

EAST BAY MUNICIPAL UTILITY DISTRICT



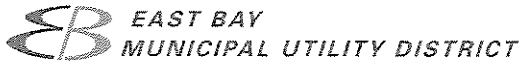
in cooperation with



**BAY AREA REGIONAL
DESALINATION PROJECT**

**GRANT PROPOSAL
for
PROPOSITION 50 CHAPTER 6(a) FUNDING**

March 24, 2006



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March 23, 2006

Fawzi Karajeh, Ph.D.
Office of Water Use Efficiency and Transfers
California Department of Water Resources
1416 Ninth Street, Room 338
Sacramento, CA 95814

**SUBJECT: Bay Area Regional Desalination Project - Pilot Project
Fiscal Year 2005/2006 Proposition 50 Chapter 6 (a) Grant Application**

Dear Dr. Karajeh:

East Bay Municipal Utility District (EBMUD) is pleased to submit an application for the Bay Area Regional Desalination Project Pilot Project for funding under the Fiscal Year 2005/2006 Proposition 50 Chapter 6 (a): Desalination of Ocean and Brackish Waters Program. The Bay Area Regional Desalination Project is a joint project being developed in collaboration by EBMUD, San Francisco Public Utilities Commission, Santa Clara Valley Water District, and Contra Costa Water District.

For over three years, the partners have worked together to determine if and how they can collaborate to develop an RDP that would serve each of their needs, while maximizing water supply efficiencies and minimizing environmental and financial costs. The four agencies continue to make significant progress on this important project. Using the preliminary findings from the Feasibility Study, the partners are prepared now to test the operation and maintenance of a joint facility on a pilot scale.

This application is being submitted by EBMUD on behalf of the four Bay Area agencies. We urge you to approve this grant request. If you have any questions, please feel free to contact me at (510) 287-055.

Sincerely,

A handwritten signature in black ink that reads 'Hasan M. Abdullah'.

Hasan M. Abdullah, P.E.
Desalination Project Coordinator

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FORM A

PROJECT INFORMATION SHEET

1. Project Title: Bay Area Regional Desalination Project
2. Principal Applicant (Organization or Affiliation): East Bay Municipal Utility District (EBMUD)
3. Type of applicant (select one):
 Public entity, specify Water Agency
 Other entity, specify _____
4. Applying for (select one):
 Feasibility Study
 Research and Development Project
 Pilot or Demonstration Project
 Construction Project
5. Project related to:
 Brackish Water Desalination (Estuarine)
Average Salinity of Brackish Water (mg/L) 10,000
 Seawater Desalination
6. Person authorized to sign the agreement and submit the proposal application:
- | | |
|------------------|--|
| Name, Title: | Dennis Diemer,
General Manager |
| Mailing address: | East Bay Municipal
Utility District |
| | P.O. Box 24055,
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7. Contract Person (if different):
- | | |
|------------------|--|
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Desalination Project
Coordinator |
| Mailing address: | East Bay Municipal
Utility District |
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FORM A
PROJECT INFORMATION SHEET

8. Funds requested (dollar amount):	<u>\$949,300</u>
9. Applicant funds pledged (dollar amount):	<u>\$949,300</u>
10. Total project costs (dollar amount):	<u>\$1,898,600</u>
11. Anticipated starting date of the proposed work	<u>October 2006</u>
12. Anticipated ending date of the proposed work	<u>January 2008</u>
13. Life of the project:	<u>15 months</u>
14. <i>Information for construction projects only:</i>	<u>NA</u>
- Capital cost (\$)	
- Estimated annual O&M costs (\$/yr)	
- Annual production capacity (ACF/yr)	
- Estimated unit cost of product water (\$/ACF)	
15. State Assembly District where the project is to be conducted:	<u>11 and 15</u>
16. State Senate District where the project is to be conducted:	<u>7</u>
17. Congressional district(s) where the project is to be conducted:	<u>7 and 10</u>
18. County where the project is to be conducted:	<u>Contra Costa County</u>
19. Location of project (City and longitude & latitude)	<u>Pittsburg, CA</u> <u>38°02'07.89"N</u> <u>121°55'41.90"W</u>

**FORM B
SIGNATURE PAGE**

By signing below, the official declares the following:

The truthfulness of all representations in the proposal;

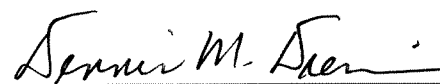
The individual signing the form has the legal authority to submit the proposal on behalf of the applicant;

There is no pending litigation that may impact the financial condition of the applicant or its ability to complete the proposed project;

The individual signing the form read and understood the Conflict of Interest, Confidentiality, and Intellectual and Proprietary Rights section and waives any and all rights to privacy and confidentiality of the proposal on behalf of the applicant;

The applicant will comply with all terms and conditions identified in this PSP if selected for funding; and

The applicant has legal authority to enter into a contract with the State.

	GENERAL MANAGER	MARCH 23, 2006
Signature	Name and Title	Date

EXECUTIVE SUMMARY

The East Bay Municipal Utility District (EBMUD) is pleased to submit this grant application for a pilot plant that would advance the development of the Regional Desalination Project (RDP) in the greater San Francisco Bay Area. EBMUD is one of four partner water agencies that are committed to developing a regional project that can either directly or indirectly serve the water needs of more than 5 million residential and business water users in the San Francisco Bay Area. The partner agencies for the RDP are four of the San Francisco Bay Area's largest water suppliers: EBMUD, the San Francisco Public Utilities Commission (SFPUC), the Santa Clara Valley Water District (SCVWD), and the Contra Costa Water District (CCWD) (hereafter referred to collectively as the partners).

For over three years, the partners have worked together to determine if and how they can collaborate to develop an RDP that would serve each of their needs, while maximizing water supply efficiencies and minimizing environmental and financial costs. Based on their evaluations to date, including the preliminary results of the RDP Feasibility Study (Feasibility Study)¹, the partners are committed to pursuing the RDP.

The partners anticipate pooling their resources to build a single desalination facility, with a maximum capacity of 65 million gallons per day (MGD), in the San Francisco Bay Area. By pooling resources for this effort and leveraging existing conveyance infrastructure, the RDP partners would minimize potential environmental impacts associated with developing independent desalination projects within a small geographic area along the California coastline. Applying a centralized regional approach offers additional benefits such as forming complementary goals and

objectives, reducing capital outlays for each partner, and providing effective and coordinated redundancy/backup facilities to be shared by the whole region.

The RDP would serve as a new, safe, and reliable water supply source that can be used to meet the water needs of the partners including providing supplemental water during emergencies and unplanned facility outages, and relief during periods of drought. The RDP would provide a new potable water source consistent with the requirements of Chapter 6(a) of Proposition 50.

Using the preliminary findings from the Feasibility Study, the partners are now prepared to test the operation and maintenance of a joint facility on a pilot scale. The scope included in this pilot plant proposal will enable the partners to (1) establish a joint organization for the operation and maintenance of a regional facility, (2) test technologies and innovative methods for maximizing the efficiency of the plant, (3) identify potential environmental impacts and test ways of mitigating those effects, (4) identify the preferred pretreatment method for the project, and (5) share test data and methodologies with other interested users in the State.

State funding support for the RDP pilot project will expedite the advancement of an important regional project that will benefit the greater San Francisco Bay Area. It will also enable the project to have a broader reach by serving as a model for other planned desalination projects. Most importantly, Chapter 6(a) funding will demonstrate the State's commitment to a project that strives to use innovative solutions and an integrated regional approach to addressing critical water challenges in California.

¹ The RDP Feasibility Study is being funded with support from Proposition 50 funds that were allocated in 2005.

1.0 STATEMENT OF WORK, PART 1: Relevance and Importance–Selection Criterion I (20 Pts)

1.1 Background and Need for Desalination

Historically, northern California has been susceptible to long periods of drought. The East Bay Municipal Utility District (EBMUD), San Francisco Public Utilities Commission (SFPUC), Santa Clara Valley Water District (SCVWD), and Contra Costa Water District (CCWD) (hereafter referred to collectively as the partners) are also vulnerable to a water supply disruption in a major catastrophe or an unplanned facility outage. Furthermore, Bay Area agencies that depend on Delta supplies incur the increasingly high cost of treatment because of the poor quality of Delta water.

Each partner is taking steps to secure its own systems and implementing additional measures to provide continuous water supply in emergency and/or drought conditions, including maximizing water conservation and recycling efforts. Each partner has adopted an Urban Water Management Plan (UWMP) in compliance with the Urban Water Management Act and submitted it to the California Department of Water Resources (DWR). Relevant programs and goals of each partner's UWMP, along with the details of each partner's water conservation and recycling programs, are described below.

The Regional Desalination Project (RDP) proposed in this application would serve as a new, safe, and reliable potable water supply source that can be used to meet the water needs of the partners including providing supplemental water during emergencies and unplanned facility outages, and relief during periods of drought.

Dry-year supply reliability and water quality were the main drivers for the CALFED-sponsored study named the Bay Area Regional Water Quality and Supply Reliability Program (BAWQSRP). A number

of alternative water supply and water quality projects were evaluated at a pre-feasibility level, including the RDP.

One of the major findings from BAWQSRP was that Bay Area agencies should seek logical partners in implementing joint projects that will provide multiple benefits to the partner agencies. The RDP is an example of four partner agencies furthering their mutual water supply interests.

The RDP is not envisioned to provide a full-time supplemental water supply option to the partners. Rather, the partners intend to explore the possibility of providing water to other local users during periods when it would not serve the partners' immediate needs. The partners are currently planning a separate study to identify other potential local users.

Given the objectives of the RDP, the project would not diminish or otherwise undermine the commitment of any partner to continue to improve water supply efficiencies and manage demand within their service areas, as demonstrated in the subsections below.

1.1.1 East Bay Municipal Utility District

EBMUD serves approximately 1.3 million customers over a 331-square-mile area that includes parts of Alameda and Contra Costa counties. On an average annual basis, approximately 90 percent of the water used by EBMUD comes from the 577-square-mile Mokelumne River watershed. EBMUD has the water rights and infrastructure to divert up to 325 million gallons per day (MGD), subject to availability of runoff and the water rights of other users who may have seniority.

Many factors affect the reliability of EBMUD's water supply, particularly the occurrences of drought and the vulnerability of the aqueducts in the Delta to earthquakes or flooding. Other factors include potential water supply contamination or other emergencies. These factors could result in an extreme shortage of water for basic needs such as fire fighting and drinking. Consequently, EBMUD

implements policies, programs, and projects that improve the reliability of its water supply system through the effective management of both supply and demand. Furthermore, EBMUD enters into transfer and exchange agreements with other Bay Area water systems to improve its water supply reliability. These agreements provide for mutual aid to the parties during emergencies or an alternative source of water during planned facility outages, or both.

In October 1993, EBMUD adopted a long-term Water Supply Management Program (WSMP) to guide the provision of a reliable high-quality water supply to the East Bay through the year 2020. In addition, EBMUD has adopted the 2005 UWMP, which describes other programs EBMUD has initiated to diversify and improve reliability of its water supply portfolio. Chapter 2 of the UWMP describes EBMUD's plans to meet projected dry-year needs, which includes the implementation of the RDP.

Since the early 1970s, EBMUD has been recycling water for landscape irrigation and for in-plant processes at its main wastewater treatment facility. Details of EBMUD's ongoing and planned projects to promote the use of recycled water are included in Chapter 5 of the 2005 UWMP. Some of these water recycling efforts have resulted in the implementation of award-winning programs such as the Recycled Water Irrigation Customer Training Program.

EBMUD offers incentives to encourage the use of recycled water such as:

- Providing subsidized costs and reduced rates for recycled water.
- Funding retrofit costs for customers' facilities to accommodate recycled water use.
- Participating in long-range water resource management planning through the San Francisco Bay Area Regional Water Recycling Program (BARWRP), a

cooperative effort involving Bay Area water and wastewater agencies and State and Federal organizations.

- Providing education and information sharing through presentations to community groups, workshops, and meetings with public groups.

In addition to recycling, EBMUD strives to maximize conservation efforts, as described in Chapter 6 of the 2005 UWMP. EBMUD offers incentives and rebates to its residential customers. For example, EBMUD has realized net savings of over 13 MGD from water conservation programs implemented between 1995 and 2005. EBMUD has a conservation goal of 35 MGD in the year 2030, an increase from its original Water Conservation Master Plan (WCMP, 1994) goal of 33 MGD. The conservation goal will be met by developing conservation programs and recommendations for natural replacement of conservation hardware such as toilets, showerheads, and faucets.

A list of EBMUD's recycling and conservation projects, budget allocations, and project implementation status is provided in **Attachment 1**. Even with successful recycling efforts and substantial demand reduction, the WSMP identified that during severe droughts EBMUD would be unable to meet its customers' water needs with its existing water supply. Furthermore, EBMUD's planning objective is to not impose rationing of greater than 25 percent on customers during a critical drought. EBMUD plans to use desalination as a sustainable and reliable water supply resource during droughts, in conjunction with its other water supply and conservation programs.

1.1.2 San Francisco Public Utilities Commission

The SFPUC provides water to both retail and wholesale customers from a combination of local Bay Area supplies and diversions from the Tuolumne River through the Hetch Hetchy Water and Power Project. A small portion of

San Francisco's water is supplied by groundwater. Over 2.4 million people within the counties of San Francisco, San Mateo, Santa Clara, Alameda, and Tuolumne rely entirely or in part on water supplied by the SFPUC.

As part of its retail efforts to develop its recycled water program, the SFPUC has also been an active participant in BARWRP. In December 1999, BARWRP produced a Recycled Water Master Plan (RWMP) for regional water recycling that identifies demands and provides a plan to achieve 125,000 acre-feet per year (AFY) of recycled water in the Bay Area within the next 10 years. The SFPUC worked with Bay Area Clean Water Agencies (BACWA) in 2005 and 2006 to complete a Wastewater and Recycled Water Functional Area Document for inclusion in the Integrated Regional Recycled Water Management Plan. The SFPUC has prepared a *Recycled Water Master Plan for the City and County of San Francisco* (SF RWMP) that explores the potential for recycled water to reduce use of potable water for applications such as irrigation. The Final SF RWMP, scheduled for release in March 2006, identifies potential Phase 1 recycled water projects for San Francisco that could produce approximately 4.1 to 4.5 MGD by 2015. The projects identified in the SF RWMP will be implemented pursuant to the Water Supply Improvement Program (WSIP) following environmental review. San Francisco's RWMP Phase 1 in part, is considered a component of the regional system.

The SFPUC adopted the *2005 Urban Water Management Plan for the City and County of San Francisco* in December 2005. The UWMP includes elements described in the Draft RWMP. Planned recycled water projects in SFPUC's service area are described in Section 10.

Sections 3.3.2 and 5.3.4 of the UWMP describe San Francisco's current recycled

water uses. San Francisco encourages water recycling through San Francisco Ordinances 390-91 and 391-91, which require dual plumbing for recycled water use for new or remodeled buildings and all subdivisions (with the exception of condominium conversions) with a total of 40,000 square feet or more, as well as for new and existing landscaped areas of 1,000 square feet or more.

The SFPUC and its customers have a proven record of commitment to and implementation of water conservation programs, as detailed in Sections 3.3.3 and 5.3.3 of the 2005 UWMP. In March 2000, San Francisco won the award for "Best Conservation Program – Large Utility" by the California Municipal Utilities Association. The SFPUC implements water conservation efforts through distribution efficiency and residential and commercial water conservation programs. Between 1994 and 2000, residential per capita water use has decreased from 74 to 61 gallons per capita per day. It is assumed that much of the decrease can be attributed to San Francisco's long-term conservation programs and a change in water use habits. Nevertheless, SFPUC estimates that approximately 4.5 MGD of additional water savings can be achieved by 2030 through water conservation, as described in Section 8.5.2 of the 2005 UWMP. SFPUC is working to identify, quantify, and develop programs to capture these savings.

Additional details on SFPUC's existing and planned programs and the projected expenditures on these programs are included in **Attachment 1**.

1.1.3 Santa Clara Valley Water District

The SCVWD implements water use efficiency programs that are innovative and comprehensive in scope. It has been awarded a number of accolades for its achievements in water use efficiency. In fiscal year (FY) 2004/2005, these water conservation and water recycling programs helped to save the district a total of 46,000 acre-feet of water, an increase in over 3,000 acre-feet since FY

2003/2004. By 2020, the district envisions meeting 20 percent of the Santa Clara County's total annual water use through water conservation and recycling. In December 2005, the SCVWD adopted its updated UWMP, which describes its current and projected water supply planning efforts.

Section 3.4 of the UWMP describes the SCVWD's recycled water use. Recycled water use programs alone accounted for a total of 11,000 acre-feet in FY 04-05, marking a continued and steady increase since the district's recycling program began in 1977. Countywide recycled water projections from recycled water producers are estimated to reach 16,800 acre-feet by 2010 and 31,200 acre-feet by 2030. Ongoing and future recycled water projects are described in **Attachment 1**.

As described in Section 5.3 of the UWMP, the SCVWD implements all 14 Water Conservation Best Management Practices (BMPs) as required through the Memorandum of Understanding (MOU) Regarding Urban Water Conservation in California with the United States Bureau of Reclamation (USBR) and estimates that water conservation programs implemented since 1992 have reduced demand by more than 35,000 acre-feet.

The SCVWD recognizes that future demands cannot be met without further expanding and maximizing conservation efforts. The district and its water retail agencies will continue planned water conservation commitments throughout the planning horizon. This includes baseline conservation programs and additional water conservation savings. Using 1992 as a baseline, the county will be permanently conserving an additional 100,000 acre-feet per year by the year 2030.

Overall, countywide water demand is projected to increase by about 70,000 acre-feet or 18 percent over the next 25 years, even with increases in new water conservation efforts. The SCVWD and most major water retail

agencies partner in regional implementation of a variety of water use efficiency programs to permanently reduce water use in the county. Demand in 2030 with conservation programs in place is projected at approximately 450,000 acre-feet. The conservation efforts planned between now and 2030 will offset about half the additional water supplies needed to meet increased demand. However, the UWMP concluded that the SCVWD cannot meet demands through 2030 without significant investments to preserve and protect the SCVWD's current mix of water supplies. In addition to protecting these sources, the SCVWD also must make investments in new water supplies such as desalination, while maximizing opportunities for water conservation.

1.1.4 Contra Costa Water District

CCWD is both a retail and a wholesale water supplier to a population of approximately 510,000 in central and eastern Contra Costa County. CCWD relies almost entirely on the Delta for its water supply, primarily from the USBR's Central Valley Project.

CCWD, in cooperation with the Central Contra Costa Sanitary District (CCCSD) and the Delta Diablo Sanitation District (DDSD), is working to identify opportunities for using recycled water. Although CCWD itself does not implement recycled water projects, the district has General Agreements in place with the CCCSD and DDSD, which both provide sanitary services within the CCWD service area that facilitate the development of regional recycled water projects. CCWD also has specific agreements with these two sanitary districts that govern the delivery of recycled water to more than 20 customers in the CCCSD service area and to two power plants in the DDSD service area. CCWD currently has an agreement with CCCSD to provide maintenance services for the recycled water distribution system.

CCWD has been implementing quality water conservation programs for several years.

Water conservation programs are available for both the treated water and the raw water service areas. CCWD's Water Conservation Program, which has an annual budget of approximately \$1.2 million, reduces long-term water demand to maximize its existing water supply resources. CCWD anticipates that by 2050, conservation (through natural replacement of devices and through CCWD-sponsored programs) will provide 15,000 acre-feet, or 38 percent, of the future water supply needed in the district.

The Water Conservation Program is also intended to meet the requirements of the 14 BMPs. CCWD meets each of the BMPs through a variety of programs, including surveys, incentives and public information programs. In 2003, CCWD received the USBR's Commissioner's Award for Water Conservation efforts in the Mid-Pacific Region. The USBR presents agencies the award for demonstrating significant accomplishments in improving water use efficiency. CCWD's Water Conservation Program has also received the award for the Landscape Water Budget Program, one of the most accurate, large-scale water budget programs in the State. CCWD was recognized for creating a progressive and successful water conservation program that provided a model of water use efficiency. In 2005, CCWD's conservation program saved over 2,700 acre-feet of water and is on track to save 9,400 acre-feet per year by 2040.

To obtain even more savings due to conservation, CCWD has implemented programs to go beyond the BMPs developed by the California Urban Water Conservation Council. CCWD provides single-family conservation surveys and has begun rebate programs for installation of Smart Controllers, residential high-efficiency clothes washer, and high-efficiency toilets and urinals. CCWD continues to implement certain BMPs even though the goals have already been met.

A summary of the CCWD's water recycling and conservation programs is included in **Attachment 1**.

1.2 Goals and Objectives

Common goals such as improving water supply reliability have brought the four partners together to explore seawater/ brackish water desalination as a way to maximize social, environmental, and economic benefits and to better serve more than 5 million residential and business customers in the San Francisco Bay Area. To meet these goals, the partners are seeking grant funding support for an RDP pilot project. Although all four partners are working together to develop the RDP, EBMUD is submitting this application and would be the designated contracting entity for the pilot project grant (see **Attachment 2**).

The aim of the RDP is to further develop desalination as a regional water supply. The pilot plant project would meet the following objectives:

- Establish an organizational structure that would own, operate, and maintain a pilot facility and identify ways to strengthen the structure for a full-scale project;
- Test technologies and methods to minimize adverse environmental effects to aquatic organisms from the intake of source water (Gunderboom Marine Life Exclusion System™ [MLES]);
- Determine preferred pretreatment method for plant (pressurized microfiltration [MF]/submerged MF);
- Test pretreatment sludge to determine whether it will meet sanitary landfill acceptance criteria;
- Test technologies and methods to maximize the efficiency of the plant (pretreatment and reverse osmosis [RO]);
- Identify and test brine toxicity levels;
- Identify potential impacts of brine discharge to the receiving water quality, aquatic life, and downstream users; and

- Test product water quality.

The concepts and process developed to successfully build an RDP in the Bay Area would directly benefit the partner agencies. In addition, the effort would have broader ramifications for the State and for other water agencies pursuing desalination as a viable water supply source. The Bay Area RDP would achieve many of the goals and recommendations of the State Desalination Task Force. One recommendation is to include desalination, where economically and environmentally appropriate, as an element of a balanced water supply portfolio, which also includes conservation and water recycling to the maximum extent practicable. Another is to ensure that seawater desalination projects are designed and operated to avoid, reduce, or minimize impingement, entrainment, brine discharge, and other environmental impacts.

2.0 STATEMENT OF WORK, PART 2: Technical/Scientific Merit, Innovation and Technological Advancement – Selection Criterion II (20 Pts)

The RDP is innovative in that it integrates the diverse needs of the four partners with a single desalination facility. Its design and operation are based on the idea of maximizing efficiencies of a regional water supply. Furthermore, the RDP would minimize potential adverse environmental impacts associated with the construction of separate desalination plants in close proximity to one another and would also provide substantial cost savings to each of the partners, and thereby to the water users in their respective service areas. Finally, the proposed joint ownership, operation, and management of a single desalination facility through a Joint Powers Authority (JPA) that will serve the needs of four major water providers in northern California is a unique concept that has no precedent in California.

Based on the Feasibility Study analysis conducted by the partners (see **Attachment 3**), a number of benefits are associated with

locating the RDP along the San Francisco Bay–Sacramento–San Joaquin River Delta estuary (Estuary) at Suisun Bay. However, the Estuary has highly variable water quality in terms of salinity and sediment. Other water quality parameters most likely vary also, but insufficient data are available to make a determination. Unlike the other sites considered by the partners (one oceanside site and one bayside site), the lack of available data for the estuarine site provides a compelling reason to locate the pilot plant for the RDP near Pittsburg, California, adjacent to the Estuary at Suisun Bay. The pilot project will be used to obtain additional data and help determine the optimal operations of a full-scale plant to be located in the area. The data obtained from the pilot will also benefit others considering desalination in an estuarine environment.

An existing CCWD pump station withdraws water from the Estuary intermittently when certain water quality constituents are at acceptable concentration levels. Diversions are non-existent in dry years. The proposed pilot would take advantage of CCWD's existing facility when the TDS concentration is greater than 1,000 milligrams of salt per liter, and CCWD is not operating the facility. Because the pilot site is in the anticipated vicinity of the full-scale RDP, it would provide relevant estuarine data and minimize costs by enabling the partners to leverage CCWD's existing facility.

The proposed pilot RDP also has other attractive and beneficial aspects. The technical areas that will be tested will contribute to better information and general advancement of desalination implementation in California. These include (1) testing Gunderboom MLES to safeguard aquatic biology and (2) testing methods to maximize plant efficiency, specifically pressurized vs. submerged membrane filtration, and RO membranes for estuarine water.

2.1 Gunderboom Marine Life Exclusion System™

The RDP facility will require an intake system capable of providing a reliable quantity of clean seawater with minimum ecological impact. However, marine life impingement and entrainment associated with intake designs may represent the most significant direct adverse environmental impact of seawater desalination.² The proposed pilot study will address this issue by testing a Gunderboom MLES with the intake that could be applicable to other locations in California.

Bay/Delta Issues

The San Francisco Bay/Sacramento–San Joaquin Delta is the largest estuary on the west coasts of the North and South American continents. It supports a diverse and productive ecosystem and a number of economic functions including shipping, industry, fishing, recreation, and water supply.

The proposed RDP pilot plant location in the western statutory Delta is part of important migratory corridors for State and Federally listed fish species, including winter-run chinook salmon, a designated Federal and State endangered species, and spring-run chinook salmon, a Federal and State threatened species. Other special-status fish species that may be found in the area of the proposed pilot study site include Central Valley steelhead and delta smelt, both Federally listed as threatened. Striped bass, threadfin shad, longfin smelt, and green and white sturgeon also occur in the area.

Over the past decade, populations of several species that were once in severe decline, including chinook salmon, striped bass, and sturgeon, have increased. Fall-run chinook salmon were recorded in 2005 at some of the highest levels ever, and winter and spring run

stocks also increased, though not to historic levels. Although these signs are positive, recent evidence indicates that populations of many important open-water fish species in the Bay/Delta are collapsing (Armor et al. 2006). Data collected within the last year suggest that delta smelt populations are at their lowest levels ever recorded. Juvenile striped bass populations have also fallen to the lowest levels recorded in California Department of Fish and Game surveys. In addition, a key food source for many fish species, planktonic copepods, have also decreased. The reasons for these declines are not currently known.

Pilot Plant Intake Issues

A desalination plant intake can entrain organisms into the system. Entrainment is the hydraulic capture of organisms by the suction field created by the water intake structure. The organisms involved are extremely small and potentially capable of passing through a fine mesh cylindrical fish screen. Of particular importance are early life stages of fish and fish eggs (ichthyoplankton). The special-status fish species described above such as salmon and steelhead would generally not be expected to have larval forms in the water column near the proposed pilot project site. These species would occur as either adults or juveniles, since spawning grounds for these species are well upstream. Nonetheless, entrainment of other larval fish and juveniles of delta smelt would be of concern for any intake in this area, particularly in light of the recent declines of several species as discussed above.

Approach

Operation of a pilot-scale test facility offers an opportunity to sample organisms entrained into the intake system and provides a basis for assessing the potential impacts of entrainment to local fish and invertebrate populations from pilot plant operation. Data on the relative densities and entrained volumes from a pilot plant can provide an assessment of the types of potential impacts from operation of a full-scale plant.

² An Overview of Seawater Intake Facilities for Seawater Desalination, the Future of Desalination in Texas, Volume 2 Biennial Report on Seawater Desalination, Texas Water Development Board, December 2004.

Because sensitive species such as delta smelt occur in this portion of Suisun Bay, the RDP proposes to test a Gunderboom MLES at the intake to minimize the potential for entrainment of ichthyoplankton (larval fish and eggs). The MLES would surround the intake with filter fabric designed to allow sufficient flow to the pilot plant. This could be implemented in the form of a panel system (filter fabric housed in rigid panels surrounding the intake) or a cartridge system (cylindrical filter fabric cartridges surrounding the intake). The specific system to be tested will be designed in association with Gunderboom, Inc.

The MLES has been shown in other parts of the country to exclude most ichthyoplankton. This pilot study would test the efficacy of this system in excluding ichthyoplankton in Suisun Bay. In conjunction with the MLES system, limited ichthyoplankton sampling would be conducted twice during the year (winter and summer). In addition, the site-specific operation and maintenance (O&M) parameters of this system are unknown and would need to be tested to determine the costs of using such a system in this location. For example, sediment can clog the pores of fabric, and periodic cleaning (using an airburst or other method) may be needed. Methods and frequency of cleaning would be tested.

Objectives of the intake investigations include the following:

- Verify that numbers of entrained organisms would be low with the MLES.
- Test the O&M procedures for the MLES to determine operational parameters, costs, and required maintenance and maintenance frequency.

Methods

Potential entrainment impacts will be assessed using established models,³ including

³ ASA Analysis & Communications and Strand 2003; Tenera 2000; DOER 1998; Wainwright et al. 1992; and others.

Equivalent Adult Loss models, Fecundity Hindcast models, and an Empirical Transport model. These methods estimate the percentage of the population vulnerable to entrainment based on assumptions regarding the spatial distribution of species densities, tidal and hydrodynamic conditions (current patterns and velocities, etc.) in the source waters, and the age and growth rates of selected species inhabiting the estuary.

Gunderboom, Inc. will be consulted regarding MLES design and maintenance methods and frequencies. Testing will include periodic inspections, varied cleaning frequencies, and measurement of head loss on both sides of the MLES fabric.

The design, sampling, data analysis, and reporting of the intake investigation are described in greater detail in Section 4.0.

2.2 Methods to Maximize Plant Efficiency

Salinity and suspended sediment concentrations in the source water have significant seasonal variations. For that reason, it is extremely important to test various pretreatment and RO processes to determine which combination will work best in this environment. **Figure 1** shows the seasonal variability in salinity near the project location. Salinity can vary from low (< 1 part per thousand [ppt]) to over 10 ppt. The RDP will operate only when the salinity is greater than 1 ppt. The suspended sediment concentration also varies from “typical” values of 50 milligrams per liter (mg/L) or less up to almost 200 mg/L during storms or high winds. **Figure 2** shows the measured suspended sediment data from 1997 to 2000.

2.2.1 Pretreatment Process

Pretreatment is the conditioning of source water to preserve RO membrane integrity and minimize maintenance on desalting equipment. Fouling of membranes by colloidal organic and inorganic particles is the most common problem that disrupts stable continuous operation of a seawater RO system. Therefore, performance and

effectiveness of pretreatment is critical to optimizing plant operation. Poor pretreatment will result in increased power consumption, increased membrane maintenance, reduced membrane life, and increased in capital and operation costs. The capital and operating cost of a membrane pretreatment system can be 50 percent of the overall desalination plant. For these reasons, it is important to study pretreatment processes before the full-scale plant is constructed.

Various pretreatment processes using microfiltration (MF) will be tested to determine which pretreatment process is most appropriate for brackish RO for the proposed RDP.

Pretreatment Process Selection

Marin Municipal Water District (MMWD) operates an RO desalination pilot plant with an intake in the San Francisco Bay. Preliminary results indicate that pretreatment with membrane filtration is more effective than conventional filtration methods (i.e., sand and other media filters). The proposed RDP pilot study site has fairly similar source water characteristics to the MMWD pilot site. Therefore, it is relevant to test membrane filtration at the RDP pilot site. CCWD operates a conventional treatment process at the Bollman Water Treatment Plant, which could be compared with membrane filtration from the RDP pilot site.

High suspended and dissolved solids concentrations constitute the main pretreatment challenge. In addition, some particulate matter can be so small that MF filtration alone is not sufficient to protect the RO membranes. Therefore, additional steps prior to membrane filtration may be required and will be tested. Pre-membrane filtration processes, such as flocculation and coagulation, will be considered in the pretreatment train. These unit processes will increase water clarity and hence allow operation of MF systems at higher fluxes. The study will compare the additional capital costs

of flocculation/coagulation and clarification versus the reduced operational cost of the MF at higher fluxes and the O&M savings from reduced MF cleaning frequency that clarification could provide.

Pretreatment Process Description

Pretreatment processes that will be evaluated are shown in **Figure 3** (Pilot Plant Schematic). The RO pretreatment will test two types of membrane filters each combined with two pre-filtration options resulting in four pretreatment combinations, operated in parallel, to assess seasonal variability in suspended solids. This set-up will provide flexibility for testing various pre-filtration unit processes on different membrane types and systems (i.e., submerged versus pressurized, described below).

Process 1: Direct MF Filtration. No chemicals are added and brackish water is directly filtered by the MF membranes. This process is likely to have more fouling and require more maintenance of MF membranes than Process 2.

Process 2: Flocculation/Coagulation and MF Filtration. Coagulation and flocculation are common unit processes used in water treatment. Coagulation involves the addition of chemicals (e.g., ferric chloride or polyaluminium chlorohydrate) during relatively intense mixing to destabilize naturally occurring particles and macromolecules and/or to precipitate additional particles. In flocculation, a period of less intense mixing is used to promote the aggregation of destabilized particles into larger flocs. During coagulation and flocculation, various dissolved ions and molecules may be adsorbed by particles or may be precipitated, depending on the type and concentration of species considered and on the overall solution chemistry. Solids/flocs created are removed by MF membranes. Flocculation/coagulation allows operation of MF systems at higher fluxes and recoveries by reducing the colloids fouling rate of

membranes because flocs are larger than the membrane pores (i.e., 0.1 microns). Additionally, it potentially reduces quantities of organics in the filtrate, reducing biological fouling of the RO membrane.

Microfiltration

There are two types of membrane filtration systems: submerged and pressurized.

In submerged systems, membranes are dropped in large concrete basins and suction is applied to force water from outside of the membrane to the inside. Filtered water is then collected from the inside of the fibers. It is a simple design that reduces the footprint requirement (more membrane area per footprint) and requires less peripheral equipment (i.e. valves, pipes, etc.) than pressurized systems. MMWD's pilot uses a submerged membrane process.

An example of a submerged system is the US Filter/Memcor CMF-S submerged MF unit.

A pressurized system is a skid-mounted system where a feed pump forces brackish water through the membranes and filtered water is collected on the outside. In the past, pressurized systems were not recommended for large-scale facilities for economical reasons, mainly due to the complexity created by the piping and large number of valves and skids, as well as lower membrane surface area to footprint ratio. These systems have more head loss but higher flux rate. However, developments in membrane engineering have made pressurized systems competitive with submerged systems.

An example of a pressurized system is the US Filter/Memcor CMF-L pressurized MF unit.

Both submerged and pressurized MF will be tested at the proposed pilot plant. Final selection of MF systems will be made during the pilot plant design phase. Systems being considered are from manufacturers such as US Filter/Memcor, Zenon, and Pall. All systems will have polyvinylidene difluoride membranes.

Pretreatment Evaluation

The most important parameters to be measured in the feedwater and pretreated water will be those that provide information on pretreatment process effectiveness and performance or that are needed to provide feedback to the operating parameters of the pretreatment system (e.g., flocculant dose). Because of the flexibility of the pilot plant given by two pre-filtration options, two MF membranes, and three RO membranes, numerous scenarios will be evaluated.

- System effectiveness (water treatment quality): Feedwater characteristics will be monitored. Requirements for RO are removal of particles with diameter greater than 10 μm , low turbidity of less than 0.1 NTU, and silt density index (SDI) less than 3. MF has a SDI less than 3. Water quality parameters that will be monitored on-line or by grab samples include, but are not limited to turbidity, SDI, temperature, total organic content, total suspended sediments, and pH.
- System performance: The system performance will be based on optimizing the flux rate and recovery while minimizing fouling and the frequency of maintenance operations. Samples throughout the treatment process will be analyzed for parameters needed to assess the performance of the pretreatment and RO systems. The system performance will be evaluated over various feedwater and operating conditions (i.e. fouling rate, flux rate, recovery rate, etc.). The evaluation will measure the effects of flux rates, recovery and cleaning on the capital cost and operating cost.
- System capital and operating costs: While one pretreatment alternative may be less expensive than another, the pilot may demonstrate that a more expensive pretreatment process that improves productivity of the RO system will have the lowest overall present-value costs.

- MF maintenance: Maintenance operations will depend on the MF systems selected. Generally, the membranes are cleaned by physical backwash that forces particulates out of the membrane pores and away from membrane surfaces. Depending on the source water and the system operation, the backwash may occur every 20 minutes to every few hours. To reduce the backwash frequency and the fouling rate, cleaning chemicals can be added to the backwash water. The membranes are then soaked for a short period before being backwashed. Backwash operations are fully automated. Over time, the physical or chemical backwash will not be sufficient, and a clean in place (CIP) operation will be necessary. CIP frequency can vary from 10 days to several months. The objective is to reduce the frequency and time of maintenance operations while maximizing the recovery.

2.2.2 RO Process

Three different RO membranes will be tested in the pilot plant. Initial selections will be made based on an evaluation of membranes available from a number of manufacturers such as FilmTEC, Toray, Hydranautics, and Koch. The goal of the analysis is to select appropriate membranes for Estuary feedwater quality that result in the highest production and permeate water quality at minimal energy input.

Three RO systems will be operated in parallel. The combined filtrate from the pretreatment systems will be used to feed each membrane array so all membranes will have the same quality feedwater.

A custom RO pilot system will be designed and built for this project. The system will consist of parallel arrays, each capable of simulating a full-scale system. Each array will consist of cartridge filtration, chemical injection points for antiscalant, pH adjustment, and bisulfite injection. A high-pressure feed pump will generate the necessary flow and

pressure to test the RO elements under all conditions. A pressure regulator and flow meter will be installed on the front end of each RO array to ensure that each array has the same transmembrane pressure. The pilot will include all instrumentation and controls necessary for continuous monitoring of flow rates, pressure, SDI, conductivity, temperature, and pH. A programmable logic controller (PLC)-based control system in conjunction with an onboard industrial computer will allow automatic and continuous recording of all data points.

Pressure at the upstream end of each array will be used as a surrogate for energy use. The results of the pilot study will be presented in terms of pressure versus membrane flux.

3.0 STATEMENT OF WORK, PART 3: Project Readiness, Feasibility, and Environmental Mitigations and Benefits – Selection Criterion III (20 Pts)

3.1 Project Readiness and Feasibility

EBMUD, SFPUC, SCVWD, and CCWD have a long history of working together. SFPUC and EBMUD have partnered with the City of Hayward to construct new facilities to allow up to 30 MGD of water to be shared among these systems in the San Lorenzo / Hayward area. A 40 MGD emergency intertie exists between SFPUC and SCVWD in the vicinity of the City of Milpitas and can transfer water between the two systems. A new 100 MGD facility is being developed as part of the EBMUD Freeport project to allow transfer of water from the EBMUD system into the CCWD system. Other such interties also exist among the partners.

In 2003, the partners entered into an MOU to explore the initial pre-feasibility of the RDP. In October 2003, the partners completed a Phase 1 Pre-Feasibility Study that included a permit reconnaissance, evaluation of product water quality from desalination, and a siting study. The siting study included an assessment of site-specific feedwater quality and review

of permitting, water rights, and environmental justice issues. The study resulted in the short-listing of three of 21 potential sites considered. In June 2004, the partners entered into a second (Phase 2) MOU to continue the development of the RDP. Phase 2 has been completed.

The partners are preparing a Feasibility Study for the project. Elements of the Feasibility Study include development of an institutional agreement for implementation of the RDP, assessment of site and infrastructure options of the three short-listed sites, preparation of a preliminary site layout for the top-ranked site, preparation of a detailed scope of environmental analysis for the preferred alternative, public outreach, and preparation of the Feasibility Study report. A framework for the institutional agreement has been prepared. Nine operational scenarios were developed for the three top sites that would be able to achieve the goals of the RDP. The three top sites were further examined for physical or environmental constraints and for existing infrastructure (water pipelines, canals, pump stations, interties, etc.) to determine limitations and evaluate new infrastructure needs. Based on these evaluations, the nine operational scenarios were revised and reduced to five. Cost estimates were calculated for producing desalinated product water for each of the five scenarios. These five operation scenarios were then subjected to a rigorous ranking evaluation by the partners that resulted in a preferred site and operational scenario. The top-ranked scenario is to construct and operate a 65 MGD desalination plant at an East Contra Costa site in the vicinity of the Pittsburg, California. Three technical memoranda documenting key aspects of the Feasibility Study work date are included in **Attachment 3**.

While the Feasibility Study results are being finalized and documented, the next step toward developing the RDP is the development of a pilot project.

Having expended significant time and resources on the Pre-Feasibility Study and Feasibility Study portions of the RDP, the partners have demonstrated their commitment to a regional approach in pursuing desalination in the Bay Area. In addition to having fewer adverse impacts associated with the construction of multiple desalination plants, a regional project also provides regional socioeconomic benefits during times of emergency.

3.2 Environmental Mitigation and Benefits

Development of desalination plants raises a number of important environmental issues. By developing a centralized regional project, the RDP would minimize the footprint of desalination plants along the coastline and reduce potential environmental impacts. In addition, substantial cost savings are associated with multiple agencies pooling their resources to develop a single project.

Throughout the project development process, the partners will coordinate with other agencies in the region including the DDSD and the MMWD so that information sharing is maximized and potential project linkages may be identified. Schedules will be coordinated so that data from these projects can also be used in preparation for the RDP. By coordinating with other projects and incorporating their findings as appropriate, the RDP is likely to avoid redundancies and possible environmental impacts.

The proposed RDP pilot plant would be developed specifically to avoid or minimize environmental impacts. The intake structure would be surrounded by a Gunderboom MLES to minimize the potential entrainment of special-status fish larvae such as Delta smelt. Brine from the desalination process would be recombined with product water prior to discharge into the source water downstream of the intake so the salinity would be the same as the receiving water.

3.2 Environmental Documentation / Permitting and Health and Safety

The proposed pilot plant will require compliance with numerous environmental regulations. For environmental review under the California Environmental Quality Act (CEQA), the project would likely qualify for a Categorical Exemption under Class 6, Information Collection, provided it can be demonstrated that the project would not have a significant effect on the environment. To demonstrate this, a CEQA Environmental Checklist will be completed. If the checklist reveals that a significant impact may occur, then mitigation will be recommended and a Mitigated Negative Declaration will be prepared. Section 401 of the Clean Water Act (CWA) will require the project to obtain a National Pollutant Discharge Elimination System (NPDES) permit and water quality certification from the Regional Water Quality Control Board (RWQCB) to discharge brine into the Delta. A permit from the U.S. Army Corps of Engineers will be needed to comply with CWA Section 404. Also, the project may require a permit from the Bay Conservation and Development Commission (BCDC). These permits will be applied for once the environmental document is complete.

A detailed schedule for the permitting activities is included in the overall project schedule provided in **Table 1**.

A Health and Safety Plan will be developed for the pilot plant project that will provide a safe work environment for employees and comply with applicable occupational health and safety laws and regulations. The Health and Safety Plan will include such items as a list of the nearest police and fire stations, medical facilities, and hospital. It will identify applicable Safety Management Standards and required training and qualifications of personnel. Personal protective equipment will also be identified.

4.0 STATEMENT OF WORK, PART 4: Project Tasks, Deliverables, Monitoring, and Assessment – Selection Criterion IV (15 Pts)

The scope of the pilot study is described in this section. A detailed schedule is provided in **Table 1** that includes project deliverables and due dates as well as projected costs for each task. To meet the goals and objectives listed in Section 1.2, the following tasks will be performed.

4.1 Establish Governing Body

The partners would establish an organizational structure such as a JPA or MOU to govern the construction, operation, and maintenance of the pilot project. A JPA is a consolidation of two or more public entities with common powers for the purpose of acquiring or constructing a joint-use facility. A JPA would have public agency status. An MOU is an approved written agreement of a non-contractual, non-legally binding nature between two or more parties, in this case the partners, that would document an intent by all partners to cooperate in the RDP project undertaking.

4.2 Design and Test Intake System

The proposed intake system will consist of an intake screen surrounded by a Gunterboom MLES to minimize the entrainment of marine organisms. Inside the MLES, a wedge wire intake screen will be installed as a backup marine life exclusion system. The system will be installed such that the velocities at the screens will be similar to those expected during the full-scale facility.

4.2.1 Task 1: Biological Sampling

Entrainment sampling from the pilot plant intake will be conducted in the day and night during two seasons over a period of one year (four sampling events). Entrained fish eggs and larvae will be sampled by diverting water from the intake pipe, downstream of the positive barrier fish screen, into entrainment abundance sampling equipment. The diverted

intake water will be discharged into a 363- μ m mesh plankton net. Sample volume and flow rate will be recorded by a flow meter installed within the seawater intake line.

Source water sampling will be conducted four times during the study, concurrent with the intake entrainment sampling. This source water sampling will provide data to be used for the empirical transport modeling and proportional entrainment estimates.

The protocols for collecting plankton samples during the entrainment study are designed to provide useful data on vulnerability of different species and sizes of ichthyoplankton to entrainment through the MLES. The protocols also serve to reduce damage to organisms during sampling to facilitate taxonomic identification and processing.

Numbers of each species entrained into the intake system during operation of the pilot plant and predicted entrainment assuming full-scale plant operations, with 95 percent confidence bounds, will be presented based on the entrainment sampling results. The results will also include the calculation of equivalent adult losses, fecundity hindcast estimates, and the empirical transport model calculations of proportional entrainment impacts to local populations. The analytical methods, assumptions, and data used in assessing entrainment impacts for both the pilot and full-scale desalination plant operations will be documented in a technical report.

4.2.2 Task 2: Gunderboom Testing

The site-specific O&M procedures for the Gunderboom MLES system will also be tested to determine the most effective operational parameters, costs, required maintenance, and maintenance frequency. This testing will include exploration of alternate fabric cleaning methods, changing the frequency of cleaning to determine the appropriate schedule, and estimating potential monthly and annual costs for O&M of the MLES system.

4.3 Design and Test Pretreatment System

An array of pretreatment systems will be tested to evaluate the effectiveness and cost benefits of submerged membrane filtration vs. pressurized membrane filtration pretreatment on RO productivity.

Pretreatment is necessary to reduce fouling of membranes by colloidal organic and inorganic particles and promote stable and continuous operation of RO systems. The level of treatment required before filtration in estuarine environments with relatively high sediment loads needs further study. For these reasons, the pilot study will test different levels of conventional treatment in front of a membrane filtration system. The pilot study will be designed to provide a side-by-side comparison of MF filtration in association with flocculation and coagulation and the effect of each on RO productivity. This task will consist of the following subtasks.

4.3.1 Task 1: Operation of the Pretreatment System

Various flux and recovery rates for both the pretreatment and RO systems will be evaluated during the course of the study to determine their effects on water productivity, water quality, capital and operating costs, and cleaning frequencies including determining the critical flux, i.e., the highest sustainable flux at which no membrane fouling occurs.

All operating data will be compiled, interpreted, and analyzed daily. Compiled data and status information will be summarized monthly.

4.3.2 Task 2: Testing

Water quality will be tested at each step of the process to determine the effectiveness of each part of the treatment system. Raw feedwater and product water will be tested for a full range of constituents to determine the removal efficiency for each constituent.

The quality of the pretreatment residuals will be measured to identify options for handling and disposal of the residuals that would occur

under the full-scale system. The final brine will be tested for both chemistry and toxicity.

The following subtasks will be conducted.

Plan Preparation

To ensure high-quality data that meet the project objectives, a Monitoring Plan and a Quality Assurance Plan (QAP) will be prepared at the outset of the project before the pilot plant starts operation, and will include standardized methods and quality specifications for the sampling, analysis, and data review procedures for the monitoring program. **Table 2** summarizes the anticipated frequency and scope of the monitoring program.

Water Quality Monitoring Design

Indicator parameters are those that are expected to change on a short-term basis (e.g., see **Figure 2** for TSS) or are critical for system control and operation. These parameters will be monitored at key locations in the pilot RO system using on-line meters (e.g., flow, pressure, temperature, electrical conductance, turbidity). Grab samples will be collected on a daily, weekly, or biweekly basis for indicator parameters that are not easily monitored using meters (e.g. TSS, SDI, TOC, DOC) and used to establish correlations or provide specific data on the effect a process operation on a given parameter. RO product water quality will be compared to all of the agencies' water quality in order to assess post-treatment requirements to assure compatibility with other existing sources.

4.3.3 Task 3: Pretreatment Evaluation

The primary objective of the pretreatment system is to remove suspended and dissolved matter that could clog the RO system membranes. On-line turbidity measurements will be made of the raw water and after the pretreatment process to provide continual data for process characterization. Additional parameters such as turbidity and electrical conductivity will also be monitored continuously. To determine appropriate

handling and disposal practices for the full-scale residual, the residual waste will be characterized.

4.4 Design and Test RO System

The following subtasks will be conducted to test RO system operation.

4.4.1 Task 1: Evaluation of RO Productivity and Quality

Three RO systems will be operated in parallel. The combined filtrate from the pretreatment systems will be used to feed each array to ensure that each RO membrane receives the same quality of water. Transmembrane pressures and flux rates will be measured. This will allow the comparison of energy requirements by flux rate.

A range of flux and recovery rates for RO system will be evaluated during the course of the study to determine their effects on water productivity, water quality, capital and operating costs, and cleaning frequencies including determining the critical flux, i.e., the highest sustainable flux at which no membrane fouling occurs.

All operating data will be compiled, interpreted, and analyzed daily. Compiled data and status information will be summarized monthly.

4.4.2 Task 2: Finished Water Compatibility Analysis

As water is transported through a distribution system, physical, chemical, and microbiological transformations may occur.

Finished water from new systems must be similar in nature to existing sources of supply to mitigate the potential deleterious effects of mixing in the distribution system. For the RDP the product water from the desalination project could be delivered to EBMUD's Mokolumne Aqueduct, which contains high-quality Sierra Nevada Mountain runoff; the CCWD canal, which contains lower quality San Joaquin River water; or CCWD's multi-purpose pipeline, which contains treated water. Bench-scale testing will be conducted

of various post-treatment alternatives that can produce a finished water that is chemically similar to EBMUD or CCWD water.

4.4.3 Task 3: Testing

A two-tier system for monitoring will be used (**Table 3**). Tier 1 provides the minimum data required to achieve the program objectives. Tier 2 provides for additional data that will depend on the results of the Tier 1 program. Tier 2 testing will be implemented if program objectives are not met.

Water Quality Monitoring Design

The water quality monitoring design would be identical to that described in Section 4.3.2.

Brine Toxicity Testing

Brine toxicity will be assessed using the most current U.S. Environmental Protection Agency–approved methods in 40 Code of Federal Regulations Part 136. A screening survey to determine the most sensitive species will be conducted using three sets of bioassay tests on three species: a fish, an invertebrate, and an aquatic plant. Each bioassay shall, at a minimum, be performed using a dilution series of RO brine and laboratory control water. Continued testing will be conducted for the most sensitive species for the duration of the pilot plant operation.

4.5 Scale Up Pilot Plant Findings

4.5.1 Scalability (Hydraulic and Performance Effects)

Both RO and microfiltration pilot plants use membrane elements constructed of the same material and the same configuration as the full-scale systems. This provides excellent correlation between the basic performance parameters (e.g., transmembrane pressure, rejection characteristics, fouling tendencies) of the pilot unit compared to the full-scale system. However, a few items are less representative (e.g., pump efficiencies, valve operation). Pilot data for the equipment that is not scalable such as pump and motor efficiencies will not be used for projecting full-scale performance. Instead, equipment

literature (pump and motor curves/data, full-scale energy recovery data such as case studies and data) will be reviewed based on the pilot-demonstrated flows and pressures.

4.5.2 Capital and Operational Costs Analysis

After the pilot test term is complete and several potential operating schemes are identified, the options will be compared in terms of capital and operational costs. In addition, data from the pilot test allows the design of the RO membrane arrays to be less conservative, which can impact footprint (building size and seismic concerns), capital investment (based on proposed flux, recovery, and number of passes), and power costs (energy associated with varying flux, recovery, passes).

The proposed facility will use a number of chemicals for pretreatment (coagulant filter aids [polymers], cleaners, and disinfectants) and for the RO process and post-treatment (acid, antiscalant, cleaners, alkalinity recovery, pH adjustment, disinfectants [chlorine/ammonia], corrosion inhibitor, etc). The pilot effort will allow the opportunity to estimate the chemical usages required and thus size the chemical feed equipment accordingly to include storage tanks, spill containment, and other ancillary equipment.

4.5.3 Post-Treatment Requirements

The RO permeate chemistry will be evaluated using desktop models and bench tests to estimate the required chemical dosages for alkalinity and/or pH adjustment and for corrosion control. Bench tests will include different ratios of post-treated permeate with water from the various potential distribution systems (CCWD, EBMUD). Estimates of the types and amounts of chemicals required will be used to create preliminary size and cost estimates for the chemical feed requirements of the full-scale facility.

4.5.4 Residuals Disposal

A significant capital and operational cost of the full-scale facility will be the disposal of

pretreatment residuals. Suisun Bay can have high suspended solids concentrations that must be removed prior to RO treatment. The efficacy of dewatering using gravity thickening, centrifuges, and belt presses will be determined using bench scale testing and by analysis of dewatering capability by equipment manufacturers (such as belt press and centrifuge manufacturers).

Further discussions with the entities that may ultimately receive residual disposal (e.g., landfills) will help determine the level of treatment/dewatering required and thus the selected full-scale alternative.

4.6 Conduct Public Outreach

The public outreach program will consist of outreach coordination, public workshops, pilot site tours, fact sheets, a web page, media releases, and speaker engagements/briefings. These tasks are described in Section 5.0, below. Any information gathered during the public outreach program will be incorporated into the Final Pilot Project Engineering Report, as appropriate.

4.7 Prepare Reports and Presentations

The following deliverables will be prepared as part of the pilot study:

- Pilot Study Protocol and Workplan
- Draft and Final Monitoring Plan and QAP
- Quarterly Laboratory Reports and Technical Memoranda
- Annual Report
- Draft and Final Pilot Project Engineering Report

The Pilot Plant Engineering Report will include the results of the pilot plant optimization and testing, results of the public outreach program, and recommendations on process selection and operating parameters for the proposed full-scale desalination facility.

Optimization and testing summaries will address pretreatment process characterization and effectiveness, pretreatment evaluation, overall system effectiveness, pretreatment

residual characterization, and waste discharge characterization.

All data collected during the operational phase of the project will be incorporated into the monthly operation reports and the Final Engineering Report. These reports, as well as quarterly and annual reports, will be submitted to DWR.

5.0 OUTREACH, INFORMATION SHARING, AND ENVIRONMENTAL JUSTICE – Selection Criterion V (10 Pts)

5.1 Public Outreach

The partners have been developing the RDP since 2003 and have made information on the project available to the public through their websites and water management plans. As part of the ongoing Feasibility Study, the partners will be making additional information available to the public and soliciting feedback. As part of this process, local groups and organizations that have potential interest in the project will be identified.

As part of the pilot-testing program, a public outreach program will be developed to introduce, showcase, and inform the public and the media on the technology and quality of desalinated water. Strategies will be developed to educate a public that comes from widely varied perspectives and backgrounds. Primary strategies may include a series of public workshops, guided tours for the public and elected officials, on-site fact sheets, a web-based interactive project site, media releases, in addition to speaking engagements for specific groups.

The public outreach plan must be multifaceted to reach a wide audience. Therefore, an outreach plan will be developed at the beginning of the project to help guide project outreach activities. The specific tasks that will be performed as part of the public outreach include the following.

Outreach Coordination

This task will consist of planning and participating in ongoing agency coordination, managers' meetings and presentations and partner meetings. The partners will also identify a spokesperson for public outreach.

Public Workshops

A series of public workshops will be conducted to educate the public and media on desalination technology and desalinated water quality. The workshops will consist of presentations on treatment technology, system design, and environmental issues, project updates, as well as question and answer sessions.

Pilot Site Tours

On-site pilot project site tours by one of the design engineers will include discussions of the various stages of treatment and equipment, as well as an overview of any on-site signage, exhibits, and fact sheets. One tour will be held specifically for elected officials.

Fact Sheets

Color handouts will be prepared for pilot plant visitors. The handouts will include pilot plant design information, a description of the source water, and a description of what will be learned from the pilot study.

Web Page

A website will be created to describe the pilot project, explain desalination, and present visiting dates and times. Links to the website will be included on each partner's website.

Media Releases

The partners will develop and prepare media releases for distribution.

Speaker Engagements/Briefings

Partner agencies will provide speakers and prepare presentations for various interested groups. It is anticipated that at least three standard presentations will be developed for consistent use such that all the presentations create a unified message.

5.2 Environmental Justice

Environmental justice has been considered throughout the RDP development process. Environmental justice was one of the criteria by which some sites were eliminated during the pre-feasibility selection and screening process.

The proposed East Contra Costa site would be located in an unincorporated area of Contra Costa County that is designated and zoned for Industrial use. The desalination facility would be designed to be consistent with the character of the surrounding environment and will not adversely affect the viewshed. The neighborhoods that are within one mile of the project area include varying income levels and ethnic groups. Low-income and/or minority populations would not be disproportionately affected by the proposed project.

6.0 QUALIFICATIONS OF THE APPLICANTS AND COOPERATORS – Selection Criterion VI (10 Pts)

For over three years, EBMUD, SCVWD, CCWD, and SFPUC have been working together to develop the Bay Area RDP.

On the basis of the letters of commitment from each partner agency, EBMUD will serve as the applicant for this pilot study proposal. EBMUD has appointed a Contract Manager, Alex Coate, to oversee the contractual details of the pilot study. Mr. Coate will manage all day-to-day contractual issues with DWR, among partners, and with any consultants retained for the project. Consultants will be selected through a competitive bidding process. The Project Manager for the proposed pilot study will be Hossein Ashktorab of the SCVWD. Mr. Ashktorab will serve as the direct project contact with the DWR for the proposed pilot study. A technical advisory team, including representatives from each of the four partners, will provide input to the Project Manager and work directly with any consultants for the project.

An organizational chart demonstrating the roles of each of the partner representatives is provided below (**Figure 5**). Mr. Ashktorab's resume and biosketches for each of the individuals listed in the chart are provided in **Attachment 4**.

7.0 COSTS AND BENEFITS – Selection Criterion VII (10 Pts)

The project for which grant funding is being requested is a pilot study. Costs for the Non-State Share for this project will be funded equally among the four partners. It is anticipated that each partner will contribute approximately \$237,325 for the pilot project. Therefore, this project requires no other funding entities for the Non State Share and a financial model has not been developed. Cost estimates for labor, equipment, supplies, travel, and other project expenses are provided in Form C, below. Funding mechanisms for the full-scale RDP will be determined at a later date.

The proposed budget for this pilot study includes approximately \$765,000 in labor costs with approximately \$120,000 for agencies' staff and \$645,000 for consultant services. Travel constitutes only a small portion of the budget, approximately \$2,000, since the project will be done locally. A 10 percent contingency, which is approximately \$190,000, has been added to the budget. The remainder of the budget, approximately \$942,000, is for equipment purchase and rental and outside laboratory services. A breakdown of project costs by category, including State Share and Non State Share, is included in **Form C**.

As shown in **Table 1**, the proposed pilot study would have an estimated duration of approximately 15 months after contractor selection. It is anticipated that the majority of the budget would be expended within the first 12 months. During the final 3 months, it is estimated that approximately \$350,000 would be expended on pilot plant operation, testing, scale-up, and reporting. **Table 1** also provides estimated costs by task.

The proposed pilot study will provide a number of benefits to the partners and to the advancement of brackish water desalination in California. For the partners, the pilot study will provide a foundation for the development of a full-scale RDP, establishing the goals, measures, and criteria for future collaboration. It will allow the partners to develop the institutional arrangements and experience in collectively designing, constructing, and operating a small-scale desalination plant. The pilot study will enable the partners to test different pre-treatment methods and their compatibility with the RDP, identify technologies and methodologies that would minimize adverse environmental effects, and ensure that pretreatment sludge will meet sanitary landfill requirements for a full-scale facility.

In addition to the project-specific benefits, the RDP pilot study will have broader implications for the State. The study will provide estuarine water quality data for parameters such as salinity and sedimentation, for which data are currently very limited. The study will also provide information on the effectiveness of the new Gunderboom technology to minimize entrainment and impingement associated with intake for desalination projects. Furthermore, the study will make new data available on pretreatment methods and technologies.

The benefits described substantially outweigh the costs of the proposed RDP pilot study. By pooling their resources, the partners are able to reduce the capital outlay for each individual agency and obtain more information with broader regional benefits. Additionally, by reducing the potential footprint of desalination projects in the region through a regional facility, the agencies would reduce potential environmental impacts such as those associated with intakes, outfalls, and other infrastructure. The minimization of environmental effects represents a long-term cost savings for the region. The overall reduction of costs will ultimately benefit consumers in the region and provide long-term cost benefits.

FORM C PROJECT COSTS (BUDGET)

Provide a brief explanation for the labor costs (including consultants), equipment, supplies, and travel included in the budget. Complete only the lines that are applicable to your project. Provide information about the amount of cost sharing for each element as well as direct and indirect costs. This Table will be used as the project budget in the agreement, if selected for funding.

APPLICANT: East Bay Municipal Utility District

PROJECT TITLE: Bay Area Regional Desalination Project

	Budget Category (I)	Non State Share (II)	State Share (Grant) (III)	Total Project Costs (IV)=(II+III)
(a)	Administration			
	Salaries, wages	\$21,330	\$21,330	\$42,660
	Fringe benefits	\$6,030	\$6,030	\$12,060
	Supplies	\$900	\$900	\$1,800
	Equipment	NA	NA	NA
	Consulting services	\$7,425	\$7,425	\$14,850
	Travel	\$900	\$900	\$1,800
(b)	Planning/Design/Engineering	\$11,250	\$11,250	\$22,500
(c)	Equipment Purchases/Rentals/Rebates/Vouchers	\$360,000	\$360,000	\$720,000
(d)	Materials/Installation/Implementation	Included in (c)	Included in (c)	Included in (c)
(e)	Implementation Verification	\$58,500	\$58,500	\$117,000
(f)	Project Legal/License Fees	\$4,500	\$4,500	\$9,000
(g)	Structures	\$4,500	\$4,500	\$9,000
(h)	Land Purchase/Easement	\$9,000	\$9,000	\$18,000
(i)	Environmental Compliance/Mitigation/Enhancement	\$22,500	\$22,500	\$45,000
(j)	Construction	\$30,375	\$30,375	\$60,750
(k)	Other (Specify) Public Outreach	\$31,500	\$31,500	\$31,500
(l)	Monitoring and Assessment	\$94,500	\$94,500	\$189,000
(m)	Report Preparation	\$94,500	\$94,500	\$31,500
(n)	SUBTOTAL (a+ ... +m)	\$663,210	\$663,210	\$1,326,420
(o)	Overhead	\$191,160	\$191,160	\$382,320
(p)	Contingency (specify % used) - 10%	\$94,930	\$94,930	\$189,860
(q)	TOTAL (n + o + p)	\$949,300	\$949,300	\$1,898,600

Tables

**Table 1 - BAY AREA REGIONAL DESALINATION PROJECT
PILOT STUDY SCHEDULE**

ID	Task Name	Duration	Start	Finish	3rd Quarter				4th Quarter			1st Quarter			2nd Quarter			3rd Quarter			4th Quarter			1st Quarter	
					Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb
1	Contractor Selection	60 days	Mon 6/12/06	Fri 9/1/06	[Summary Bar]																				
2	Solicit Proposals from Contractors	30 days	Mon 6/12/06	Fri 7/21/06	[Task Bar]																				
3	Evaluate Proposals and Select Contractor	30 days	Mon 7/24/06	Fri 9/1/06			[Task Bar]																		
4																									
5	Program Development/Permitting (\$191,000)	101 days	Mon 10/2/06	Mon 2/19/07					[Summary Bar]																
6	Kickoff Meeting with Contractor	1 day	Mon 10/2/06	Mon 10/2/06																					
7	Draft Work Plan	6 days	Fri 10/13/06	Fri 10/20/06																					
8	Meet with Agencies to Discuss Permitting	1 day	Mon 10/30/06	Mon 10/30/06																					
9	Conduct Permitting	75 days	Tue 10/31/06	Mon 2/12/07					[Task Bar]																
10	Final Work Plan	5 days	Tue 2/13/07	Mon 2/19/07																					
11																									
12	Construction (\$895,000)	55 days	Wed 2/21/07	Tue 5/8/07																					
13	Equipment Procurement/Layout/Specifications	15 days	Wed 2/21/07	Tue 3/13/07																					
14	Delivery of Equipment	20 days	Wed 3/14/07	Tue 4/10/07																					
15	Pilot Plant Construction	20 days	Wed 4/11/07	Tue 5/8/07																					
16																									
17	Operation (\$367,600)	156 days	Wed 5/9/07	Wed 12/12/07																					
18	Operator Training	10 days	Wed 5/9/07	Tue 5/22/07																					
19	Equipment Optimization	24 days	Wed 5/9/07	Mon 6/11/07																					
20	Pilot Plant Operation	130 days	Tue 6/12/07	Mon 12/10/07																					
21	Data Collection and Reporting	110 days	Thu 7/12/07	Wed 12/12/07																					
22	Monthly Operating Reports	110 days	Thu 7/12/07	Wed 12/12/07																					
29																									
30	Testing (\$249,000)	110 days	Thu 7/12/07	Wed 12/12/07																					
31	Water Quality Results	110 days	Thu 7/12/07	Wed 12/12/07																					
38	Biological Sampling	96 days	Wed 7/25/07	Wed 12/5/07																					
44																									
45	Scale-Up Pilot Plant Findings ((\$66,000)	20 days	Thu 12/13/07	Wed 1/9/08																					
46																									
47	Public Outreach (\$75,000)	119 days	Tue 7/3/07	Fri 12/14/07																					
48																									
49	Reporting (\$55,000)	305 days	Mon 11/13/06	Fri 1/11/08																					
50	Quarterly Reports	305 days	Mon 11/13/06	Fri 1/11/08																					
65	Annual Report	1 day	Fri 1/11/08	Fri 1/11/08																					

Project: Project1 Date: Thu 3/23/06	Task [Blue Box]	Progress [Black Bar]	Summary [Black Bar]	External Tasks [Grey Bar]	Deadline [Green Arrow]
	Split [Dotted Line]	Milestone [Black Diamond]	Project Summary [Grey Bar]	External Milestone [Black Diamond]	Deliverable [Black Diamond]

Table 2 – Summary of Tier 1 Testing Program

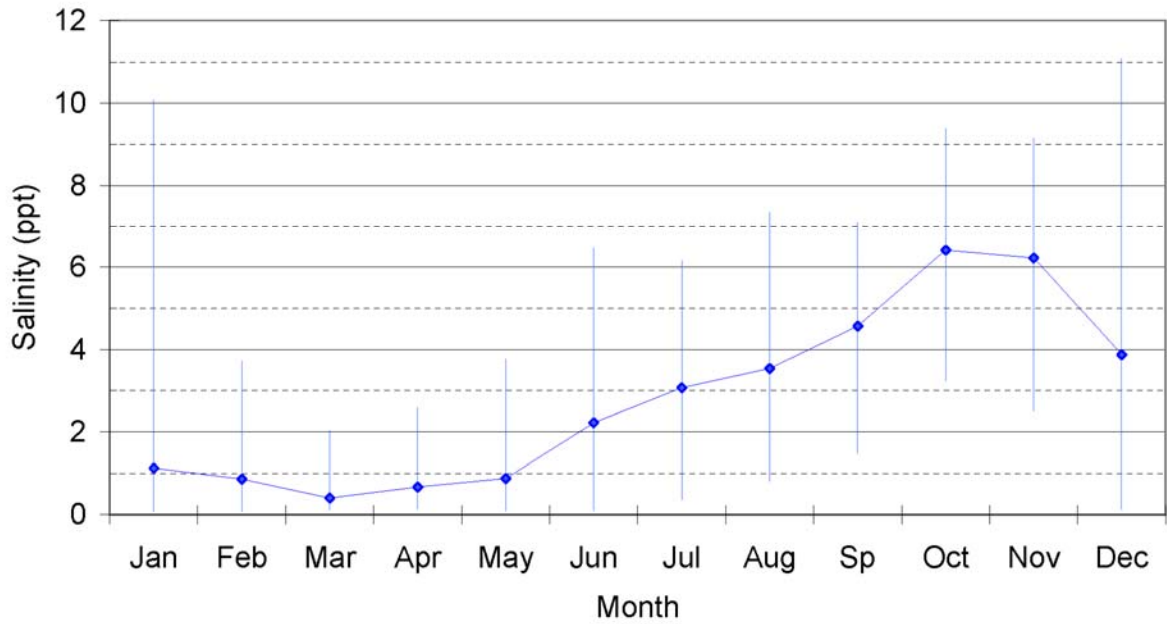
Testing Stream	Indicator Parameters	Standard Drinking Water Parameters	Standard NPDES Parameters	Landfill Parameters
Raw Feedwater	Daily, weekly/Continuously	Quarterly	Twice yearly	
Pretreated Water Systems	Daily, weekly/Continuously	Quarterly		
Pretreatment Residual				Twice

Table 3 – Two-Tier Monitoring System

Tier 1	Tier 2
Indicator and performance parameters will be monitored on a continual, daily, or weekly basis in raw water and pretreated water.	Troubleshooting tests may be conducted if fouling occurs in the RO membranes.
Standard drinking water parameters will be monitored once at all sample locations (raw water, pretreated water, and RO) after system start-up and stabilization. Thereafter, standard drinking water parameters will be monitored quarterly in the product water.	If drinking water standards are not met in the permeate for certain constituents, those constituents will be monitored on a quarterly basis.
Additional drinking water parameters will be monitored quarterly in the product water.	If certain constituents are detected in the permeate, those constituents will be monitored on a quarterly basis to determine whether removal occurs. They may also be monitored in the raw water and/or the pretreated water to determine concentrations prior to RO treatment.

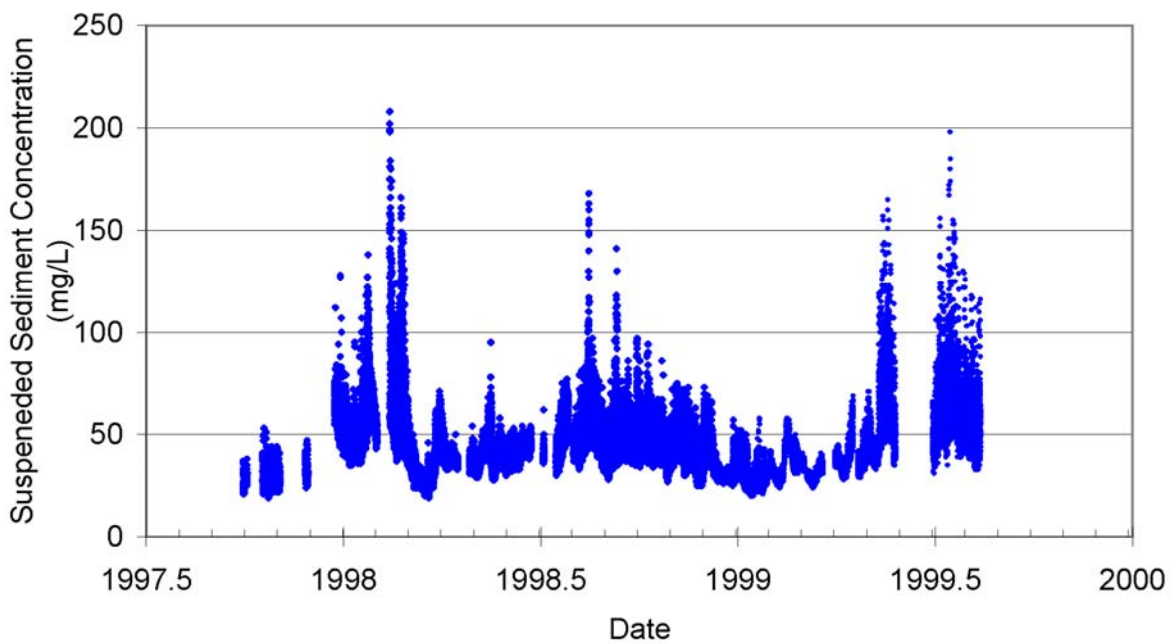
Figures

Figure 1 Variation in Salinity near Pilot Plant Location
(data for Pittsburg, CA for period May 2000 through January 2006)

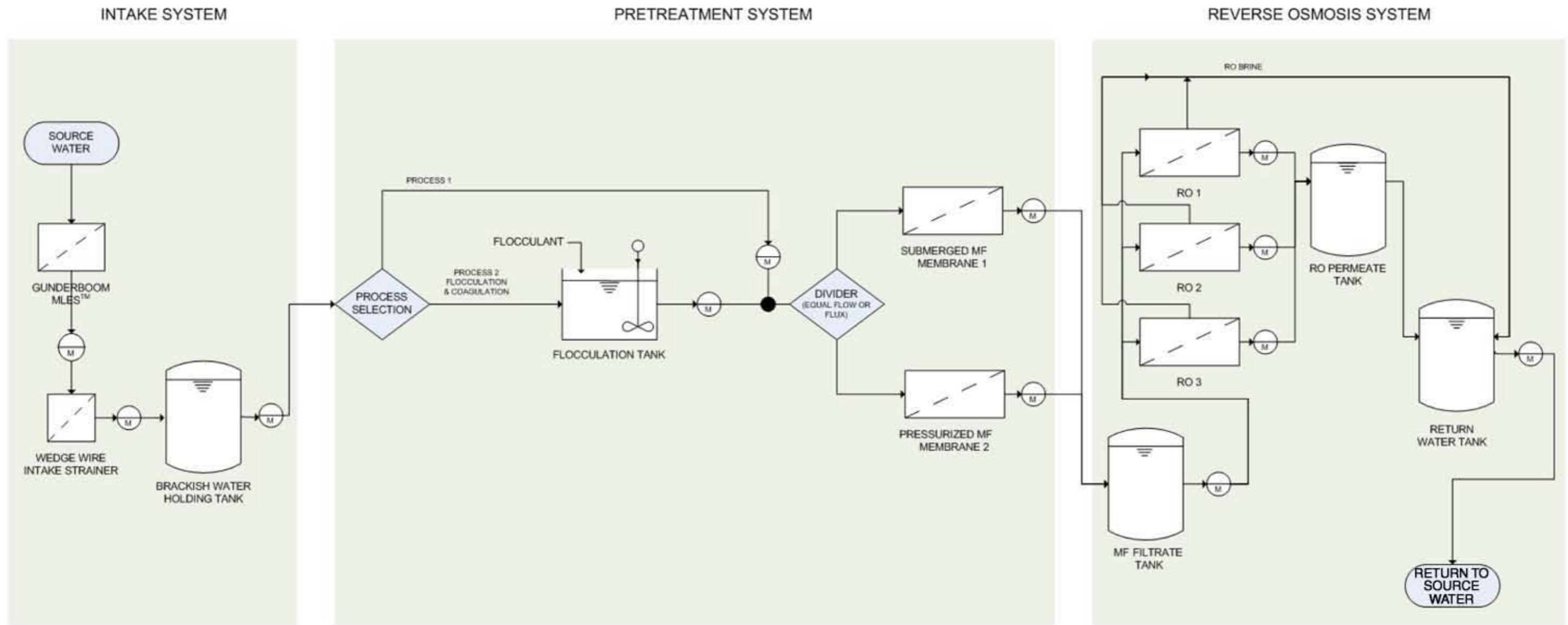


data from California Data Exchange Center (CDEC) (<http://cdec.water.ca.gov/>) for Station PTS

Figure 2 Suspended Sediment Concentration near Project Site



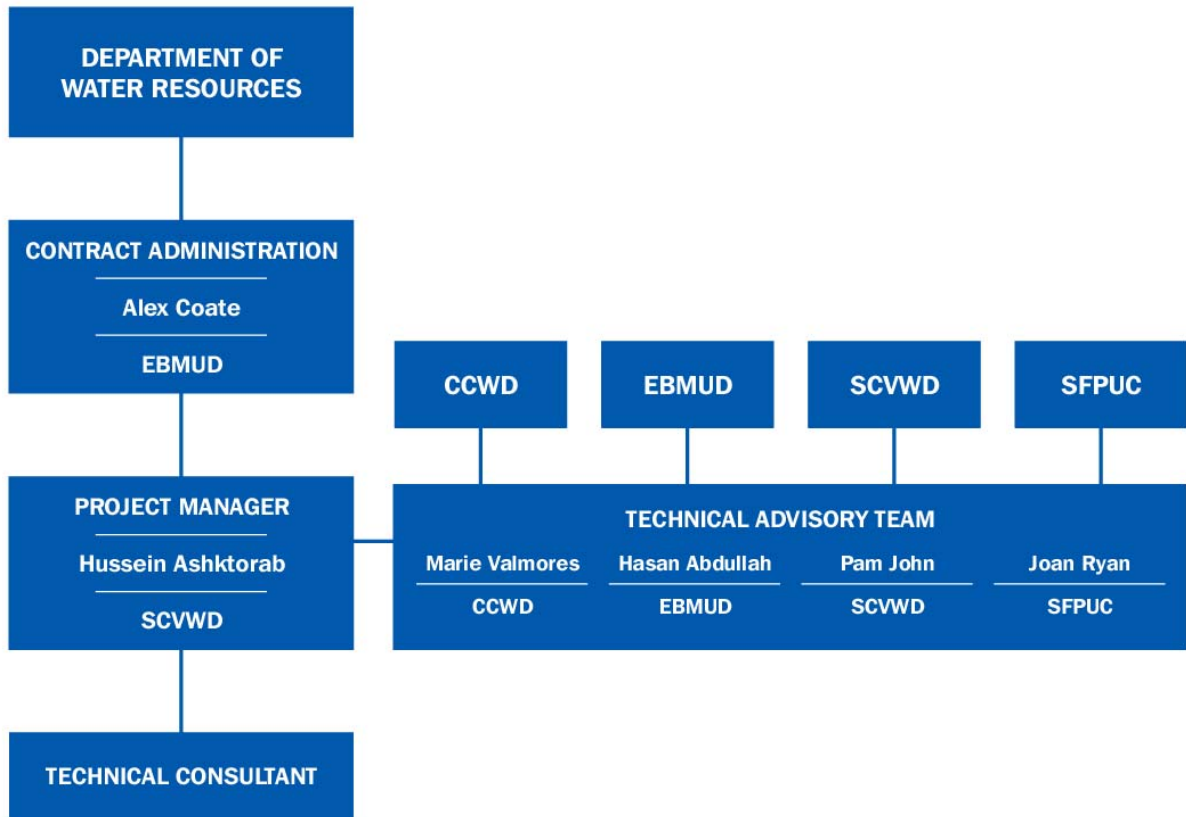
Data from USGS Mallard Island Sediment Station (http://sfbay.wr.usgs.gov/sediment/cont_monitoring/index.html)



Test parameters measurement point

Bay Area Regional Desalination Pilot Plant Project	Pilot Plant Schematic	Figure 3
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Figure 4 Bay Area Regional Desalination Project Pilot Study – Organization Chart



Attachment 1
Partner Agencies Conservation and Water Recycling Programs

EBMUD's Water Recycling Program						
<i>Project Title</i>	<i>Project Description</i>	<i>Current Annual Yield</i>	<i>Current Allocated Budget</i>	<i>Anticipated Annual Yield (Planned)</i>	<i>Future Allocated Budget (Planned)</i>	<i>Implementation Status</i>
Water Recycling Program (1993)	Incentives such as reduced rates and the provision of funds for retrofit costs for recycled water facilities. EBMUD also provides education and information sharing with the community.	8.5 MGD (5.9 for industrial processes and irrigation and 2.6 MGD for irrigation and industrial cooling)	\$13M (FY05)	14 MGD (by 2020) plus 5.9 MGD for industrial processes and irrigation at EBMUD's main wastewater treatment facility	\$20M (FY06)	Ongoing
SF Bay Area Regional Water Recycling Program	Regional long-range water resource management planning with 16 entities	NA				Ongoing
LEAD	Produce potable quality water from brackish source	0	Planning level, \$0.5M FY06	1.5 MGD	\$14.1	Ongoing

EBMUD's Water Conservation Program						
<i>Project Title</i>	<i>Project Description</i>	<i>Current Annual Yield</i>	<i>Current Allocated Budget</i>	<i>Anticipated Annual Yield (Planned)</i>	<i>Future Allocated Budget (Planned)</i>	<i>Implementation Status</i>
Water Conservation Master Plan (1994)	Comprehensive water-use efficiency program including water use surveys, incentives and rebates, irrigation reductions, education and outreach program, and technology research and development	18 MGD (20,000 acre-feet/year)	\$5M (FY05)	35 MGD by 2020	\$25M (FY06-10)	Ongoing

SFPUC's Water Recycling Program						
<i>Project Title</i>	<i>Project Description</i>	<i>Current Annual Yield</i>	<i>Current Allocated Budget</i>	<i>Anticipated Annual Yield (Planned)</i>	<i>Future Allocated Budget (Planned)</i>	<i>Implementation Status</i>
Westside San Francisco Recycled Water Projects	The SFPUC has developed a Recycled Water Master Plan and is working on developing recycled water projects on the Westside of San Francisco. The projects will provide recycled water to irrigate Golden Gate Park, Lincoln Park, Harding Park, the San Francisco Zoo, San Francisco State University, and other locations, as well as provide a supplemental water supply for Lake Merced. A number of these parks and golf courses were dual plumbed for recycled water during park upgrades over the last several years.	NA (future projects)	\$202M total budget	4.1–4.5 MGD (4,500–4,900 acre-feet/year).	Same as “ <i>Current Allocated Budget</i> ”	Planning Phase

SFPUC's Water Conservation Program						
<i>Project Title</i>	<i>Project Description</i>	<i>Current Annual Savings</i>	<i>Current Allocated Budget</i>	<i>Anticipated Annual Savings (Planned)</i>	<i>Future Allocated Budget (Planned)</i>	<i>Implementation Status</i>
Rebates	Provide rebates for a wide variety of water-using devices such as high-efficiency washers and toilets. Rebates are available to all customers – residential, commercial, and municipal – and are focused on promoting ultra-high-efficiency products such as dual-flush toilets and ultra-high-efficiency washing machines.	In the process of determining savings.	\$500,000		\$500,000	130% increase in number of rebates and 60% in ultra-high efficiency rebates over previous year. Currently expanding rebate types to include hospitality-specific devices such as connectionless steamers, etc.
Rinse & Save	Replace inefficient spray valves with 1.6 gpm models. Agency provides free valve and installation.	316 acre-feet/year	\$150,000		\$0	All valves in the SFPUC retail area have been replaced (over 2,000)
Water Saver	Market-based approach to conservation with contractors proposing programs and bidding on water-savings per acre-foot. Program		\$400,000	To be determined through bidding process.	\$500,000	Two-year program to begin in final quarter of FY05-06.

SFPUC's Water Conservation Program						
<i>Project Title</i>	<i>Project Description</i>	<i>Current Annual Savings</i>	<i>Current Allocated Budget</i>	<i>Anticipated Annual Savings (Planned)</i>	<i>Future Allocated Budget (Planned)</i>	<i>Implementation Status</i>
	is focused on top 20% of non-residential users.					
Cooling Tower Pilot	Participate in CUWCC program that provides rebates for conductivity and pH controllers for cooling towers.		\$100,000	To be determined		Begin 06/06
Unaccounted for water Project	Provide an accurate water balance, test various leak detection methodologies and implement and appropriate leak abatement program.		\$50,000 (another \$160,000 has been provided by the planning department)	Will depend on final results.		Currently fishing Phase I and beginning Phase II.
Audit program	Provide free water conservation audits to all commercial and residential customers with a specific focus on the top 20% users.					Ongoing – program in existence for over a decade.
Giveaways	Provide free aerators and showerheads to all customers.		\$40,000			Over 500 showerheads and aerators given in FY05-06
Total			Budget for all SFPUC retail conservation projects is \$1.7M			

SCVWD's Water Recycling Program						
<i>Project Title</i>	<i>Project Description</i>	<i>Current Annual Yield</i>	<i>Current Allocated Budget</i>	<i>Anticipated Annual Yield (Planned)</i>	<i>Future Allocated Budget (Planned)</i>	<i>Implementation Status</i>
Partnerships with Producers + reimbursement incentives for recycled water produced and used in Santa Clara county that offsets potable water + water quality improvement projects + capital infrastructure	Partnerships with South Bay Water Recycling, Sunnyvale Pollution Control Program, South County Regional Wastewater Authority & Palo Alto Regional Water Quality Control Plant	12,000 acre-feet/year	<p>SCVWD's 05-06 recycled water budget is \$4.5M for RW operations. Within the District's capital improvement budget, the following amounts are budgeted for recycled water capital projects:</p> <p>Santa Clara & South County RW Improvements - \$9M</p> <p>Silver Creek pipeline \$5.7M</p> <p>Advanced treatment - \$1M</p> <p>Couth County Short & Long Term Projects - \$3.224M in FY06 and \$16M total</p>	<p>Per the SCVWD's 2005 Urban Water Management Plan:</p> <p>Recycled water projections are 16,800 acre-feet/year by 2010,</p> <p>21,100 acre-feet/year by 2015 and</p> <p>25,000 acre-feet/year by 2020</p>	District's 06-07 recycled water budget is \$4.5M for operations.	Ongoing

SCVWD's Water Conservation Program						
<i>Project Title</i>	<i>Project Description</i>	<i>Current Annual Savings 04-05 data</i>	<i>Current Allocated Budget</i>	<i>Anticipated Annual Savings (Planned) YEAR 2020</i>	<i>Future Allocated Budget (Planned)</i>	<i>Implementation Status</i>
Residential ULFTs		15,656 acre-feet		23,556 acre-feet		
Showerheads		5,337		7,044		
Aerators		3,503		3,965		
Single Family Washers		819		4,966		
CII ULFTs		4,378		7,086		
Multi Family Washers		366		7,300		
Other CII Programs		4,660		11,590		
Residential landscape		952		3,565		
Leak Repair		809		2,335		
Ag. Conservation programs		1,000		1,000		
Total			Budget for all the above projects within SCVWD's budget is \$5M for FY05-06		Budget for all the above projects within SCVWD's budget is \$5M for FY06-07	
New Building Blocks for Conservation in addition to what is listed above. These new building blocks will include but are not limited to ET Controllers, landscape rebates, irrigation retrofits .				*28,000 in year 2020 * As identified in SCVWD's "No regrets option" of the Integrated water resources plan		

CCWD's Water Recycling Program						
<i>Project Title</i>	<i>Project Description</i>	<i>Current Annual Yield</i>	<i>Current Allocated Budget</i>	<i>Anticipated Annual Yield (Planned)</i>	<i>Future Allocated Budget (Planned)</i>	<i>Implementation Status</i>
General and Specific Agreements with CCCSD for implementing future and current recycled water projects	CCWD and CCCSD have agreements that allow CCCSD to purvey recycled water, primarily for landscape irrigation, to areas of Concord and Pleasant Hill.	1,450 acre-feet/year	NA	Per CCWD 2005 Urban Water Management Plan, 2,750 acre-feet/year	NA	Ongoing
General and Specific Agreements with DDS D for implementing future and current recycled water projects	CCWD and DDS D have agreements that allow DDS D to purvey recycled water for industrial uses and landscape irrigation to areas of Pittsburg and Antioch.	7,170 acre-feet/year	NA	Per CCWD 2005 Urban Water Management Plan, 10,330 acre-feet/year	NA	Ongoing

CCWD's Water Conservation Program						
<i>Project Title</i>	<i>Project Description</i>	<i>Current Annual Savings (Acre-Feet) (FY06)</i>	<i>Current Allocated Budget</i>	<i>Anticipated Annual Savings – (Acre-Feet) (FY2020)</i>	<i>Future Allocated Budget (Planned)</i>	<i>Implementation Status</i>
SF Surveys		218				
MF Surveys		249				
CII Surveys		459				
Landscape Surveys		391				
SF Showerheads		59				
MF Showerheads		27				
Residential ULFTs		997				
CII ULFTs		53				
SF Washers		166				
CII Washers		23				
Pre-Rinse Nozzles		102				
CII Low Flow Urinals		2				
CII Low Flow Faucets		1				
'Smart' Sprinkler Timers		19				
Standard Sprinkler Timers		13				
Drip Retrofit (stations)		4				
Rain Sensors		2				
Sprinklers Replaced		2				
Total		2,787	Budget for all conservation projects within CCWD's budget is \$1.33M for FY 06	5,300	Budget for all conservation projects within CCWD's budget is \$1.73M for FY 07	

Attachment 2
Partner Letters

March 22, 2006

Fawzi Karajeh, Ph.D.
Chief, Water Recycling and Desalination Branch
Office of Water Use Efficiency
CA Department of Water Resources
901 P Street
Sacramento, CA 95814

SUBJECT: Equal Partnership between CCWD, EBMUD, SCVWD and SFPUC for the San Francisco Bay Regional Desalination Project

Dear Dr. Karajeh:

The four largest water management agencies in Northern California, i.e. the East Bay Municipal Utility District (EBMUD), Santa Clara Valley Water District (SCVWD), San Francisco Public Utilities Commission (SFPUC) and Contra Costa Water District (CCWD), have come together as equal partners to conduct a collaborative desalination project as well as seek a Proposition 50 Chapter 6 (a) grant for their Regional Desalination Project. However, since criteria for the said grant requires a single agency to be the lead agency, these four agencies have mutually agreed that this lead agency be designated as East Bay Municipal Utility District. These four agencies also mutually agreed that Hossein Ashktorab, Ph.D. from Santa Clara Valley Water District will be the designated Project Manager for the proposed grant project.

This desalination project is of vital importance to the San Francisco Bay Region's 5.4 million residents served by these four agencies and we urge your consideration when making funding decisions.

Sincerely,



Alexander R. Coate
Manager Water Supply Improvements Division

cc: Pamela John, SCVWD - Regional Desalination Project Partner
Hasan Abdullah, EBMUD - Regional Desalination Project Partner
Marie Valmores, CCWD - Regional Desalination Project Partner
Joan Ryan, SFPUC - Regional Desalination Project Partner



**CONTRA COSTA
WATER DISTRICT**

1331 Concord Avenue
P.O. Box H20
Concord, CA 94524
(925) 688-8000 FAX (925) 688-8122

March 20, 2006

Directors

Joseph L. Campbell
President

Elizabeth R. Anello
Vice President

Bette Boatman
John A. Burgh
Karl L. Wandry

Walter J. Bishop
General Manager

Fawzi Karajeh, Ph.D.
Chief, Water Recycling and Desalination Branch
Office of Water Use Efficiency
CA Department of Water Resources
901 P Street, Sacramento, CA 95814

**SUBJECT: Equal Partnership between CCWD, EBMUD, SCVWD and
SFPUC for the San Francisco Bay Regional Desalination Project**


Dear Dr. Karajeh:

Fawzi

The four largest water management agencies in Northern California, i.e. the East Bay Municipal Utility District (EBMUD), Santa Clara Valley Water District (SCVWD), San Francisco Public Utilities Commission (SFPUC) and Contra Costa Water District (CCWD), have come together as equal partners to conduct a collaborative desalination project as well as seek a Proposition 50 Chapter 6 (a) grant for their Regional Desalination Project. However, since criteria for the said grant requires a single agency to be the lead agency, these four agencies have mutually agreed that this lead agency be designated as East Bay Municipal Utility District. These four agencies also mutually agreed that Hossein Ashktorab, Ph.D. from Santa Clara Valley Water District will be the designated Project Manager for the proposed grant project.

This desalination project is of vital importance to the San Francisco Bay Region's 5.4 million residents served by these four agencies and we urge your consideration when making funding decisions.

Sincerely,


Jerry Brown
Director of Planning

JB:MV/crp

cc: Pamela John, SCVWD – Regional Desalination Project Partner
Hasan Abdullah, EBMUD – Regional Desalination Project Partner
Suresh Patel, SFPUC – Regional Desalination Project Partner
Marie Valmores, CCWD - Regional Desalination Project Partner

March 8, 2006

Fawzi Karajeh, Ph.D.
Chief, Water Recycling and Desalination Branch
Office of Water Use Efficiency
CA Department of Water Resources
901 P Street, Sacramento, CA 95814

SUBJECT: Equal Partnership between CCWD, EBMUD, SCVWD and SFPUC for the San Francisco Bay Regional Desalination Pilot Project

Dear Dr. Karajeh:

The four largest water management agencies in Northern California, i.e. the East Bay Municipal Utility District (EBMUD), Santa Clara Valley Water District (SCVWD), San Francisco Public Utilities Commission (SFPUC) and Contra Costa Water District (CCWD), have come together as equal partners to conduct a collaborative desalination pilot project as well as seek a Proposition 50 Chapter 6 (a) grant for the pilot project. However, since criteria for the said grant requires a single agency to be the lead agency, these four agencies have mutually agreed that this lead agency be designated as East Bay Municipal Utility District. These four agencies also mutually agreed that Hossein Ashktorab, Ph.D. from Santa Clara Valley Water District will be the designated Project Manager for the proposed grant pilot project.

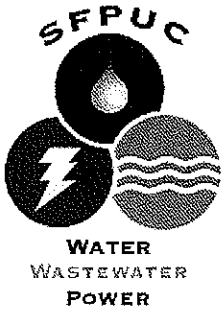
This regional desalination project is of vital importance to the San Francisco Bay Region's 5.4 Million residents served by these four agencies and we urge your consideration when making funding decisions.

Sincerely,



Keith Whitman
Deputy Operating Officer
Water Supply Management Division

cc: Hossein Ashktorab, SCVWD –Regional Desalination Project Partner
Pamela John, SCVWD –Regional Desalination Project Partner
Hasan Abdullah, EBMUD – Regional Desalination Project Partner
Marie Valmores, CCWD – Regional Desalination Project Partner
Joan Ryan, SFPUC – Regional Desalination Project Partner



SAN FRANCISCO PUBLIC UTILITIES COMMISSION

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March 8, 2006

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Chief, Water Recycling and Desalination Branch
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SUSAN LEAL
GENERAL MANAGER


Re: Equal Partnership between Partner Agencies, EBMUD CCWD SCVWD
and SFPUC, for the Bay Area Regional Desalination Project

Dear Dr. Karajeh:

The four largest water management agencies in Northern California, namely East Bay Municipal District (EBMUD), Santa Clara Valley Water District (SCVWD), Contra Costa Water District (CCWD) and the San Francisco Public Utilities Commission (SFPUC) have come together as equal partners to conduct a regional desalination project as well as seek Proposition 50 Chapter 6(a) grant funding for their Bay Area Regional Desalination Project.

For joint application proposals, the grant requirements stipulate that a single agency act as the lead agency. Accordingly, the four partner agencies have mutually agreed that EBMUD will be the designated lead agency for the grant proposal work. In addition, it was also mutually agreed by the partners that Hossein Ashktorab, Ph.D., from SCVWD, would be the designated Project Manager for the grant proposal work.

The Bay Area Regional Desalination Project is of vital importance to the 5.4 million water customers served by the project partners; consequently, on behalf of the SFPUC and its partners, the SFPUC urges your consideration of the future water needs of the San Francisco Bay Area when making your grant funding decisions.

Sincerely,


Michael P. Carlin
Assistant General Manager, Water

cc: Pamela John, SCVWD - Bay Area Regional Desalination Project Partner
Hasan Abdullah, EBMUD - Bay Area Regional Desalination Project Partner
Marie Valmores, CCWD - Bay Area Regional Desalination Project Partner
Joan Ryan, SFPUC - Bay Area Regional Desalination Project Partner

Attachment 3
Technical Memoranda from Feasibility Study

Bay Area Regional Desalination Project Institutional Development

EAST BAY MUNICIPAL UTILITY DISTRICT



CONTRA COSTA WATER DISTRICT

Santa Clara Valley Water District



SAN FRANCISCO Public Utilities Commission

BAY AREA REGIONAL DESALINATION PROJECT

INSTITUTIONAL DEVELOPMENT

**Revised as of
November 2005**

Prepared by



**URS Corporation
1333 Broadway, Suite 800
Oakland, CA 94612**

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The East Bay Municipal Utility District (EBMUD), the San Francisco Public Utilities Commission (SFPUC), Contra Costa Water District (CCWD), and the Santa Clara Valley Water District (SCVWD) (collectively referred to hereafter as “the agencies”) currently serve over five million users with diverse and growing water needs, despite limited resources. The agencies are jointly exploring desalination in order to meet the key objectives of: 1) providing additional water during droughts and emergencies, and 2) allowing existing facilities to be taken out of service for maintenance and repairs.

Based on pre-feasibility study analysis, the agencies have identified three potential site options for a proposed Regional Desalination Project (RDP). The RDP would consist of one or two desalination plants at a site in San Francisco (Oceanside site), Oakland (Near Bay Bridge site), and/or Pittsburg (East Contra Costa site).

For each of the potential sites, the agencies have identified the most feasible and efficient conveyance options to transfer or exchange water so that each participating water district may benefit – either directly or indirectly – from the addition of a new water supply source in the region (Conveyance Options Evaluation Report, 2005). Depending on the site(s) selected and existing physical infrastructure constraints, the conveyance options would vary.

This technical memo serves three purposes.

- It provides a brief overview of some of the types of agreements the agencies may consider in collectively setting up a desalination plant and subsequently delivering water through existing infrastructure.
- It provides a discussion of the various considerations and issues that would likely be included in the agreements among the water districts.
- It identifies the parties to individual agreements and the points in the water delivery structure, based on the site(s) selected for the RDP, where agreements would be necessary.

This memo is intended to serve as a decision-making guide for managers as they consider the agreements that the agencies would have to enter into in order to implement the RDP. No legal advice or opinions are reflected in this memo, and the discourse provided herein does not replace or otherwise advise any review of contractual agreements by the agencies’ respective legal counsels.

There are three basic types of agreements that the participating water districts may enter into for the establishment of the desalination project. Although other permutations may exist, the types of agreements listed below generally describe the categories of agreements that could be considered for the implementation of the RDP.

2.1 JOINT POWERS AGREEMENT (JPA)

A JPA is a legally binding way to link several public agencies together to create a new entity that will share in fulfilling a specific and agreed-upon goal, such as the RDP. A JPA is a contract that is limited in authority to what each of the water districts is individually legally authorized to do. A JPA provides *flexibility* to meet goals, *protection* for local identity interests and *opportunity* to meet water district needs. A JPA provides for the ability of districts to share risks and costs without incurring direct liability to member districts for other member financial obligations.

The JPA can be organized in many different ways, depending upon member preferences. A Governing Board may be established that sets the policy direction for the JPA. It is relatively simple to form since the statutory authority necessary to execute its functions already exists. The JPA would have public agency status and the ability to aggregate, finance, and/or own infrastructure. Thus, the JPA would own those facilities that are directly associated with the RDP and are designed for exclusive use by the RDP. Auxiliary facilities that may be used by the RDP, but are not designed for the exclusive use of the RDP, such as pipelines and reservoirs, would continue to be owned by agencies that currently own them; the JPA would have rights to use those facilities for conveyance or water storage. The rights and obligations of the JPA would be laid out in the implementing agreement of the RDP.

If a JPA is selected for the development of an RDP, the participating agencies must consider that participation is limited to public entities. Potential private stakeholders would be excluded from the regional partnership.

2.2 MEMORANDUM OF UNDERSTANDING (MOU)

An MOU is an approved written agreement of a non-contractual, non-legally binding nature between two or more parties, in this case the four partner water districts, (also sometimes referred to as “participants”) that will document an intent by all parties to cooperate in the RDP project undertaking. An MOU will clarify relationships and responsibilities between the agencies, but is characteristically general and non-binding in nature.

2.3 STANDARD CONTRACT

A contract is a legally binding agreement among two or more parties that can be used to define relative benefits, obligations and liability of the parties with respect to the proposed project. While a contract can define terms, conditions and obligations as agreed to by the parties, it does not create a new entity for the purposes of ownership of the new facilities. Ownership would either be joint ownership pursuant to the contract or owned by one party with terms of participation by other parties defined by the contract. Private entities could be parties to a contract.

As the RDP is planned and structured, each of the participating water agencies will have to consider and come to agreement on a number of issues. Some of the key issues that will eventually drive the types of agreements that the agencies enter into are described below.

3.1 FACILITY OWNERSHIP, OPERATIONS AND MAINTENANCE

There are three primary alternatives for ownership of the desalination facilities. The facilities could be owned by the agency in whose service area the facilities are located, with cost sharing and water sharing obligations defined by a binding contractual agreement among the agencies. In this case, one agency would likely have all management, operation and maintenance responsibilities and discretion. The governing board of the agency owning the facility would have the overall responsibility for the facilities, including residual benefits and risks of ownership if the agreement is terminated. It is possible that the agency owning the facility could be perceived as having a greater potential risk or benefit through ownership. Other participating agencies would receive water supply benefits and share in capital and O&M costs based on the terms of the agreement.

A second option would be joint responsibility of the facilities with benefits and obligations, including water supply and share of costs, defined by terms of an agreement among the parties. The facilities would be most efficiently operated and maintained by the agency in whose service area the facilities are located. Protocols and procedures for O&M of the facilities would be subject to agreement by the parties. The agreement would also have to provide for the governance of the facilities and the manner in which policy level decisions would be made. The agreement should also provide for disposition of the facilities in the event that the agreement is terminated.

The third option would be the formation of a separate public entity (an Authority) through a JPA. The Authority would own the facilities, and the benefits and obligations of the member agencies would be defined by the JPA. The JPA would also identify infrastructure that it would use to convey or store water, but may not own, such as pipelines and reservoirs owned by the individual members of the JPA.

The Authority could hire its own employees to manage, operate and maintain the facilities or it could contract with one of the agencies or a third party for such services. One of the benefits of a JPA is that the member agencies can share the benefits of the facility as defined in the JPA while being at least partially insulated from some of the liabilities and risks of ownership. No party would be perceived as having greater risks or benefits than those defined in the JPA. Responsibility for policy decisions and management would be shared by the Authority member agencies through the governance structure of the JPA.

The initial agreement that assigns the roles and responsibilities of the member agencies of the RDP, regardless of the type selected, will serve as the project's implementing agreement (hereafter referred to as Master Agreement).

3.2 WATER SUPPLY DISTRIBUTION

SCVWD and CCWD have identified dry year supplemental water needs of 10 MGD and 15 MGD, respectively. EBMUD and SFPUC have each identified a need of 20 MGD during dry years. Based on these preliminary needs identified by the agencies, this technical memo assumes

that the proposed RDP would provide 65 MGD of supplemental water to serve the member agencies. Since the agency needs are limited to dry years, the RDP would either operate only during dry years or market wet year production to other entities. A separate marketing study will determine the potential for selling water produced during wet years. For purposes of this institutional analysis, it is assumed that production would take place year-round.

The existing facilities do not have the capacity to directly deliver desalination plant product water to all of the member agencies at any of the sites under consideration. In each case, only one or two agencies would receive the water generated by the desalination plant, and that agency or agencies would then have the obligation of transferring water to other members, as defined in the Master Agreement. Due to limited interconnectivity options between agencies, transfers and/or exchanges would also take place between member agencies that do not directly receive any desalination water. As such, transfer or exchange agreements would be required to provide for the delivery of water from the agency receiving the RDP product water to other member agencies, and subsequently for other member agencies exchanging water. Water transfers and exchanges between individual water districts may take the forms of standard contracts or MOU's. These agreements would likely modify or replace existing MOU's that govern emergency interties and other interconnections between agencies' water delivery systems.

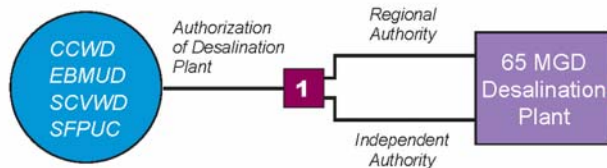
The recipient of RDP product water may or may not be party to agreements between other member agencies exchanging water, based on the roles and responsibilities assigned in the Master Agreement. Figure 1 illustrates how the various agreements could enable the distribution of water supply benefits.

Key issues in each transfer / exchange agreement will include timing of deliveries, conditions and costs for use of existing connecting facilities, and possibly cost differentials related to different water quality and levels of treatment. The actual configuration of the relationships between agencies and the individual transfer or exchange agreements may vary depending on various other factors including water supply rights and entitlements of the member agencies, capacity and design constraints of existing infrastructure such as conveyance and storage facilities. These constraints have been taken into account in Figure 1 and are described below.

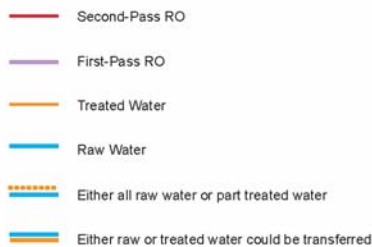
3.2.1 Water Supply Rights and Entitlements

The agencies currently rely on various water sources to meet demand in their respective service areas. Each agency has water rights and entitlements attached to its current water supply. Modifications to the point of diversion, place of use, and purpose of use would be required in order to exchange water between agencies. For example, rights to Hetch Hetchy water are derived from the Raker Act. Modifications to the point of diversion in order to supply water to EBMUD would need to contemplate the rights of other water districts entitled to use Hetch Hetchy water. In some cases, such as the delivery of Hetch Hetchy water to SCVWD, Hetch Hetchy water is already delivered within SCVWD and no water entitlement changes may be necessary. Similarly, Mokelumne River water and Bay-Delta water also have water supply entitlements associated with them. Modifications may similarly be limited by the governing legislation. These restrictions would have to be considered in the water transfer / exchange agreement.

Figure 1
BAY AREA REGIONAL
DESALINATION PROJECT
 Agreement Decision Flow Diagram



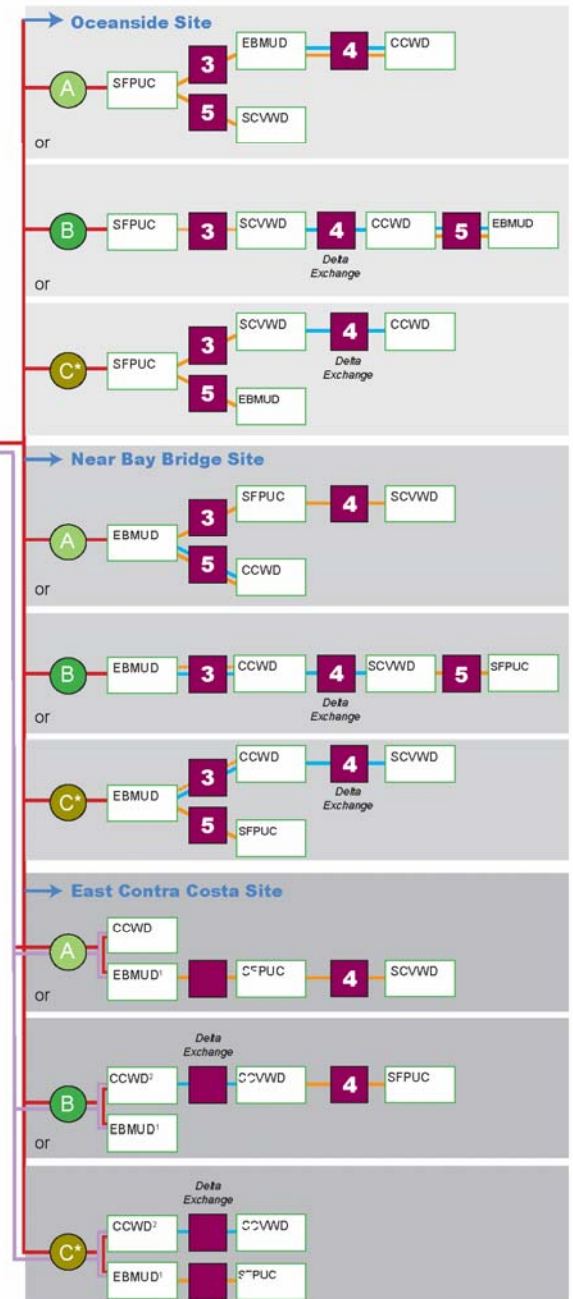
- 1** Implementing agreement for the authorization of the Regional Desalination Project (Master Agreement)
- 2** Agreement to supply desalination water to 1-2 water districts (may be part of Master Agreement)
- 3** Water transfer/exchange agreement with terms and conditions for delivery throughout existing facilities; may require modification of existing interconnection agreement(s)
- 4** Water transfer/exchange agreement as above. The original recipient(s) of desalination product water may be party to this agreement. **4** may be a separate agreement or it may be part of **3**
- 5** Water transfer/exchange agreement including original recipient(s) of desalination product water [same as **3**]



* This alternative assumes use of both the Hayward Intertie and exchange of Delta water. Because this alternative allows for flexibility in the amount of water transferred between agencies, there may be other permutations of this scenario.

¹ At this location, EBMUD pipelines currently convey raw water; aqueducts can be converted to convey treated desalination water, or the desalination plant may produce first-pass RO water.

² At this location, CCWD can only accept up to 25 MGD of treated water through the Multi-Purpose Pipeline (MPP).



Water transfer / exchange agreements that affect the point of diversion, place of use, and purpose of use are typically subject to review and approval by the State Water Resources Control Board. Since the RDP may need to establish the diversion rights for the facility (depending on the site location and transfer option selected), it would be reasonable to seek all necessary place of use change authorizations necessary to implement the transfer / exchange agreements at that time. In addition, it would probably be most efficient to deal with the water transfer and exchange issues from a regulatory perspective (i.e. compliance with California Environmental Quality Act (CEQA), National Environmental Policy Act (NEPA), and Endangered Species Act guidelines) at the time the RDP facilities are evaluated.

3.2.2 Water Banking

In addition to supplemental water to be provided on a regular basis, the agencies have identified mitigation for droughts, emergencies, and facility repair / maintenance as a key objective of the RDP. Needs and priorities of each agency may vary substantially during times of emergency. The impacts of a drought on water users, for example, will depend on: 1) the extent to which water uses can be maintained by drawing on stored water; and 2) how the available water is allocated among potential users.

Water banking is a management tool that can supplement traditional reliance on surface water reservoirs. Water banks can facilitate voluntary water transfers to help mitigate the impacts of an emergency scenario by increasing water supplies for highly valued uses during water-shortage periods. In the case of the RDP, because some agencies have already identified year-round needs, water banking would not replace but augment the need for regular water transfers and exchanges. As such, provisions for water banking may be outlined within the implementing agreement for the RDP.

A water bank can be involved to differing degrees in water exchange, as determined by the member agencies of the RDP. If water supply from the desalination plant (assumed at 65 MGD for each site under consideration) exceeds the regular water needs identified by the member agencies, excess water supply can be pooled and made available to third-party buyers. During times of water shortage for any of the member agencies, banked water can be purchased by those members. The implementing RDP agreement would establish the uses of the water bank and priorities of members over non-members. The agreement would also provide a ranking of values in order to prioritize water values during times when demand among agencies exceeds supply. Based on these values, the water bank would establish a cost structure for the sale / purchase of banked water.

In the implementing agreement of the RDP, on the issue of water banks, the following would have to be established:

- Determine what rights can be banked.
- Establish quantity of bankable water.
- Limit who can purchase or rent from the bank if necessary.
- Set contract terms and/or prices.

- Facilitate regulatory requirements.

3.2.3 Water Capacity Constraints

The Conveyance Options Evaluation Report developed two scenarios for each of the three sites under consideration. Each scenario takes into account physical limitations posed by the existing infrastructure. For example, the emergency intertie between SFPUC and EBMUD (Hayward Intertie) has a maximum carrying capacity of 30 MGD, and a treated water interconnection between EBMUD and CCWD has a capacity limit of between 10 and 15 MGD. As noted in the Conveyance Options Evaluation Report, further hydraulic modeling is warranted to determine actual conveyance capacities between the agencies. In addition, each member agency will have to consider existing utilization and available capacity in the individual water transfer / exchange agreements.

3.2.4 Pipeline Design Constraints

Pipeline design and current use dictates the exchange of raw or treated water and the direction of the water flow. These issues will also impact how agreements are established and the parties that can exchange water. The scenarios shown in Figure 1 take these issues under consideration. For example, under the Alternative B scenario at the East Contra Costa site, SCVWD takes an additional 25 MGD of raw Bay-Delta water. Pipeline configurations necessitate that SCVWD provide 15 MGD of treated water to SFPUC. Any cost differentials associated by the transfer that are dictated by pipeline infrastructure would have to be taken into account in the appropriate transfer / exchange agreements.

3.3 OTHER CONSIDERATIONS IN FORMULATING AGREEMENTS

The agencies have identified the need for additional water during droughts and emergencies and the need for existing facilities to be taken out of service for maintenance and repairs as two key objectives of the RDP. Contingencies that account for such situations, such as water banking, should be incorporated into the Master Agreement for the RDP. The cost and distribution of water during times of emergency or drought, for example, should be clearly identified in the initial implementing document for the project. Responsibilities for water transfer should also be clearly assigned. Mechanisms for dispute resolution and termination of the RDP should also be laid out in the Master Agreement. The Master Agreement should also clearly describe the “seniority” or first right of refusal each partner would be entitled to during situations that may require using the RDP facilities.

The agencies have a number of options, both for establishing the framework for the desalination facility or facilities, and for the transfer and delivery of water between individual water districts. The form that these agreements take (JPA, MOU, or contract for the RDP implementation and transfer / exchange agreements for water distribution) will depend on the management decisions that guide the development of the project.

A range of issues are presented in this memo that will have to be taken into consideration in the formulation, structuring, and implementation of agreements associated with the RDP. These issues include ownership, physical and regulatory constraints, and individual needs and priorities. These issues, in turn, will have important implications on cost, water delivery, conditions of use, and water quality. Once member agencies are in agreement on how the issues will be handled for the purposes of the RDP, appropriate contractual mechanisms can be identified and executed.

In the Feasibility Study for the RDP, the needs and priorities of the member agencies will be identified and ranked based on a weighted scale that will correlate to the cost and distribution structure of the shared water. The Feasibility Study will also further explore the participation of non-member and non-public partners in the implementation of the RDP, and how their participation may impact the institutional structure of the project. These steps will enable member agencies to make the necessary management decisions to establish institutional agreements for the RDP.

4.1 SUMMARY OF KEY PRINCIPLES FOR AN INTER-AGENCY INSTITUTIONAL FRAMEWORK

I. PLANNING

Anticipated planning for the RDP includes the following components for which funding has not yet been allocated:

- a) Construction, operation, and permitting of a pilot plant(s)
- b) Preparation and certification of an EIR
- c) Resolution of any challenges to the EIR
- d) Permit applications for the RDP

Key Principles:

1. As the agencies have done through the development of the feasibility study, agencies agree to share costs equally for planning (as listed above).
2. Cost savings and overruns will be shared equally.

Key Management Decisions:

- i) Does each agency agree to continue to share planning-related costs equally? (see above)
- ii) Will one, two, or three sites be selected for the pilot testing?

II. GOVERNANCE

Key Principles:

1. Under a JPA or with individual agency ownership, the agencies would share costs in a manner that is commensurate with individual agency benefits from the project.
2. There would be a commitment to share costs of O&M based on quantities of water to be received by each agency.
3. There will be provisions for the addition and withdrawal of members in a manner that keeps members whole financially.

Key Management Decisions:

- i) Will the RDP facilities be owned jointly through a JPA, or individually by the agency in whose service area the plant(s) is located?
- ii) If a JPA is selected, should funding of the JPA be based on relative quantities of water received from the project, or should 50% of the costs be shared on an equal basis, and the remaining 50% shared on the basis of relative water amounts?
- iii) If individual ownership is selected, should a) the agency that owns the facilities have all management, operation, and maintenance responsibility, and primary responsibility for these costs (excluding O&M that can be shared), or b) the agencies be jointly responsible for cost sharing all expenses associated with management, operation, and maintenance (for efficiency, the agency in whose service area the facilities are located would still take the lead)?

III. PLANT DESIGN AND CONSTRUCTION

Key Principles:

1. Agencies would share capital costs in a manner that is commensurate with individual agency benefits from the project.
2. Assumption of design, technology, and construction risks will be factored into the agreement.
3. The owner of the RDP will make final decisions and incur liabilities as defined by the governance agreement.

Key Management Decisions:

- i) Do agency managers agree that capital costs should be shared in a manner that is proportionate to the relative water benefits they receive?
- ii) Should design, technology, and construction risks be borne by the facility owner, or shared among agencies equally?

IV. OPERATION AND MAINTENANCE

Key Principles:

1. Facility staffing will be determined by ownership structure.

2. Baseline O&M costs may be shared proportionately among agencies. Each agency would incur the additional O&M costs needed to obtain water supply associated with the RDP.
3. The owner will be responsible for renewing and maintaining permits.

Key Management Decisions:

- ii) Who will take responsibility of staffing the RDP facilities? (JPA-hired, member agency staff, or private contractors?)
- ii) Do agencies agree with the approach for the assignment of O&M costs above?

WATER DISTRIBUTION AND REDISTRIBUTION

Key Principles:

1. Share of cost for delivery of water to a designated point of delivery is relative to quantity of water received from the project.
2. No one agency will be adversely affected by facilitating a transfer, the transferring agency will be made whole in costs and expenses by the agency receiving the benefit.
3. To the extent possible, water rights issues related to transfers and exchanges necessary to distribute the water to member agencies will be dealt with during the water rights proceedings for the RDP facilities.
4. Provisions for water banking.

Key Management Decisions:

- i) Should the point of delivery be a) exit from the treatment plant or any conveyance facilities owned and operated by the RDP, or b) the point at which the receiving agency takes water into its distribution system? The selection can affect the assignment of cost responsibilities.
- ii) Should water banking be the responsibility of each individual agency (banking and subsequent delivery), or should the RDP be responsible for arranging banking and subsequent delivery to members? Banked water may also be marketed to others under terms and conditions defined by members, or water banking may be kept independent of the RDP.

EMERGENCIES

Water conveyance contingency plans will be in place, which would take effect in the event of a natural or man-made emergency, prolonged drought, or other short- or long-term unanticipated disruption of water supply affecting one or more member agency.

Key Principles:

1. Water supply quantities to member agencies may change depending on the affect and nature of the water supply disruption.
2. The cost of changes in water conveyance necessary for the affected agency(s) to obtain water through the RDP will be borne by that agency(s).
3. Member agencies that may or may not be affected by the emergency agree to convey water through their pipelines in order to facilitate efficient water supply to members.
4. Provisions will be made for non-member agencies facing emergencies to utilize RDP facilities during emergency periods.

Key Management Decisions:

- i) Do agencies agree with the contingency emergency actions laid out above?

UTILIZATION OF EXCESS CAPACITIES / UNUSED FACILITIES

Key Principles:

1. Partner agencies not utilizing their full capacities may enter into separate agreements with other agencies of the State for utilizing the excess capacities. These separate agreements will include the same terms and conditions of the RDP agreement.

Key Management Decisions:

- i) Do agencies agree with the principle laid out above?

GRANTS AND SUBSIDIES

Key Principles:

1. Partner agencies or the JPA responsible for RDP will pursue State and Federal funds for assisting in all stages of development. Any costs of the grant proposal applications will be shared in accordance with the cost-sharing agreement for that phase of the project (i.e. planning, design, construction, operation).

Key Management Decisions:

- i) Do agencies agree with the principle laid out above?

Bay Area Regional Desalination Project Conveyance Options Evaluation

EAST BAY MUNICIPAL UTILITY DISTRICT



CONTRA COSTA WATER DISTRICT

Santa Clara Valley Water District



SAN FRANCISCO Public Utilities Commission

BAY AREA REGIONAL DESALINATION PROJECT

CONVEYANCE OPTIONS EVALUATION

**Revised as of
June 2005**

Prepared by

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SECTION ONE

1.0 INTRODUCTION

The Bay Area's four largest water agencies, East Bay Municipal Utility District (EBMUD), the San Francisco Public Utilities Commission (SFPUC), Contra Costa Water District (CCWD) and the Santa Clara Valley Water District (SCVWD), (the agencies) are jointly exploring the development of regional desalination facilities that could benefit over 5 million Bay Area residents and businesses served by these agencies. The Bay Area Regional Desalination Project (RDP) may consist of one or more desalination facilities. The RDP would:

- Provide additional sources of water during emergencies;
- Provide a supplemental supply source during droughts;
- Allow other major facilities to be taken out of service for maintenance or repairs; and
- Provide a full-time supplemental water supply to increase reliability.

Each agency's final demand has not yet been determined but it has been estimated that SCVWD would like 10 million gallons per day (mgd), CCWD 16 mgd and EBMUD and SFPUC between 20 and 30 mgd on a full-time basis.

The purpose of this technical memorandum is to document the findings of the regional desalination project conveyance options evaluation. The objective of this evaluation is to determine the feasibility of water exchanges among the partner agencies through an initial assessment of the capacity of existing water transmission facilities and identify any potential fatal flaws.

The agencies conducted a preliminary siting study, which resulted in the identification of three potential RDP sites: Oceanside, Near Bay Bridge, and East Contra Costa. **Figure 1** shows the locations of the proposed desalination sites and major transmission lines for the four partner agencies involved in this evaluation. The Oceanside site is located in San Francisco near Lake Merced. The Near Bay Bridge site resides in the EBMUD service area near the Bay Bridge, and the East Contra Costa site is in Pittsburg along the Carquinez Straights in the vicinity of the CCWD Contra Costa Canal.

For each of the three proposed RDP locations, possible pathways for sharing/exchanging water have been developed. The key questions to be addressed for this evaluation include the following:

- What should be the size of the desalination facility in order to make use of existing water transmission capability?
- What are the limitations in the conveyance/exchange of water between systems?

For this analysis, it is assumed that the maximum capacity of any given conveyance facility would be available for conveyance of water associated with a desalination facility. This assumption is valid assuming that current operating capacities are modified to facilitate the introduction of a new water supply from a desalination facility. It would be possible to take less water from the desalination facility under normal operating conditions, however to determine capacity under drought or worst-case conditions the maximum capacity assumption is most valid. For the desalination plant a maximum size of 80 mgd was assumed.

SECTION ONE

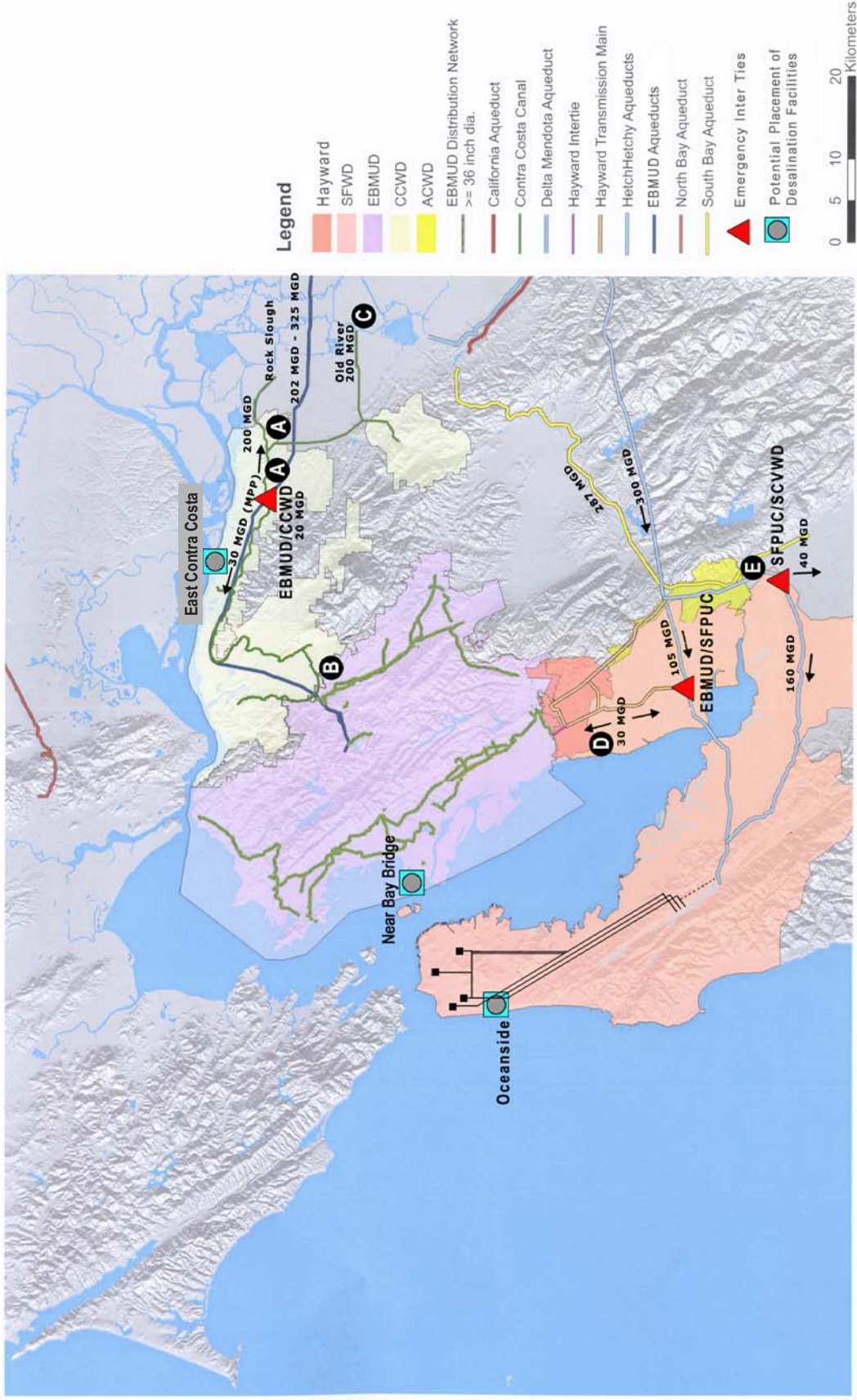


Figure 1. Potential RDP Sites

SECTION TWO

2.0 INTER-CONNECTIONS BETWEEN WATER AGENCIES

Five locations were identified through which water may be shared between the partner agencies. These include:

- EBMUD/CCWD Emergency Intertie (Location A, Figure 1)
- EBMUD/CCWD Distribution Systems (Location B, Figure 1)
- CCWD/SCVWD Delta Diversions (Location C, Figure 1)
- EBMUD/SFPUC Emergency Intertie (Location D, Figure 1)
- SFPUC/SCVWD Emergency Intertie (Location E, Figure 1)

The capability of these water system interconnections to transfer water between agencies is described in the following sections.

2.1 EBMUD/CCWD EMERGENCY INTERTIE (LOCATION A)

The Mokelumne Aqueducts parallel the Contra Costa Canal from the CCWD Delta take-outs to the City of Walnut Creek. A raw water transfer capability already exists near Lone Tree Way in Antioch and is equipped to transfer roughly 20 mgd.

A new facility located at the intersection between the Los Vaqueros Pipeline and the Mokelumne Aqueducts is also being developed as part of the EBMUD Freeport project to allow transfer of 3,200 acre-ft per year of water from the EBMUD system into the CCWD system. The interconnection will be designed to a capacity of 100 mgd. The Mokelumne Aqueducts also are in close proximity to Mallard Reservoir in the CCWD system, which feeds the Bollman Water Treatment Plant. Any one of these locations would serve the same purpose of allowing a raw water transfer between the EBMUD and CCWD systems. However, only the transfer point near Lone Tree Way in Antioch could be used without construction of any further facilities.

2.2 EBMUD/CCWD DISTRIBUTION SYSTEMS (LOCATION B)

The EBMUD and CCWD distribution systems are located in the same vicinity within the Cities of Walnut Creek and Pleasant Hill with zone gates separating the systems. In addition, an 8-inch emergency intertie between the two systems exists in the City of Martinez near Port Costa. An emergency connection between EBMUD and CCWD is also located on Boyd Road at Pleasant Hill Road in Pleasant Hill, which was completed in October 2004. The new emergency connection between the treated water systems can deliver 10-15 mgd and connects an existing 30-inch pipeline in EBMUD's system with a 24-inch pipeline in CCWD's system.

The actual quantity of finished water that may be shared between the two systems has not been quantified in this region; however, the intertie capacity is assumed that approximately 15 mgd for the purpose of this evaluation. Further hydraulic modeling is warranted to determine actual conveyance capacities between water systems.

SECTION TWO

2.3 CCWD/SCVWD DELTA DIVERSIONS (LOCATION C)

The Delta take outs for the Contra Costa Canal and the South Bay Aqueduct are in close proximity and are a possible location where raw water transfers may be made between CCWD and SCVWD. The certainty for such water exchanges are difficult to assess since Delta water diversions carry institutional issues and are subject to historical water rights and rules established by the Department of Water Resources involving salinity and fisheries. However, water can be physically transferred at these diversion points through the San Joaquin Delta waterways. The capacity of the diversions is roughly 200 mgd for the Contra Costa Canal and 287 mgd for the South Bay Aqueduct. The capability also exists to transfer water in the Delta between the SCVWD and CCWD intakes to Banks Pumping Plant on the South Bay Aqueduct. The existing pumping facility capacity may need to be upgraded in order to fully utilize this alternative. The concept would be to make a water transfer in the Delta to the South Bay Aqueduct where water would need to be treated by the SCVWD. This alternative would require SCVWD to expand treatment facilities to meet peak demands.

2.4 EBMUD/SFPUC EMERGENCY INTERTIE (LOCATION D)

A regional partnership between SFPUC, EBMUD, and the City of Hayward was formed to construct new facilities to allow up to 30 mgd of water to be shared among these systems in the San Lorenzo/Hayward area. The project is not yet completed; however it includes construction of a new 30 mgd pump station located within the City of Hayward Executive Airport near the intersection of Winton Avenue and Hesperian Boulevard. New pipeline, valving, and pump stations will allow transfer of up to 30 mgd between SFPUC and EBMUD. Additional emergency interties may be possible in this area where Alameda County Water District (ACWD) and the City of Hayward intertie with EBMUD to relieve up to an additional 30 mgd demand from the SFPUC system. However, water system modeling would be required to assess this further.

2.5 SFPUC/SCVWD EMERGENCY INTERTIE (LOCATION E)

A 40 mgd emergency intertie was constructed between the SFPUC and SCVWD in the vicinity of the City of Milpitas with capability to transfer water between the two systems on the Bay Division Pipelines (BDPL) 3 & 4. The intertie is capable of pumping either direction and has water treatment capability to match disinfection requirements of both systems. This system currently exists and has the capability to perform water exchanges.

SECTION THREE

3.0 EVALUATION AND RESULTS

A review of the transfer capabilities between water agencies shows that the primary limitation for sharing of water between all the agencies is the EBMUD/SFPUC Emergency Intertie through Hayward, since it can only transfer 30 mgd unless water is exchanged in the Delta. Although EBMUD and CCWD can share more between each other and SFPUC and SCVWD can share more between themselves, this intertie limits the amount of treated water that can be shared between the utilities to the north (EBMUD and CCWD) and the utilities to the south (SFPUC and SCVWD). **Table 1** summarizes the possible transfer options between the water agencies for each RDP site based on the following assumptions:

- For a plant constructed at Oceanside, EBMUD and CCWD are limited to a total of 30 mgd by the EBMUD/SFPUC Emergency Intertie unless there is an exchange of water between SCVWS and CWD in the Delta.
- SCVWD takes 10 mgd and CCWD takes 16 mgd in all cases. SFPUC and EBMUD take similar amounts between 20 and 30 mgd when possible.
- Use of existing conveyance facilities except for the connection between the desalination plant and existing conveyance facility.

This evaluation did not consider upgrading the EBMUD/SFPUC Emergency Intertie, since it would require significant new transmission capability at this location. It will also be important to perform hydraulic modeling in the EBMUD and SFPUC systems at the point of entry for desalination water to refine the estimates for desalination plant sizing.

A description of conveyance for each desalination plant site alternative is included in the following sections.

3.1 OCEANSIDE SITE

A RDP facility constructed in the vicinity of the Oceanside site could offset demands on the Hetch Hetchy System by an amount equal to the capacity of the plant. Water would need to be conveyed to the SFPUC upper zones including Sunset and Sutro Reservoirs, and a portion dropped to the lower zone to the University Mound Reservoir. Alternatives that include the possible use of Lake Merced Pumping Plant for transferring water to Sutro Reservoir will also need to be evaluated. The concept, for the purposes of this evaluation, is to pump water from the RDP to the Lake Merced Pumping Plant to maximize use of existing pumping capacity. Connection to these facilities would require construction of a new pipeline to connect into the existing system at Lake Merced at an elevation of 385 feet. The new pipeline would be designed to convey up to 80 mgd from the RDP to Sunset Reservoir. Approximately 30 mgd would then drop to University Mound Reservoir for distribution into the lower zone. Approximately 5 mgd could be conveyed through University Mound Reservoir to Peninsula Water Agencies (**Figure 2**).

Lowering the demand on the Hetch Hetchy Aqueducts would allow 10 mgd of treated water to be transferred to SCVWD through the SFPUC/SCVWD Emergency Intertie, and another 30 mgd through the EBMUD/SFPUC Emergency Intertie to EBMUD. Treated water would then be transferred from

SECTION THREE

Table 1. Comparison of Conveyance Alternatives

	SFPUC	CCWD	EBMUD	SCVWD	Advantages/ Disadvantages
Oceanside Max 80 mgd	Build new Plant and convey to Lake Merced Pumping Plant. SFPUC would then have up to 40 mgd available if 80 mgd plant constructed.	EBMUD to give portion of 30 mgd received from SFPUC through emergency intertie to CCWD through distribution system near Walnut Creek or raw water into Contra Costa Canal.	EBMUD to receive up to 15 mgd through emergency intertie through Hayward.	SCVWD to take 10 mgd through emergency intertie on BDPL 3&4	Best site overall for SFPUC since SFPUC would have supplies from both sides of Bay. EBMUD and CCWD limited by EBMUD/SFPUC Emergency Intertie.
Near Bay Bridge Max 70 to 100 mgd	SFPUC to receive up to 30 mgd on emergency intertie through Hayward. SFPUC to receive up to 70 mgd if SCVWD uses SBA at 50 mgd through SCVWD intertie.	EBMUD to give up to 20 mgd to CCWD through distribution system near Walnut Creek or raw water into CCWD canal through emergency intertie at Contra Loma	EBMUD to have up to 100 mgd new production from Plant and take up to 30 mgd. Will need to pass up to 30 mgd through emergency intertie through Hayward and give SFPUC 20 mgd and SCVWD 10 mgd SFPUC to receive up to 70 mgd if SCVWD uses SBA at 50 mgd through SCVWD intertie	SCVWD to take 10 mgd through emergency intertie on BDPL 3&4 or receive 50 mgd on SBA and transfer 40 mgd to SFPUC.	EBMUD would have water source on west side of Claremont Tunnel. SFPUC and SCVWD would be limited by EBMUD/SFPUC Emergency Intertie.
East Contra Costa (Max?)195 mgd	SFPUC to receive up to 20 mgd on BDPL 1 & 2. SFPUC to receive up to 70 mgd if SCVWD uses SBA at 50 mgd through SCVWD intertie.	CCWD take up to 25 to 30 mgd into MPP. CCWD could pump treated water into EBMUD Aqueduct for re treatment, convert one aqueduct for treated water use, or make water exchange at Freeport or Banks PP.	EBMUD would receive up to >125 mgd and send 30 mgd to SFPUC and SCVWD through emergency intertie at Hayward. SCVWD to take 10 mgd through emergency intertie on BDPL 3&4.	SCVWD to take 10 mgd through emergency intertie on BDPL 3&4 or raw water transfer on SBA.	CCWD and EBMUD could take as much water as they felt they needed since location is near major transmission facilities. SFPUC and SCVWD would be limited by EBMUD/SFPUC Emergency Intertie unless Delta transfers are implemented. Delta transfers would allow an additional 40 mgd transfer to SFPUC.

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EBMUD to CCWD through use of the emergency intertie in the Walnut Creek area (B in Figure 2), or by means of a raw water transfer (A in Figure 2). This would result in a net increase to EBMUD of 14 mgd and of 40 mgd to SFPUC.

This option would provide a high degree of reliability for SFPUC since the water supply point is located to the west of where the Bay Division Pipelines cross major faults.

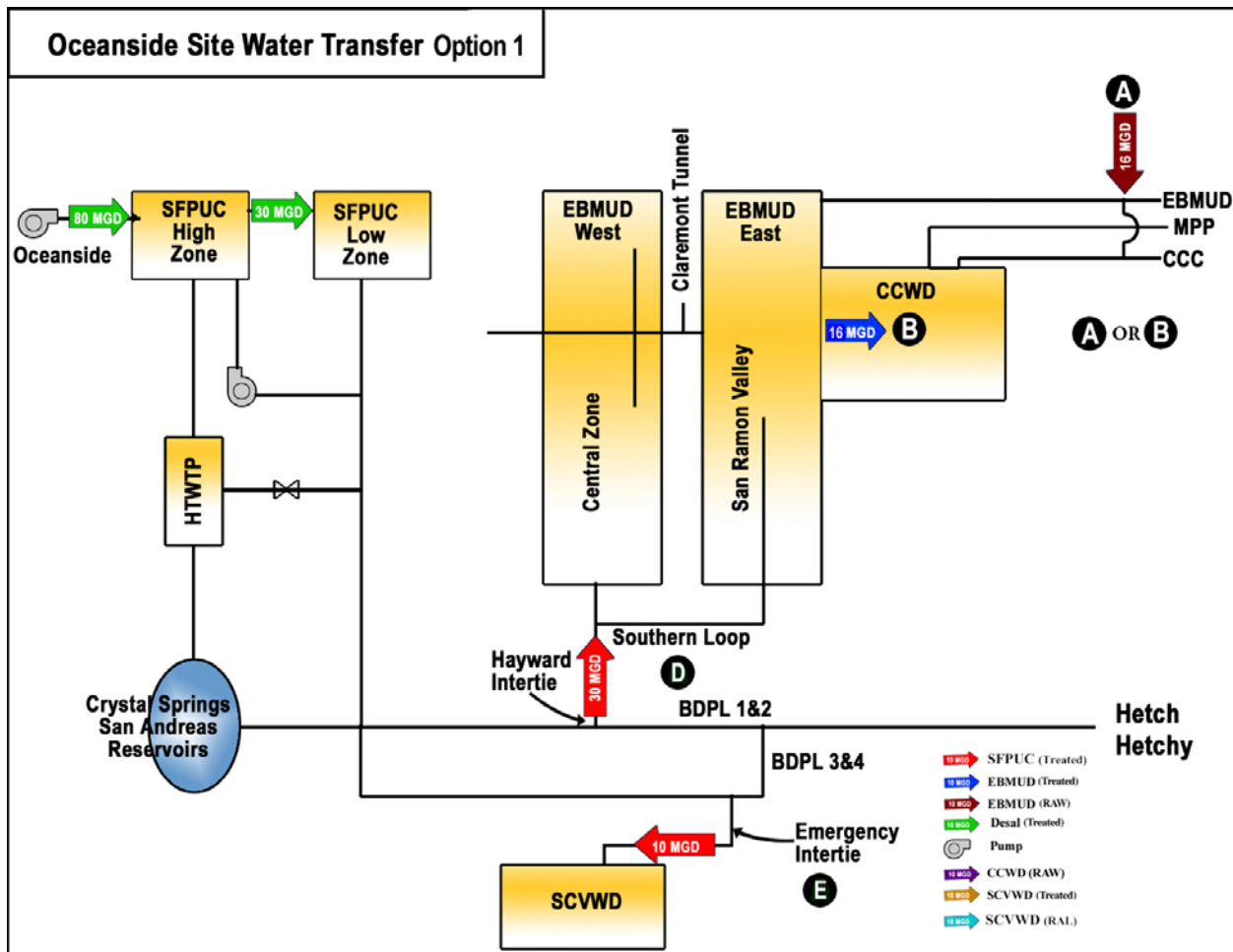


Figure 2. Oceanside Site Water Transfer Option 1

To increase the amount of water available for EBMUD, SCVWD and CCWD could exchange water in the Delta (Figure 3). If they exchanged 16 mgd in the Delta at the Banks Pumping Plant EBMUD could retain all the water transferred at the Hayward Intertie. SFPUC would then need to increase its transfer to SCVWD by 16 mgd to make up for the Delta transfer. This would decrease SFPUC’s net increase in water to a minimum of 20 mgd.

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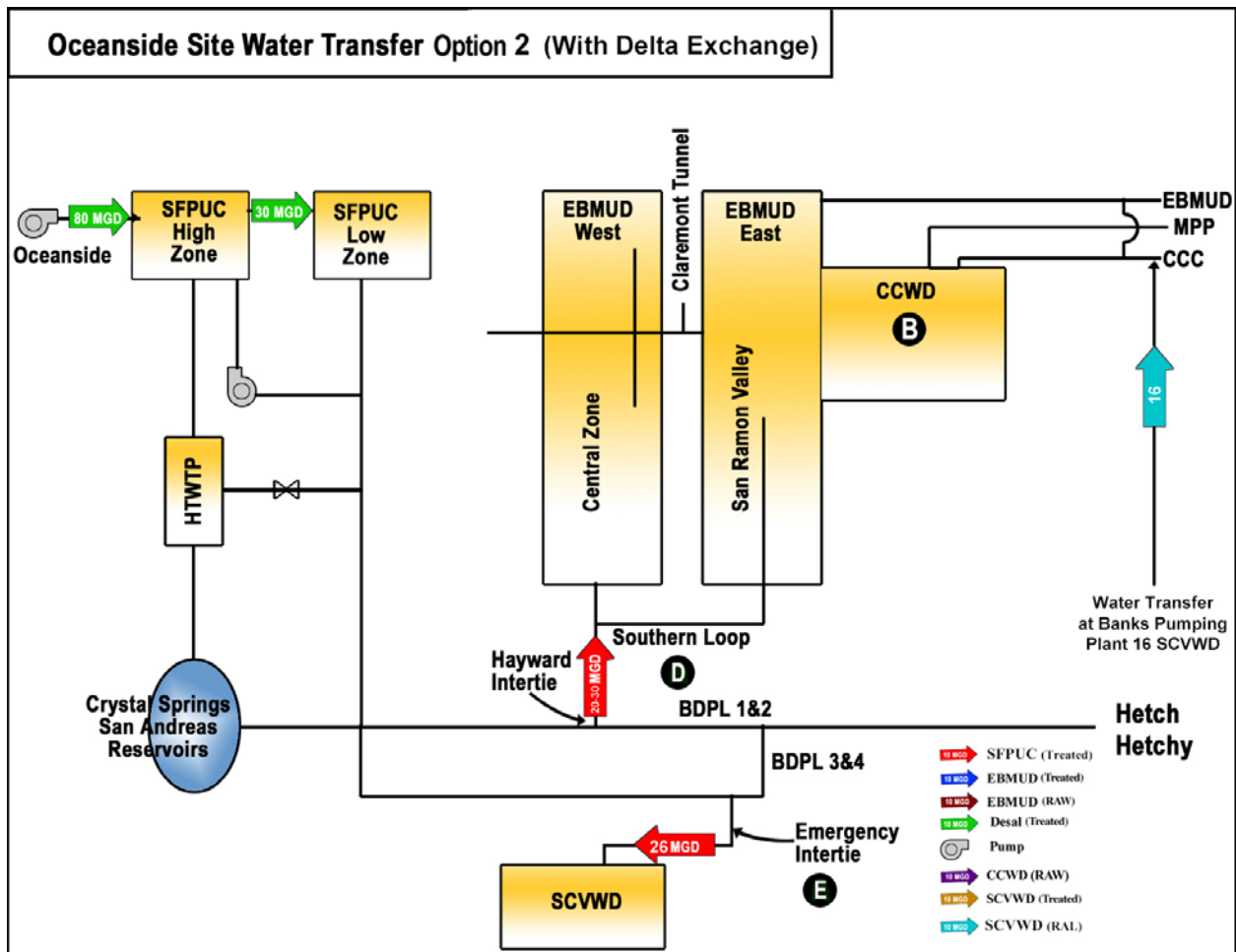


Figure 3. Oceanside Site Water Transfer Option 2

3.2 NEAR BAY BRIDGE SITE

If a RDP were constructed at the Near Bay Bridge site, then water produced by the facility would be available to offset localized demands in the central zone of EBMUD. The lower zones have an average daily demand of 20 to 50 mgd. To meet demand in a greater region of the EBMUD west of hills system a new pumping plant would need to be constructed to convey water in reverse up the Central Aqueduct on 59th Avenue to higher than 328 feet elevation for broader distribution at Claremont Tunnel. These concepts would require two new water delivery lines. One would connect to the lower pressure zones below Genoa Rate Control Structure to serve a demand of between 20 to 50 mgd. The second line of approximately 48 inches would connect to the Central Aqueduct, which would be used to flow backwards and deliver up to 50 mgd to Claremont Tunnel discharge headworks where water would be available to the Sequoia and Wildcat aqueducts for broader distribution.

Up to 30 mgd of treated EBMUD water would be conveyed from the EBMUD system through the EBMUD/SFPUC Emergency Intertie to the Bay Division Pipelines where 30 mgd would be conveyed to SFPUC and SCVWD systems. A 15 mgd raw or treated water transfer can be made

SECTION THREE

from EBMUD to CCWD through the emergency intertie on the Contra Costa Canal or in Walnut Creek. **Figure 4** is a block flow diagram illustrating this transfer option between the agencies.

This option is favorable to EBMUD since a seismic event that disrupts the Claremont Tunnel deliveries would allow the plant to backup the west of hills water system demands.

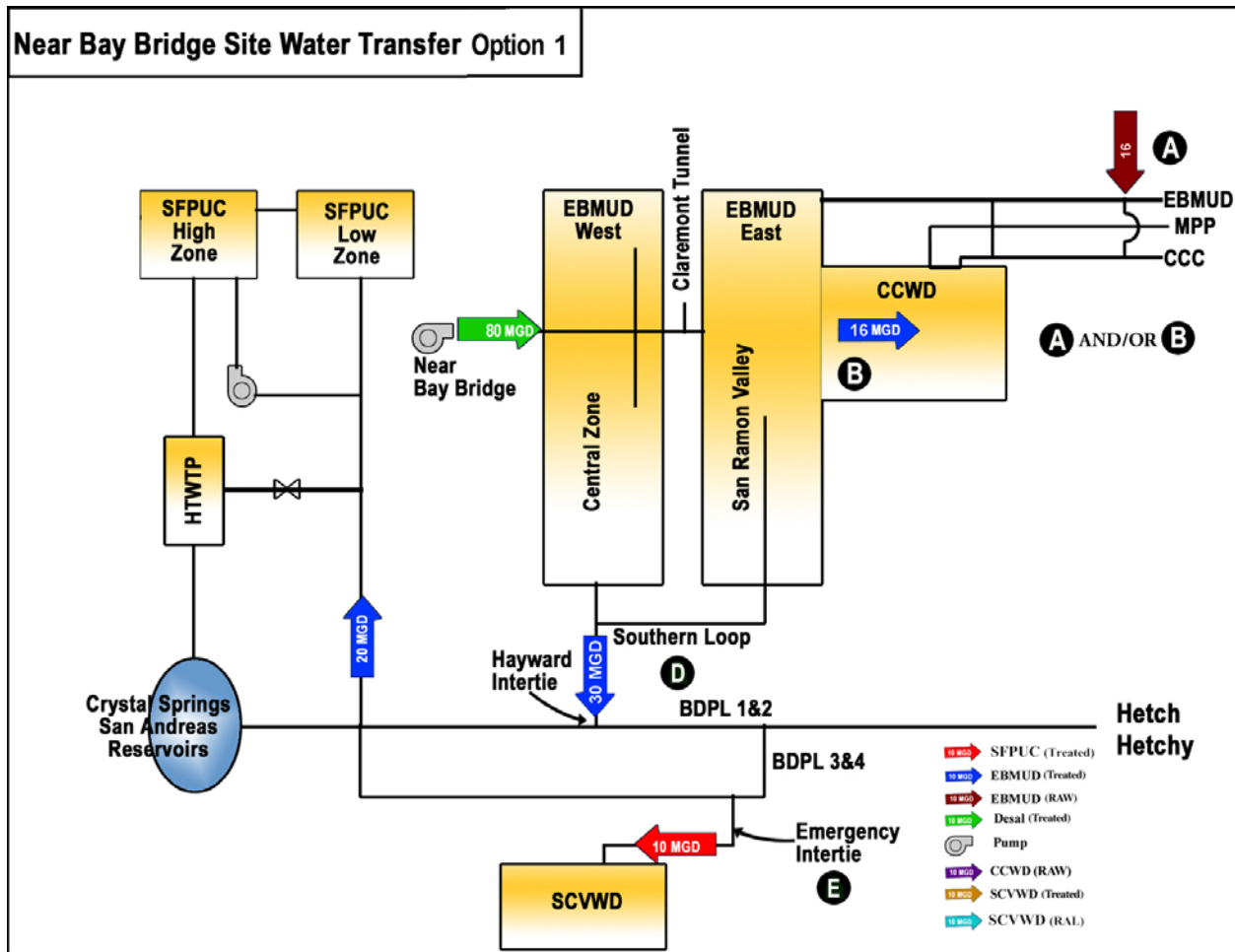


Figure 4. Near Bay Bridge Site Water Transfer Option 1

To increase the amount of water available for SFPUC, SCVWD and CCWD could exchange water in the Delta (**Figure 5**). If they exchanged 10 mgd in the Delta at the Banks Pumping Plant SFPUC could retain all the water transferred at the Hayward Intertie. EBMUD would then need to increase its transfer to CCWD by 10 mgd to make up for the Delta transfer. This would decrease EBMUD's net increase in water to a minimum of 24 mgd.

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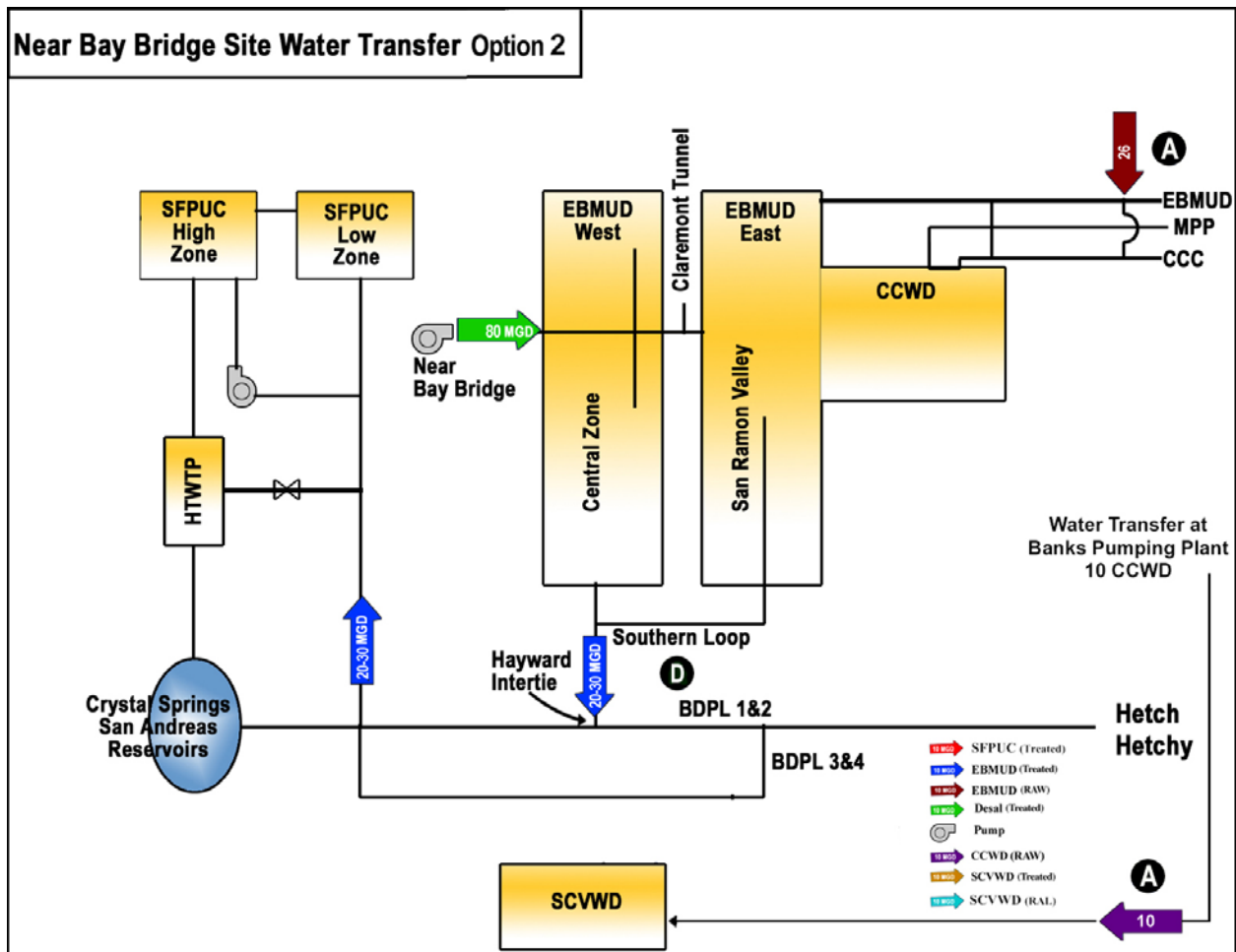


Figure 5. Near Bay Bridge Site Water Transfer Option 2

3.3 EAST CONTRA COSTA SITE

A RDP constructed at the East Contra Costa site would be near the Mokelumne Aqueducts, Contra Costa Canal, and Multipurpose Pipeline. This alternative allows a second point of treated water delivery for CCWD at the Multipurpose Pipeline that can take up to 25 to 30 mgd. Transfer of water to the other three agencies is possible with this alternative by three options. One option would be to transfer the desalinated water by pumping into the Mokelumne Aqueducts as raw water for downstream treatment and distribution to the other water agencies. If the capacity of the Mokelumne Aqueducts is exceeded by gravity flow, then the Walnut Creek Pumping Plant would be needed to convey up to an additional 125 mgd capacity. The “southern loop” has 30 mgd capacity to convey water to the SFPUC and SCVWD. The second option would be to transfer the desalinated water as treated water by converting one or more of the Mokelumne Aqueducts for treated water use from the point of entry. This alternative would require further work with the California Department of Health Services for permitting the system. The third option would be to have EBMUD divert more water through the Freeport Project as a raw water transfer while CCWD would take less water at Rock Slough and Old

SECTION THREE

River and supplement with water through the RDP. A variation of this delta transfer option would be to transfer water from the SCVWD and CCWD intakes to the South Bay Aqueduct. **Figures 6 and 7** are block flow diagrams illustrating the water transfer options between agencies for this RDP site.

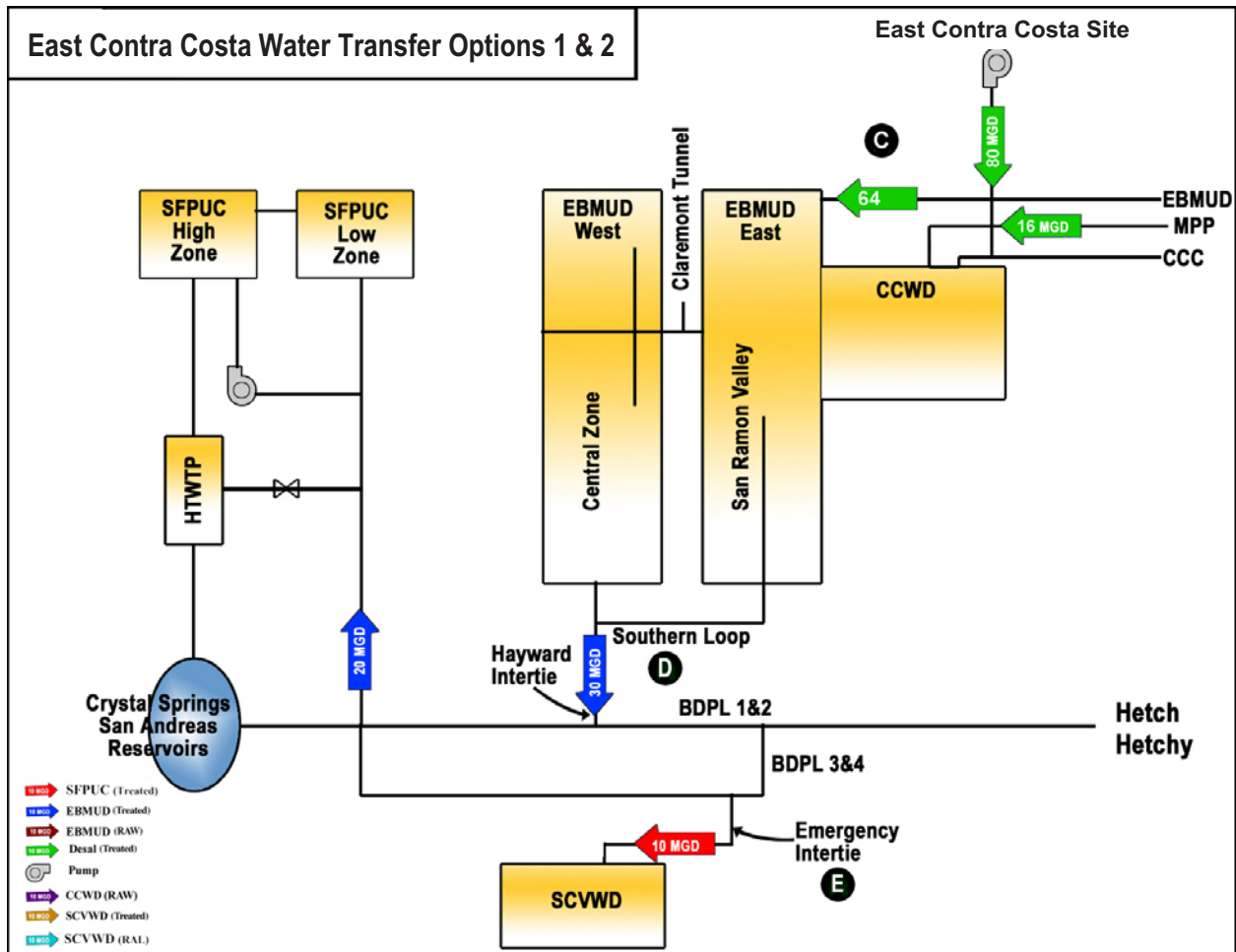


Figure 6. East Contra Costa Water Transfer Options 1 and 2

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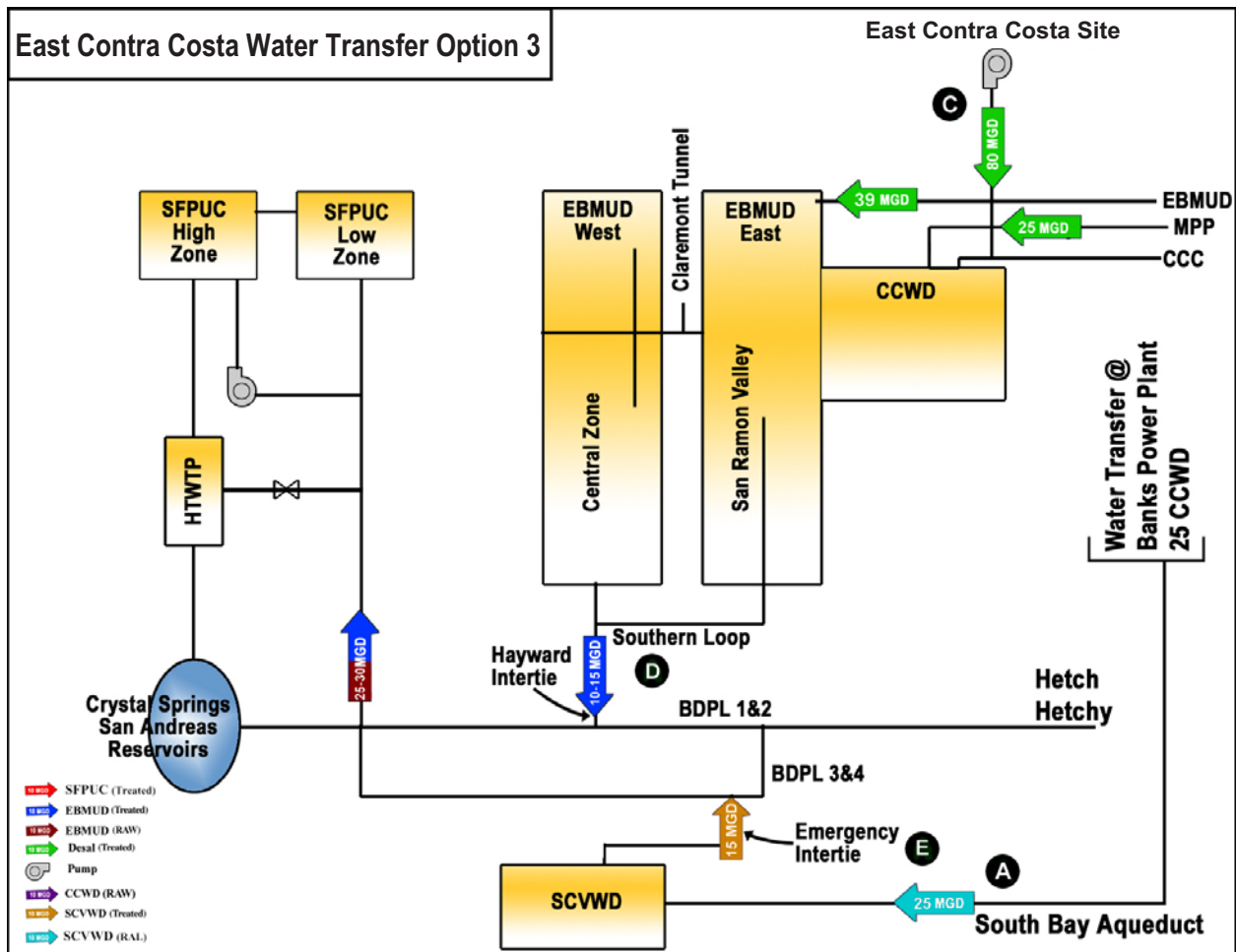


Figure 7. East Contra Costa Water Transfer Option 3

3.4 POTENTIAL WATER QUALITY ISSUES

The purpose of this section is to give a brief comparison of water quality for treated water from each of the agencies and provide some insight into any water quality implications of blending water from the various agencies. **Table 2** summarizes water quality parameters that are indicative of the quality for the treated water supplies on a comparative basis. In general, water supplied by CCWD and SCVWD are comparable and representative of using Delta water as a primary source of supply. Both EBMUD and SFPUC transport water through long conveyance systems from the Sierra Mountain foothills to the Bay Area and are for the most part very similar in quality. Upper San Leandro Reservoir is located near the EBMUD/SFPUC Emergency Intertie. If Upper San Leandro Reservoir provided water it may be of a different quality because it is influenced by local runoff.

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Table 2 Comparison of Water Quality Parameters from 2003 Annual Report

Parameter	units	MCL	CCWD	SCVWD	SFPUC	EBMUD
Chloride	mg/l	600	50	70	12	8
TDS	mg/l	1500	NR	250	99	102
Turbidity	NTU	5	0.11	0.05	1.58	0.05
THMs	ug/l	80	32.1	64	65.3	39
HAAs	ug/l	60	8	24	19.5	20
Bromate	ug/l	10	ND	NR	NR	<5
Hardness	mg/l	None	85	109	51	130
Alkalinity	mg/l	None	72	80	49	116
TOC	mg/l	None	NR	1.95	2.8	NR

Water from a desalination facility is of high quality and low mineral and solids content. In general, water from a desalination facility should have minimal impact on the water agencies and in many cases the blended water would improve water quality overall. Desalinated water would require chemical adjustment for corrosion control when delivered to all water agencies.

Blending of waters from different sources has been known to have impacts on the water quality delivered to the consumer in the following areas:

- Taste and odor
- Variability of water causing customers to notice the difference in quality
- Impacts on industrial users on process water treatment
- Corrosivity
- Disinfection
- Denitrification in distribution systems
- Precipitated particulate material

These water quality issues are difficult to predict without blending studies to make a final determination. **Table 3** shows the potential for water quality impacts between water sources dependant on how dissimilar the waters are in terms of constituents and the relative amount of water being blended.

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Table 3 Potential for Water Quality Impacts Due to Blending

From/To	EBMUD	SCVWD	CCWD	SFPUC	Desalinated Water
EBMUD	None	NA	None	Possible Impacts	None
SCVWD	NA	None	NA	Possible Impacts	None
CCWD	Possible Impacts	None	None	NA	None
SFPUC	None	Possible Impacts	NA	None	None
Desalinated Water	None	None	None	None	None

NA – Not Applicable

None – No Likely Impacts

A description of the possible impacts of blending waters between agencies is provided below.

EBMUD to SFPUC – If water supplied by EBMUD is primarily from Upper San Leandro Reservoir, then the mineral, TOC, and nutrient content, along with the potential for taste and odors may be issues when delivering water to SFPUC. Another possible issue is that SFPUC industrial customers are sensitive to water changes that impact industrial water treatment practices in Silicon Valley. These issues are of lesser concern if the primary source of water is from the Orinda WTP.

SCVWD to SFPUC – If water supplied to SFPUC is from the South Bay Aqueduct, then the mineral, TOC, and nutrient content, along with potential for taste and odors may be issues when delivering water to SFPUC. SFPUC industrial customers may be sensitive to water changes that impact industrial water treatment practices in Silicon Valley. Also, SCVWD uses chlorine as a disinfectant and SFPUC uses chloramines. This issue would need to be addressed when exchanging water.

CCWD to EBMUD – If a treated water transfer occurs to EBMUD, then water using the Delta as a source may be noticeable to the customers. The primary difference will be in the taste of the water since it can be dissimilar in nature in mineral content.

SFPUC to SCVWD – The SFPUC has already delivered water to SCVWD without measurable impacts to date. The primary caution is in the need to match disinfectants to avoid interaction between chlorinated and chloraminated water. It should also be mentioned that during some incidents, water may not be available from Hetch Hetchy, and only water from Sunol Valley WTP is available which is higher in mineral content than Hetch Hetchy water.

In conclusion, it is not anticipated that significant problems will occur by sharing water between the water agencies. However, a more detailed analysis and possible blending studies should be performed to confirm the potential for interactions to verify this conclusion.

SECTION FOUR

4.0 CONCLUSIONS AND RECOMMENDATIONS

The above evaluation is based on a comparison of capacities of the existing transmission facilities that could be used as part of the conveyance options for a potential RDP. Hydraulic modeling would need to be conducted to determine the actual feasibility of using any of the options presented in this evaluation in terms of overall operation of the water systems.

Table 1 summarizes the options evaluated in this study and the results of the evaluations. The following general conclusions came out of the evaluation.

1. The major bottleneck in the conveyance systems between the agencies is the EBMUD/SFPUC Emergency Intertie. This intertie has a capacity of about 30 mgd, limiting the transfer between the northern agencies (EBMUD and CCWD) and southern agencies (SFPUC and SCVWD).
2. The potential maximum size of a RDP for each site is governed by local demand or the local infrastructure capacity.
3. The East Contra Costa site is limited to about 25 to 30 mgd of treated water. This limitation is imposed by the capacity of the MPP, the closest conveyance of treated water. The East Contra Costa site is close to both the Contra Costa Canal and the Mokelumne Aqueducts. Both these facilities have a large capacity for raw water, which would allow for a larger plant (up to 195 mgd) if the RDP product water is treated as raw water.
4. Section 3.4 discusses the potential water quality impacts of transferring water between agencies.
5. Development of a RDP at each of the three sites would require construction of interconnection pipelines and pump stations.
6. Memoranda of Understanding developed between the agencies for use of the existing interties would have to be revised to allow for transfer of water for the RDP.

4.1 RECOMMENDATIONS

1. Hydraulic modeling of the conveyance systems near each potential site should be conducted before selecting a site.
2. Blending studies should be conducted for all the water sources that could be exchanged to determine any potential limitations in water exchanges.
3. Each agency needs to develop an estimate of its maximum potential demand from a new desalination plant.

Bay Area Regional Desalination Project Preliminary Environmental Screening

EAST BAY MUNICIPAL UTILITY DISTRICT



**CONTRA COSTA
WATER DISTRICT**

CONTRA COSTA WATER DISTRICT

Santa Clara Valley Water District



SAN FRANCISCO Public Utilities Commission

BAY AREA REGIONAL DESALINATION PROJECT

Preliminary Environmental Screening

Revised as of
April 2005

Prepared by

URS

**URS Corporation
1333 Broadway, Suite 800
Oakland, CA 94612**

Bay Area Regional Desalination Project

DRAFT **Preliminary Environmental Screening**

This document is a preliminary environmental screening of three potential sites for locating the Regional Desalination Project. A CEQA Initial Study checklist format was used to prepare this document. This is not intended to be an Initial Study.

1. **Project title:** Bay Area Regional Desalination Project
2. **Description of project:** Four of the Bay Area's regional water supply agencies, East Bay Municipal Utility District (EBMUD), San Francisco Public Utilities Commission (SFPUC), Santa Clara Valley Water District (SCVWD), and Contra Costa Water District (CCWD) (hereafter referred to collectively as the "agencies"), are jointly exploring desalination as a means of meeting the water needs of their constituencies. The proposed Regional Desalination Project (RDP) may consist of one or more desalination facilities, likely built in increments of 20 million gallons per day (MGD) or less, with an ultimate total capacity of up to 80 MGD. The objective of the RDP would be to improve water supply reliability for the over 5 million residents and businesses served by the four agencies.

EBMUD, SFPUC, SCVWD, and CCWD have somewhat different needs or proposed uses for the RDP. These uses could include:

- Providing additional sources of water during emergencies such as an earthquake;
- Providing a supplemental supply source during extended drought periods;
- Allowing other major facilities such as treatment plants, transmission mains, and pump stations to be taken out of service for an extended period of time for maintenance or repairs;
- Providing a full-time supplemental water supply to increase the diversity of the agencies' water supply portfolio, which would increase reliability.

The partner agencies are evaluating the potential of locating one or more desalination plants at any of three proposed sites: Oceanside site (San Francisco), East Contra Cost site (Pittsburg), and the Near Bay Bridge site (Oakland).

3. **Surrounding land uses and setting: Briefly describe the project's surroundings:** See Section IX below for a description of the land use setting for each of the 3 proposed sites.
4. **Other public agencies whose approval is required (e.g., permits, financing approval, or participation agreement.)** Environmental reviews and major permits or approvals that will likely be required for the proposed project include the following:
 - Compliance with the California Environmental Quality Act (CEQA).
 - Compliance with the National Environmental Policy Act (NEPA), if federal funds are used to finance any portion of the project, or if the project takes place on federal land, or if a federal permit is required.
 - A National Pollutant Discharge Elimination System (NPDES) permit from the California Environmental Protection Agency (Cal/EPA), through the Regional Water Quality Control Board (RWQCB) (either San Francisco or Sacramento, depending on the site selected). The U.S. Environment Protection Agency (USEPA) Region IX oversees the implementation of the program.
 - Section 404 Permit (Clean Water Act) and Section 10 Permit (Rivers and Harbors Act) from the U.S. Army Corps of Engineers (USACE).
 - Permit from the Bay Conservation Development Commission (BCDC) and/or California

Bay Area Regional Desalination Project

Coastal Commission.

- An amendment of Drinking Water Permits from the DHS will be required to include the new water supply source.
- A California Coastal Commission permit will be required if development is proposed within the coastal zone.
- A lease permit may be required from the State Lands Commission (SLC) if there are any offshore components of the proposed project on any ungranted tidelands.
- Consultation with the U.S. Fish and Wildlife Service (USFWS) and the National Marine Fisheries Services (NMFS) in accordance with Section 7 of the Federal Endangered Species Act.
- Consultation with California Department of Fish and Game (CDFG) through the Federal Endangered Species Act Section 7 process for state-listed threatened or endangered species.
- Consultation with the State Historic Preservation Office.
- A Water Rights Permit from the State Water Resources Control Board (SWRCB).

Bay Area Regional Desalination Project

ENVIRONMENTAL REVIEW CHECKLIST

Brief explanation or reference of all answers following each issue:

I. AESTHETICS Would the project:	Potentially Significant Impact	Less Than Significant With Mitigation Incorporated	Less-Than-Significant Impact	No Impact
a. Have a substantial adverse effect on a scenic vista?			A,B,C	
b. Substantially damage scenic resources, including but not limited to trees, rock outcroppings, and historic buildings within a state scenic highway?			A,B,C	
c. Substantially degrade the existing visual character or quality of the site and its surroundings?	A(?)		A,B,C	
d. Create a new source of substantial light or glare which would adversely effect day or nighttime views in the area?				A,B,C

DISCUSSION:

A – Oceanside Site

The Oceanside site is off the Great Highway in San Francisco. The proposed site is in the vicinity of the existing SFPUC water pollution control plant. The water pollution control plant entrance, located at 3500 Great Highway, faces the ocean to the west and is immediately south of the San Francisco Zoo. Industrial uses occur in the vicinity of this proposed RDP site. Although the Great Highway is designated as a Scenic Highway, the vista is to the west of the highway. The ocean view would remain unobstructed with the construction of a desalination plant adjacent to the water pollution control plant. No scenic resources would be damaged by the construction or operation of a desalination plant. Furthermore, the plant would fit with the existing industrial nature of the adjacent structures and therefore would not degrade the visual character or quality of the site. No substantial light or glare sources would be generated from the plant that could affect views from the Great Highway.

If a RDP is constructed outside of the Oceanside water pollution control plant property on other property that is part of the San Francisco Zoo then an impact to aesthetic resources could potentially occur.

B – East Contra Costa Site

The East Contra Costa site is located at 696 W. 10th Street in Pittsburg, within an unincorporated area of Contra Costa County. The proposed RDP would be co-located with an existing power plant, sharing its intake and outfall structures. The area around the site is dominated by industrial and commercial uses. New commercial housing is planned across from the power plant. Additional housing is located within 0.5 miles of the site. No scenic vistas occur in the immediate project vicinity. Therefore, a RDP would not adversely affect or otherwise degrade the visual character of the site. The plant would be consistent with the visual character of the industrial complex in which it would be located. No damage to scenic resources is envisioned. A RDP at this site would not create any visible source of light or glare.

C – Near Bay Bridge Site

The Near Bay Bridge site is located at 2020 Wake Avenue in Oakland, close to the Interstate 80 freeway. The RDP would be co-located with the wastewater treatment plant. The project area is characterized by industrial uses such as gravel crushing, firewood / lumber storage, and container storage. No scenic vistas are located in the vicinity, so no adverse impacts to scenic vistas or damage to scenic resources would occur from this project. The visual character of the area would not be degraded by the construction or operation of

Bay Area Regional Desalination Project

a desalination plant. The plant would not generate any new visible sources of light or glare that could affect day or nighttime views in the area.

Conclusion

Construction of a RDP at any of the three sites would not degrade the visual quality or otherwise affect visual resources. An exception would be if a RDP is constructed outside of the Oceanside water pollution control plant property on other property that is part of the San Francisco Zoo then an impact to aesthetic resources could potentially occur.

II. AGRICULTURAL RESOURCES				
In determining whether impacts to agricultural resources are significant environmental effects, lead agencies may refer to the California Agricultural Land Evaluation and Site Assessment Model (1997) prepared by the California Dept. of Conservation as an optional model to use in assessing impacts on agriculture and farmland. Would the project:	Potentially Significant Impact	Less Than Significant With Mitigation Incorporated	Less-Than-Significant Impact	No Impact
a. Convert Prime Farmland, Unique Farmland, or Farmland of Statewide Importance (Farmland), as shown on maps prepared pursuant to the Farmland Mapping and Monitoring Program of the California Resources Agency, to non-agricultural use?				A,B,C
b. Conflict with existing zoning for agricultural use, or a Williamson Act contract?				A,B,C
c. Involve other changes in the existing environment which, due to their location or nature, could result in conversion of Farmland, to non-agricultural use?				A,B,C

DISCUSSION:

A – Oceanside Site

The Oceanside site is located in San Francisco County. The California Department of Conservation does not map farmlands in San Francisco County because it is a highly urbanized area with little or no farmland. The site is adjacent to an industrial facility, surrounded by lands that are used for industrial or commercial purposes. The San Francisco Zoological Park is also within a ¼ mile of the proposed site. No agricultural uses occur in the project vicinity. Therefore, a regional plant located at this site would have no impact on important agricultural resources. No farmlands would be converted for the project, and the proposed plant would not conflict with any existing agricultural uses.

B – East Contra Cost Site

This site is zoned for industrial use and is located in an urbanized area. According to Michael Kisko, Land and Water Use Analyst for the Farmland Mapping and Monitoring Program at the California Department of Conservation, there are designations of Important Farmland in the project vicinity. No agricultural activity takes place within one mile of the Pittsburg power plant facility and there is no land under Williamson Act contract in the vicinity of the project site.

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C – Near Bay Bridge Site

The California Department of Conservation confirmed that the Near Bay Bridge site is also located in, and surrounded by Urban Land. No Prime Farmlands, Unique Farmlands, or Farmlands of Statewide Importance occur in the vicinity of this potential project site. Therefore, a RDP at this site would not cause any conflict of use or require any conversion of farmlands.

Conclusion

There are no existing agricultural uses or designated prime farmlands at any of the three sites. There would be no impacts to agricultural resources associated with development of the RDP at any of the three proposed sites.

III. AIR QUALITY				
Where available, the significance criteria established by the applicable air quality management or air pollution control district may be relied upon to make the following determinations. Would the project:	Potentially Significant Impact	Less Than Significant With Mitigation Incorporated	Less-Than-Significant Impact	No Impact
a. Conflict with or obstruct implementation of the applicable air quality plan?				A,B,C
b. Violate any air quality standard or contribute substantially to an existing or projected air quality violation?		A,B,C		
c. Result in a cumulatively considerable net increase of any criteria pollutant for which the project region is in non-attainment under an applicable federal or state ambient air quality standard (including releasing emissions which exceed quantitative thresholds for ozone precursors)?			A,B,C	
d. Expose sensitive receptors to substantial pollutant concentrations?				A,B,C
e. Create objectionable odors affecting a substantial number of people?				A,B,C

DISCUSSION:

All Sites

Construction activities would directly emit both fugitive dust (PM₁₀) and exhaust pollutants (NO_x, CO, PM₁₀, SO₂, and ROG) from diesel-fueled construction equipment. In addition, construction activities may cause indirect emissions associated with generation of electricity supplied for construction. This impact can be mitigated to less than significant with implementation of BAAQMD Basic and Enhanced Control measures for construction activities.

Operation of the RDP would require the consumption of substantial amounts of electrical energy, much of which may be generated by burning fossil fuels that generate air emissions. The facility will not have any directly emitting sources, with the exception of minor amounts of organic materials that may be used for maintenance and painting. The facility will also generate some vehicular traffic for employees and material deliveries. This impact is less than significant.

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Air emissions associated with construction and operation of the proposed RDP at any of the sites would not contribute substantially to an existing or projected air quality violation or expose sensitive receptors to substantial pollutant concentrations.

No objectionable odors would be created as a result of the proposed RDP.

Conclusion

Impacts to air quality would occur primarily during construction. There would be little direct emissions from the RDP itself but generating the energy to power the RDP could emit substantial emissions. Air quality impacts associated with the RDP would be essentially the same at each of the three sites.

IV. BIOLOGICAL RESOURCES				
Would the project:	Potentially Significant Impact	Less Than Significant With Mitigation Incorporated	Less-Than-Significant Impact	No Impact
a. 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 or U.S. Fish and Wildlife Service?	A,B,C			
b. Have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, or regulations, or by the California Department of Fish and Game or U.S. Fish and Wildlife Service?				A,B,C
c. 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?				A,B,C
d. 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?			A,B,C	
e. Conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance?				A,B,C
f. Conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or state habitat conservation plan?				A,B,C

DISCUSSION:

A record search was conducted of the California Natural Diversity Database to determine if any known federal or state-listed special status plant or animal species occur within the vicinity of each of the 3 project sites. The results of this record search are on file at URS' Oakland office and are summarized below.

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A – Oceanside Site

Table 1 lists the special status species potentially occurring in the vicinity of the Oceanside site and Figure 1 illustrates their distribution.

Table 1
Special Status Species Potentially Occurring in the Vicinity of the Oceanside Site

Scientific Name	Common Name	Status			
		Federal ^a	State ^b	CNPS ^c	Other ^d
<i>Chorizanthe cuspidate</i> var. <i>cuspidata</i>	San Francisco Bay spineflower			1B	
<i>Chorizanthe robusta</i> var. <i>robusta</i>	robust spineflower			1B	
<i>Cirsium occidentale</i> var. <i>compactum</i>	compact cobwebby thistle			1B	
<i>Emys</i> (= <i>Clemmys</i>) <i>marmorata</i>	western pond turtle				SSC
<i>Eucyclogobius newberryi</i>	tidewater goby	E			
<i>Geothlypis trichas sinuosa</i>	saltmarsh common yellowthroat				S/FSC
<i>Grindelia hirsutula</i> var. <i>maritima</i>	San Francisco gumplant			1B	
<i>Horkelia cuneata</i> ssp. <i>sericea</i>	Kellogg's horkelia			1B	
<i>Laterallus jamaicensis coturniculus</i>	California black rail		T		
<i>Layia carnosa</i>	beach layia	E	E	1B	
<i>Lessingia germanorum</i>	San Francisco lessingia	E	E	1B	
<i>Lichmanthe ursina</i>	bumblebee scarab beetle				FSC
<i>Linanthus rosaceus</i>	rose linanthus			1B	
<i>Phalacrocorax auritus</i>	double-crested cormoran				SSC
<i>Rana aurora draytonii</i>	California red-legged frog	T			
<i>Riparia riparia</i>	bank swallow		T		
<i>Triphysaria floribunda</i>	San Francisco owl's-clover			1B	

Notes:

^a Federal Status Codes:

E = Endangered. Species in danger of extinction throughout all or a significant portion of its range.

T = Threatened. Species likely to become endangered within the foreseeable future.

^b California Status Codes:

E = Endangered. Species whose continued existence in California is in jeopardy.

T = Threatened. Species likely to become endangered within the foreseeable future.

^c California Native Plant Society Status Codes:

1B = Plants that are rare, threatened, or endangered in California and elsewhere.

^d Other:

SSC=State Species of Concern.

S/FSC=State and Federal Species of Concern.

FSC=State Federal Species of Concern.

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Depending on the precise site location and layout, and location of access roads and appurtenant facilities, some of the species listed above could be affected by construction of a RDP at this location. Brine would be discharged through the Oceanside Water Pollution Control Plant's outfall and would be mixed in the pipe and dilute rapidly upon discharge due to the substantial water mixing in the ocean. Also, it may be possible to construct beach wells at this location which would eliminate any entrainment/impingement impacts on aquatic organisms. Impacts to biological resources on land could be greater at this site compared with the other two sites. However, impacts associated with brine disposal and the intake could be less, especially if beach wells are employed.

B – East Contra Costa Site

Table 2 lists the special status species potentially occurring in the vicinity of the East Contra Costa site and Figure 2 illustrates their distribution.

**Table 2
Special Status Species Potentially Occurring in the Vicinity
of the East Contra Costa Site**

Scientific Name	Common Name	Status			
		Federal ^a	State ^b	CNPS ^c	Other ^d
<i>Aster lentus</i>	Suisun Marsh aster			1B	
<i>Blepharizonia plumosa</i>	big tarplant			1B	
<i>Laterallus jamaicensis coturniculus</i>	California black rail		T		
<i>Lathyrus jepsonii var. jepsonii</i>	Delta tule pea			1B	
<i>Lilaeopsis masonii</i>	Mason's lilaeopsis		R	1B	
<i>Melospiza melodia maxillaris</i>	Suisun song sparrow				S/FSC
<i>Oenothera deltooides ssp. howellii</i>	Antioch Dunes evening-primrose	E	E	1B	
<i>Sterna antillarum brownii</i>	California least tern	E	E		
<i>Oncorhynchus tshawytscha</i>	Chinook salmon	T	T		
<i>Oncorhynchus mykiss</i>	Steelhead	T			
<i>Hypomesus transpacificus</i>	Delta smelt	T	T		

Notes:

^a Federal Status Codes:

E = Endangered. Species in danger of extinction throughout all or a significant portion of its range.

^b California Status Codes:

E = Endangered. Species whose continued existence in California is in jeopardy.

R= Rare. Plant species, although not presently threatened with extinction, that may become endangered in the foreseeable future.

T = Threatened. Species likely to become endangered within the foreseeable future.

^c California Native Plant Society Status Codes:

1B = Plants that are rare, threatened, or endangered in California and elsewhere.

^d Other:

S/FSC=State and Federal Species of Concern.

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Depending on the precise site location and layout, and location of access roads and appurtenant facilities, some of the species listed above could be affected by construction of a RDP at this location. However, the project area is fairly disturbed and it is likely that special status plant and animal species do not exist at this site. Although there are special status fish species in the source and receiving waters, they should not be additionally adversely affected by desalination plant operations since the plant would use the East Contra Costa site's existing intake structure and brine discharge is not likely to significantly affect fish species due to the amount of dilution that would occur. Brine would be discharged through the power plant's outfall and would be mixed in the pipe and dilute rapidly upon discharge, however the receiving water is less saline than at the other two sites.

C – Near Bay Bridge Site

Table 3 lists the special status species potentially occurring in the vicinity of the Near Bay Bridge site and Figure 3 illustrates their distribution.

Depending on the precise site location and layout, and location of access roads and appurtenant facilities, some of the species listed above could be affected by construction of a desalination plant at this location. However, the project area is fairly disturbed and it is likely that special status plant and animal species do not exist at this site. A new intake structure would need to be constructed in the Bay. Construction activity could affect aquatic organisms. Operation of the intake would create some entrainment and impingement impacts to marine organisms. Although steelhead run in this vicinity of the Bay they do not spawn here. Therefore, entrainment of steelhead eggs is not an issue. Brine would be discharged through EBMUD's wastewater treatment plant outfall and would be mixed in the pipe and dilute rapidly upon discharge.

Conclusion

A CNDDDB record search was conducted to find out which biological resources of concern may occur in the vicinity of each of the three proposed RDP sites. A biological survey will need to be conducted of the sites to determine if habitat does exist to support these resources. Based on the CNDDDB search and a preliminary assessment of the likely disturbed nature of the proposed sites, it appears that the Oceanside site is most likely to contain biological resources of concern. However, impingement/entrainment impacts could be less at this site if beach wells could be constructed to obtain source water. This may be difficult to achieve since numerous wells would probably need to be constructed to feed a desalination plant and there may be land use restrictions at Ocean Beach. This would need to be investigated further. Although there are special status fish species that run past the East Contra Costa site, a desalination plant at that location would not affect these species since it would use the power plant's existing intake structure and any impingement/entrainment impacts would already have occurred as a result of power plant operations.

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Table 3
Special Status Species Potentially Occurring in the Vicinity of the Near Bay Bridge Site

Scientific Name	Common Name	Status			
		Federal ⁱ	State ^b	CNPS ^c	Other ^d
<i>Accipiter cooperii</i>	Cooper's hawk				SSC
<i>Amsinckia lunaris</i>	bent-flowered fiddleneck			1B	
<i>Astragalus tener var. tener</i>	alkali milk-vetch			1B	
<i>Chorizanthe cuspidate var. cuspidata</i>	San Francisco Bay spineflower			1B	
<i>Cordylanthus maritimus ssp. palustris</i>	Point Reyes bird's-beak			1B	
<i>Erodium macrophyllum</i>	round-leaved filaree			2	
<i>Eucyclogobius newberryi</i>	tidewater goby	E			
<i>Holocarpha macradenia</i>	Santa Cruz tarplant	T	E	1B	
<i>Horkelia cuneata ssp. sericea</i>	Kellogg's horkelia			1B	
<i>Laterallus jamaicensis coturniculus</i>	California black rail		T		
<i>Rallus longirostris obsoletus</i>	California clapper rail	E	E		
<i>Reithrodontomys raviventris</i>	salt-marsh harvest mouse	E	E		
<i>Trifolium depauperatum var. hydrophilum</i>	saline clover			1B	
<i>Oncorhynchus mykiss</i>	Steelhead	T			

Notes:

^aFederal Status Codes:

E = Endangered. Species in danger of extinction throughout all or a significant portion of its range.

T = Threatened. Species likely to become endangered within the foreseeable future.

^bCalifornia Status Codes:

E = Endangered. Species whose continued existence in California is in jeopardy.

T = Threatened. Species likely to become endangered within the foreseeable future.

^cCalifornia Native Plant Society Status Codes:

1B = Plants that are rare, threatened, or endangered in California and elsewhere.

2 = Plants that are rare, threatened, or endangered in California, but more common elsewhere.

^dOther:

SSC=State Species of Concern.

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V. CULTURAL RESOURCES		Less Than Significant With Mitigation Incorporated	Less-Than-Significant Impact	No Impact
Would the project:	Potentially Significant Impact			
a. Cause a substantial adverse change in the significance of a historical resource as defined in Section 15064.5?		A		B,C
b. Cause a substantial adverse change in the significance of an archaeological resource pursuant to Section 15064.5?				A,B,C
c. Directly or indirectly destroy a unique paleontological resource or site or unique geologic feature?				A,B,C
d. Disturb any human remains, including those interred outside of formal cemeteries?				A,B,C

DISCUSSION:

A cultural resources record search was conducted for each of the 3 project sites to determine if there are any known prehistoric or historic archaeological sites or historic structures within the project areas. The results of the records search are summarized below. The records search was conducted through the Northwest Information Center at Sonoma State University. All site records received from the search are on file at URS' Oakland office.

A – Oceanside Site

There are two historic archaeological sites within the vicinity of this proposed RDP site. One is an historic well possibly associated with an 1890's Life Guard Station, or 1898 Spanish-American War cantonment, or World War I era battery. The other site is a concrete coal bin foundation constructed in 1940 that was part of Fort Funston. Both of these features are potentially associated with Fort Funston. Fort Funston has been determined eligible for inclusion to the National Register of Historic Places. Further research is required to determine if either of these features are contributing elements to its National Register eligibility. In addition, the site record for the historic well, which was recorded in 1980, indicated that the site was in jeopardy of being destroyed due to construction of the Oceanside Water Pollution Control Plant. Therefore, it is possible that the well site no longer exists. No other recorded cultural resources occur within ½ mile of this proposed RDP site. However, depending on the precise location of a RDP at this locale, construction of the RDP and appurtenant facilities could have a significant affect on cultural resources. It is likely that if there are potential impacts to cultural resources that they could be mitigated to less than significant.

B – East Contra Costa Site

One historic site exists within the immediate vicinity of this proposed RDP site. It is a portion of the Union Pacific Railroad alignment, originally the Central Pacific Railroad. The property has been not been evaluated as to its eligibility for inclusion in the National Register of Historic Places and California Register of Historical Resources; therefore its significance has not yet been determined. Nine other cultural resources are recorded within ½ mile of this proposed RDP site. Eight of these are single-family residences dating from 1900 to 1950 and one is a poured concrete building constructed in 1930. None of these structures appear to be eligible for listing in the National Register of Historic Places or the California Register of Historical Resources. It appears unlikely that construction of a RDP and its appurtenant facilities at the East Contra Costa site would affect historic properties.

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C – Near Bay Bridge Site

There are no known recorded archaeological or historic sites within the immediate vicinity of this proposed RDP site. There are 14 recorded historic sites within ½ mile of this proposed RDP site. Twelve of these historic sites are structures, primarily single-family residences, built in the late 19th and early 20th centuries that do not appear to be eligible for the National Register of Historic Places or California Register of Historical Resources. Another site is a historic refuse deposit that also does not appear to be National or California Register eligible. The last site is Building 823 of the former Oakland Army Base. The former Oakland Army Base has been found to be potentially eligible for listing in the National Register of Historic Places and Building 823 may be considered a contributing element to the base’s significance. However, it is unlikely that construction of a RDP and its appurtenant facilities at the Near Bay Bridge site would affect this historic resource.

Conclusion

Depending on the precise location of a RDP at the Oceanside site, construction of a RDP and appurtenant facilities could have a significant affect on cultural resources. The other two potential RDP sites have recorded historic resources in the immediate vicinity (East Contra Costa) or within ½ mile but it appears unlikely that construction of a RDP at either of these two sites would have a significant effect on historic resources. There are no known unique paleontological resources, unique geologic features, or archaeological sites containing human remains at any of the three proposed RDP sites.

VI. GEOLOGY AND SOILS				
Would the project:	Potentially Significant Impact	Less Than Significant With Mitigation Incorporated	Less-Than-Significant Impact	No Impact
a. Expose people or structures to potential substantial adverse effects, including the risk of loss, injury, or death involving:			A,B,C	
i. Rupture of a known earthquake fault, as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map issued by the State Geologist for the area or based on other substantial evidence of a known fault? Refer to Division of Mines and Geology Special Pub. 42.			A,B,C	
ii. Strong seismic ground shaking?			A,B,C	
iii. Seismic-related ground failure, including liquefaction?			A,B,C	
iv. Landslides?			A,B,C	
b. Result in substantial soil erosion or the loss of topsoil?			A,B,C	
c. 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?			A,B,C	
d. 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?			A,B,C	

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VI. GEOLOGY AND SOILS		Less Than Significant With Mitigation Incorporated	Less-Than-Significant Impact	No Impact
Would the project:	Potentially Significant Impact			
e. 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?			A,B,C	

DISCUSSION:

The ten acres required for the construction of a RDP makes large-scale excavation or tillage engineering unnecessary, though slight alterations in local topography and geography due to such construction processes as land filling, excavation, tillage, and structural assembly are inevitable. As for geological considerations, because desalination plants do not breach existing geological structures, the implementation of a construction plan should not result in any geological damage. Geologic conditions and potential hazards associated with each of the sites are discussed below.

A – Oceanside Site

The Oceanside site is located on Holocene dune and beach sand. Beach deposits and dune sands are well-sorted fine to coarse sands with some fine gravel. The dune sand has been extensively modified in this area and likely consists of remobilized Pleistocene dune sand that now veneers a thicker stack of dune deposits. Typical soils developed here are inceptisols. Liquefaction susceptibility is characterized as moderate based on the absence of historical liquefaction in predominantly Pleistocene dune areas. Groundwater levels on the San Francisco Peninsula may be more than 30 feet below the surface of the dune deposits at this location.

The Oceanside site is immediately east of the San Andreas fault. Further west lies the San Gregorio fault, and to the east is the Hayward fault line. The site is susceptible to strong ground motion in the event of an earthquake, particularly along the San Andreas fault. Other potential hazards include possible subsidence.

B – East Contra Costa Site

The geology of the area surrounding the East Contra Costa site is structurally complex, largely a result of the interaction of the strike-slip tectonics of the San Andreas fault system and the compressional tectonics of Diablo Range of the Coast Ranges, in which the site is located. Upper Jurassic (150 million years old) and younger rocks of the Franciscan complex underlie the Coast Ranges. The site consists of alluvial and fluvial deposits, sedimentary rocks, and Franciscan basement.

Major faults within 50 miles of the site include: Antioch fault, Calaveras fault, Concord-Green Valley fault, Greenville fault, Hayward fault, Rodgers Creek fault, San Andreas fault, and West Napa fault. Based on historical evidence, the site is susceptible to strong ground motion in the event of earthquakes along these fault lines. However, no active or potentially active fault lines cross the site. The Concord-Green Valley fault and the Greenville fault are the closest faults to the site, and both are approximately ten miles from the site. As such, the hazard from ground rupture within the site is considered low. During strong shaking, loose, saturated soils can experience temporary loss of strength, or liquefaction. The potential hazard associated with liquefaction is seismically induced settlement.

As the land at the site is flat, the hazard from slope stability is low. Significant excavating or fill work during construction could introduce slope stability hazards. Engineering design of the plant would incorporate Best Management Practices (BMPs) to reduce such risks.

C – Near Bay Bridge Site

The Near Bay Bridge site is located on artificial fill that has been placed over Bay Mud. There is no known fault rupture at or near the site. However, the site is susceptible to potential geological hazards. Active and

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potentially active faults near the project site include the Hayward, San Andreas, Rodgers Creek, Green Valley, Calaveras, Concord, West Napa, and Greenville Faults. The EBMUD site is approximately 15 miles from the San Andreas fault and about 4 miles from the Hayward fault, making strong ground motion likely in the event of an earthquake. The likelihood of liquefaction at the site is also high. Other potential hazards include possible subsidence resulting from compaction of unconsolidated layers in the Bay Mud. Construction of a RDP at this site would likely require using deep piles as part of the foundation for any heavy structures.

Conclusion

Given that all three sites are located in the Bay Area, each site is susceptible to some risk from seismic activity. All three sites present unique geologic conditions that would need to be taken into account during project design. All three sites already contain large industrial facilities (power plant, wastewater treatment plants) and adding a new facility to these sites could be accomplished through appropriate engineering and construction methods. Geotechnical investigations are required to determine the precise local geologic conditions to provide information for the appropriate engineering design. A RDP could be designed for any of the three sites to minimize effects from seismic activity and other local geologic conditions.

VII. HAZARDS AND HAZARDOUS MATERIALS		Less Than Significant With Mitigation Incorporated	Less-Than-Significant Impact	No Impact
Would the project:	Potentially Significant Impact			
a. Create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials?			A,B,C	
b. 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?			A,B,C	
c. Be located on a site which is included on a list of hazardous materials sites compiled pursuant to Government Code Section 65962.5 and, as a result, would create a significant hazard to the public or the environment.				
d. Impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan?				A,B,C
e. 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?				A,B,C

DISCUSSION:

All Sites

The RDP would result in routine transport, use and storage of hazardous materials through operation, maintenance and support activities, which would not create significant hazards to the public or the environment.

Hazardous material transport, use, storage are regulated by numerous federal, state and local laws and regulations which stipulate minimum standards for storage requirements, transport and disposal. The RDP must conform to these requirements, which would reduce potential effects associated with hazardous

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materials to less than significant. Pre-treatment sludge is not considered hazardous and this material would routinely disposed of in a Class III landfill facility.

RDP operations potentially could result in the accidental spill of hazardous materials transported to or stored on site. Operation of the desalination plant will involve the use of several chemicals which have the potential to adversely affect human health if they are accidentally spilled or released and subsequently come in to contact with operational personnel or the public. Many of the chemicals to be transported, stored and used during plant operations would have insignificant consequences if spilled. The primary concerns would arise for spills of sulfuric acid, aqueous ammonia, sodium hypochlorite solution, or calcium carbonate.

Hazardous material transport, use, storage are regulated by numerous federal, state and local laws and regulations which stipulate minimum standards for storage requirements, spill prevention procedures, emergency response and contingency plans, risk management, and employee training procedures. Operators of the RDP must conform to these requirements. Emergency response plans would be submitted to the appropriate local agencies. Hazardous materials should not be transported through residential areas.

A RDP at any of the three sites would not result in interference with an emergency response plan. None of the three sites is located within a wildland fire area.

Conclusion

A RDP at any of the three sites would require the transport, storage and use of hazardous materials. This would be conducted in accordance with applicable laws and regulations. Impacts associated with the use of hazardous materials and the generation of waste would be similar among the three sites.

VIII. HYDROLOGY AND WATER QUALITY				
Would the project:	Potentially Significant Impact	Less Than Significant With Mitigation Incorporated	Less-Than-Significant Impact	No Impact
a. Violate any water quality standards or waste discharge requirements?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	A,B,C
b. 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)?				A,B,C
c. 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?				A,B,C
d. 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?			A,B,C	

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VIII. HYDROLOGY AND WATER QUALITY				
Would the project:	Potentially Significant Impact	Less Than Significant With Mitigation Incorporated	Less-Than-Significant Impact	No Impact
e. 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?			A,B,C	
f. Otherwise substantially degrade water quality?			A,B,C	
g. 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?				A,B,C
h. Place within a 100-year flood hazard area structures which would impede or redirect flood flows?			B	A,C
i. 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?			B	A,C
j. Inundation by seiche, tsunami, or mudflow?		A		B,C

DISCUSSION:

All Sites

Development of a RDP would require construction activities such as site clearing and grading, trenching, and excavation, which could potentially cause temporary increases in erosion during storm events. Implementation of the project would require compliance with the NPDES statewide General Permit for Discharge of Storm Water Associated with Construction Activity by implementing control measures and BMPs required by project-specific Storm Water Pollution Prevention Plans (SWPPPs) to eliminate or reduce nonstorm and storm water discharges to receiving waters. Compliance with the statewide General NPDES permit would make this impact less than significant.

Development of a RDP would increase the amount of impervious surface on the proposed project site and could alter drainage patterns, thereby increasing runoff and potentially increasing loads of pollutants in storm water, which could affect water quality. Runoff would be directed to existing storm drain systems. If necessary, vegetative swales could be constructed to intercept the runoff and reduce its pollutant load prior to entering the storm drain. The following BMPs should be conducted as part of implementing the RDP:

- Absorbent materials should be used to clean up automotive fluids on the parking lot and disposed of properly
- Litter should be controlled and dumpster lids would be kept closed
- Storm drain inlets should be stenciled with “No dumping, Drains to Bay” message.

Implementation of the RDP could alter drainage patterns in the project area and increase impervious surfaces, which may exceed the capacity of storm water drainage systems and result in localized flooding and contribution to offsite flooding. Local storm drain system capacities will need to be determined and an assessment made as to their ability to accommodate the additional project-related flow. If needed, storm drain systems will be upgraded to accommodate the additional flow.

Discharge of brine could affect the receiving water quality. In all cases the brine will be mixed with either treated wastewater effluent or power plant cooling water. An assessment will need to be made to

Bay Area Regional Desalination Project

determine if the brine mixture would exceed WQOs for the receiving water bodies.

A – Oceanside Site

The Oceanside site is the most susceptible to the effects from a tsunami of the three sites because of its proximity to the ocean and low elevation. Optimal siting and design of the desalination facility would reduce this potential impact to less than significant. This part of the coast has not been mapped by the National Flood Insurance Program.

Construction activities associated with an intake structure could temporarily disturb bottom sediments in the ocean increasing turbidity, if beach wells are not feasible.

Other effects to hydrology and water quality would be similar to the other two sites.

B – East Contra Costa Site

The East Contra Costa site is the least susceptible to the effects from a tsunami of three sites. Ritter and Dupre (1972) show that for a tsunami originating outside San Francisco Bay, the amount of inundation based on tsunami run-up decreases to 50 percent of its maximum at the Golden Gate by the time it passes the Bay Bridge to the south and the Richmond-San Rafael Bridge to the north. By the time the tsunami reaches the Carquinez Strait to the north or Alviso in the south, the run-up would only be approximately 10 percent of its maximum at the Golden Gate. This model was used to assess hazards related to tsunamis and seiche in San Francisco Bay.

This site has been mapped by the National Flood Insurance Program and determined to be in Zone A2 (Areas of 100-year flood) (See Flood Insurance Rate Map at end of checklist). A RDP at this site would need to be designed and constructed in accordance with Federal Emergency Management Agency (FEMA) guidelines for developing within a 100-year flood zone. A building permit would not be issued until it is confirmed that the building design meets these guidelines. The FEMA guidelines provide for design elements that would minimize the structure's effect as to impeding or redirecting flood flows. Construction of a structure in the 100-year flood zone would require that the base elevation of the ground floor be above the flood elevation (7 feet msl) and may require a Conditional Letter of Flood Map Revision (CLOMAR) from FEMA. This would make this impact less than significant.

Construction of an intake structure at this site would not be necessary since one already exists for the power plant that could be used by a RDP.

Other effects to hydrology and water quality would be similar to the other two sites.

C – Near Bay Bridge Site

The Near Bay Bridge site is less susceptible to the effects from a tsunami than the Oceanside site but more susceptible than the East Contra Costa site. See discussion above. This site has been mapped by the National Flood Insurance Program and determined to be in Zone C (Areas of minimal flooding) (See Flood Insurance Rate Map at end of checklist).

Construction activities associated with an intake structure could temporarily disturb bottom sediments in the Bay increasing turbidity.

Other effects to hydrology and water quality would be similar to the other two sites.

Conclusion

The Oceanside site would be most susceptible to the effects from a tsunami while the East Contra Costa site would be the least susceptible. The East Contra Costa site is within a 100-year flood zone. Construction of a structure in the 100-year flood zone would require that the base elevation of the ground floor be above the flood elevation and may require a Conditional Letter of Flood Map Revision (CLOMAR) from FEMA. The East Contra Costa site would not require construction of an intake structure and would avoid disturbing bottom sediments. The Near Bay Bridge site would require construction of an intake

Bay Area Regional Desalination Project

structure thus disturbing bottom sediments while the Oceanside site may require the construction of an intake structure if beach wells are not feasible. Other effects to hydrology and water quality would be similar among the three sites.

IX. LAND USE AND PLANNING				
Would the project:	Potentially Significant Impact	Less Than Significant With Mitigation Incorporated	Less-Than-Significant Impact	No Impact
a. Physically divide an established community?				A,B,C
b. 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.				A,B,C
c. Conflict with any applicable habitat conservation plan or natural community conservation plan?				A,B,C

DISCUSSION:

A – Oceanside Site

The existing use at the Oceanside site consists of the San Francisco Public Utilities' Commission's water pollution control plant. The proposed RDP would be co-located with the existing facility, in the southwest quadrant of the site. According to the San Francisco Planning Department, the land use designation for the property is Open Space and the zoning designation is Public Use. A RDP would be consistent with the zoning designation for the site. Because the plant would be located in an existing industrial complex, it would not divide any existing communities or conflict with any land use plans, policies, or regulations. Surrounding land uses include the San Francisco Zoo, the Westside Pump Station, a recreation center for the handicapped, and the California National Guard.

B – East Contra Costa Site

The East Contra Costa site is located within an unincorporated area of Contra Costa County. According to the County's Planning Division, the site is designated and zoned for Heavy Industrial use. A RDP at this site would require a Land Use Permit from the county. Surrounding uses include commercial housing, an auto wrecking yard, painting, towing, and crane heating companies. Two motels, a church, and two housing complexes are also located within ¼ mile of the plant site. A RDP located within the premises of the power plant would not physically divide a community or conflict with any applicable land use plans or policies. There is no known conflict with any conservation plan or natural community conservation plan at the site.

C – Near Bay Bridge Site

The Near Bay Bridge site is located in Oakland (Alameda County), close to the I-80 freeway. The Community and Economic Development Agency of Oakland confirmed that the land use designation for the site is General Industrial and it is zoned for Industrial (M-40) use. Surrounding uses include abandoned railroad tracks, gravel crushing, firewood / lumber storage, and container storage. A proposed RDP at this site would not physically divide a community or conflict with any land use plans or policies. No habitat

Bay Area Regional Desalination Project

conservation plan or natural community conservation plan covers this site.

Conclusion

Development of a RDP at any of the three proposed sites would be a consistent land use. An exception to this would be if the water pollution treatment plant site at Oceanside could not accommodate a RDP then it would need to be constructed elsewhere on San Francisco Zoo property. The land use designation for the property is Open Space and the zoning designation is Public Use. A RDP would be consistent with the zoning designation for the site.

X. MINERAL RESOURCES		Less Than Significant With Mitigation Incorporated	Less-Than-Significant Impact	No Impact
Would the project:	Potentially Significant Impact			
a. 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?				A,B,C
b. 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?				A,B,C

DISCUSSION:

A – Oceanside Site

The California Geological Survey (CGS) (formerly the California Division of Minerals and Geology (CDMG)) has classified urbanizing lands according to the presence or absence of significant sand, gravel, or stone deposits that are suitable as sources of aggregate. There are four such areas, called Mineral Resource Zones (MRZs). MRZ-1 is a zone for which adequate information exists to indicate that no significant mineral deposits are present.

According to the CGS, most of the San Francisco Bay Area study zones are located within areas designated as MRZ-1, indicating that no significant mineral deposits are present or likely to be present. The Oceanside site is characterized MRZ-1. Therefore, the construction of a RDP would not reduce the availability of any minerals that could be of value to the region.

B – East Contra Costa Site

Mineral resources in Contra Costa County include aggregate and stone for commercial, industrial, and construction uses. There are several active quarry mining operations in the county, which generate essential aggregate and mineral resources. These materials include: (1) broken and crushed stone used primarily for waterway armor (riprap); (2) crushed rock used mainly as road base; (3) sand and gravel used as bituminous and concrete aggregate; (4) specialty sands including foundry and glass; and (5) dimension stone. The Contra Costa County General Plan identifies areas of mineral resources of value to the region or to residents of the State.

The largest known coal deposit in California, the Mount Diablo Coalfield, is located within five miles of the site. However, no ongoing mining is occurring. A large number of gas and hydrocarbon fields exist within structural traps deep below ground surface. The closest proven hydrocarbon resources are beneath Honker Bay and Van Sickle Island and the Los Medanos Hills. There are no known hydrocarbon resources in the immediate vicinity of the site. CGS classifies the site of the Pittsburg facility within Mineral Resources Zone 1 (MRZ-1), indicating the adequate information suggests that no significant mineral

Bay Area Regional Desalination Project

deposits are present and there is little likelihood for their presence. Therefore, the proposed RDP would not pose any threat to the mineral resources at this site.

C – Near Bay Bridge Site

This proposed site is located in an industrial area. The project area has no known existing mineral resources. The project would not require quarrying, mining, dredging, or extraction of locally important mineral resources on site, nor would it deplete any nonrenewable natural resource. No impact to mineral resources would result from the construction of a RDP at this site.

Conclusion

Construction of a RDP at any of the three proposed sites would have no effect to mineral resources.

XI. NOISE				
Would the project result in:	Potentially Significant Impact	Less Than Significant With Mitigation Incorporated	Less-Than-Significant Impact	No Impact
a. Exposure of persons to or generation of noise levels in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies?				A,B,C
b. Exposure of persons to or generation of excessive groundborne vibration or groundborne noise levels?				A,B,C
c. A substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project?				A,B,C
d. A substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project?			A,B,C	

DISCUSSION:

All Sites

All three sites have existing industrial or public use facilities that generate some noise. A RDP operating at any of the three sites would not substantially increase the ambient noise level. Noise would occur during construction of the RDP. This noise increase would be temporary. Conforming with local noise ordinances regarding construction noise would reduce this impact to less than significant.

Conclusion

Noise impacts would be the same at all three sites. There would not be a substantial increase in ambient noise levels due to operation of a RDP. There would be temporary noise increases due to construction activities that could be mitigated to less than significant by following local noise ordinances.

Bay Area Regional Desalination Project

XII. POPULATION AND HOUSING				
Would the project:	Potentially Significant Impact	Less Than Significant With Mitigation Incorporated	Less-Than-Significant Impact	No Impact
a. Induce substantial population growth in an area, either directly (for example, by proposing new homes and businesses) or indirectly (for example, through extension of roads or other infrastructure)?	A,B,C			
b. Displace substantial amounts of existing housing, necessitating the construction of replacement housing elsewhere?				A,B,C
b. Displace substantial numbers of people, necessitating the construction of replacement housing elsewhere?				A,B,C

DISCUSSION:

All Sites

The proposed desalination plant would be a regional facility that would augment the water supply for emergency and drought relief to the residents and businesses served by four of the Bay Area's water agencies: EBMUD, SFPUC, CCWD and SCVWD. Regardless of where the plant is physically located, it would serve the same populations and have impacts that are not site-specific.

The RDP can either directly or indirectly serve the water needs of more than 5 million residential and business water users in the Bay Area. The purpose of the desalination project would be to provide water for emergency and drought relief as well as supplement existing permanent supplies. As such, the potential for the project would to provide any direct impetus for new home or business development that is not already planned needs to be examined. Greater water security during emergencies may contribute to growth when combined with other factors. Therefore, there is the possibility to be some impact on growth, regardless of the site selected for this project. This needs to be examined in greater detail.

Each of the three alternative sites being considered are developed industrial sites with existing industrial facilities. No displacement of people or housing would be required for the implementation of the project.

Conclusion

There is the possibility to be some impact on growth, regardless of the site selected for this project. This needs to be examined in greater detail.

XIII. PUBLIC SERVICES				
a. Would the project 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 any of the following public services:	Potentially Significant Impact	Less Than Significant With Mitigation Incorporated	Less-Than-Significant Impact	No Impact
a. Fire Protection?			A,B,C	
b. Police Protection?			A,B,C	
c. Schools?				A,B,C

Bay Area Regional Desalination Project

XIII. PUBLIC SERVICES				
a. Would the project 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 any of the following public services:	Potentially Significant Impact	Less Than Significant With Mitigation Incorporated	Less-Than-Significant Impact	No Impact
d. Parks?				A,B,C
e. Other public facilities?			A,B,C	

DISCUSSION:

A – Oceanside Site

The proposed RDP would have relatively minor demands on public services. While it would be an additional facility that would require fire and police response in the event that an emergency occurs at the site, the location is currently availing of such public services. The number of additional employees required to run the facility would not warrant any new public services. It is assumed that because of the small number of employees required to operate and maintain the facility, no relocation would be required. Therefore, there would be no impact to schools, parks or other public facilities (i.e. hospitals) associated with the increase in people residing in the project vicinity. If there is growth that can be attributed in part to the proposed project, there may be an indirect need for a greater number of public services over several years. However, this growth is planned for the local General Plans governing the area served by the project.

B – East Contra Costa Site

As with the Oceanside site, the East Contra Costa site would not have significant direct impacts on public services. Aside from fire and police protection, no other impacts to public services are envisioned as a result of constructing or operating a RDP at the East Contra Costa site. The effects to police and fire services would be a less than significant impact because 1) this location would not require that existing emergency services alter their destinations or traveling routes, and 2) there would be few employees manning the desalination plant on a regular basis who would require access to emergency services.

C – Near Bay Bridge Site

Because there is an existing wastewater treatment plant at this site, a RDP here could take advantage of the public services available to the existing site. Much like the other two alternatives under consideration, locating a RDP at this site would not result in any impacts to public services, other than less than significant impacts to the need for fire and police protection at the new facility.

Conclusion

Development of a RDP at any of the three sites would require fire and police response in the event that an emergency occurs at the site. This increased demand in public services, and the ability to meet this demand, would be equal at all three sites.

Bay Area Regional Desalination Project

XIV. RECREATION	Potentially Significant Impact	Less Than Significant With Mitigation Incorporated	Less-Than-Significant Impact	No Impact
a. Would the project increase the use of existing neighborhood and regional parks or other recreational facilities such that substantial physical deterioration of the facilities would occur or be accelerated?				A,B,C
b. Does the project include recreational facilities or require the construction or expansion of recreational facilities which might have an adverse physical effect on the environment?				A,B,C

DISCUSSION:

A – Oceanside Site

The San Francisco Zoo and a recreation center for the handicapped are located adjacent to the proposed SFPUC Oceanside site. Harding Park is also within ¼ mile of the site. The project would not increase the use of existing neighborhood and regional parks, or other recreational facilities. The project itself does not include the construction or expansion recreational facilities. However, if a RDP would need to be constructed on San Francisco Zoo property other than the water pollution treatment plant site, then the zoo could possibly be affected.

B – East Contra Costa Site

No recreational resources occur in the immediate vicinity of the East Contra Costa site. The proposed desalination plant would not impact the use of any recreational facilities, nor would it include the construction or expansion of recreational facilities.

C – Near Bay Bridge Site

No recreational resources occur in the immediate vicinity of Near Bay Bridge site. The proposed RDP would not impact the use of any recreational facilities, nor would it include the construction or expansion of recreational facilities.

Conclusion

Development of a RDP at any of the three sites would not affect recreational resources with one exception. if a RDP would need to be constructed on San Francisco Zoo property other than the water pollution treatment plant site at Oceanside, then the zoo could possibly be affected.

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XV. TRANSPORTATION/TRAFFIC		Less Than Significant With Mitigation Incorporated	Less-Than-Significant Impact	No Impact
Would the project:	Potentially Significant Impact			
a. 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, on congestion at intersections)?			A,B,C	
b. Exceed, either individually or cumulatively, a level of service standard established by the county congestion management agency for designated roads or highways?			A,B,C	
c. Result in inadequate emergency access?			A,B,C	
d. Result in inadequate parking capacity?			A,B,C	

DISCUSSION:

A – Oceanside Site

Access to the Oceanside site is via the Great Highway. Access to this part of San Francisco is either from I-280 from the south then on local streets to the Great Highway; US 101 from the north then on local streets to the Great Highway; or I-80 from the east to US 101 south and I-280 then on local streets to the Great Highway.

B – East Contra Costa Site

Access to the East Contra Costa site is via State Route 4 then on local streets to 10th Street.

C – Near Bay Bridge Site

Access to the Near Bay Bridge site is via I-8- then on local streets to Wake Avenue.

All Sites

Implementation of the RDP would not cause an increase in the traffic that may be substantial in relation to the existing roadway capacity of the street system as indicated by a substantial increase in the number of vehicle trips. Construction and operation of the RDP would increase the number of vehicle trips at the proposed desalination plant and along the streets where the proposed in-system improvements would occur, however the increase would not be substantial. Construction traffic impacts would be temporary and operation of a RDP would add 15 to 20 employees, generating an equal number of vehicles on the access routes. Truck trips to and from the facility during operation are estimated to be on the order of one to two truck trips per day. An exception to this may be the Near Bay Bridge site where disposal of sludge generated during pretreatment may require more truck trips to landfills.

Implementation of the RDP would not result in inadequate parking capacity. Parking for employees would be provided on site.

Implementation of the RDP would not result in inadequate emergency access in the project vicinity.

Conclusion

Traffic impacts associated with operation of a RDP would be minor since the number of employees and truck trips required for operation would be small. Truck trips associated with the Near Bay Bridge Site

Bay Area Regional Desalination Project

could be more due to pretreatment sludge disposal. Temporary traffic impacts could occur during construction but these would be less than significant with proper traffic control measures.

XVI. UTILITIES AND SERVICE SYSTEMS		Less Than Significant With Mitigation Incorporated	Less-Than-Significant Impact	No Impact
Would the project:	Potentially Significant Impact			
a. Exceed wastewater treatment requirements of the applicable Regional Water Quality Control Board?			A,B,C	
b. 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?				A,B,C
c. 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?			A,B,C	
d. Have sufficient water supplies available to serve the project from existing entitlements and resources, or are new or expanded entitlements needed?	B			A,C
e. 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?				A,B,C
f. Be served by a landfill with sufficient permitted capacity to accommodate the project's solid waste disposal needs?	C		A,B,	

DISCUSSION:

All Sites

Wastewater generated by a RDP that would be treated at a municipal wastewater treatment plant would consist of sanitary wastewater that would not exceed the wastewater treatment requirements of the RWQCB. The amount of wastewater generated would not be significant since the facility would employ no more than 20 people. The amount of additional stormwater generated by developing a RDP and creating additional areas of impervious surface to generate runoff would not be significant and should be accommodate by existing storm drain systems.

A – Oceanside Site

No new water entitlements would be needed for a RDP at this site since the source water would be the ocean and water rights would not be required. Solid waste generated at a RDP at this site would mostly be pretreatment sludge. There is less fine particulate matter in ocean water than Bay water so less sludge would be generated than at the Near Bay Bridge site.

B – East Contra Costa Site

New water entitlements would be needed for a RDP at this site since the source water would be the Delta and water rights would be required. Solid waste generated at a RDP at this site would mostly be

Bay Area Regional Desalination Project

pretreatment sludge. There is less fine particulate matter in Delta water than ocean or Bay water so less sludge would be generated than at the Oceanside or Near Bay Bridge sites.

C – Near Bay Bridge Site

No new water entitlements would be needed for a RDP at this site since the source water would be the Bay and water rights would not be required. Solid waste generated at a RDP at this site would mostly be pretreatment sludge. There is more fine particulate matter in Bay water than ocean water so more sludge would be generated than at the Oceanside or Near Bay Bridge sites.

Conclusion

No water rights would be required for a RDP at The Oceanside or Near Bay Bridge sites but would be required for a RDP at the East Contra Costa site. More pretreatment sludge requiring landfill disposal would be generated at the Near Bay Bridge site than the other two sites. Other impacts associated with utilities and service systems would be similar among the three sites.

SUMMARY

Oceanside Site

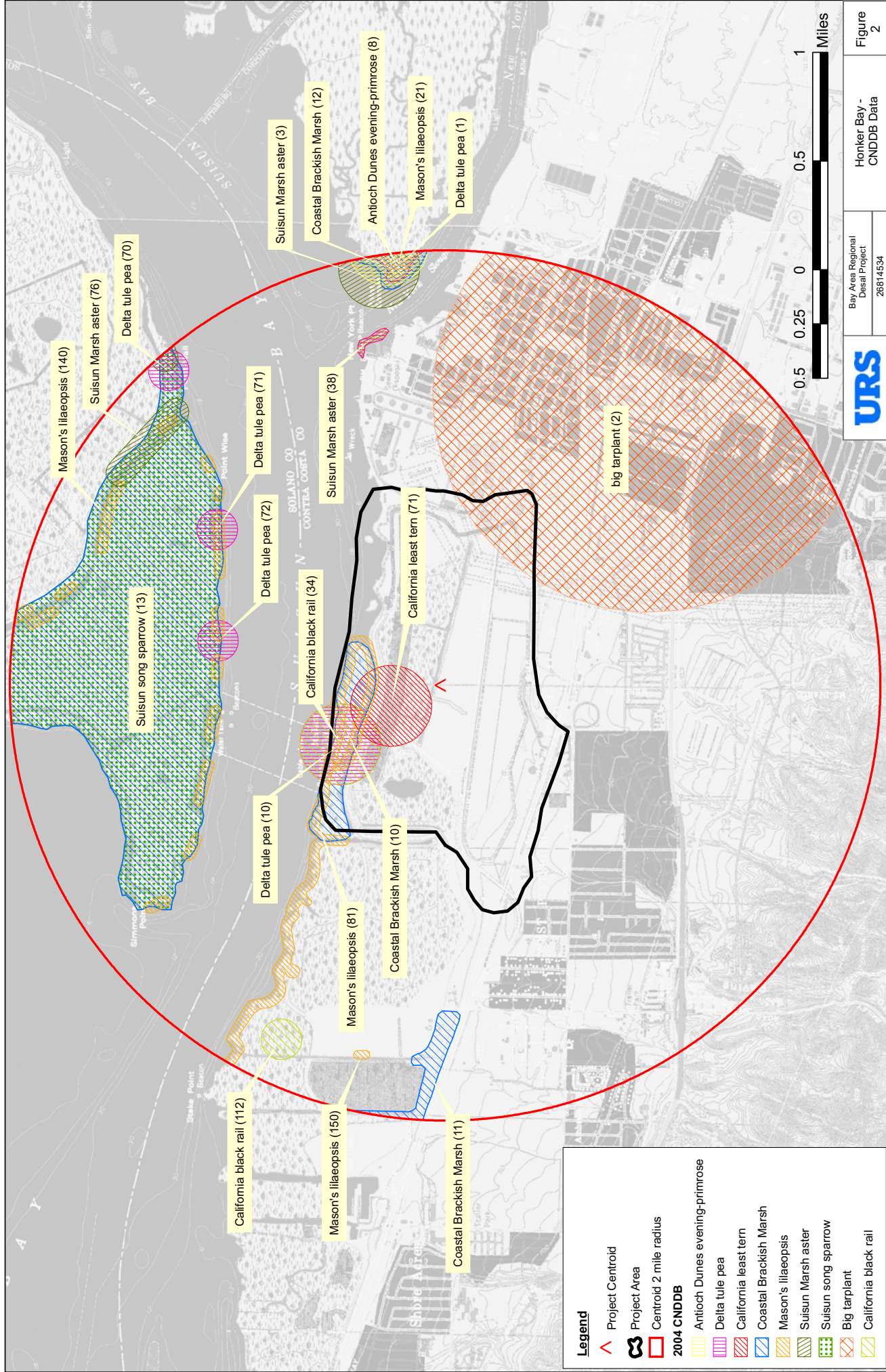
If a RDP is constructed outside of the Oceanside water pollution control plant property on other property that is part of the San Francisco Zoo then an impact to aesthetic resources could potentially occur. Impingement/entrainment impacts could be less at this site if beach wells could be constructed to obtain source water. This may be difficult to achieve since numerous wells would probably need to be constructed to feed a desalination plant and there may be land use restrictions at Ocean Beach. This would need to be investigated further. Depending on the precise location of a RDP at the Oceanside site, construction of a RDP and appurtenant facilities could have a significant affect on cultural resources. The Oceanside site would be most susceptible to the effects from a tsunami.

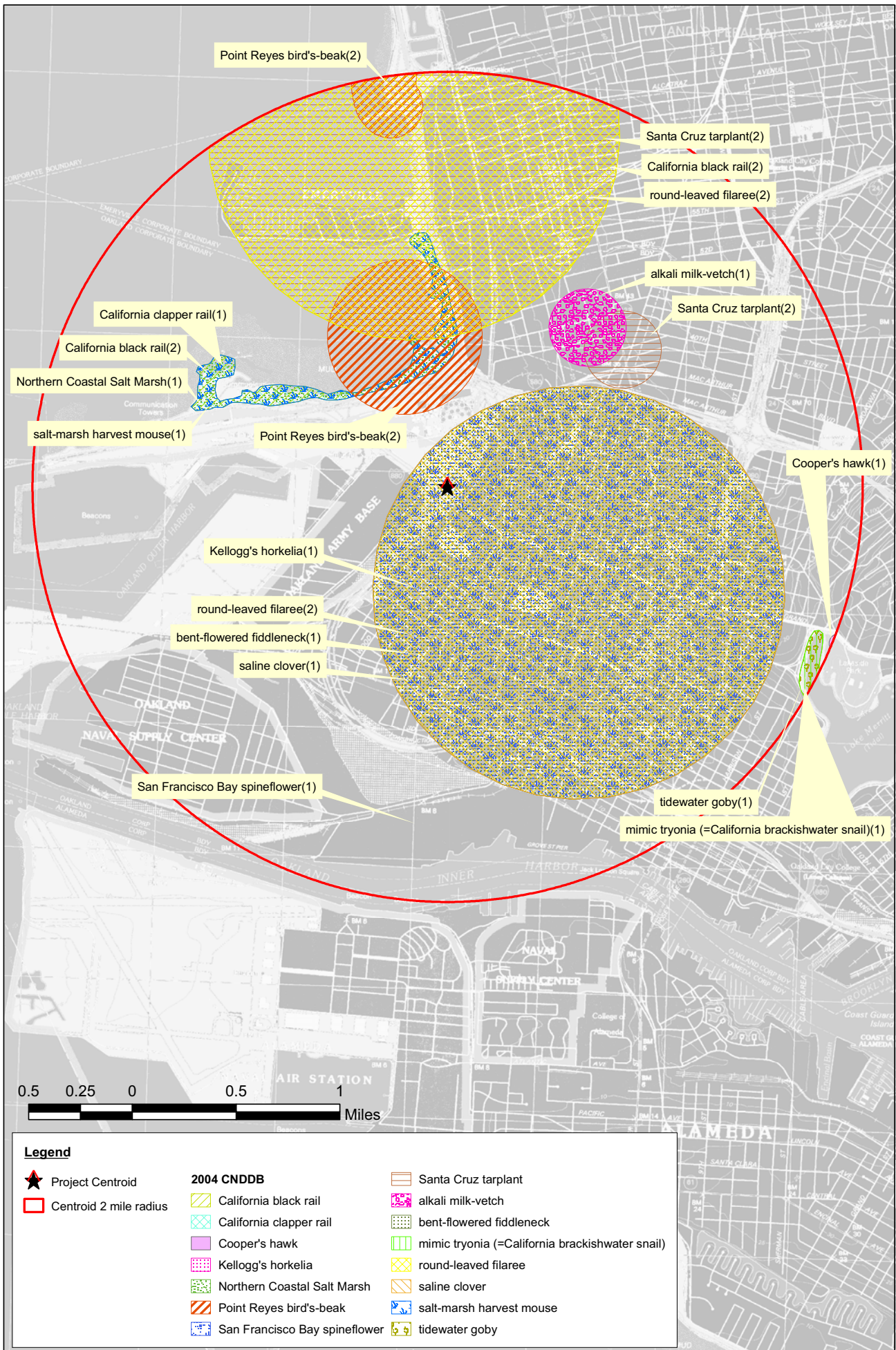
East Contra Costa Site

The East Contra Costa site would be the least susceptible to a tsunami. The East Contra Costa site is within a 100-year flood zone. Construction of a structure in the 100-year flood zone would require that the base elevation of the ground floor be above the flood elevation and may require a Conditional Letter of Flood Map Revision (CLOMAR) from FEMA. The East Contra Costa site would not require construction of an intake structure and would avoid disturbing bottom sediments. New water entitlements would be needed for a RDP at this site since the source water would be the Delta and water rights would be required.

Near Bay Bridge Site

The Near Bay Bridge site would require construction of an intake structure thus disturbing bottom sediments. Solid waste generated at a RDP at this site would mostly be pretreatment sludge. There is more fine particulate matter in Bay water than ocean water so more sludge would be generated than at the Oceanside or Near Bay Bridge sites. Construction of a RDP at this site would likely require using deep piles as part of the foundation for any heavy structures.





URS Corporation \Projects\Regional_Desalination\XCO\Current Working Documents\Figure_3_Oakland_West_CNDDB.mxd Date: 10/13/2004 10:50:17 AM Name: akne@0



APPROXIMATE SCALE
 1000 0 1000 FE

NATIONAL FLOOD INSURANCE PROGRAM

FIRM
FLOOD INSURANCE RATE MAP

CITY OF
OAKLAND, CALIFORNIA
 ALAMEDA COUNTY

PANEL 15 OF 45
 (SEE MAP INDEX FOR PANELS NOT PRINTED)

COMMUNITY-PANEL NUMBER
 065048 0015 B

EFFECTIVE DATE:
 SEPTEMBER 30, 1982



Federal Emergency Management Agency

This is an official copy of a portion of the above referenced flood map. It was created using FIRM On-Line. This map does not reflect changes to the map since the last time it was printed. For the latest product information about National Flood Insurance Program flood maps, check the FEMA Flood Map Store at www.fema.gov.





APPROXIMATE SCALE IN FEET
 1000 0 1000

NATIONAL FLOOD INSURANCE PROGRAM

FIRM
FLOOD INSURANCE RATE MAP

CONTRA COSTA COUNTY,
 CALIFORNIA
 (UNINCORPORATED AREAS)

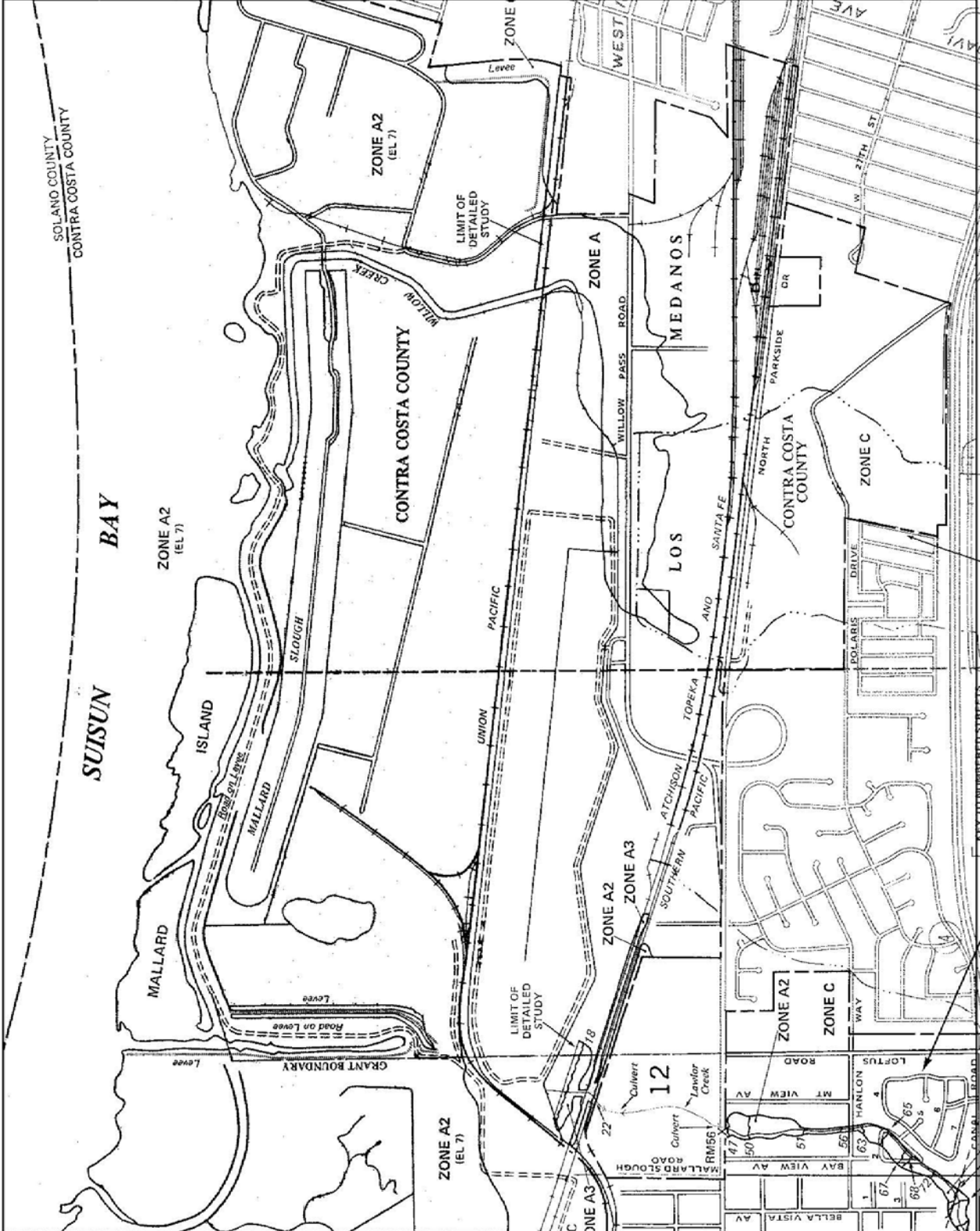
PANEL 120 OF 625
 (SEE MAP INDEX FOR PANELS NOT PRINTED)

COMMUNITY-PANEL NUMBER
 060025 0120 B
 EFFECTIVE DATE:
 JULY 16, 1987



Federal Emergency Management Agency

This is an official copy of a portion of the above referenced flood map. It was generated using FIRM On-Line. This map does not reflect changes to the map since the last time it was printed. For the latest product information about National Flood Insurance Program flood maps, check the FEMA Flood Map Store at www.msc.fema.gov.



KEY TO NUMBERED STREETS

Attachment 4
Project Manager Resume and Team Member Biosketches

HOSSEIN ASHKTORAB
Santa Clara Valley Water District
5750 Almaden Expressway
San Jose, CA 95118-3614
(408) 265-2600

EDUCATION:

Ph.D., University of California, Davis, 1989. Plant, Soil and Water Science.
Master of Science, California State University, Chico, 1981. Irrigation.
Bachelor of Science, University of Mazandaran, 1979. Agriculture Engineering.

PROFESSIONAL EXPERIENCE:

Unit Manager, Water Conservation & Recycling Unit, Santa Clara Valley Water District
Jan. 2001-Present

Responsible for managing the District Water Use Efficiency Unit (WUE) providing technical direction, coordinating its activities with other District Units, and external stakeholders including 11 water retailers. The water conservation program is a long-term commitment of the District, which provides the highest quality programs and educational opportunities to residents businesses, and growers in Santa Clara County.

Managing the implementation of all 14 BMPs required by the Memorandum of Understanding Regarding Urban Water Conservation in California (MOU). In addition, managing the adopted Water Conservation Plan (including agriculture water conservation program) to comply with US Bureau of Reclamation mandate as required by the Central Valley Project Improvement Act (CVPIA).

Manage and participate in the development, implementation and administration of the water conservation and water recycling programs with more than \$9 million annual budget in Santa Clara County. In addition to this, managed numerous grant funded programs, which, in FY 03/04 alone, totaled over \$2.8 million.

Develop partnership with local and regional cities including various water conservation programs with City of San Jose with more than \$3 million cost-sharing budget as well as cost-sharing agreement with six other agencies in Northern California for residential efficient clothes washing machine.

Participate and engage in the recycled water partnership such as South Bay Water Recycling cost sharing agreement for the \$50 million of projects in the Santa Clara County.

Responsible for implementation of CALF ED grants for the District Agricultural and Urban Water Use efficiency programs. Developed proposals and received grant fund for two District's water recycling projects from Proposition 13 grant funding.

Water Conservation Specialist, Water Conservation & Recycling Unit, Santa Clara Valley Water District Jan. 1997-Jan. 2001

Developed and managed water conservation programs including programs for agricultural and large landscape water users.

RESEARCH AND TEACHING EXPERIENCE:

Researcher/ Assistant professor, University of California, Davis. June 1996-Dec 1997.
Crop water requirement and water management

Assistant Professor, Dept. of Irrigation Eng., Shiraz University. Sept. 1993-June 1996.
Lectured on urban water use, conservation, cropwater requirements, and irrigation systems

Associate Land Water Use Analyst, California Department of Water Resources, Dec. 1986-Sept. 1993.

Technical coordinator for the Assembly Bill 325 Task Force Advisory Committee in 1991 and 1992 and facilitated the development of the State Landscape Water Conservation Model Ordinance. Assisted water agencies, cities and counties to develop and implement landscape water conservation guidelines and ordinances.

As a member of the State Water Conservation Advisory Committee, participated in the development of the Best Management Practices (BMPs) in water conservation.

Developed a new method using nonlinear regression model to estimate crop water requirement values for major crops in the Delta's agricultural area, which was the basis for the negotiation of the irrigation water use.

Supported agencies in the development of their water management plan, implementation and evaluation of various water conservation programs such as the ULF toilet replacement, toilet displacement devices, low flow shower heads and outdoor water audits.

Developed a new method using nonlinear regression model to estimate historical ETo values in the Delta's agricultural area.

PUBLICATION:

Published two scientific books and several technical papers on water management.

Alex Coate – Alex Coate is currently Manager of EBMUD’s Water Supply Improvements Division with 23 staff and a five-year combined capital and operating budget of more than \$500 million. For ten of the 12 years that Mr. Coate has been employed with EBMUD he has held various management positions. Prior to joining EBMUD, Mr. Coate worked for ten years with engineering consulting (CH2M Hill), research (U.C. Berkeley Sanitary Engineering Environmental Health Research Labs), and legal (McCutchen, Doyle, Brown and Emerson) businesses.

Joan Ryan – Joan Ryan is a registered Professional Mechanical Engineer in the state of California. She has over ten years of professional engineering experience in water resource planning with the San Francisco Public Utilities Commission. She is the lead of the Engineering Section of the SFPUC/Water Resources Planning Bureau. As project manager, Ms. Ryan’s work includes projects related to water resource development, regional water management, water systems operations, and recycled water master planning and conceptual design. She has managed the Regional Desalination Project for SFPUC since June 2005.

Hasan Abdullah – Mr. Abdullah has been working as EBMUD’s Desalination Project Coordinator for the past two years. He is also the Project Manager for the Phase 2 Pre-Feasibility Study of the Bay Area Regional Desalination Project. He is a member of the ACWA Desalination Sub-committee. Mr. Abdullah has over 15 years of project management and engineering experience, most of it working in Bay Area. He has lead several water supply projects for EBMUD and has been coordinating EBMUD’s desalination efforts lately. Mr. Abdullah has a Bachelors Degree in Chemical Engineering (Professional Engineer in California) with an emphasis on water treatment and a Masters Degree in Environmental Engineering.

Pamela John – Pamela John is a registered Civil Engineer in the state of California and holds a Water Treatment Operator license T-4 from the California Department of Health Services. She holds both bachelor and master degrees in Civil Engineering with emphasis in water resources and environmental engineering. In addition to prior civil engineering experience, she has worked professionally on water projects since 1990, in the capacity of project engineer, project manager, senior project manager and senior engineer. Since 2003, she has managed the Regional Desalination Project for SCVWD.

Marie Valmores – Marie Valmores is a registered Civil Engineer in the state of California and has over 20 years of work experience at EBMUD. She worked as a project engineer on water resources, treatment, operations and distribution planning projects, and as a senior engineer she supervised the water service planning section which served as the environmental documentation and preliminary design review clearinghouse of projects that potentially impact the District's raw water, treatment or distribution systems. Currently with the CCWD, she manages the various water recycling agreements with two local wastewater agencies and has managed the Regional Desalination Project since mid-2004.