97, however, the State of California has established GHG reduction targets and has determined that GHG emissions as they relate to global climate change are a source of adverse environmental impacts in California that should be addressed under CEQA (see descriptions of AB 32 and SB 97 provided above in "Greenhouse Gas Regulatory Setting"). Although AB 32 did not amend CEQA, the legislation does include language identifying the various environmental problems in California caused by global warming (Health & Safety Code, Section 38501[a]). SB 97, in contrast, did amend CEQA to require OPR to prepare State CEQA Guidelines revisions addressing the mitigation of GHGs or their consequences. As an interim step toward development of required guidelines, OPR recently released a technical advisory recommending, among other things, that CEQA documents consider the impacts of GHGs, quantify the emissions where feasible, and develop measures to mitigate impacts when significant (OPR 2008) and also released draft Guidelines for comment. It should be noted that GHGs are a global issue caused by development and burning of fossil fuels around the world and no single project would measurably affect climate change. For the purposes of this PEIR, the proper context for addressing climate change is the discussion of cumulative impacts, because while the emissions of one single project will not cause global climate change, GHG emissions from multiple projects throughout the world could result in a cumulative impact with respect to global climate change.

In addition to quantifying and disclosing the mass level of GHG emissions associated with the proposed project, as recommended by OPR (2008), this analysis examines whether the proposed WSMP 2040 Preferred Portfolio would be consistent with the pertinent GHG emission reduction goals mandated under AB 32. Particular focus will be on the strategies of the Preferred Portfolio in light of the GHG reduction goals in ARB's *Proposed Scoping Plan* that pertain to the use, conveyance, and treatment of water.
To meet the GHG emission reduction targets of AB 32, California would need to generate fewer GHG emissions in the future than current levels. However, for most projects no straightforward quantitative metric is available to determine if a single project would substantially increase or decrease overall GHG emission levels or conflict with the goals of AB 32.

AB 32 demonstrates California's commitment to reducing the rate of GHG emissions and the State's associated contribution to climate change, without the intent to limit population or economic growth within the State. Thus, to achieve the goals of AB 32, which are tied to GHG emission rates of a specific benchmark year (i.e., 1990), California would have to achieve a lower rate of emissions per unit of population (per person) than it has now. Further, to accommodate future population and economic growth, the State would have to achieve an even lower rate of emissions per unit than was achieved in 1990. (The goal to achieve 1990 quantities of GHG emissions by 2020 means that this reduction will need to be accomplished regardless of 30 years of population and economic growth beyond 1990 in place.) The proposed project aims to develop sufficient water supply for the growing EBMUD service population. Therefore, it is appropriate to consider how efficiently the project can supply water for the increasing population and growing economy while also helping the State achieve the goals of AB 32.

While the text of AB 32 focuses on major stationary and area sources of GHG emissions, the primary objective is to reduce California's contribution to climate change by reducing the total annual production of GHG emissions. The effect of GHG emissions on global climate change is not dependent on whether they were generated by stationary, mobile, or area sources, or whether they were generated in one region or another. Delivery, treatment, and use of water are responsible for 20 percent of electricity and one-third of non-power plant natural gas consumption in California (ARB 2008b). Through programs that would increase water use efficiency, re-use of urban runoff, system-wide efficiency, renewable energy production, and recycled water, the *Proposed Scoping Plan* projects a reduction of 4.8 MMT CO_2e in 2020 (ARB 2008b). Thus, consistency with the *Scoping Plan*'s methods and goals to reduce water-related GHG emissions is the best measure for determining whether the project would contribute to climate change. In the case of the proposed project, if the WSMP 2040 Preferred Portfolio would not be consistent with the goals and methods in AB 32's *Proposed Scoping Plan* to increase GHG efficiency and the use of clean energy for water consumption, conveyance, and treatment, then the impact of the project would be cumulatively considerable (significant).

8.6.2 WSMP 2040 Preferred Portfolio Impacts on Climate Change

Impact 8-1: Potential to generate short-term and temporary GHG emissions during construction of each component.

Implementation of the Rationing and Conservation components would not involve any activities that would generate GHG emissions.

The discussion below addresses the following Preferred Portfolio components:

- Recycled Water;
- Northern California Water Transfers;
- Bayside Groundwater Phase 2;
- Sacramento Basin Groundwater Banking / Exchange;
- Regional Desalination;
- Enlarge Pardee Reservoir;
- Enlarge Lower Bear Reservoir; and
- IRCUP / San Joaquin Groundwater Banking / Exchange.

As discussed in Air Quality Impact 5.2.F-2 in Section 5.2.F, construction of the Preferred Portfolio components would commence in 2010 and occur intermittently over a 30-year period. During this period, construction activities at any given time could range from construction of multiple components to no construction. Construction of the Preferred Portfolio components would generate GHG emissions as a result of heavy-duty construction equipment, material (i.e., soil and building materials) hauling trucks, and construction worker vehicle exhaust emissions. Construction GHG emissions would be short-term and temporary in nature. Following buildout of the Preferred Portfolio and each respective component, all construction activities would cease, which would discontinue the generation of construction-related GHG emissions. The following discussion qualitatively evaluates the sources of GHG emissions during construction activity and their impact with respect to global climate change.

GHG emissions generated by construction would predominantly be in the form of CO_2. While emissions of other GHGs, such as CH_4 and N_2O, are important, the emission levels of these other GHGs from off-road and on-road vehicles used during construction are relatively small compared with CO_2 emissions, even when factoring in the relatively larger GWP of CH_4 and N_2O.

The types of construction equipment used for each Preferred Portfolio component would vary depending on the required construction activities. For instance, components that would require earthmoving such as enlargement of the Pardee Reservoir might use excavators, scrapers, dozers, and backhoes. However, components that involve building or facility erection such as the Regional Desalination Plant may require forklifts, flatbed trucks, and cranes. A list of typical construction equipment that may be used for construction of the Preferred Portfolio is provided in Section 5.1.3, Construction Assumptions for Impact Analysis. The types of equipment used for the Preferred Portfolio may include, but is not limited to this list. Nevertheless, all construction equipment would generate GHG exhaust emissions as result of fuel combustion. Although using electrical equipment would not generate direct GHG exhaust emissions, indirect GHG emissions would be generated as a result of off-site electricity production. In addition to construction equipment, heavy-duty haul trucks would be used to import or export soil for grading activities, deliver construction materials, and transport off-road heavy duty construction equipment. Heavy-duty haul trucks would also produce GHG exhaust emissions as a result of fuel combustion. Lastly, GHG emissions would be generated by the passenger vehicles and light-duty trucks associated with daily construction worker commute trips to project sites.

At the time this PEIR was prepared, the exact types of equipment, amounts of soil hauling, materials needed, and numbers of construction workers had yet been determined for each WSMP 2040 Preferred Portfolio component. Therefore, the exact magnitude of GHG emissions associated with the construction of each component could not be determined at this point. Due to the duration and overall amount of construction required for completion of the Preferred Portfolio, and the lack of available mitigation measures to abate GHG emissions from heavy-duty construction equipment and material haul trucks, the Preferred Portfolio's construction emissions would be expected to make an incremental contribution to global climate change. However, construction-generated emissions would be temporary and would not continue on an ongoing basis throughout the operational life of the development. The potential for cumulative impacts associated with operation of Preferred Portfolio components is discussed in Impact 8-2 below.

The regulatory environment that continues to evolve under the mandate of AB 32 will determine the extent to which emissions reductions are needed from construction activity. ARB's *Proposed Scoping Plan* does not directly discuss GHG emissions generated by construction activity; however, it does recommend measures for improving the fuel efficiency of medium-and heavy-duty on-road vehicles (1.4 MMT CO_2e) and expanded efficiency strategies for off-road vehicles (e.g., forklifts, bulldozers), which are commonly used during construction activities for either materials hauling or construction worker vehicles (ARB 2008b). In addition, the *Proposed Scoping Plan* states that measures contained in the Diesel Risk Reduction Plan and 2007 State Implementation Plan will result in an accelerated phase-in of cleaner technology for construction equipment. Executive Order S-1-07 Low Carbon Fuel Standard will reduce the carbon intensity associated with the life-time cycle of gasoline and diesel fuel used in construction operations, among others. The *Proposed Scoping Plan* also indirectly addresses embedded emissions of construction materials through energy efficiency audits by major industrial facilities, such as cement plants and concrete batch plants, which would evaluate individual combustion and other direct GHG emission sources within each facility in order to determine potential GHG reduction opportunities (ARB 2008b). The energy efficiency audits would evaluate GHG emission reduction measures for their cost-effectiveness, technical feasibility, and potential to reduce regional air pollutants. Thus, levels of GHG emissions associated with construction activities and materials are expected to decrease over time as new regulations are developed and implemented under the mandate of AB 32.

Lastly, Air Quality Mitigation Measures 5.2.F-2b and 5.2.F-2c would also reduce GHG emissions from construction activity by requiring the use of electric-powered equipment (where feasible), compliance with ARB's regulation for In-Use Off-Road Diesel Vehicles, use of Tier 1 or new equipment, and implementation of a Construction Traffic Emissions Management Plan. As discussed above, electric-powered equipment would also generate off-site GHG emissions; however, this would be less than that those associated with direct on-site fuel combustion. In addition, ARB's regulation for In-Use Off-Road Diesel Vehicles and the use of Tier 1 or new equipment would ensure the use of fuel-efficient construction equipment and avoid the generation of GHG emissions emitted by older, less efficient equipment. Furthermore, development and implementation of a Construction Traffic Emissions Management Plan would reduce the amount of time haul trucks, employee vehicles, and other construction-related vehicles idle unnecessarily during construction activities.

Because construction-generated emissions would be temporary in nature, and because both existing State-wide emission reduction plans and new regulations being developed under the mandate of AB 32 will increase the GHG efficiency of construction activity and because further efficiencies will result from implementation of Mitigation Measures 5.2.F-2b and 5.2.F-2c, the Preferred Portfolio's construction-related GHG emissions would not be cumulatively considerable, and therefore they would be ***less than significant***.

Impact Significance After Mitigation: Less than Significant

Impact 8-2: Potential to generate long-term GHG emissions due to operational activities associated with each component.

Implementation of the Rationing and Conservation components would not generate any operational GHG emissions. Rationing and Conservation programs are designed to reduce water consumption within the EBMUD service area, which would reduce electricity required to convey and treat water. The reduction of electrical usage for conveyance and treatment of water would reduce GHG emissions associated with electrical generation. The Preferred Portfolio includes a Rationing goal of 22 million gallons per day (MGD) and a Conservation level of 39 MGD. The GHG emissions associated with the Preferred Portfolio and each alternative are presented in Table 8-5.

The discussion below addresses the following Preferred Portfolio components that would include operational GHG emissions as part of their day-to-day activities:

- Recycled Water;
- Northern California Water Transfers;
- Bayside Groundwater Phase 2;
- Sacramento Basin Groundwater Banking / Exchange;
- Regional Desalination;
- Enlarge Pardee Reservoir;
- Enlarge Lower Bear Reservoir; and
- IRCUP / San Joaquin Groundwater Banking / Exchange.

At the time of this analysis, detailed information about the location and day-to-day operations of each component was not yet available. As discussed in Section 5.2.F, Air Quality, in most cases the approximate location of each component has been narrowed down to an air basin. However, as mentioned above, the impact of GHG emissions occurs on a global scale and is not determined by the location of the emissions as is the case for CAPs and TACs. This section qualitatively discusses the GHG emission sources associated with the Preferred Portfolio, presents the projected GHG emissions associated with the Preferred Portfolio, and determines the impact of the project with respect to global climate change.

Operation of the Preferred Portfolio components could generate GHG emissions as a result of worker trips. As is the case with most major infrastructure projects, it is anticipated that all components of the Preferred Portfolio would require some level of employee maintenance. Components such as the Regional Desalination are anticipated to have regular employees that operate and maintain the plants in optimal operating conditions. The Northern California Water Transfers, Sacramento Basin Groundwater Banking / Exchange and IRCUP / San Joaquin Groundwater Banking / Exchange components would include diesel pumps and back-up generators to pump water to the EBMUD service area. Some components including Recycled Water, Bayside Groundwater Project Phase 2, Sacramento Basin Groundwater Banking / Exchange, IRCUP / San Joaquin Groundwater Banking / Exchange, and Enlarge Pardee and Lower Bear Reservoirs would require periodic monitoring and maintenance. The levels of GHG emissions associated with proper operation and maintenance of each component would depend on the required frequency of employee services and distance traveled by employees to reach the component sites. In addition, components such as Enlarge Pardee and Lower Bear Reservoirs would expand reservoir capacity and replace existing recreational facilities with new ones. It is anticipated that the proposed new recreational facilities could draw higher levels of visitor trips. Further site-specific analysis would be required for each component to estimate the operational GHG emissions associated with employee trips and net change in visitor trips.

Some components would involve energy intensive equipment, such as pre-treatment plants, pumping stations, extraction wells, injection wells, and a desalination plant. These types of facilities and equipment are typically electric-powered, but would include a back-up diesel generator in case of an emergency or power-outage. The energy consumption associated with operation of each component would generate off-site GHG emissions associated with electrical production. In particular, the estimated energy consumption for the Regional Desalination component is 11,000 kWh/MG in dry years when the facilities would be operated at full capacity, as shown in Table 5.2.K-1 in Section 5.2.K, Public Services, Utilities and Energy. Operation of the Regional Desalination component is expected to consume a substantial amount of energy relative to the other facilities under current conditions.

Back-up diesel generators would generate GHG emissions due to periodic testing and maintenance, and potential use during emergency situations. The exact specifications and number of back-up generators for each component has not yet been determined at this point in development; however, the contribution of GHG emissions is not anticipated to be significant relative to the electricity consumption emissions. Furthermore, the Enlarge Pardee Reservoir would generate 19 GWh/year of electrical energy, which would offset some of the Preferred Portfolio energy consumption, which in turn would result in a reduction of GHG emissions. Nevertheless, further site-specific analysis would be required for each component to estimate the operational GHG emissions associated with electricity consumption and back-up diesel generators.

The determination of the Preferred Portfolio's impact on global climate change is based on its consistency with the proposed measures to reduce GHG emissions associated with water usage in ARB's *Proposed Scoping Plan*. The *Proposed Scoping Plan* identifies 3 "urban end use" and 2 energy-related GHG reduction measures. The "urban end use" reduction measures target water use efficiency, recycled water, and reuse of urban runoff. The energy-related reduction measures aim to increase renewable energy production and water system energy efficiency.

The Preferred Portfolio includes multiple components that would help reduce GHG emissions associated with "urban end use." As discussed in Chapter 3, Preferred Portfolio and Alternative Portfolios, the Rationing and Conservation components would educate customers in the EBMUD service area on methods to reduce water usage. The Conservation component will also provide information on the water reduction benefits of replacing fixtures and appliances. Thus, these components would help increase water use efficiency and reduce GHG emissions associated with conveyance, treatment, and use of water. The Rationing and Conservation components of the Preferred Portfolio are expected to reduce water usage by 22 and 39 MGD, respectively.

All components of the Preferred Portfolio would increase water system energy efficiency. Components of the Preferred Portfolio that involve water conveyance or treatment would be constructed using new pipelines, treatment equipment, and conveyance equipment. It is anticipated that use of newer equipment for water conveyance and treatment will increase the energy efficiency of these processes. New pretreatment plants and the desalination plant are anticipated to use the most state-of-the-art technology, which would tend to increase the efficiency of these energy intensive processes. In addition, the Conservation component would include supply-side programs that increase water use and distribution efficiency through detection and repair of distribution system leaks. Leaks within a distribution system would increase the amount of energy required to convey a given quantity of water due to loss of water and energy through pipeline leaks.

Enlargement of the Pardee and Lower Bear Reservoir components would be consistent with the goal of the *Proposed Scoping Plan* to increase renewable energy production. Both reservoir components would add capacity to the existing reservoirs, which would be used for hydroelectric generation. The Enlarge Pardee Reservoir component would also include a new 30-megawatt (MW) powerhouse facility downstream of the replacement dam. The new powerhouse facility would add additional renewable energy production to the replacement dam, which would generate 19 GWh/year of electrical energy. Although the facilities to be implemented as part of the Enlarge Lower Bear Reservoir component have not yet been determined, there is the potential for hydroelectric generation at this site as well. These components would help meet the goals of the *Draft Scoping Plan* to

increase renewable energy production for water usage and to achieve 33 percent statewide renewable energy mix. Furthermore, GHG emissions estimated from electricity consumption in Table 8-5 do not account for future reductions caused by regulatory actions for utility providers. The estimate of these emissions is not discounted to reflect the alternative energy mandate of SB 107, which requires electric utilities (e.g., Pacific Gas and Electricity [PG&E] and Sacramento Municipal Utilities District [SMUD]) to provide a minimum 20 percent of its electricity supply from renewable sources by 2010, a mandate that would be fully implemented by the first operational year of the new school. Therefore, the estimated rate of GHG emissions from electricity consumption and generation is expected to decrease between now and 2010.
In addition, SB 1368 requires more stringent emissions performance standards for new power plants, both in-State and out-of-State, that will supply electricity to California users. Thus, implementation of SB 1368 will further reduce GHG emissions associated with electricity consumption, which is the primary energy source for the Preferred Portfolio.

Implementation of the Preferred Portfolio would secure and provide an adequate water supply for the growing EBMUD service population while contributing to the emission reduction measures outlined in the *Proposed Scoping Plan*. Components of the Preferred Portfolio would contribute to the Water and Renewables Portfolio Standard GHG emission reduction measures of the *Proposed Scoping Plan*. Although certain components of the Preferred Portfolio would be energy intensive and all components (except Rationing and Conservation) would cause an incremental increase in GHG emissions, the GHG emissions associated with electrical production, which is the main source of energy for the project, would decrease over time with the implementation of SB 107 and SB 1368. In addition, the reservoir components of the Preferred Portfolio would contribute to the State's renewable energy supply for the life of the project. Lastly, the project would improve water use efficiency and water system efficiency through educational programs, installation of new conveyance and treatment systems, and recycled water projects. Implementation of the Preferred Portfolio would help achieve all project-related GHG emission reductions identified in the *Proposed Scoping Plan* to meet the emission reduction goals of AB 32. Therefore, Preferred Portfolio would be consistent with the goals of AB 32 to increase the GHG efficiency and use of clean energy for water consumption, conveyance, and treatment and the impact of the project on climate change would not be cumulatively considerable and therefore they would be ***less than significant***.

8.6.3 Key Distinctions for Greenhouse Gas Emissions between the Preferred Portfolio and Alternative Portfolios

Preferred Portfolio

The GHG emission sources associated with the Preferred Portfolio are described in Section 8.6.2, WSMP 2040 Preferred Portfolio Impacts on Climate Change. As discussed above, construction-related GHG emissions would be generated as a result of all Preferred Portfolio components, with the exception of the Rationing and Conservation components. Implementation of Air Quality Mitigation Measures 5.2.F-2b and 5.2.F-2c would reduce GHG emissions associated with construction activities; however, even with full implementation of electric-powered construction equipment, GHG emissions would still be generated off-site due to electrical generation. Implementation of the Preferred Portfolio would generate the most construction-related GHG emissions compared to the other Alternative Portfolios. Nevertheless, due to the short-term and temporary nature of construction-related emissions, implementation of State-wide regulations reducing construction-related emissions, and future construction-related GHG emission reductions achieved through the regulatory framework of AB 32, construction-related GHG emissions would have a less-than-significant impact on global climate change.

Following construction of the Preferred Portfolio, operational GHG emissions would be generated as result of new energy intensive facilities, such as pre-treatment plants, pumping stations, extraction wells, injection wells, and a desalination plant, as well as worker vehicle trips, reservoir visitor trips, recreational vehicle activity, and emergency generator testing. Unlike most of the Alternative Portfolios, the Preferred Portfolio includes the Regional Desalination component, which is expected to consume a substantial amount of energy relative to the other facilities. However, as discussed in Impact 8-2, many of the Preferred Portfolio components would be consistent with the water-related reduction measures described and quantified in the *Proposed Scoping Plan*. Therefore, the Preferred Portfolio would be expected to help California meet the GHG emission reduction goals of AB 32 associated with water usage.

Key Distinctions between the Preferred Portfolio and No Project Alternative

The No Project Alternative would not result in the generation of new GHG emissions associated with construction and operational activities. Under this alternative, there would be no increases in worker vehicle activity, recreation vehicle activity, or energy consumption for water-related facilities. Although the existing WSMP 2020 would meet water demands through its planning horizon, under the No Project Alternative, rationing and conservation would be the only solutions to future water shortages. Due to the uncertainty of water rationing and conservation effectiveness, these measures cannot be depended on to respond to the variability in future water supply. It is anticipated that hydrologic changes associated with global climate change (e.g., less now pack, earlier spring melt) may affect storage levels in EBMUD reservoirs, which may jeopardize EBMUD's ability to supply water to its users. In addition, the business as usual (BAU) approach to water treatment, conveyance, and use would not be consistent with the GHG emission reduction goals of ARB's *Proposed Scoping Plan* associated with water use. Therefore, the impact with respect to global climate change would be potentially significant.

Key Distinctions between the Preferred Portfolio and Alternative Portfolios

Portfolios that include fewer components than the Preferred Portfolio would typically generate less construction-related GHG emissions as a result of reduced construction activities. Implementation of Portfolio C (i.e., Buckhorn Canyon Reservoir) would generate construction-related GHG emissions similar to those for the Enlarge Pardee Reservoir and Enlarge Lower Bear Reservoir components. Construction-related GHG emissions would be reduced for all portfolios through implementation of Air Quality Mitigation Measure 5.2.F-2b, State-wide construction-related regulations, and the regulatory framework of AB 32. In addition, construction activities for each portfolio would be short-term and temporary and nature. An evaluation of the operational GHG emissions associated with each portfolio provides a more considerable and substantial distinction between portfolios.

Changing the levels of the Rationing or Conservation components would not generate operation-related GHG emissions. However, portfolios with higher levels of rationing and conservation would require less electricity for water conveyance and treatment, which reduces the generation of GHG emissions and increases water use efficiency (see Table 8-5). Typically, portfolios with fewer components would require less electricity for water conveyance and treatment along with less mobile source GHG emissions (e.g., worker trips, visitor trips). In addition, portfolios with lower levels of recycled water (Level 2; 5 MGD) would result in less GHG emission reductions compared to the Preferred Portfolio. For instance, portfolios that include water treatment facilities would tend to be more energy intensive to due to the high energy demands of water treatment facilities (e.g., desalination plant). Portfolios including groundwater banking and exchange components (i.e., Bayside Groundwater Project Phase 2, Sacramento Basin, and IRCUP / San Joaquin Groundwater Banking / Exchange) would cause a net increase in energy use as a result of new water conveyance and pumping (e.g., new extraction and injection wells, pumps, new pipelines). Portfolios that include the Regional Desalination component (the Preferred Portfolio and Alternative Portfolio B) would consume more energy than the other portfolios, as shown in Table 8-5. Portfolios that include the Enlarge Pardee Reservoir component would generate 19 GWh/year of electrical energy that would offset some energy consumption and associated GHG emissions.

Although most components would generate additional operational GHG emissions, many would help achieve the *Proposed Scoping Plan*'s GHG emission reduction goals for water use. Portfolios that include the enlarged reservoir components would contribute to *Proposed Scoping Plan* goal to increase renewable energy production. Portfolios that involve a higher level of recycled water would contribute more to the *Proposed Scoping Plan*'s goals of increased recycled water and reusing urban runoff.

Table 8-5: EBMUD Greenhouse Gas Emissions by Water Supply Portfolio (2010-2040)

EBMUD WSMP 2040 PORTFOLIO	MILLION METRIC TONNES CO_2E [A]			MILLION GALLONS PER DAY (MGD)		
	MAXIMUM EMISSIONS	MINIMUM EMISSIONS	MEDIAN EMISSIONS	RATIONING LEVEL	CONSERVATION LEVEL	RECYCLED WATER LEVEL
Preferred[b]	318	236	282	22	39	11
A	290	236	257	22	39	5
B	338	268	291	22	37	5
C	274	241	255	32	37	5
D	242	207	222	32	37	5
E	281	231	254	22	37	11

Notes:
Estimation of GHG emissions is based on projected electricity usage associated with each portfolio.
[a] Carbon dioxide equivalent (CO_2e) represents the mass of each GHG pollutant multiplied by its global warming potential (GWP) relative to carbon dioxide, which has a GWP of 1.
[b] Preferred Portfolio GHG emissions were estimated based on the example implementation scenario described in Section 3.2.7 and illustrated in Figure 3-14 in Chapter 3. The GHG emissions estimates for the Preferred Portfolio include the Recycled Water, Northern California Water Transfers, Bayside Groundwater Project Phase 2, Sacramento Basin Groundwater Banking / Exchange, and Regional Desalination components. In this example implementation scenario, the Upcountry components are not included.
Source: RMC 2008

8.7 The Effects of Climate Change on EBMUD's Water Supply

This section assesses whether there are reasonably foreseeable consequences of global climate change that would result in substantial adverse effects on the proposed Preferred Portfolio as opposed to evaluating whether the Preferred Portfolio components will contribute to global climate change. There are no formally accepted methodologies nor are there thresholds of significance for measuring effects on a project from global climate change. An agency must use its best efforts to research and disclose all that it reasonably can about the potential adverse environmental effects of the project as noted above. Speculation of unspecified and uncertain future effects that cannot reasonably be evaluated serves no purpose and may mislead the reader. "If after a thorough investigation, an agency finds that a particular impact is too speculative for evaluation, the agency should note its conclusion and terminate discussion of the impact" (State CEQA Guidelines Section 151145).

8.7.1 Climate Change Sensitivity Analysis

EBMUD conducted a sensitivity analysis to determine the effects of climate change on EBMUD's water supply. As described in the Climate Change Analysis Technical Memorandum (2008), EBMUD used historical hydrology data to determine the water system sensitivity to a range of possible climate scenarios. In general, the results of the climate change sensitivity analysis identified that the District is most vulnerable to the following:

- A more extreme shift in springtime runoff from the April-to-July period (as the District has seen historically) to winter months, further lowering spring runoff volumes; and
- Decreases in annual runoff volumes (especially where simulations predict reductions of 20 percent or more).

Impacts to storage are expected to be moderately susceptible to shifts in early springtime runoff and increased customer demands, and very susceptible to decreases in annual runoff volumes. Climate change impacts on rationing, as observed in the sensitivity model simulations, include the following:

- The frequency of rationing appears to be sensitive only to decreases in annual precipitation volume. In general, the frequency of rationing did not change with increased customer demand or shifts in springtime runoff, while there was a significant increase in rationing frequency due to decreases in Mokelumne River runoff;
- The magnitude of rationing appears to have a modest increase as customer demand increases, but has a marked, more severe increase when annual runoff volume decreases; and
- The magnitude of rationing decreases when runoff occurs earlier. This is due to the corresponding earlier re-filling of reservoirs.

The climate change modeling also indicates that the volume of flood releases increases with earlier spring runoff and decreases with reductions in annual runoff volume. Furthermore, climate change impacts on customer shortages indicate the following:

- Customer shortages do not appear to be significantly affected by shifts in Mokelumne River runoff;
- Customer shortages are somewhat sensitive to increased customer demands (resulting from temperature increases); and
- Customer shortages appear to be very sensitive to decreases in annual runoff.

Finally, the modeling results indicate that climate change impacts appear to be most severe if the years preceding the DPS have small snowmelt contribution relative to overall runoff, and that increases in water temperature can be expected with increases in air temperature; however, the severity of the impacts would depend on both the magnitude of air temperature increases and the hydrologic year type.

Overall, based on the modeling results, additional storage combined with source diversity (i.e., different watersheds for water supplies) and the low rationing goal stated in the Preferred Portfolio would give the District the maximum flexibility to adapt to unknown future conditions.

8.7.2 Other Indirect Climate Change Effects on Water Supply

Sea level rise would have adverse effects on EBMUD's water supply, both directly and indirectly. Sea level rise could increase the potential for levee failure in the Delta, thus increasing the exposure to risk for EBMUD's Mokelumne Aqueduct. Any damage to the aqueduct would result in disruption to EBMUD's delivery of water to its customers in the service area. In addition, sea level rise could affect water supply and water quality (e.g., by causing wetland erosion and salinity intrusion). The Delta is a water source for more than 23 million Californians. Any adverse effects on the Delta's water supply water quality (source of CVP and SWP water supply) would limit EBMUD's opportunity to obtain water from Delta sources, particularly during the dry-water years, when EBMUD needs additional supplies most. As such, climate change could both directly or indirectly reduce EBMUD's water supply, leading to an increase in rationing in the future.

8.7.3 Conclusions

Effects of Climate Change on EBMUD's Water Supply

There are no established or standard methods mandated by any government agencies to address the effects of climate change on water supplies. However, the Natural Resources Defense Council (NRDC) has identified 4 steps to address impacts on water resources related to climate change. These steps and associated actions are briefly summarized below:

- Vulnerability analysis: NRDC recommends agencies conduct an agency-level analysis to understand how specific system reacts to climate-related changes and the risk to that system. The analysis should examine a range of fundamental factors including watershed characteristics, allocation, storage versus runoff ratio, diversity of water supply, flood management, shared regional water resources, water quality impacts, resource allocation and environmental water requirements.
- Response strategies: NRDC recommends designing a robust, resilient and flexible water management approach to handle the effects of climate change on water resources, including following the 8 guiding principles for responding to water supply impacts[2], determining the best mix of water management tools, and conducting integrated regional water management planning.

[2] The 8 guiding principles include:

- Strengthen institutional capacity
- Build In Flexibility
- Increase Resilience
- Seek "No Regrets" and "Multiple Benefits" Strategies
- Address multiple Stresses
- Invest in Cross-Agency Relationships
- Incorporate Climate Change into Ongoing Project Design
- Expand Dialogue with the Scientific Community

- Prevention: This step includes action at various levels of government. At the local level, NRDC recommends individual water agencies in laying the groundwork for programs to reduce their greenhouse gas emissions.
- Public outreach: NRDC recommends educating the public about the connections between climate change and water management.

EBMUD has taken a proactive role in addressing climate change effects on its water resources. EBMUD has assembled a WSMP 2040 Preferred Portfolio that includes components relatively unaffected by climate change (maximum conservation and recycled water levels), and diversified its supplemental water options to include water from a variety of sources (enlarge reservoirs, water transfers, desalination, etc.) and with multiple partners. In addition, EBMUD has conducted a sensitivity analysis that models how EBMUD's water system would respond to various shifts in climatic factors. The results of this analysis will allow EBMUD to adjust its water strategy if conditions dramatically shift due to climate change.

The WSMP 2040 Preferred Portfolio is designed to provide maximum flexibility in both meeting anticipated demands during future dry-water years as well as responding to climate change. The sequencing of the components over the 30-year planning horizon allows for more refined adjustments to be made along the way as real-time data is collected about how global climate change is affecting water resources in the west.

Effects of Climate Change on the WSMP 2040 Preferred Portfolio

The characterization of climate change and the analysis of potential effects on EBMUD's water supply presented above show that climate change would not have any effects on the implementation (construction and operation) of the WSMP 2040 Preferred Portfolio or is too speculative for meaningful evaluation. As such, no further evaluation is required.

9 OTHER SECTIONS REQUIRED BY CEQA

9. Other Sections Required by CEQA

9.1 Irreversible or Irretrievable Commitment of Resources

Section 15126.2(c) of the California Environmental Quality Act (CEQA) Guidelines states: "Uses of nonrenewable resources during the initial and continued phases of the Project may be irreversible since a large commitment of such resources makes removal or irreversible nonuse thereafter unlikely. Primary impacts and, particularly, secondary impacts (such as highway improvement which provides access to a previously inaccessible area) generally commit future generations to similar uses. Also, irreversible damage can result from accidents associated with the Project. Irretrievable commitments of resources should be evaluated to assure that such current consumption is justified."

Implementation of the WSMP 2040 Preferred Portfolio would result in some irreversible or irretrievable commitment of resources, since many of its components would require the use of fuel and other nonrenewable materials. In the long term, some of the Preferred Portfolio components (e.g., desalination and other treatment plants and pumping facilities) would require the use of energy. The amount of energy consumed would depend on the operations for each component, and would vary (please refer to Chapter 5, Section 5.2.K, Public Services, Utilities and Energy, for a discussion of the anticipated energy requirements). One component of the WSMP 2040 Preferred Portfolio, Enlarge Pardee Reservoir, would generate hydroelectricity, thus contributing to the existing supply from a renewable source. The provision of this electricity would therefore offset some of the energy usage associated with the Preferred Portfolio. Operations and maintenance (O&M) activities would be necessary for all components, but would vary according to specifications of the technology implemented. O&M activities would involve labor as well as energy usage by construction equipment and vehicles, but this would be considered a relatively minor commitment of resources compared to operation of specific components (i.e., Recycled Water, Regional Desalination, Sacramento Basin Groundwater Banking / Exchange, IRCUP / San Joaquin Groundwater Banking / Exchange).

Reduction in water usage would result in a concomitant reduction in the energy requirement associated with conveyance and treatment of water, by EBMUD as well as individual customers. Conservation would require a limited commitment of resources associated with EBMUD staff and customers implementing specific conservation measures to reduce water use (e.g., labor time associated with installation of new appliances and meters, vehicle miles traveled to check customer meters, etc.).
The reduction in water use is expected to correlate with a minor reduction in the use of systems requiring energy, such as heating water.

Rationing would change customer behavior, and customer water use (e.g., number and length of showers, the use of washing machines and dishwashers, etc.) would likely be reduced. As such, enforcement of Rationing during drought years is not expected to result in any irreversible or irretrievable commitment of resources.

9.2 Potentially Significant Environmental Impacts Identified in this PEIR

Environmental documents prepared pursuant to CEQA are required to identify any significant effects on the environment that cannot be avoided if the project is implemented (CEQA Section 21100(b)(2)). Chapter 5 of this PEIR assesses the environmental impacts of the WSMP 2040 Preferred Portfolio, and concludes that the following impacts would be potentially significant and unavoidable:

- Impact 5.2.A-9: Potential impacts to Sacramento and Delta downstream water users;
- Impact 5.2.D-1: Potential reduction of agricultural productivity and conversion of farmland to non-agricultural uses;
- Impact 5.2.F-2: Potential to violate an air quality standard or contribute substantially to an existing or projected air quality violation;
- Impact 5.2.F-3: Potential for a cumulatively considerable net increase of criteria pollutants for which the region is in nonattainment under an applicable national or State ambient air quality standard;
- Impact 5.2.F-4: Potential exposure of sensitive receptors to substantial pollutant concentrations;
- Impact 5.2.G-1: Potential exposure of sensitive receptors to noise levels in excess of the applicable noise standards and/or result in a noticeable increase in ambient noise levels from short-term construction activities;
- Impact 5.2.G-2: Potential exposure of noise-sensitive receptors to noise levels in excess of the applicable noise standards and/or result in a noticeable increase in ambient noise levels from long-term operational activities;
- Impact 5.2.G-4: Potential exposure of sensitive receptors to excessive ground-borne noise and vibration levels (e.g., exceed FTA, Caltrans, and local guidelines);
- Impact 5.2.I-1: Potential to adversely affect the existing visual character and scenic vistas or resources; and
- Impact 5.2.L-1: Potential disproportionate impact to densely populated minority and low income communities.

In addition, the WSMP 2040 Preferred Portfolio would contribute to cumulatively significant impacts on hydrology, land use, air quality, noise, visual resources and environmental justice. These impacts are discussed in Chapter 8.

As noted in Section 5.1, it is possible that the project-level CEQA analyses that will be prepared for the Preferred Portfolio components will demonstrate that the potentially significant impacts identified in the PEIR would be less-than-significant, or could be mitigated to less-than-significant levels through siting and/or design modifications.

9.3 Effects Found Not to Be Significant

Section 15128 of the CEQA Guidelines requires an EIR to contain a statement briefly indicating the reasons that various potentially significant effects of a project were determined not to be significant and were therefore not discussed in detail in the EIR. This PEIR contains an analysis of the potentially impacts on environmental resources that would result from implementation of the WSMP 2040 Preferred Portfolio. The analysis in this document determines that with the implementation of the identified mitigation measures the WSMP 2040 Preferred Portfolio would have less-than-significant impacts on issues concerning hydrology, groundwater and water quality; geology, soils and seismicity; biological resources; land use; transportation; air quality; noise; cultural resources; visual resources; hazards; public services, utilities and energy; and environmental justice. These impacts are discussed in Chapters 5, 7 and 8.

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10 GLOSSARY AND ACRONYMS

10. Glossary and Acronyms

10.1 Acronyms

µPa	Micropascals
µg/m^3	micrograms per cubic meter
A	acceleration
AB	Assembly Bill
ABAG	Association of Bay Area Governments
AC	acre
ACAPCD	Amador County Air Pollution Control District
AC Transit	Alameda-Contra Costa Transit District
ACEHS	Alameda County Environmental Health Services
ACFCD	Alameda County Flood Control District
ACHP	Advisory Council on Historic Preservation
ACS	American Community Survey
ACWA	Amador County Water Agency
ACWD	Alameda County Water District
ADT	average daily trips
AF	acre-feet
AF/MO	acre-feet per month
AF/yr	acre-feet per year
AFA	acre-foot annually
AFY	Acre-feet per year
amsi	above mean sea level
APE	area of potential effect
ARB	California Air Resources Board
ARIMA	autoregressive integrated moving acreage
AS	Aqueduct Security
ASR	Aquifer storage and recovery
ASTM	American Society for Testing and Materials
AT&SF	Atchison, Topeka & Santa Fe Company
ATCM	airborne toxics control measure
AWS	Alameda whipsnake
BAAQMD	Bay Area Air Quality Management District
BACT	best available control technology
BART	Bay Area Rapid Transit
BCDC	San Francisco Bay Conservation and Development Commission
bgs	below ground surface
BLM	Bureau of Land Management
BMP	Best Management Practice
BRAC	Base Realignment and Closure
BSAI	BioSystems Analysis, Inc.
BSSC	Building Seismic Safety Council
Bureau	U.S. Bureau of Reclamation
CAA	Federal Clean Air Act
CAAA	Clean Air Act Amendments
CaARP	California Accidental Release Program
CAL FIRE	California Department of Forestry and Fire Protection (formerly CDF)
CAL OSHA	California Occupational Safety and Health Administration

CalTrans	California Department of Transportation
CALVEG	U.S. Forest Service State Vegetation Maps
CAP	Clean Air Plan
CAPs	criteria air pollutants
CAAQS	California ambient air quality standards
CBC	California Building Code
CCAA	California Clean Air Act
CCCSD	Central Contra Costa Sanitary District
CCCTA	Central Contra Costa Transit Authority
CCMP	Comprehensive Conservation and Management Plan
CCR	California Code of Regulations
CCT	Central California Traction Railroad
CCWD	Contra Costa Water District
CDC	California Department of Conservation
CDF	California Department of Forestry and Fire Protection, now CAL FIRE
CDFG	California Department of Fish and Game
CDMG	California Department of Mines and Geology
CDPR	California Department of Parks and Recreation
CEC	California Energy Commission
CEQA	California Environmental Quality Act
CESA	California Endangered Species Act
cfs	cubic feet per second
CHABA	Committee of Hearing, Bio Acoustics, and Bio Mechanics
CHP	California Highway Patrol
CIWMB	California Integrated Waste Management Board
CLC	Community Liaison Committee
CNDDB	California Natural Diversity Database
CNEL	Community Noise Equivalent Level
CNNDB	California Natural Diversity Data Base
CNPS	California Native Plant Society
CO	carbon monoxide
Corps	US Army Corps of Engineers
CP	Composite Program
CPA	California Power Authority
CPUC	California Public Utilities Commission
CPUD	Calaveras Public Utility District
CRCV	Coast Ranges-Central Valley'
CRHR	California Register of Historical Resources
CRWQCB	California Regional Water Quality Control Board
cu. yd.	cubic yard
CUWA	California Urban Water Agencies
CVP	Central Valley Project
CWA	Clean Water Act
dB	decibel
dB(A)	decibels, (A-weighted)
dB/DD	dB per doubling of distance
DBP	Disinfection by-product
DCC	Delta Cross Channel
Delta	Sacramento-San Joaquin River Delta
DEIS	Draft Environmental Impact Statement
DERWA	DSRSD - EBMUD Recycled Water Authority

DHS	California Department of Health Services
District	East Bay Municipal Utility District
DMC	Delta-Mendota Canal
DMP	Drought Management Program
DOT	Department of Transportation
DPH	California Department of Public Health
DPM	diesel particulate matter
DS	Delta Supply
DSCR	Debt Service Coverage Ratio
DSOD	Division of Safety of Dams
DSRSD	Dublin San Ramon Sanitary District
DTSC	California Department of Toxic Substances Control
DWR	Department of Water Resources (California)
DWRSIM	DWR's Central Valley Simulation Model
DWSAP	Drinking Water Source Assessment and Protection
EBMUD	East Bay Municipal Utility District
EBMUDSIM	East Bay Municipal Utility District Simulation Model
EBRPD	East Bay Regional Park District
EDF	Environmental Defense Fund
EFH	Essential Fish Habitat
EIA	Energy Information Administration
EIR	Environmental Impact Report
EIS	Environmental Impact Statement
EJSA	Environmental Justice Study Area
EO	Executive Order
EPA	Environmental Protection Agency
EPCRA	Emergency Planning & Community Right to Know Act
EPRI	Electric Power Research Institute
ERP	Emergency Response Plan
ESA	Earth Sciences Associates
ESU	Evolutionarily Significant Unit
FEMA	Federal Emergency Management Administration
FERC	Federal Energy Regulatory Commission
FESA	Federal Endangered Species Act
FL	fork length
FMP	Fire Management Plan
FP	CDFG Fully Protected
FRWA	Freeport Regional Water Authority
FRWP	Freeport Regional Water Project
FSC	Folsom South Canal
FSCC	Folsom South Canal Connection
ft	Feet
FTA	Federal Transit Administration
FY	fiscal year (July 1 through June 30)
G	gravity
GAC	granular activated carbon
GBA	Groundwater Banking Authority
GHG	greenhouse gas
GIS	Geographic Information Systems
GPCPD	gallons per capita per day
GPM	gallons per minute
GW	groundwater

GWh	gigawatt-hours
Gwh/yr	gigawatt hours per year
Ha	hectares
HAA	Haloacetic acid
HAP	hazardous air pollutants
HAER	Historic American Engineering Record
HCP	Habitat Conservation Plan
HEP	Habitat Evaluation Procedure
HMBP	Hazardous Material Business Plan
HMMP	Hazard Materials Management Plan
hp	horsepower
HSI	Habitat Suitability Indices
HSO	Habitat Suitability Overlay
HSPF	Hydrologic Simulation Program – FORTRAN
HU	Habitable units
HUD	Federal Department of Housing and Urban Development
HVAC	heating, ventilating, and air conditioning
Hz	Hertz
I	Interstate (freeway)
ID	Inside diameter
IDHAMP	Interagency Delta Health Aspects Monitoring Program
IFIM	Instream Flow Incremental Methodology
in/sec	Inches per second
IRCUP	Mokelumne Inter-Regional Conjunctive Use Project
JPA	Joint Powers Authority
JSA	Joint Settlement Agreement
JVID	Jackson Valley Irrigation District
KEC	Kaiser Engineers/Calpine
kV	kilovolt
kWh/MG	kilowatts hours of energy per million gallons of water
LAFCOs	Local Agency Formation Commissions
LARPD	Livermore Area Recreation and Park District
L_{dn}	Day-Night Noise Level
LEDPA	Least Environmentally Damaging Practicable Alternative
LEPC	Local Emergency Planning Committee
L_{eq}	Equivalent Noise Level
LF	low flush
L_{max}	Maximum Noise Level
L_{min}	Minimum Noise Level
LMRMP	Lower Mokelumne River Management Plan
L_n	Statistical Descriptor
LTS	Less than Significant
LTSM	Less than Significant with Mitigation
LUST	Leaking Underground Storage Tank
LVOPS	Los Vaqueros Operations Model
M	million
M&I	municipal and industrial
MBTA	Migratory Bird Treaty Act
MCAB	Mountain Counties Air Basin
MCE	Maximum Credible Earthquake
MCL	Maximum Contaminant Level

MF	Multi-family
MG	million gallons
Mg/l	milligrams per liter
MGD	million gallons per day
MLD	Most Likely Descendant
MM	millimeters
MMP	Mitigation and Monitoring Plan
MMWD	Marin Municipal Water District
MOA	Memorandum of Agreement
MOU	Memorandum of Understanding
mph	miles per hour
MPN	most probable number
MRFH	Mokelumne River Fish Hatchery
msl	mean sea level
MSY	Maximum Sustainable Yield
MTBE	Methyl Tert-Butyl Ether
MUD	Municipal Utility District
MW	Megawatt
MWD	Metropolitan Water District of Southern California
MWh	megawatt-hours
NAAQS	national ambient air quality standards
NAHC	Native American Heritage Commission
NDP	North Delta Plan
NEPA	National Environmental Policy Act
NEPDG	National Energy Policy Development Group
NESHAP	national emissions standards for hazardous air pollutants
NHPA	National Historic Preservation Act
NMFS	National Marine Fisheries Service
NOA	Notice of Availability
NOA	naturally occurring asbestos
NOAA	National Oceanic and Atmospheric Administration
NOP/NOI	Notice of Preparation/Notice of Intent
NO_x	nitrogen oxides
NPDES	National Pollutant Discharge Elimination System
NPPA	California Native Plant Protection Act
NRDC	National Resources Defense Council
NRHP	National Register of Historic Places
NSJWCD	Northern San Joaquin Water Conservation District
NTU	Nephelimetric turbidity units
NWP	Nationwide Permit
NWS	National Weather Service
O&M	Operations and Maintenance
OES	Office of Emergency Services
OHWM	Ordinary high water mark
OLSD	Oro Loma Sanitary District
OPR	Governor's Office of Planning and Research
OSHA	Occupational Safety and Health Administration
OSY	optimum sustainable yield
OWR	Office of Water Recycling
PCB	Polychlorinated Biphenyl Compounds
PEIR	Program EIR
PG&E	Pacific Gas and Electric Company

PGA	peak groundsurface acceleration
$PM_{2.5}$	fine particulate matter
PM_{10}	respirable particulate matter
PMF	probable maximum flood
PMP	probable maximum precipitation
PPB	parts per billion
PPM	parts per million
PPV	peak particle velocity
PRC	Public Resources Code
PROSIM	U.S. Bureau of Reclamation Projects Simulation Model
PS	Potentially Significant
PSI	pounds per square inch
PUC	Public Utilities Commission
RA1	Reclamation Alternative 1
RA2	Reclamation Alternative 2
RA6	Reclamation Alternative 6
RARE	Richmond Advanced Recycled Expansion
RCRA	Federal Resource Conservation and Recovery Act
RF	regulated flow (the actual flow after regulations and diversions)
RHA	Rivers and Harbors Act
RIS	Reservoir-induced seismicity
RMS	root mean square
RO	reverse osmosis
ROG	reactive organic gasses
ROW	Right-of-way
RP	Raise Pardee
RUF	Regulated undiminished flow
RWQCB	Regional Water Quality Control Board
SC	CDFG Species of Concern
SCC	system capacity charges
SCGA	Sacramento Central Groundwater Authority
SCHISM	State Water Project and Central Valley Project Hydrogeologic Integrated Simulation Model
SCIES	Stream Corridor Inventory Evaluation System
SCS	US Soil Conservation Service
SCVWD	Santa Clara Valley Water District
SCWA	Sacramento County Water Agency
SDWA	Safe Drinking Water Act
SDWMP	South Delta Water Management Plan
SEBP	South East Bay Plain
SEBPB	South East Bay Plain Basin
SEL	Sound Exposure Level
SENEL	Single Event Noise Exposure Level
SF	single family
SFBAAB	San Francisco Bay Area Air Basin
SFBJV	San Francisco Bay Joint Venture
SFPUC	San Francisco Public Utilities Commission
SFRWQCB	San Francisco Bay Regional Water Quality Control Board
SGA	Sacramento Groundwater Authority
SHPO	State Historic Preservation Office
SIP	State Implementation Plan

SJCHD	San Joaquin County Health District
SJMSCP	San Joaquin County Multi-Species Habitat Conservation and Open Space Plan
SJVAB	San Joaquin Valley Air Basin
SJVAPCD	San Joaquin Valley Air Pollution Control District
SMAQMD	Sacramento Metropolitan Air Quality Management District
SMUD	Sacramento Municipal Utility District
SOI	Sphere of Influence
SO_x	sulfur oxides
SP	Southern Pacific (Railroad)
SR	State Route
SRA	Shaded Riverine Aquatic
SRVRWP	San Ramon Valley Recycled Water Program
STC	Sound Transmission Class
SVAB	Sacramento Valley Air Basin
SWANCC	Solid Waste Agency Northern Cook County
SWP	State Water Project
SWPPP	Storm Water Pollution Prevention Plan
SWRCB	State Water Resources Control Board
TA	Technical Appendix
TAC	toxic air contaminant
TAF	thousand acre-feet
TAFY	thousand acre-feet per year
TDS	Total dissolved solids
THM	Trihalomethane
THMFP	Trihalomethane Formation Potential
TL	total length
TNF	True natural flow
USEPA	United States Environmental Protection Agency
UAW	Unaccounted-for water
UBC	Uniform Building Code
UFC	Uniform Fire Code
ULF	Ultra low flush
UMRWA	Upper Mokelumne River Watershed Authority
UP	Union Pacific Company (Railroad)
USB	Ultimate Service Boundary
USBR	United States Bureau of Reclamation
USDA	United States Department of Agriculture
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey
USL	Upper San Leandro
UST	underground storage tank
VdB	vibration decibels
VMT	vehicle miles traveled
WAPA	Western Area Power Authority
WCMP	Water Conservation Master Plan
WDR	waste discharge requirement
WET	U.S. Army Corps of Engineers Wetlands Evaluation Technique
WHRP	Wildlife Habitat Relationships Program
WID	Woodbridge Irrigation District
WL	CDFG Watch List
WQO	Water Quality Objective

WSMP	Water Supply Management Program
WTP	Water Treatment Plant
WUA	Weighted usable area
WY	Water Year (October 1 to September 30)

10.2 Glossary

Acre-Foot: The quantity of water (43,560 cubic feet or 325, 800 gallons) that would cover one acre to a depth of one foot.

Alevin: Fish fry, particularly salmonids, on which the yolk sac is still apparent.

American Community Survey: A large, continuous demographic survey conducted by the Census Bureau that will eventually provide accurate and up-to-date profiles of America's communities every year. Questionnaires are mailed to a sample of addresses to obtain information about households -- that is, about each person and the housing unit itself. The survey produces annual and multi-year estimates of population and housing characteristics and produces data for small areas, including tracts and population subgroups.

Anadromous: Fish species that inhabit marine waters during juvenile and adult life stages but migrate to fresh water for spawning.

Aquifer: A porous soil or geological formation lying between impermeable strata in which water may move for long distances; yields groundwater to springs and wells.

Armoring: The formation of an erosion-resistant layer on the surface of the stream bed that resists degradation by water currents and may be unsuitable for spawning.

Attraction Flows: Large water releases intended to stimulate upstream salmonid migration. These releases may aid in orientation and passage during migration.

Base Case: Also called "Existing Conditions at 1990 Level of Development." This case used 1990 demand conditions and fishery release requirements in accordance with the 1961 Agreement between EBMUD and CDF&G.

Bay: Unless otherwise noted, San Francisco Bay.

Candidate Species: (also Candidate Threatened or Endangered Species) Taxa (species or subspecies) of plants and animals currently under consideration for listing by the US Fish and Wildlife Service.

Carriage Water: Delta outflow required to compensate for the hydraulic effects of Delta exports on Delta circulation and, thus, water quality standards, or flow required in channel to provide adequate head for water delivery.

CDFG Plan: The plan for operations and other management proposed by the California Department of Fish and Game (CDFG) for the lower Mokelumne River.

Census Block: Small statistical subdivisions of a county for grouping and numbering blocks in non-metropolitan counties where local census statistical area committees have not established census tracts.

Census Tract: Small, relatively permanent statistical subdivisions of a county. Census tracts are delineated for most metropolitan areas (MAs) and other densely populated counties by local census statistical areas committees following Census Bureau guidelines

Coded Wire Tagging: A method of internally marking fish by injecting a small piece of wire into the fish's head. The wire is encoded with a unique number which is used, upon recovery, to determine the river of origin.

Colluvium: Loose bodies of sediment that have been deposited or built up at the bottom of a slope or against a barrier on that slope, transported by gravity.

Component, Component Categories: A constituent part; in this case, alternative parts of a Composite Program. A category of alternatives; Conservation components, Reclamation components, Groundwater Storage/Conjunctive Use components, Reservoir components and Supplemental Supply components.

Component-specific Criteria: A standard defined specifically for a component category of alternatives to rate or measure the relative value of each alternative.

Composite Program: Combinations of components that, when working in conjunction, can meet the specified need for water. Many types of Composite Programs were assessed during this EIR study.

Conjunctive Use: A term used to describe the operation of a groundwater basin in coordination with a surface water system.

Critical Dry Water Year: For the Lower Mokelumne River Management Plan (LMRMP), a critical dry water year occurs when Pardee and Camanche storage is more than 250,000 acre-feet below that allowed by the Corps flood control rules.

Cubic Feet per Second (cfs): A rate of flow. One cfs is equal to 0.265 acre-feet per day.

Cultural Resource: Any building site, district, structure, object, data or other materials significant in history, architecture, archeology or culture.

Decision-Making Framework: The process within which to weigh and assess the relative value of all types of Updated WSMP alternatives (potential components and Primary Composite Programs).

Delta: The Sacramento-San Joaquin River Delta.

Desalination or Desalinization: The removal of salt, especially from sea water to make it drinkable.

Downstream Beneficial Uses: Valued water uses downstream of a specified point. Beneficial water uses are recognized by state law.

Drought: A prolonged serious shortage of runoff resulting from lack of precipitation.

Drought Planning Sequence: A three-year hydrology sequence presenting a worst case drought event. For the Updated WSMP, the three-year hydrology sequence includes the historic runoff for 1976, followed by historic 1977 runoff, followed by an average of these two years or 185 TAF.

Dry Water Year: For the CDFG Plan, a dry year occurs when annual unimpaired inflow into Pardee Reservoir is less than 50 percent of the historical average. For the LMRMP, dry year releases are made if the storage on November 5 in Pardee and Camanche reservoirs is below (but by no more than 250,000 acre-feet) that allowed by COE flood control rules.

Emergence: The act of alevin leaving the gravel of the redd and entering the river to rear.

Entrapment Zone: An area in an estuary where fresh and salt water mix. The specific location varies with freshwater outflow.

Endangered Species: Generally taken to mean any species or subspecies whose survival is threatened with extinction.

Entitlements: Water available for consumptive uses through the issuance of licenses and/or permits.

Environmental Justice Study Area: A minority or low-income community that may bear a disproportionate share of the negative environmental consequences resulting from industrial, municipal, and commercial operations or the execution of federal, state, local, and tribal programs and policies.

Epilimnion: The upper, warm water zone in a thermally stratified impoundment.

Evaluating Criteria: Criteria used to rate or determine the reasonableness of alternatives. Evaluating criteria were applied to those alternatives which survived the exclusionary test. The evaluating criteria were used to compare and array the alternatives for their relative satisfaction in meeting an objective.

Evaluation Species: A species used in the Habitat Evaluation Procedure (HEP) analysis to assess habitat value, presence of species indicates level of health of community.

Exclusionary Criteria: Criteria by which potential alternatives are screened. These criteria are stated in terms of “must” and “must not” and provide the fatal flaw analysis through a binary decision; either an alternative does or does not meet the criteria. Any alternative which does not meet any one exclusionary criterion, by definition, fails to meet the planning objectives and is eliminated from further study.

Fall-run Chinook: A race of chinook salmon in which the adults migrate upstream in the fall, spawn in the fall and winter, fry emerge in the winter or spring, and juveniles migrate downstream in the spring or summer.

Fall Turnover: When the upper layers of a stratified lake cool in the fall to become as heavy as lower layers, and the water mixes. Also known as destratification.

Fines: Small particles of sediment, as in suspended mud, silt, or sand.

Flashboards: A board or boards placed at the top of a dam to increase the depth or force of the stream.

Flow Strategies: Methods of managing flow levels using upstream reservoir releases.

Fry: Fish between the egg and smolt stages. Depending on the species, fry can be a few millimeters to a few centimeters long.

Game Fish: Fish species generally found on the higher end of the food chain and considered sport fishes by anglers.

Ground Truth: Confirmation of data; verified with site visit.

Groundwater Banking: Storing water underground during wet years for use during dry years.

Habitat: Range of environmental factors in a particular location that support specific plant and animal communities.

Hibernaculum: A location chosen by an animal, commonly a mammal or insect, for hibernation.

Hydrostatic: Refers to the pressure and equilibrium of water and other liquids.

Hypolimnion: The part of a lake below the thermocline made up of water that is stagnant and of uniform temperature except during mixing; the lower, cool water zone in a thermally stratified impoundment.

Induced Seismicity: Seismic activity caused by overloading. Normally associated with inundation (i.e. reservoirs) in faulted areas.

Interconnections: Linking together water systems owned and operated by different entities to facilitate exchanges during times of need.

In-migration: The upstream spawning migration of adult anadromous fish.

Inundation Area: Land that would be flooded with water as a result of creating an impoundment.

Judge Hodge's Decision: Judge Hodge's Decision was reached after 17 years of litigation associated with the Environmental Defense Fund v. EBMUD case. The Decision holds that EBMUD has the right to use its American River entitlement of 150,000 acre-feet per year. The Decision is also tentative, pending the conclusion of a proceeding and related technical studies being conducted by a "special master" appointed by Judge Hodge. This special master is expected to finalize the Decision's tentative "physical solution." The physical solution is one of the constraints placed on EBMUD's use of American River water and states that EBMUD may not use American River water from the Folsom South Canal when flows drop below the following levels: from October 15 through February, 2,000 cfs; from March through June, 3,000 cfs; and from July through October 15, 1,500 cfs.

Levee: A man-made embankment for preventing flooding.

Levee Flooding: The failure of an embankment resulting in flooding.

Liquefaction: Transformation of granular water-saturated material into a liquid flowing state as a result of strong ground shaking during an earthquake.

Lower Mokelumne River Management Plan (LMRMP): The plan for operations and management developed by BioSystems and EBMUD for the lower Mokelumne River, also the preferred plan.

Metalimnion: The stratum between the epilimnion and the hypolimnion of a stratified reservoir that exhibits a marked thermal discontinuity.

Migration: To pass periodically from one region to another for feeding or breeding.

Minimum Flows: A mandated flow level having priority over all other flow levels, except as may be specifically allowed.

Mitigation: Methods to reduce or eliminate adverse impacts.

Model: A mathematical formula that expresses the actions and interactions of the elements of a system in such a manner that the system may be evaluated under any given set of conditions.

Natural Production Alternative: The LMRMP, which emphasizes in-river reproduction of fish.

Need for Additional Water: Describes the difference between the supply available to EBMUD during the drought planning sequence and EBMUD's demand for water during the drought. EBMUD's need for additional water is discussed further in Chapter 4 and is expected to reach 130 TAF by the year 2020.

Need for Water: Refers to the *total* amount of water EBMUD needs to supply its customers, the natural resources of the lower Mokelumne River, and the senior water right holders below Camanche Reservoir. (The need for *additional* water only refers to the incremental amount of water EBMUD cannot supply during the drought planning sequence.)

No Action Alternative: The option of EBMUD not implementing a new Updated WSMP. In the near term, this EIR study assumes conditions under the No Action Alternative would be the same as those under existing conditions. In the long term, EBMUD's demand for water would increase as would the demands of other agencies that divert water from the Mokelumne River.

Non-flow Alternatives: Measures to improve survival or otherwise increase production of salmon using technology or methods that do not change water releases from upstream reservoirs.

Nongame Fish: Fish species generally found near the lower end of the food chain and not considered sport fishes by anglers.

Normal Water Year: For the CDFG plan, annual unimpaired inflow into Pardee Reservoir is between 50 and 110 percent of historical inflow. For the LMRMP, a normal water year occurs when Pardee and Camanche storage on November 5 is at or above levels allowed by the COE.

Outage: Failure or interruption of service.

Out-migration: The downstream movement of smolts or fry to the estuary or ocean.

Peri-urban: Occurring in or around urban areas.

Pile Support: A structural column driven into the ground to support a vertical load.

Place of Use: Area where water appropriated under specific California water rights may be used.

Pool: An area of stream that is deep and of slow velocity relative to contiguous hydraulic types.

Potentiometric Surface Contours (also Piezometric Surface): Surface to which water in an aquifer would rise by hydrostatic pressure. Contours of equal elevation can be drawn to define this surface.

Primary Composite Programs: Six Primary Composite Programs were selected from fifteen Composite Programs for detailed study based on their ability to meet the screening criteria.

Planning Objectives: Broad statements of intent based on the District's overall needs. In the analysis process these objectives are divided into four categories for evaluation: Operational, Engineering, Legal and Institutional; Economic; Public Health, Public Safety and Sociocultural; and Biological.

Primary Alternatives: Alternatives selected through the screening process for consideration in the development of Composite Programs.

Public Trust Doctrine: A water law principle which holds that a state takes title to and must protect tidelands, the beds of navigable waters and the waters above them. Entities that acquire rights to these types of water can assert no vested right in a manner that is harmful to "public trust resources," including navigations, commerce, fisheries, recreation and other resources.

Raptors: Predatory birds such as eagles, owls and hawks.

Real-time Management: Management in response to actual and immediate conditions.

Redd: Areas within the spawning gravels where salmon and trout eggs are laid.

Riffle: A shallow area (generally) of a stream, where the water surface is broken into waves by bed material wholly or partly submerged.

Riffle Pool Complex: A special aquatic site designated under Section 404 of the Clean Water Act. It is characteristically described as a series of pools and riffles that occur in reiterative cycles in a stream or river system.

Riparian: Lying on or adjacent to a water supply such as a riverbank, lake or pond.

Riparians and Appropriators: Refer to the holders of riparian and appropriative water rights, respectively. Riparian rights are held by those who own land abutting the stream or body of water from which they use water under their rights. Appropriative rights are held by those who do not own land abutting the water they divert for use under their water rights.

Rip Rap: A foundation or wall made of broken stones thrown together irregularly or loosely, as in water or on a soft bottom.

Safe Yield: The long-term rate or amount at which a water source may be utilized without exceeding recharge and incurring overdraft.

Scour: Used in stream or river systems to indicate substrate degradation-channel erosion. The term implies the transport of bedload material (substrate).

Sediment: Solid fragmented material that originates from weathering of rocks and is transported or deposited by air, water or ice.

Section 106: Refers to the portion of the 1966 National Historic Preservation Act (amended 1980) that pertains to federal actions affecting cultural resources.

Senior Riparians and Appropriators: Refers to the riparian and appropriative water rights holders on the Mokelumne River with rights that are "senior" (older and of higher priority in times of shortage) to the rights held by EBMUD. The needs of these senior water rights holders, primarily irrigation districts below Camanche Dam, must be met before EBMUD can exercise its rights.

Sensitive Species: Species with special legal or management status: federal endangered or threatened, federal candidate species, California state threatened or endangered, California state fully protected, and Department of Fish and Game bird and mammal species of species concern,

Smolt: A stage in anadromous salmonid development when juveniles are physiologically and behaviorally capable of migrating into saline waters.

Soils Topical Area: The field/discipline dealing with the transported or weathered in-place near-surface materials overlying bedrock and/or thick alluvial deposits.

Spawn: To lay eggs, especially said of fish.

Species: The basic category of biological classification intended to designate a single kind of animal or plant.

Spring-run Chinook: A race of chinook salmon in which the adults migrate upstream in the spring, spawn in the fall, and juveniles migrate downstream in the spring.

State Responsibility Area: Wildlands where the California Department of Forestry and Fire Protection (CDF) is the primary agency responsible for wildland fire prevention and suppression under the authority of the State Public Resources Code.

Steelhead: The anadromous form of rainbow trout.

Support Bent: A framework transverse to the length of a structure, for supporting lateral as well as vertical loads.

Test Pitting: The excavation of a relatively small (10' to 20' long by 2-3' wide by 10' to 20' deep) pits in the earth's surface in order to obtain samples for laboratory testing, and to examine/identify/log the type and physical nature of the soil and rock materials excavated.

Thermal Refugia: Cool microinhabitants in a river used by fry and smolts to avoid unfavorably hot conditions.

Thermocline: Plane or surface of maximum rate of decrease of temperature with respect to depth.

Threatened Species: A species that is likely to become endangered in the foreseeable future and is included in the federal list of endangered species.

Time Step: Unit of time used in model analysis.

Title 22 Regulations: The California Department of Health Services water and treatment reliability criteria for water recycling under Title 22, Chapter 4, of the California Code of Regulations.

Toxic: Pertaining to poison.

Trihalomethanes (or THMs): Group of water disinfection byproducts including chloroform, bromodichloromethane, chlorodibromomethane and bromoform, created by interaction of THM precursors (incl. humic acids) with disinfectants, especially chlorine.

Trihalomethane Formation Potential (THMFP): a scale established by laboratory tests under conditions similar to disinfection to measure the potential a water source has for producing THMs.

Visitor Day: A standard unit of use consisting of a visit by one individual to a recreation development or area for recreation purposes during any reasonable portion or all of a 24-hour period.

Volant: Having the wings extended as if in flight; flying or capable of flying.

Warmwater Fish: Fish species that favor warm water.

Wastewater Reclamation: Recycling treated discharge water.

Water Conservation: Using less water to accomplish the same purpose.

Water Right: A grant, permit, license, decree, appropriation or claim to the use of water for beneficial purposes. California has a dual system of water rights: riparian and appropriative.

Watershed Area: The areas drained by different rivers or river systems.

Waters of the United States: "Those water that are subject to the ebb and flow of the tide and/or are presently used or have been used in the past, or may be susceptible for use to transport interstate or foreign commerce." (33 CFR Part 329.4).

Water Transfers: Selling or exchanging water or water rights among individuals or agencies.

Water Use: The quantity of water actually being diverted or assumed to be diverted in the future.

Water Year: October 1 to September 30.

Wetlands: Areas defined by the prevailing vegetation types and soil moisture content and that contain vegetation typical of soils that are saturated for a major portion of the year.

Wet Water Year: By CDFG criteria, a year with unimpaired inflow to Pardee Reservoir in excess of 110 percent of the historical average.

Yearling: In salmonids, the life-stage during juvenile development that occurs 12 months after spawning through 24 months after spawning.

Yield: The volume of water available over a period of time from a storage facility.

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12 REPORT PREPARERS

12. Report Preparers

12.1 Lead Agency

East Bay Municipal Utility District
Water Supply Improvements Division
375 Eleventh Street MS 407
Oakland, CA 94607-4240

Alexander Coate, Director of Water and Natural Resources
Mike Tognolini, Manager of Water Supply Improvements
Tom Francis, Senior Civil Engineer
Fred Etheridge, Special Assistant to the General Manager
Karen Donovan, Office of General Counsel
Richard Harris, Conservation Programs Manager

12.2 Principal Preparers

Responsibility for preparation of this PEIR rests with the lead agency for the EBMUD WSMP 2040. Listed below are the employees of the consulting firms that assisted EBMUD in the preparation of this PEIR.

12.2.1 EDAW | AECOM

David Blau, Project Director and Principal-In-Charge
Marcia Tobin, Project Manager and Water Resources Planner
Marie Galvin, CEQA Task Leader
Suet Chau, Assistant CEQA Task Leader
Kara Demsey, Water Resources Planner
Sarah Heard, Environmental Planner
Yanna McLaughlin, Environmental Planner / Public Outreach
Honey Walters, Air Quality Specialist
Austin Kerr, Air Quality Specialist
George Lu, Air Quality Specialist
Chris Shields, Noise Specialist
Brian Ludwig, Archaeologist
Chris Fitzer, Fisheries Biologist
Christine Tovey, Fisheries Biologist
Angie Harbin-Ireland, Terrestrial Biologist
Veronica Wunderlich, Terrestrial Biologist
Sean Avent, Terrestrial Biologist
Lynn Frederico, GIS Specialist
Don Lee, Graphics Specialist
Brian Vahey, Word Processor

12.2.2 RMC

Leslie Dumas, P.E., Hydrologist, Portfolio Modeling

12.2.3 GTC

Jim Thurber, R.G., C.E.G., C.H.G., Hydrogeologist
Megan Simpson, Geologist

12.2.4 TOVA

Booker Holton, Environmental Justice

12.2.5 Karen Johnson

Karen Johnson, Water Demand Projections

12.2.6 Maddaus Water Management

Bill Maddaus, Conservation Program and Levels