Water Management Plan 2011
(Based on 2008 Criteria)

East Bay Municipal Utility District
Oakland, CA
EBMUD Board Adoption: April, 2012

Index

		Page
Section 1:	Description of the District	1-1
Section 2:	Inventory of Water Resources	2-1
Section 3:	Best Management Practices (BMPs) for Agricultural Contractors	3-1
Section 4:	Best Management Practices for Urban Contractors	4-1
Section 5:	District Water Inventory Tables	5-1

Attachment A DISTRICT FACILITY MAP
- Figure 1. EBMUD Service Boundary
- Figure 2. EBMUD Water Supply System
- Figure 3. South East Bay Plain Basin
- Figure 4. EBMUD Facilities and Water Conveyance System
- Table 1. Storage Reservoirs

Attachment B DISTRICT SOILS MAP (not applicable)

Attachment C DISTRICT RULES AND REGULATIONS
- Water Supply Operating Objectives Summary
- Policy 9.03. Water Supply Availability & Deficiency
- Policy 7.10. Source Water Quality
- FY10 Water Rates
- Policy 3.07. Responsibility to Serve Water Customers
- Section 29. Prohibiting Wasteful Use of Water

Attachment D DISTRICT SAMPLE BILLS

Attachment E DISTRICT WATER SHORTAGE PLAN
- Urban Water Management Plan 2010, June 2011

Attachment F DISTRICT MAP OF GROUNDWATER FACILITIES
- Map of Groundwater Facility and Basins within the EBMUD Ultimate Service Boundary

Attachment G GROUNDWATER MANAGEMENT PLAN (not applicable)

Attachment H GROUNDWATER BANKING PLAN (not applicable)

Attachment I 2010 ANNUAL POTABLE WATER QUALITY REPORT – URBAN

Attachment J NOTICES OF DISTRICT EDUCATION PROGRAMS AND SERVICES AVAILABLE TO CUSTOMERS (not applicable)

Attachment K DISTRICT AGRICULTURAL WATER ORDER FORM (not applicable)

Attachment L DRAINAGE PROBLEM AREA REPORT (not applicable)

Attachment M OTHER

East Bay Municipal Utility District Low Effect East Bay Habitat Conservation Plan, April 2008

Attachment N OTHER

East Bay Watershed Master Plan, revised March 15, 1999

Section 1: Description of the District

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A. History

East Bay Municipal Utility District (EBMUD), a public utility, was formed under the Municipal Utility District (MUD) Act, passed by the California Legislature in 1921. The MUD Act permits formation of multi-purpose government agencies to provide public services on a regional basis.

In accordance with the MUD Act's provisions, voters in the San Francisco East Bay Area created EBMUD in 1923 to provide water service. In 1929, EBMUD first began water deliveries from the Sierra Nevada Mountains to the East Bay when construction of Pardee Dam and the first Mokelumne Aqueducts were completed.

The MUD Act was amended in 1941 to enable formation of special districts. In 1944, voters in six East Bay cities elected to form EBMUD's Special District No. 1 to treat wastewater from their jurisdictions prior to it being released into the San Francisco Bay. Wastewater treatment for those cities began in 1951 and later expanded to annex the Stege Sanitary District, which includes Kensington, El Cerrito, and parts of Richmond.

EBMUD supplies water and provides wastewater treatment for significant parts of Alameda and Contra Costa counties, including 20 incorporated cities and 15 unincorporated communities therein. Based on 2010 census data, approximately 1.34 million people are served by EBMUD's water system in a 332-square-mile area extending from Crockett on the north, southward to San Lorenzo (encompassing the major cities of Oakland and Berkeley), eastward from San Francisco Bay to Walnut Creek, and south through the San Ramon Valley. The wastewater system serves approximately 650,000 people in an 88-square-mile area of Alameda and Contra Costa counties along the Bay's east shore, extending from Richmond on the north, and southward to San Leandro. EBMUD customers include residential, industrial, commercial, institutional and irrigation water users.

1. Date district formed: May 1923 *Date of first Reclamation contract*: 1970
Original size (acres): 59,520 *Current year (last complete calendar year)*: 2010

2. Current size, population, and irrigated acres

	(2010)
Size (acres)	212,480
Population served	1.34 million
Irrigated acres	Not Applicable

The EBMUD service area encompasses incorporated and unincorporated areas within Alameda and Contra Costa counties. The current service area, illustrated in Figure 1 in Attachment A, is the area in which EBMUD has jurisdiction to provide services. The Ultimate Service Boundary (USB) is the furthest extent of the EBMUD's planning for the provision of water service.

The Local Agency Formation Commissions (LAFCOs) of Alameda and Contra Costa counties have established a Sphere of Influence (SOI) for EBMUD. The SOI, illustrated in Figure 1 in Attachment A, is the probable ultimate physical boundaries and service area of a city, local agency or district, as determined by LAFCO.

- Current Service Area includes all areas (current land area 332 sq. miles) where service can be provided in accordance with EBMUD's Policies and Procedures.
- Ultimate Service Area includes all areas (current land and water area 485 sq. miles) where the EBMUD expects and plans for annexation for service at some point in the future upon direct application by landowners or request or direction of governmental bodies.

3. Water supplies received in current year

Water Source	*AF*
Federal urban water (Tbl 1)	
Federal agricultural water (Tbl 1)	
State water (Tbl 1)	
Other Wholesaler (define) (Tbl 1)	
Local surface water (Tbl 1)	193,936
Upslope drain water (Tbl 1)	
District ground water (Tbl 2)	
Banked water (Tbl 1)	
Transferred water (Tbl 6)	
Recycled water (Tbl 3)	13,146
Other (define) (Tbl 1)	
Total	207,082

4. *Annual entitlement under each right and/or contract*

	AF	*Source*	*Contract #*	*Availability period(s)*
Reclamation Urban AF/Y	Up to 133,000 (1)	Sacramento River	14-06-200-5183A-LTR1	Available in dry years only. Diversions at Freeport of up to 133,000 AF in single dry year(1) and up to 165,000 AF during three consecutive dry years.
Reclamation Agriculture AF/Y	N/A	N/A	N/A	N/A
Other AF/Y(State Water Right)	See Below			
Other AF/Y(State Water Right)	See Below			

(1) Dry years only –as defined by EBMUD's Drought Management Program – Chapter 3 and Appendix G of UWMP 2010 in Attachment E.

State Water Right	*Maximum Annual Direct Diversion To Service Area (MGD)*[a]	*Maximum Annual Diversion To Storage (AF/Year)*[b]	*Maximum Annual Direct Diversion And Diversion From Storage For Use Within EBMUD Service Area*	*Source*	*Contract #*
Pardee Reservoir	200	209,950[c]	200 MGD (224,037 AF)	Mokelumne River	1924 Application 4228 1981 License 11109
Camanche Reservoir	125	353,000	125 MGD[d] (140,000 AF)	Mokelumne River	1949 Application 13156 1956 Permit 10478
Total	325	562,950	325 MGD (364,037 AF)		

Notes:
[a] Under License 11109, EBMUD can divert to direct use from January 1 to December 1. Under Permit 10478, EBMUD can divert to direct use from December 1 to July 1.
[b] Under License 11109, EBMUD can divert to storage from October 1 to July 15. Under Permit 10478, EBMUD can divert to storage from December 1 to July 1.
[c] Total amount to be taken from the source (the river) under License 11109 shall not exceed 316,250 AF per year.
[d] Total amount to be taken from the watershed by direct diversion or diversion from storage under Permit 10478 (and any subsequent license), as restricted by the 1959 Release of Priority, shall not exceed 194 cubic feet per second (cfs) (125 MGD).

Reference: EBMUD, Draft Program Environmental Impact Report, Water Supply Management Program 2040, February 2009, p. 2-13

	Reservoir	*Capacity (AF)*	*Source*	*Contract #*	*Availability period(s)*
Other AF/Y(State Water Right)	San Pablo	38,600	San Pablo Creek	License 1749	Jan 1 – Dec 31 of each season
	Briones	60,510	Bear Creek and San Pablo Creek	License 10797	Jan 1 – Dec 31 of each season
	Upper San Leandro	37,960	San Leandro, Kaiser, Redwood, Moraga, King's, Reilly's, and Peres Creeks	License 1750 and pre-1914 water right	Jan 1 – Dec 31 of each season
	Lafayette	4,250	Unnamed stream tributary to Lafayette Creek	Riparian	N/A
	Chabot	10,350	San Leandro Creek watershed	Pre-1914 water right	N/A

5. *Anticipated land-use changes*

Urban land uses in the EBMUD service area include residential (ranging from very low-density single-family lots to high density multi-family residences), commercial, industrial (including petroleum refining), and public facilities, such as parks and schools. A majority of the high-density urban growth within EBMUD has occurred along the Bay plain and includes residential, commercial, institutional, and industrial developments. Other urban development areas include Pleasant Hill, the San Ramon Valley, and Walnut Creek. Over the next 25 years, the increased water demand as projected would come mainly from increased densities in existing developed urban areas, as formerly lower consumption land uses are replaced with more intensive mixed use and other development.

6. *Cropping patterns (Agricultural only) Not applicable*

List of current crops (crops with 5% or less of total acreage) can be combined in the 'Other' category.

Original Plan (enter date)		*Previous Plan (enter date)*		*Current Plan*	
Crop Name	*Acres*	*Crop Name*	*Acres*	*Crop Name*	*Acres*
Other (<5%)		*Other (<5%)*		*Other (<5%)*	
Total		*Total*		*Total*	

(See Planner, Chapter 2, Appendix A for list of crop names)

7. *Major irrigation methods (by acreage) (Agricultural only) Not applicable*

Original Plan (enter date)		*Previous Plan (enter date)*		*Current Plan*	
Irrigation Method	*Acres*	*Irrigation Method*	*Acres*	*Irrigation Method*	*Acres*
Other		*Other*		*Other*	
Total		*Total*		*Total*	

(See Planner, Chapter 2, Appendix A for list of irrigation system types)

B. Location and Facilities

The EBMUD water supply system collects, transmits, treats, and distributes high-quality water from its primary water source, the Mokelumne River, to its customers in the San Francisco East Bay Area (refer to Figure 2. in Attachment A). EBMUD's water supply system consists of a network of reservoirs, aqueducts (pipelines), water treatment plants (WTP), pumping plants, and other distribution facilities that convey Mokelumne River water from Pardee Reservoir to EBMUD customers. EBMUD's secondary water supply source is local runoff from the East Bay area watersheds that is stored in the terminal reservoirs located within the service area boundaries. Dry-year supplemental supply sources come from the Freeport Regional Water Facility and the Bayside Groundwater Facility.

Existing Water Supply Infrastructure

Camanche Reservoir is operated jointly with Pardee Reservoir to provide water supply benefits while maintaining numerous downstream obligations, including stream-flow regulation, water for fisheries and riparian habitat, flood control, and obligations to downstream diverters. Camanche Dam is located on the Mokelumne River approximately 10 miles downstream from Pardee Dam. Camanche Reservoir has 63 miles of shoreline, a surface area of 7,470 acres, and a current capacity of 417,120 acre-feet (AF)[1] at spillway crest elevation.

Pardee Dam and Reservoir are located approximately 38 miles northeast of Stockton near the town of Valley Springs. The reservoir has 37 miles of shoreline, a surface area of 2,222 acres, and a current capacity of 197,950[2] AF at spillway crest elevation. Pardee Reservoir is used principally for EBMUD's municipal water supply, power generation, and as a supply source for Jackson Valley Irrigation District. Raw water from Pardee Reservoir is transported approximately 91 miles to EBMUD WTPs and terminal reservoirs through the Pardee Tunnel, the Mokelumne Aqueducts, and the Lafayette Aqueducts.

The Pardee Tunnel is a 2.2 mile, 8-foot high horseshoe structure constructed in 1929. The Mokelumne Aqueducts are comprised of three 82-mile long 65 to 87-inch steel pipelines that transport water from the end of Pardee Tunnel in Campo Seco to Walnut Creek at the east end of the two Lafayette Aqueducts. From Walnut Creek, the water is sent directly to EBMUD's three in-line filtration WTPs or to one or more of the EBMUD terminal reservoirs (see Figure 2 in Attachment A).

[1] Camanche Reservoir was originally constructed with a capacity of 431,500 AF.
[2] Licensed quantity to store in Pardee Reservoir is 209,950 AFY.

After treatment at the WTPs, water is distributed throughout EBMUD's service area. The water distribution network includes over 4,100 miles of pipe, 140 pumping plants and 174 neighborhood reservoirs (tanks storing treated drinking water) having a total capacity of 830 million gallons.

Local runoff from the East Bay watersheds that will be put through the WTPs and eventually distributed is stored in three of five EBMUD's terminal reservoirs located within the service area boundary: Briones, San Pablo, and Upper San Leandro reservoirs. The remaining two terminal reservoirs, Chabot and Lafayette, that also receive local runoff are dedicated only for use as an emergency supply. In addition, Chabot provides untreated water supply to several local golf courses. The availability of the secondary water supply source from local runoff is dependent on two factors: hydrologic conditions and terminal reservoir storage availability. Hydrologic conditions determine the amount of runoff in the local watershed. In dry-years, evaporation can exceed runoff, resulting in no net local supply. In addition, limited space is available to capture local runoff because these reservoirs provide an emergency standby supply of 180 days and are also used to regulate EBMUD's Mokelumne River supply. The total maximum capacity of these reservoirs is 151,670 AF.

The terminal reservoirs serve multiple functions that include:

- regulating EBMUD's Mokelumne River supply in winter and spring;
- augmenting EBMUD's Mokelumne water supply with local runoff;
- providing emergency sources of supply during extended drought or in the event of interruption of delivery of the Mokelumne supply;
- providing environmental and recreational benefits to East Bay communities; and
- minimizing flooding.

Existing Supplemental Water Supply Sources

Freeport Regional Water Facility

The Freeport Regional Water Facility is a result of a regional water supply project undertaken by Freeport Regional Water Authority (FRWA), which was created by exercise of a joint powers agreement between Sacramento County Water Agency (SCWA) and EBMUD. The City of Sacramento is an associate partner. The facility, as shown in Figure 2 in Attachment A, enables delivery of water diverted from the Sacramento River as part of EBMUD's CVP contract near the town of Freeport to EBMUD customers during dry-years and will provide water in all years for the Sacramento County. It will be used to supplement EBMUD's aggressive water conservation and recycling programs to reduce the potential for severe water rationing and associated economic losses during droughts.

The facility includes:

- a 185-MGD water intake and pumping plant (with state-of-the-art fish screens) on the Sacramento River near Freeport. (EBMUD's allocation capacity in the Freeport Regional Water Facility is 100 MGD);
- a 72- to 84-inch diameter pipeline to transport water eastward from the Sacramento River to the existing Folsom South Canal and to Sacramento County Water Agency's treatment plant;
- the aforementioned WTP in central Sacramento County; and
- approximately 20 miles of 72-inch diameter pipeline and two 100 MGD pumping plants to transport water from the southern end of the Folsom South Canal to EBMUD's Mokelumne Aqueducts.

Bayside Groundwater Facility

The Bayside Groundwater Facility was built to enable EBMUD to inject potable drinking water into the deep aquifer of the South East Bay Plain Groundwater Basin (SEBPB) during wet years until its subsequent recovery, treatment and use during times of drought. The facility supplies supplemental water to EBMUD customers only when supplemental water is needed, and overall, the quantity of water injected into the aquifer of the SEBPB will exceed the quantity of water extracted. See Figure 3 in Attachment A for basin location.

The facility consists of a new water treatment facility and associated pipelines linking the treatment plant to an injection/ extraction well, subsidence monitoring system, and a network of groundwater monitoring wells. The injection/ extraction system uses a 600-foot deep well, located on property leased from the Oro Loma Sanitary District in San Leandro.

Flow Measurement and Water Quality Monitoring Locations

Flows in the Mokelumne Aqueducts are measured at the Campo Seco facility in Calaveras County. Figure 2 of Attachment A illustrates EBMUD facilities and the water conveyance system within the service area. Drinking water regulations of the EPA and the State require that EBMUD monitor water quality of its source water and treated water. Source water monitoring can occur at water supply reservoirs (e.g. Sobrante outlet tower in San Pablo Reservoir, etc.) or at water treatment plants (e.g. Sobrante Treatment Plant influent, etc.). The quality of treated water is monitored in the effluent at the water treatment plants and in the distribution systems to represent water quality delivered to the consumers.

1. *Incoming flow locations and measurement methods*

Location Name	*Physical Location*	*Type of Measurement Device*	*Accuracy*
Folsom South Canal Diversion	Clay Station Pumping Plant, 12352 Clay Station Road, Herald	72”-diameter Electromagnetic	0.25%
Bayside Groundwater Facility	2655 Grant Ave. San Lorenzo, Ca - Upstream of throttling valve at the well head	Endress+Hauser Electromagnetic Flow Meter (ProMag 53), on 10" I.D. approach pipe	0.2%
Mokelumne No. 1 Aqueduct, Campo Seco	Upstream of throttling valve at Campo Seco	Venturi, on 65" I.D. approach pipe	2%
Mokelumne No. 2 Aqueduct, Campo Seco	Upstream of throttling valve at Campo Seco	Venturi, on 68" I.D. approach pipe	2%
Mokelumne No. 3 Aqueduct, Campo Seco	Upstream of throttling valve at Campo Seco	Venturi, on 87" I.D. approach pipe	2%
Orinda Water Treatment Plant, North Raw Water Influent Flow	190 Camino Pablo, Orinda, Ca - North end of the Raw Water Channel	MGD Doppler Flow Meter, ADFM Pro 20 Velocity Profiler	2%

Orinda Water Treatment Plant, New North Raw Water Influent Flow	190 Camino Pablo, Orinda, Ca - North end of the Raw Water Channel	Emco channel mag meter. PM2 Series	2%
Orinda Water Treatment Plant, South Raw Water Influent Flow	190 Camino Pablo, Orinda, Ca - South end of the Raw Water Channel near the Siphons	MGD Doppler Flow Meter, ADFM Pro 20 Velocity Profiler	2%
Orinda Water Treatment Plant, New South Raw Water Influent Flow	190 Camino Pablo, Orinda, Ca - South of the Raw Water Confluence	Emco channel mag meter. PM2 Series	2%
San Pablo Water Treatment Plant, Raw Water Influent at Riser Building	300 Berkeley Park Blvd, Kensington, Ca - 200' south of aerators	Venturi & flow tube pressure transducer, on 60" I.D. approach pipe	2%
Sobrante Water Treatment Plant, Water Inlet Works	300 Berkeley Park Blvd, Kensington, Ca - 20' north of aerators	Venturi, on 54" I.D. approach pipe	2%
Lafayette Water Treatment Plant, Raw Water Influent	3848 Mt Diablo Blvd, Lafayette, Ca - On the Raw Water inlet pipe east of the Rapid Mix Structure	Accusonic flowmeter (model 7410), on 72" I.D. approach pipe	2%
USL Water Treatment Plant No. 2, Raw Water Influent	7700 Greenly Dr, Oakland, Ca - Raw Water Pit	Venturi, on 54" I.D. approach pipe	2%
Walnut Creek Water Treatment Plant, North raw water metering vault	2201 Larkey Ln, Walnut Creek, Ca - North Raw Water Control Vault	Accusonic Ultrasonic on 54" I.D. approach pipe	2%
Walnut Creek Water Treatment Plant, South raw water metering vault	2201 Larkey Ln, Walnut Creek, Ca - South Raw Water Control Vault	Accusonic Ultrasonic on 54" I.D. approach pipe	2%

Measurement device accuracy of 2% is the designed percentage of the instrument per the manufacturer and will vary per flow rates.

2. *Current year Agricultural Conveyance System* Not Applicable

Miles Unlined - Canal	*Miles Lined - Canal*	*Miles Piped*	*Miles - Other*

3 *Current year Urban Distribution System*

Miles AC Pipe	*Miles Steel Pipe*	*Miles Cast Iron Pipe*	*Miles - Other*
1,144	1,262	1,354	405

GIS data current as of August 2011. Includes all diameters of pipe in distribution system.

4. *Storage facilities (tanks, reservoirs, regulating reservoirs)*

Name	*Type*	*Capacity (AF)*	*Distribution or Spill*
Briones	Terminal Reservoir	60,510	Distribution
Chabot	Terminal Reservoir	10,350	Distribution (untreated water to golf courses and emergency supply)
Lafayette	Terminal Reservoir	4,250	Emergency supply only[(1)]
San Pablo	Terminal Reservoir	38,600	Distribution
Upper San Leandro	Terminal Reservoir	37,960	Distribution

[(1)] The raw water line for the Mokelumne aqueducts was disconnected from the reservoir in 1971.

EBMUD storage reservoirs are illustrated in Figure 4 and listed in Table 1 of Attachment A.

EBMUD operates five terminal reservoirs within the East Bay service area: Briones, Chabot, Lafayette, San Pablo, and Upper San Leandro reservoirs. Upper San Leandro, San Pablo and Briones reservoirs can supply water to EBMUD throughout the year, whereas Lafayette Reservoir and Lake Chabot provide emergency standby supply. Lake Chabot also provides untreated water supply to several golf courses. These two reservoirs are not used for regular domestic supplies and are used for public recreation (e.g. fishing, sailing, canoeing, hiking, jogging, bicycling, picnicking, walking, and nature observations). San Pablo Reservoir is also used for public recreation.

5. *Outflow locations and measurement methods (Agricultural only)* Not Applicable
Provide this information in Section 2 F.

6. *Description of the agricultural spill recovery system* Not Applicable

7. *Agricultural delivery system operation (check all that apply)* Not Applicable

On-demand	*Scheduled*	*Rotation*	*Other (describe)*

8. Restrictions on water source(s)

Source	*Restriction*	*Cause of Restriction*	*Effect on Operations*
Refer to discussion in Q8	Refer to discussion in Q8	Refer to discussion in Q8	Refer to discussion in Q8

Mokelumne River

Since the late 1920s, EBMUD's primary source of water has been the Mokelumne River. Approximately 90 percent of the water used on average by EBMUD comes from the Mokelumne River watershed. EBMUD has water rights that allow for delivery of up to a maximum of 325 million gallons per day (MGD) from the Mokelumne River. EBMUD's ability to use its full entitlement of Mokelumne River water is constrained by the limitations incorporated into the state issued licenses and permits that grant EBMUD the right to serve its customers 325 MGD from the Mokelumne River. Although EBMUD's water supply system was designed and constructed to deliver 325 MGD, the extent to which EBMUD's water rights can be exercised in dry-years is further constrained by other Mokelumne River water users with water entitlements that are senior to those held by EBMUD.

EBMUD's Mokelumne River flow commitments are further tied to the variability in the Mokelumne River watershed rainfall and runoff patterns which govern the release requirements for the year. These requirements are set by water rights priorities; agreements with State and Federal regulatory agencies; State Board orders and decisions; federal directives; court decrees; and numerous agreements with other Mokelumne River water users both upstream and downstream of EBMUD's Mokelumne River facilities.

EBMUD meets its commitment to protect the lower Mokelumne River by providing instream flow releases from EBMUD's Camanche Dam to improve fishery conditions, per the requirements of the 1998 Joint Settlement Agreement (JSA) among EBMUD, US Fish and Wildlife Service (USFWS), and the California Department of Fish and Game (CDFG).

In addition to the requirements set forth in the licenses and permits, EBMUD's water supply system operating goals and objectives must also conform to State Water Resources Control Board Decisions, Court Decisions, Federal Energy Regulatory Commission Orders, and water right settlement agreements. EBMUD is obligated to meet multiple operating objectives, including providing municipal water supply benefits, streamflow regulation, fishery/ public trust interests, flood control, temperature management, and obligations to downstream diverters.

In 2007, the State Water Resources Control Board (SWRCB) publicly noticed EBMUD's petition for a time extension of its permit to put Mokelumne River water rights entitlement to full beneficial use.

Local Runoff

On average, approximately 10% of the water used by EBMUD comes from local runoff from the East Bay area watersheds. The availability of water from local runoff is dependent on two factors: hydrologic conditions and terminal reservoir storage availability. Hydrologic conditions determine the amount of runoff in the local watershed. In dry-years, evaporation can exceed runoff, resulting in no net local supply. In addition, the amount of storage available for capturing local runoff is limited. Maintaining lower water levels in the terminal reservoirs would provide space for storing additional local runoff to supplement EBMUD's existing dry-year supplies. However, because these reservoirs also regulate

EBMUD's Mokelumne River supply and provide emergency standby storage, limited space can be held for the variable local runoff.

Freeport Regional Water Facility
The Freeport facility enables delivery of water diverted from the Sacramento River near the town of Freeport to EBMUD customers during dry-years. EBMUD's ability to take delivery of water through the Freeport facility is based on its Long Term Renewal Contract (LTRC) with the USBR, which provides for up to 133,000 AF in a single dry-year, not to exceed a total of 165,000 AF in three consecutive dry-years. Under the LTRC, the CVP supply is available to EBMUD only in dry-years when EBMUD's total stored water supply is forecast to be below 500 TAF at the end of each water year.

Bayside Groundwater Facility
The Bayside Groundwater Facility was built to enable EBMUD to inject potable drinking water into the deep aquifer of the South East Bay Plain Groundwater Basin (SEBPB) during wet years until its subsequent recovery, treatment and use during times of drought. The facility supplies supplemental water to EBMUD customers only when supplemental water is needed because of drought conditions. The project is designed to yield 2 MGD over a 6-month period, resulting in an average annual production capacity of 1 MGD or 1,120 acre-feet per year (AFY).

Groundwater from the SEBPB is available only to a limited extent as part of the implementation of the injection/extraction system associated with the Bayside Groundwater Facility. The native groundwater of the SEBPB is not available as a significant source of water to EBMUD. A permit from the Department of Public Health, which is pending, is required before the groundwater can be extracted and treated for municipal use.

9. Proposed changes or additions to facilities and operations for the next 5 years
EBMUD is interested in exploring a water transfer program to secure up to 13 MGD of dry-year water supply through voluntary water transfers. The purpose of EBMUD's Water Transfer Program is to develop and implement water transfer and exchange opportunities throughout northern California. EBMUD plans to use the Freeport facilities to convey the transfer water to EBMUD's service area. EBMUD's primary interest is exploring partnership opportunities with willing parties within the Sacramento River Watershed on long-term or permanent water transfer arrangements. In the future, EBMUD's Water Transfer Program also may pursue short-term transfer arrangements, as needed, to help reliably meet EBMUD's dry-year water supply needs.

In the next five years (2011-2015), EBMUD has constructed or plans to construct these structures and facilities:

Structure/Facility	Planned Construction Year
New 2.7 MG Highland Reservoir	2011 (constructed)
New Round Hill No. 2 Pumping Plant	2011-2013
New Withers Pumping Plant	2012-2013
New Happy Valley Pumping Plant	2014
New Sunnyside Pumping Plant	2014
New Purdue Reservoir	2014-2015
New Purdue Pumping Plant	2014-2015
New 3 MG Selby Reservoir	2015-2016
New Ardith Reservoir	2015-2017
New Chlorine Contact Basin at Sobrante Water Treatment Plant	2015-2017

Reference: EBMUD, Infrastructure Prioritization Master Plan, March 2011
Note: Planning schedule is subject to change as priorities or budgets may be reassessed.

C. Topography and Soils

1. Topography of the district and its impact on water operations and management

Geographically, the EBMUD service area is divided by the Oakland/ Berkeley Hills that rise to about 1,900 feet above sea level. The area west of the Oakland/ Berkeley Hills (West-of-Hills) is characterized by a plain that extends from Richmond to Hayward and from the shore of the Bay inland. The terrain east of the Oakland/Berkeley Hills (East-of-Hills) is characterized by rolling hills as the land descends to about 100 feet above sea level near Walnut Creek. Water is distributed throughout EBMUD's service area, which is divided into more than 120 pressure zones ranging in elevation from sea level to 1,450 feet. Segmenting EBMUD into pressure zones assures all customers a relatively uniform pressure service and minimizes leak potential due to higher pressures.

2. District soil association map (Agricultural only) Not Applicable

3. Agricultural limitations resulting from soil problems (Agricultural only) Not Applicable

Soil Problem	*Estimated Acres*	*Effect on Water Operations and Management*
Salinity		
High-water table		
High or low infiltration rates		
Other (define)		

D. Climate

1. General climate of the district service area

EBMUD has two regions ("East-of-Hills" and "West-of-Hills") with distinct climates. West-of-Hills areas that border San Francisco Bay experience a moderate climate tempered by ocean and Bay waters. The "West-of-Hills" towns of Oakland, Berkeley, Richmond, etc. are generally cooler in temperatures and typically have a lower water demand per account. "East-of-Hills" is the service area east of the Oakland/Berkeley hills ridgeline (i.e. Walnut Creek, San Ramon Valley). East-of-Hills areas, such as Lafayette, Walnut Creek, and the San Ramon Valley, experience greater extremes in climate where it is generally cooler in winter and hotter in summer, and water demand per account is higher.

EBMUD obtains weather input from weather stations located on its facilities. The data representing East-of-Hills and West-of-Hills shown in the following tables of section 1.D.1 is collected from weather stations at Lafayette Reservoir (East-of-Hills) and at Upper San Leandro Reservoir (West-of-Hills) on EBMUD property. These two weather stations are used exclusively by EBMUD for operational purposes and because their data are not posted to the California Data Exchange Center, no identification numbers are assigned to these two weather stations.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Avg Precip. (in.)	6.0	5.5	4.2	1.8	0.7	0.1	0.0	0.1	0.2	1.5	3.5	5.3	28.9
Avg Temp. (^oF)	47.5	50.9	53.8	56.4	61.0	65.5	69.1	69.4	68.6	63.2	54.4	47.7	58.9
Avg Daily Max. Temp. (^oF)	55.8	60.1	64.0	67.3	72.3	77.5	82.3	82.4	82.2	75.7	64.4	56.1	70.0
Avg Daily Min. Temp (^oF)	39.1	41.7	43.7	45.5	49.7	53.5	55.8	56.3	54.9	50.7	44.3	39.2	47.9
Avg ETo (in.)	1.2	1.7	3.2	4.6	6.3	7.3	8.1	7.4	5.9	4.0	2.1	1.2	52.9

For the calculation of Avg ETo, a combination of pan data (1969-2007) and weather station inputs (2007-present) was used. Pan evaporation was multiplied by an average coefficient of 0.8 (dependent on season… ambient wind, temps and Relative Humidity) to obtain lake evaporation. The Penman equation was applied to weather station inputs to obtain direct evaporation estimates.

Weather station ID (EBMUD) Lafayette Reservoir

Data period: Year 1969 *to Year* 2010

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Avg Precip. (in.)	5.2	4.9	4.0	1.9	0.8	0.2	0.0	0.1	0.3	1.5	3.5	4.9	27.3
Avg Temp. (^oF)	48.2	51.0	53.1	55.2	58.5	62.6	65.0	65.9	65.9	61.6	54.1	48.4	57.5
Avg Daily Max. Temp. (^oF)	56.8	60.1	62.8	65.7	69.0	73.7	76.2	77.1	77.9	73.2	64.0	57.0	67.8
Avg Daily Min. Temp (^oF)	39.7	41.9	43.4	44.7	48.1	51.6	53.8	54.7	54.0	50.0	44.1	39.8	47.2
Avg ETo (in.)	1.0	1.4	2.7	3.8	5.2	6.0	6.6	5.9	4.9	3.3	1.8	1.1	43.8

For the calculation of Avg ETo, a combination of pan data (1969-2007) and weather station inputs (2007-present) was used. Pan evaporation was multiplied by an average coefficient of 0.8 (dependent on season… ambient wind, temps and Relative Humidity) to obtain lake evaporation. The Penman equation was applied to weather station inputs to obtain direct evaporation estimates.

Weather station ID (EBMUD) Upper San Leandro Reservoir

Data period: Year 1969 *to Year* 2010

Average wind velocity 8.8 MPH

Average annual frost-free days: 361 (Berkeley, CA); 321 (Mount Diablo Junction, CA)

Average wind velocity source: www.wrcc.dri.edu for Oakland International Airport, CA (KOAK) (monthly average wind speeds based on hourly observations for 1996-2006)

Average annual frost-free days source: National Climatic Data Center, U.S. Climate Normals, Freeze/Frost Data, CLIM20 supp no. 1. Assumes temperatures exceed 36 deg F. Results based on records from 1919-2001 (Berkeley, CA) and 1952-2001 (Mount Diablo Junction, CA)

2. *Impact of microclimates on water management within the service area*

See response for Question D1.

E. Natural and Cultural Resources

1. *Natural resource areas within the service area*

Name	Estimated Acres	Description

Refer to answer in question E2	28,200	Refer to answer in question E2

2. *Description of district management of these resources in the past or present*

Within the EBMUD service area, numerous environmental and recreational resources are managed and operated by a number of different entities (counties, cities, and special districts) and by EBMUD. EBMUD owns and manages a total of 28,200 acres of watershed land in the East Bay Area (as open space with access for recreation). This watershed land, which includes five terminal reservoirs, is managed to protect and enhance biodiversity, thus protecting watershed health and water quality. EBMUD completed the East Bay Habitat Conservation Plan in April 2008 (Attachment M) which discusses watershed maintenance activities as identified in its 1996 East Bay Watershed Master Plan (Revised in March 1999) and subsequently detailed in its Watershed Fire Management Plan (October 2000) and Range Resource Management Plan (December 2001).
Figure 2-1 in the attached East Bay Watershed Master Plan (Attachment N) illustrates EBMUD lands and resources.

3. *Recreational and/or cultural resources areas within the service area*

Name	*Estimated Acres*	*Description*
Lafayette Reservoir – Recreational Resource	126 (surface)	3 miles of shoreline – Recreational site for trail use, boating, fishing, and picnicking
Chabot Reservoir – Recreational Resource	340 (surface)	9 miles of shoreline - Recreational site for trail use, boating, fishing, picnicking, and camping
San Pablo Reservoir – Recreational Resources	834 (surface)	14 miles of shoreline - Recreational site for trail use, boating, fishing, and picnicking
EBMUD Watershed Trails – Recreational Resources	-	65 miles of hiking trails in the East Bay watershed (trail permit required)
San Pablo Reservoir watershed – Cultural Resources	-	9 prehistoric archaeological sites, 9 historic archaeological sites and 1 historical structure (Orinda Filter Plant)
Briones Reservoir watershed – Cultural Resources	-	1 prehistoric archaeological sites, 1 historical archaeological site (Felipe Briones Adobe), and 1 historical site (Hampton's Grave site).
Pinole watershed – Cultural Resources	-	3 prehistoric sites and two historic sites (Mohring and Tormey Homestead)
Lafayette Reservoir Watershed	-	1 historical feature (Lafayette Reservoir Dam)
Upper San Leandro Reservoir watershed	-	9 historic archaeological sites, 2 historic structures, and 1 prehistoric site.
Chabot Reservoir watershed	-	1 prehistoric site and 6 historic sites

Source: EBMUD, 1996. East Bay Watershed Master Plan. Revised March 15, 1999.

Figure 2-5 in the attached East Bay Watershed Master Plan (Attachment N) illustrates the details of EBMUD's major recreational sites and trails and Figure 2-1 illustrates the location of EBMUD's cultural resources.

F. Operating Rules and Regulations

1. Operating rules and regulations
See Attachment C, Operating Criteria and Assumptions

2. Water allocation policy (Agricultural only)
Not Applicable - Agriculture only

3. Official and actual lead times necessary for water orders and shut-off (Agricultural only)
Not Applicable - Agriculture only

4. Policies regarding return flows (surface and subsurface drainage from farms) and outflow (Agricultural only)
Not Applicable - Agriculture only

5. Policies on water transfers by the district and its customers
Refer to the attached UWMP 2010 (Attachment E), pages 2-19 and 3-6 through 3-8, for more details on water transfers. EBMUD's annual Water Supply Availability and Deficiency Report, under Policy 9.03 (Attachment C), is submitted annually (in April) to the Board to assess the adequacy of water supply for the current year. Policy 7.10 – Source Water Quality (Attachment C) states that EBMUD will preferably obtain high quality water from the best available source rather than rely on additional treatment. This policy guides the options for water transfers to source water surplus that are of the same or similar quality to that of EBMUD's Mokelumne River supply.

G. Water Measurement, Pricing, and Billing

NOT APPLICABLE – AGRICULTURE ONLY

1. Agricultural Customers

a. Number of farms _____

b. Number of delivery points (turnouts and connections) _____

c. Number of delivery points serving more than one farm _____

d. Number of measured delivery points (meters and measurement devices) _____

e. Percentage of delivered water that was measured at a delivery point _____

f. Delivery point measurement device table (Agricultural only)

Measurement Type	*Number*	*Accuracy (+/- %)*	*Reading Frequency (Days)*	*Calibration Frequency (Months)*	*Maintenance Frequency (Months)*
Orifices					
Propeller meter					
Weirs					
Flumes					
Venturi					
Metered gates					

Acoustic doppler					
Other (define)					
Total					

2. *Urban Customers*

a. *Total number of connections* 381,142

Includes water, (construction-related) hydrant, (private) fire, and recycled water service counts. (Average monthly number of active services.)

EBMUD defines each active service as a "connection," which may be installed with more than one meter. As a result, the number of meters in the system is usually greater than the number of connections in the system.

b. *Total number of metered connections* 381,142

c. *Total number of connections not billed by quantity* 0

d. *Percentage of water that was measured at delivery point* 100

e. *Percentage of delivered water that was billed by quantity* 89

Actual M&I Water Sales (from Table 6) and Total Water Supply (from Table 3) were used to calculate the 'percentage of delivered water that was billed by quantity'.

f. *Measurement device table*

EBMUD regulations require customers to be served through a meter and all service connections are metered. Metered consumption and total system demand are different quantities. Total system demand includes such quantities as minor losses in the distribution system and authorized water use for fire fighting, which are not metered.

Meter Size and Type[1]	*Number*[2]	*Accuracy (+/-percentage)*	*Reading Frequency (Days)*[3]	*Calibration Frequency (Months)*	*Maintenance Frequency (Months)*
5/8-3/4"	346,268	- 0.7%	30 or 60	Replace As needed[4]	As needed[4]
1"	13,410	- 0.7%	30 or 60	Replace As needed[4]	As needed[4]
1 ½"	11,485	- 0.7%	30 or 60	Replace As needed[4]	As needed[4]
2"	5,107	- 0.7%	30 or 60	Replace As needed[4]	As needed[4]
3"	1,411	- 1.4% [5]	30 or 60	As needed or 48 [6]	As needed or 48 [6]
4"	1,470	- 0.4% [5]	30 or 60	As needed or 36 [6]	As needed or 36 [6]
6"	1,591	+ 0.3% [5]	30 or 60	As needed or 24 [6]	As needed or 24 [6]
8"	1,218	- 3.2% [5]	30 or 60	As needed or 24 [6]	As needed or 24 [6]
10"	159	- 0.7% [5]	30 or 60	As needed or 24 [6]	As needed or 24 [6]
Compound	-	-	-	-	-
Turbo	-	-	-	-	-
Other (12")	24	+/- 2%	30 or 60	6	6
Other (14")	1	+/- 2%	30	6	6
Other (16")	3	+/- 2%	30	6	6

Other (18")	2	+/- 2%	30	6	6
Total	382,149				

(1) Meters from 5/8" – 2" are all positive displacement meters. Meters from 3"-10" include compound and turbo meters. Meters from 10"-18" are all flow meters.
(2) Number of meters includes active water, hydrant, and fire services
(3) Customer accounts will be subject to monthly (30 days) instead of bi-monthly (60 days) meter reading and customer billing schedules for the following situations:

- Accounts for which the average monthly bill is estimated to exceed $1500; such account will be billed monthly.
- Accounts for which there are reasonable and justifiable customer requests for monthly billing.
- Accounts for which the average monthly bill is estimated to be between $100 and $1500, and the customer service manager recommends monthly billing based on an evaluation of credit and/or collection problems.

(4) About 200 meters are randomly sampled for testing every 10 years. Older meters that fail prior to or during tests are replaced.
(5) Meter accuracy pertains to non-fire service meters. Fire service meters, in general, have higher accuracies.
(6) Meters are tested every 24-48 months. Calibration and maintenance is performed as needed or as necessary based on results of the tests. Test records were analyzed to determine which meters require a higher testing frequency.

3. Agriculture and Urban Customers

a. Current year agriculture and /or urban water charges - including rate structures and billing frequency

See Attachment C for FY10 water rates

- Schedule of Rates and Charges to Customers of the East Bay Municipal Utility District, Schedule A – Rate Schedule for Water Service, Effective July 1, 2009

Billing Frequency
Most customers are billed every two months. Meter reading and billing occur once a month for approximately 1,100 large commercial and industrial accounts.

Water Charges
Bills for all metered services, except for Private Fire Services, consist of four elements: 1) a service charge and a Seismic Improvement Program (SIP) Surcharge based on the size of a standard meter, 2) a SIP surcharge for each residential account, 3) a charge for water delivered and, 4) an elevation surcharge. In addition, a supplemental supply surcharge will be implemented on total volume charges on potable water bills whenever the Freeport facilities are operated to deliver supplemental water to EBMUD. Customers outside EBMUD's boundaries pay double water delivery rates.

Service Charge
A Service Charge based on water meter size is levied to pay for the use of the water meter. When a meter larger than 4 inches is required for a single-family residential customer to maintain adequate water pressure, the maximum service charge amount and Seismic Improvement Program Surcharge are set at the 4-inch meter level.

The service charge and Seismic Improvement Program surcharge for a special type of meter or for a battery of meters installed on one service in lieu of one meter will be based on the size of a single standard meter of equivalent capacity as determined by EBMUD.

Seismic Improvement Program Surcharge

A flat Seismic Improvement Program Surcharge is levied for each Single Family Residential or Multiple Family Residential account to pay for system-wide seismic improvements being made from 1995-2025. The SIP program costs are being paid over 30 years; the charge is effective on each water bill through February 28, 2025.

Units Delivered Charge
Charges for units of water delivered is levied for both monthly and bimonthly billing. (One unit is 100 cubic feet, or 748 gallons.)

Elevation Surcharge
An elevation surcharge based on the costs of additional pumping required to serve customers in the higher pressure zones. This surcharge applies to both monthly and bimonthly bills. The Elevation Surcharge is determined by the pressure zone in which the service connection is located.

Private Fire Service
Private fire services are charged a monthly or bimonthly service charge based on the size of the meter. When a meter larger than 4 inches is required for a single-family residential customer to maintain adequate water pressure, the maximum service charge amount and Seismic Improvement Program Surcharge shall be set at the 4-inch meter level.

There is no charge for water used through fire service in extinguishing accidental fires, but any fire service water lost through leakage or used in violation of EBMUD regulations is charged at double the usual volume charge.

Supplemental Supply Surcharge
The supplemental supply surcharge is effective on each potable water bill after the EBMUD Board declares a need to use the Freeport Project to deliver supplemental supplies from outside of EBMUD's normal watershed.

Water Charge Basis
Water rates for each class of customers are derived from cost analyses and cost allocations that were completed as part of a 2009 water rate cost of service study. The EBMUD's water rate structure is designed to provide equitable water rates that encourage water conservation and is based on the following principles:

- Cost of service for each customer class based on their demand characteristics
  - Single family
  - Multi-family
  - Other (commercial, industrial, irrigation, etc.)
- No geographic differentiation in rate structures (all customers pay the same rate for water usage)
- Inverted (increasing) block rates for single family residential customers
- Revenue neutral (i.e., projected revenues equal anticipated expenditures)

Cost of Service
The rate structure is based upon a cost of service concept such that projected revenues from each customer class is equal to the allocated costs of providing the service for that class of customer. Costs are allocated to a variety of customer classes, distinguished by their different demand characteristics. Each class is further characterized by geographic location (east and west of hills) to evaluate the cost of service by area.

Tiered Rates
A tiered rate structure consists of prices for each tier and breakpoints between the tiers such that the overall amount of revenues generated by these prices, when applied to EBMUD's customer usage pattern, will equal the projected revenue requirements. Since EBMUD does not collect revenues that are in excess of its costs, prices for some tiers will be lower and prices for certain other tiers will be higher than the system average cost to provide service.

For single-family residential customers, the rate structure consists of three tiers (0-7, 8-16, and 16+ units) with the basis for the breakpoints shown below.

SINGLE-FAMILY RESIDENTIAL RATE STRUCTURE COMPONENTS

Tiered structure with inclining blocks:

Breakpoints: 7 units (172 gpd) -	average monthly winter consumption for all customers (equal to year-round indoor consumption)
16 units (393 gpd) -	average monthly consumption for east of hills customers in 1993

The first tier of the rate structure reflects the average winter consumption for all customers (7 units or 172 gpd) and approximates year round indoor consumption.

The second tier is priced so that it reflects the needs of customers whose usage may exceed the system average indoor usage. The customer may have a higher need for water for a number of reasons including family size, medical reasons, limited outdoor watering, or simply personal preferences. The second tier, priced at or near the system average cost of water, will provide such users with an amount of water that recognizes their additional needs.

Elevation Surcharge
EBMUD's current rate structure includes three elevation zones, with surcharges in the two upper zones. These surcharges are based on the costs of the additional pumping required to provide water to these areas. The elevation surcharges result in the higher elevation users paying for the pumping that benefits them, and this approach enhances the overall equity of the rate structure.

Supplemental Supply Surcharge
A surcharge will be implemented on total volume charges on the water bill for all potable water customers whenever the Freeport facilities are operated to deliver supplemental water to EBMUD. Because the Freeport project is anticipated to be periodically operated, the costs to operate the facilities is not built into the annual operating budget or water rates. Supplemental water increases water supplies and reduces the need for water rationing and drought restrictions to benefit all customers. The surcharge on all consumption is set to recover the added Freeport operating costs, which vary depending on the share of its CVP water that EBMUD takes. The surcharge would begin when actual supplemental water deliveries are made. By varying the duration of the surcharge, the revenue recovered will match the actual operating costs.

System Capacity Charge (Non-Recurring Charge)

System Capacity Charges (SCC) are collections from customers requesting new water service or upsizing an existing connection. The charges are designed to recover costs of facilities necessary to serve new customers. These costs include facilities that serve the system as a whole and a portion of the costs of supplemental water supply.

The SCC is applied on a regional basis. Three principal regions divide the EBMUD service area for planning water distribution facilities and for assigning an appropriate share of the costs of water distribution capital improvements. These regions are defined by differences in water use and their relationship to necessary capital improvements. Additional regions are established for areas that require construction of major facilities in addition to or significantly differ from those already included in EBMUD's distribution system master plan.

b. Annual charges collected from customers[1] *(Fiscal Year 2010 data)* [2][3]

Fixed Charges			
Charges ($ unit)	*Charge units ($/acre), ($/customer) etc.*	*Units billed during fiscal year (acres, customer) etc.*	*$ collected ($ times units) (unadjusted)*[4]
See water rate schedule in Attachment C	Service charge and seismic improvement program surcharge by meter size with flat seismic improvement program surcharge for residential accounts	-[3]	$60.7 million [5]

Volumetric charges			
Charges ($ unit)	*Charge units ($/AF), ($/HCF), etc.*	*Units billed during fiscal year (AF, HCF) etc.*	*$ collected ($ times units) (unadjusted)* [4]
See water rate schedule in Attachment C	Charge per 100 cubic feet with volumetric seismic improvement program surcharge for non-residential accounts	78 million ccuft	$206.7 million [5]
See water rate schedule in Attachment C	Elevation surcharge per 100 cubic feet	31 million ccuft	$13.7 million

[1] Data includes customer accounts with water, fire, hydrant, non-potable, and recycled water service.

[2] The table above reports fiscal year data, conforming to financial reporting requirements for EBMUD, instead of calendar year data.

[3] EBMUD is currently upgrading its customer database software such that detailed queries as requested in this table can be performed in the future.

(4) The reported monies collected listed in the table above does not include adjustments, such as for meter reading errors, etc., to customer water bills. The total of these other charges and adjustments increases the amount collected by approximately $3.4 million.

(5) The seismic surcharge portion of the fixed and volumetric revenues collected is approximately $16.7 million.

See Attachment D, District Sample Bills

c. Water-use data accounting procedures

Customer accounts are billed on a bimonthly basis (42 cycles), with the exception of approximately 0.25% of the total accounts (large users) that are billed monthly. Each of the 42 cycles represents a day's worth of work for EBMUD's meter reading unit. Each cycle is made up of multiple meter reading assignments called routes. The route number and billing frequency for an account is found in the Customer Information System (CIS). The CIS downloads each cycle to the Itron meter reading system and meter reading routes are loaded into individual meter reading handheld devices. Meter readings are recorded via the hand-held devices into the Itron meter reading system and from there uploaded to the CIS where readings are captured and calculated (based on Board approved rate charges) for bill printing as part of the nightly process. An actual bill is generated 3 days after the specific meter is read. Approximately 90% of bills are printed and mailed out to customers. The other 10% are electronically sent via Electronic Bill Presentment and Payment (EBPP) vendor CheckFree. EBMUD produces 9,000 – 10,000 bills per night.

The bill itemizes the following information:

- Previous balances and payments made, if applicable
- Automatic bill payment information, if enrolled in program
- Current water charges based on units of consumption and the charges at the specific tiered level
- Waste water or sewer agency charges when applicable
- Special fees and charges like seismic charges, water elevation charges, one time account set-up fees, etc.
- Utility Users' Tax on water when applicable
- Current billing period's consumption in gallons compared to the same period of prior year

The CIS provides the Accounting Division with daily and monthly receivable distribution reports that show all financial transactions by General Ledger (GL) funds (Water, Sewage, Deposit, Agency, etc.).

Customers can access their water-use information upon request by calling or writing the EBMUD's Contact Center. Limited account, bill, and payment information from CIS can be accessed via EBMUD's self-service webpage. The CIS keeps both consumption and financial detail (billing and payment information) for up to 2 years. Consumption for billing periods and financial transactions related to specific accounts are archived in an Oracle based system, Water Consumption Online (WCO), and can be retrieved for any period from the present to 30+ years prior.

H. Water Shortage Allocation Policies

1. Current year water shortage policies or shortage response plan - specifying how reduced water supplies are allocated

Refer to Attachment E (Urban Water Management Plan 2010): Chapter 3. 2010 Water Shortage Contingency Plan, Appendix G-1. Central Valley Project Supply, and Appendix G-2. Interim Drought

Management Plan Guidelines, and Attachment C (Policy 3.07. Responsibility to Serve Water Customers).

2. Current year policies that address wasteful use of water and enforcement methods

Refer to Attachment C: Section 29. Regulations Governing Water Service to Customers of the East Bay Municipal Utility District - Prohibiting Wasteful Use of Water

Section 2: Inventory of Water Resources

A. Surface Water Supply

1. *Acre-foot amounts of surface water delivered to the water purveyor by each of the purveyor's sources*

See Water Inventory Tables, Table 1

2. *Amount of water delivered to the district by each of the district sources for the last 10 years*

See Water Inventory Tables, Table 8

B. Ground Water Supply

1. *Acre-foot amounts of ground water pumped and delivered by the district*

See Water Inventory Tables, Table 2

In this plan's current reporting year of 2010, EBMUD received no groundwater deliveries.

2. *Ground water basin(s) that underlies the service area*

Name	*Size (Square Miles)* [1]	*Usable Capacity (AF)*	*Safe Yield (AF/Y)*
East Bay Plain	121	Not Applicable	Not Applicable
Ygnacio Valley[2]	25	Not Applicable	Not Applicable
San Ramon Valley	11	Not Applicable	Not Applicable
Livermore Valley[2]	109	Not Applicable	Not Applicable
Castro Valley	3	Not Applicable	Not Applicable

[1] Information on the size of the ground water basins were taken from *California's Groundwater, Bulletin 118 update of 2003, Supplemental Information*

[2] A majority of the Ygnacio Valley and Livermore Valley basins lie outside the EBMD service area as shown in Attachment F.

EBMUD has performed extensive studies to determine the viability of groundwater storage and recovery. These studies included hydrogeologic analyses, analyses of water quality and treatment options, demonstration testing of treatment methodologies, construction of test wells, and construction and operation of a full-size injection/extraction demonstration well.

Studies have demonstrated that among those basins listed in the above table that are overlain by the EBMUD service area, the best site for storage and extraction of groundwater is only the South East Bay Plain Basin. EBMUD has completed the construction of the Bayside Phase 1 Groundwater Facility within the South East Bay Plain Basin. Accordingly, usable capacities and safe yields for the remaining listed basins underlying the service area are not applicable for describing the EBMUD water supply. However, data on basin characteristics are listed to meet the requirements of this WMP 2011. As reported in California Department of Water Resources' *California's Groundwater, Bulletin 118 Update of 2003, Supplemental Information*, the calculated total storage capacity is 2,670,000 acre-feet in the East Bay Plain Subbasin and is an estimated 500,000 acre-feet in the Livermore Valley Basin. No published groundwater storage capacity data for the Ygnacio Valley, San Ramon Valley, and Castro Valley basins were found.

The service area of EBMUD is underlain by the basins listed in the above table. The East Bay Plain Basin, which extends along the East Bay foothills to the Bay approximately from Richmond to Hayward, is shown in Figure 3 in Attachment A. Consisting of a portion of the East Bay Plain Basin, the South East Bay Plain Basin (SEBPB) is bounded to the east by the Hayward Fault and extends beneath San Francisco Bay to the west. Because the precise location of the western boundary under the Bay is not known, the boundary is assumed to coincide with the edge of the Bay, consistent with the California Department of Water Resources' depiction of this boundary. The SEBPB thins out to the north and becomes an insignificant source of groundwater near Berkeley. The southern boundary is in the City of Hayward near the San Mateo Bridge.

The Ygnacio Valley Groundwater Basin is in northern Contra Costa County along the south shore of Suisun Bay. The basin is about 30 miles northeast of San Francisco. It is bounded by Suisun Bay on the north, by Highway 680 and Taylor Road on the west, by the Concord Fault, which separates this basin from the Clayton Valley Groundwater Basin, on the east, and by the City of Walnut Creek on the south.

The San Ramon Valley Groundwater Basin occupies a structural trough in the central Coast Range east of the San Francisco Bay. The basin is located in southern Contra Costa County and is nearly 30 miles east of San Francisco. It is bounded by Stone Valley on the north, on the west by Las Trampas Ridge, on the east by the foothills of Mt Diablo, and on the south by the Livermore Valley Groundwater Basin. The cities of Danville and San Ramon overlie the basin.

The Livermore Valley Groundwater Basin lies about 40 miles east of San Francisco and 30 miles southwest of Stockton within a structural trough of the Diablo Range. The groundwater basin extends from the Pleasanton Ridge east to the Altamont Hills (about 14 miles) and from the Livermore Upland north to the Orinda Upland (about 3 miles).

The Castro Valley Groundwater Basin is a dogleg shaped intermontane valley located approximately 5 miles east of San Francisco Bay, north of the city of Hayward, and bisected by Interstate 580. The basin is bound on the east by the San Lorenzo Creek and by the Hayward Fault on the west. The basin extends from Lake Chabot in the north to the intersection of Jackson Street with U.S. Highway 238 in the south in Hayward.

In its *California's Groundwater, Bulletin 118 Update of 2003,* the California Department of Water Resources has not identified the following groundwater basins in critical condition of overdraft: East Bay Plain Subbasin, Ygnacio Valley, San Ramon Valley, Livermore Valley, and Castro Valley.

3. Map of district-operated wells and managed ground water recharge areas
See Figure 3 in Attachment A, South East Bay Plain Basin.

4. Description of conjunctive use of surface and ground water

The Bayside Groundwater Facility was built to enable EBMUD to inject potable drinking water into the deep aquifer of the South East Bay Plain Groundwater Basin (SEBPB) during wet years until its subsequent recovery, treatment and use during times of drought. The facility supplies supplemental water to EBMUD customers only when supplemental water is needed, and overall, the quantity of water injected into the aquifer of the SEBPB will exceed the quantity of water extracted. See Figure 3 in Attachment A for basin and facility location.

Groundwater from the SEBPB is available only to a limited extent as part of the implementation of the injection/extraction system associated with the Bayside Groundwater Facility. Because it is possible that some extractions may include native groundwater, which will subsequently be treated, EBMUD has started the process for preparing a groundwater management plan for the SEBPB, but EBMUD has not yet adopted a groundwater management plan. The native groundwater of the SEBPB is not available as a significant source of water to EBMUD.

The groundwater facility became operational in 2010. The facility consists of a new water treatment facility and associated pipelines linking the treatment plant to the injection/ extraction well, subsidence monitoring system, and a network of groundwater monitoring wells. The project will supply water to EBMUD customers only when supplemental water is needed because of drought conditions.

The injection/ extraction system uses a 600-foot deep well, located on property leased from the Oro Loma Sanitary District in San Leandro. When operated in injection mode, treated water from EBMUD's distribution system is directed through the project well into the deep aquifers of the SEBPB. The injection mode operation will take place during wet years when surplus water is available for storage. During droughts, water will be extracted and treated to meet all federal and state drinking water standards prior to distribution to the customers. A permit from the Department of Public Health, which is pending, is required before the groundwater can be extracted and treated for municipal use.

The project is designed to yield 2 MGD over a 6-month period, resulting in an average annual production capacity of 1 MGD or 1,120 acre-feet per year (AFY). EBMUD's long-range plan calls for investigating potential expansion of the Bayside Groundwater Facility in the future.

5. Ground Water Management Plan

No groundwater management plan is available. However, as a result of the EBMUD Board of Directors' adoption of a resolution of intent to prepare the groundwater management plan for the South East Bay Plain basin, EBMUD is preparing a groundwater management plan in collaboration with stakeholders anticipated for completion by May 2013.

6. Ground Water Banking Plan

No groundwater banking plan is available, nor does EBMUD plan to complete one since a groundwater banking project has not materialized.

C. Other Water Supplies

1. "Other" water used as part of the water supply

See the Water Inventory Tables, Table 1

EBMUD does not have any other long-term water supplies beyond those already identified in Table 1.

D. Source Water Quality Monitoring Practices

1. Potable Water Quality (Urban only)

Refer to Attachment I for EBMUD's 2010 Annual Potable Water Quality Report. The report provides water quality data for year 2010, information about the source of water, measured contaminants, and how it compares with the regulatory standards set by the California Department of Health Services (CDHS) and the United States Environmental Protection Agency (USEPA). EBMUD meets every

public health requirement set by CDHS and USEPA regulations. EBMUD's Laboratory Services conducts water quality testing.

On certain occasions, turbidity in Pardee reservoir can exceed the water quality limits that the EBMUD water treatment plants can treat adequately and reliably to meet regulatory water quality standards. The degradation in water quality has historically been attributed to extreme weather or unusual events in the watershed such as landslides. In those situations, the Mokelumne Aqueducts must be shutdown or throttled to low flow until the water quality in Pardee Reservoir sufficiently improves. EBMUD's local reservoir supply is the primary source of supply in these emergency situations. Since 1982 the aqueducts were taken out of service at least three times because of poor raw water quality (i.e. high turbidity) in Pardee Reservoir, caused by winter storm runoff or landslides. The longest recorded shutdown duration was for a period of 65 days in 1997 when a landslide occurred on January 7, on a slope of the Mokelumne River in the Upper Mokelumne River watershed.

As performance regulations for drinking water treatment become more stringent, recovery from poor water quality events is expected to take longer, resulting in longer aqueduct shutdowns or reduced flows. When the aqueducts are shut down because of severe water quality events, EBMUD implements water management plans, which are already in place. Terminal reservoirs are normally operated to provide 180 days of emergency standby storage, and EBMUD meets its service area demands by relying on this supply when the Mokelumne River supply is temporarily unavailable. After water quality has returned to acceptable levels, the terminal reservoirs are refilled as soon as practical by the Mokelumne Aqueducts to meet standby storage levels.

EBMUD WTPs that process the water supplied by local terminal reservoirs are designed to handle high turbidity conditions that can be caused by severe local storms. Consequently, water quality variations do not limit the water supply available from terminal reservoirs.

2. *Agricultural water quality concerns*: *Yes* _____ *No* _____
(If yes, describe)
Not Applicable – Agriculture Only

3. *Description of the agricultural water quality testing program and the role of each participant, including the district, in the program*
Not Applicable – Agriculture Only

4. *Current water quality monitoring programs for surface water by source (Agricultural only)*

Not Applicable – Agriculture Only

Analyses Performed	*Frequency*	*Concentration Range*	*Average*

Current water quality monitoring programs for groundwater by source (Agricultural only)

Analyses Performed	*Frequency*	*Concentration Range*	*Average*

E. Water Uses within the District

1. Agricultural
See Water Inventory Tables, Table 5 - Crop Water Needs
Not Applicable – Agriculture Only

2. Types of irrigation systems used for each crop in current year

Not Applicable – Agriculture Only

Crop name	*Total Acres*	*Level Basin - acres*	*Furrow - acres*	*Sprinkler - acres*	*Low Volume - acres*	*Multiple methods - acres*

3. Urban use by customer type in current year

Customer Type	*Number of Connections*	*AF*
Single-family	322,096	84,368
Multi-family	29,209	31,972
Commercial	17,901	15,355
Industrial	2,300	8,966
Institutional	4,384	8,697
Landscape irrigation	5,149	11,906
Wholesale		
Recycled	67	13,146
Other (Petroleum)	36	11,665
Other (specify)		
Other (specify)		
Unaccounted for(Losses excluding Apparent & Real)		11,139
Total	381,142	197,214

Data from UWMP 2010 and supplemented by the Water Supply Engineering Section and by Water Supply Improvements Division.
Connections include water, hydrant, fire, and recycled water service counts. (Average monthly number of active services.)

4. Urban Wastewater Collection/Treatment Systems serving the service area – current year

EBMUD's wastewater service district (known as Special District No. 1, or SD-1) was established as a separate wastewater district within EBMUD's water service area in 1944. SD-1 treats domestic, commercial and industrial wastewater for the cities of Alameda, Albany, Berkeley, Emeryville, Oakland and Piedmont, and for the Stege Sanitary District, which includes El Cerrito, Kensington and parts of Richmond. Each of these communities operates sewer collection systems that discharge into one of five EBMUD sewer interceptors (Adeline, Alameda, North, South, and South Foothill).

EBMUD's collection facilities are comprised of the interceptor system and collection system pumping stations. The interceptors consist of 29 miles of reinforced concrete pipes ranging from 12 inches to 9 feet in diameter. They collect wastewater from approximately 1,400 miles of sewers owned and operated by the communities in the SD-1 service area. Fifteen collection system pumping stations, ranging in capacity from 0.5 to 54.7 MGD, lift wastewater throughout the interceptors as it travels to the Wastewater Treatment Plant.

Wastewater collected by the interceptors flows to EBMUD's Wastewater Treatment Plant, which is located in Oakland near the foot of the San Francisco-Oakland Bay Bridge. The plant provides secondary treatment for a maximum flow of 168 MGD. Primary treatment can be provided for up to a peak flow of 320 MGD. The average annual daily flow is approximately 65 MGD.

Primary treatment removes floating materials, oils and greases, sand and silt and organic solids heavy enough to settle in water. Secondary treatment biologically removes most of the suspended and dissolved organic and chemical impurities that would deplete life-giving oxygen from the waters of the Bay if allowed to decompose naturally. The treatment steps are pre-chlorination (for odor control), screening (to remove large objects), grit removal, primary sedimentation, secondary treatment using high-purity oxygen-activated sludge, final clarification, sludge digestion, and dewatering. The treated effluent is then disinfected, dechlorinated and discharged through a deep-water outfall one mile off the East Bay shore into San Francisco Bay.

Chapter 5, Figure 5-1, and Tables 5-1 and 5-2 in the attached Urban Water Management Plan 2010 (Attachment E) provide more details on the EBMUD Wastewater Collection and Treatment Systems.

Treatment Plant	*Treatment Level (1, 2, 3)*	*AF*	*Disposal to / uses*
EBMUD Special District No. 1 (SD-1)	2	82,891	San Francisco Bay/ Plant Processes (Industrial) and Landscape Irrigation
Central Contra Costa Sanitary District	2	41,445	Suisun Bay/ Landscape Irrigation
City of Pinole/ Hercules	2	3,921	San Pablo Bay/ No recycling
City of Richmond	2	9,521	San Francisco Bay/ No recycling
City of San Leandro	2	5,601	San Francisco Bay/ Golf Course and Landscape Irrigation
Crockett Sanitary Department	2	784	Carquinez Straits/ No recycling
Dublin San Ramon Services District	2	13,106	San Francisco Bay/Landscape Irrigation
Oro Loma Sanitary District	2	15,122	San Francisco Bay/ Golf

			Course Irrigation
Rodeo Sanitary District	2	616	San Francisco Bay/ No recycling
West County Wastewater District	2	7,393	San Francisco Bay/ Golf Course Irrigation and Cooling Tower Water
	Total	180,400	
Total discharged to ocean and/or saline sink		155,857	

Data from the Urban Water Management Plan 2010 and from the Wastewater Planning Division

5. *Ground water recharge/management in current year (Table 6)*

Recharge Area	*Method of Recharge*	*AF*	*Method of Retrieval*
Bayside Phase 1 Groundwater Facility in the South East Bay Plain Groundwater Basin	Direct Injection	0	Direct Extraction
	Total	0	

6. *Transfers and exchanges into or out of the service area in current year (Table 6)*

From Whom	*To Whom*	*AF*	*Use*
EBMUD	San Francisco Public Utilities Commission - Hayward	1,092	Test of Emergency SFPUC-Hayward-EBMUD Intertie

Refer to pages 3-6 through 3-8 in the attached Urban Water Management Plan 2010 (Attachment E), for more details on transfers

7. *Trades, wheeling, wet/dry year exchanges, banking or other transactions in current year (Table 6)*

From Whom	*To Whom*	*AF*	*Use*
Not applicable – None			

Refer to pages 3-6 through 3-8 in the attached Urban Water Management Plan 2010 (Attachment E), for more details on transfers

8. *Other uses of water in current year*

Other Uses	*AF*
None	

F. Outflow from the District (Agricultural only)

SECTION F IS NOT APPLICABLE – AGRICULTURE ONLY

Districts included in the drainage problem area, as identified in "A Management Plan for Agricultural Subsurface Drainage and Related Problems on the Westside San Joaquin Valley (September 1990)," should also complete Water Inventory Table 7 and Appendix B (include in plan as Attachment L)

See Facilities Map, Attachment A, for the location of surface and subsurface outflow points, outflow measurement points, outflow water-quality testing locations

1. *Surface and subsurface drain/outflow in current year*

Outflow point	*Location description*	*AF*	*Type of measurement*	*Accuracy (%)*	*% of total outflow*	*Acres drained*

Outflow point	*Where the outflow goes (drain, river or other location)*	*Type Reuse (if known)*

2. *Description of the Outflow (surface and subsurface) water quality testing program and the role of each participant in the program*

3. *Outflow (surface drainage & spill) Quality Testing Program*

Analyses Performed	*Frequency*	*Concentration Range*	*Average*	*Reuse limitation?*

Outflow (subsurface drainage) Quality Testing Program

Analyses Performed	*Frequency*	*Concentration*	*Average*	*Reuse*

		Range		*limitation?*

4. Provide a brief discussion of the District's involvement in Central Valley Regional Water Quality Control Board programs or requirements for remediating or monitoring any contaminants that would significantly degrade water quality in the receiving surface waters.

G. Water Accounting (Inventory)

1. Water Supplies Quantified

a. Surface water supplies, imported and originating within the service area, by month (Table 1)
b. Ground water extracted by the district, by month (Table 2)
c. Effective precipitation by crop (Table 5)
d. Estimated annual ground water extracted by non-district parties (Table 2)
e. Recycled urban wastewater, by month (Table 3)
f. Other supplies, by month (Table 1)

2. Water Used Quantified

a. Agricultural conveyance losses, including seepage, evaporation, and operational spills in canal systems (Table 4) or
Urban leaks, breaks and flushing/fire uses in piped systems (Table 4)
b. Consumptive use by riparian vegetation or environmental use (Table 6)
c. Applied irrigation water - crop ET, water used for leaching/cultural practices (e.g., frost protection, soil reclamation, etc.) (Table 5)
d. Urban water use (Table 6)
e. Ground water recharge (Table 6)
f. Water exchanges and transfers and out-of-district banking (Table 6)
g. Estimated deep percolation within the service area (Table 6)
h. Flows to perched water table or saline sink (Table 7)
i. Outflow water leaving the district (Table 6)
j. Other

3. Overall Water Inventory
a. Table 6

H. Assess Quantifiable Objectives:

Identify the Quantifiable Objectives that apply to the District (Planner, chapter 10) and provide a short narrative describing past, present and future plans that address the CALFED Water Use Efficiency Program goals identified for the District.

Quantifiable Objectives do not apply to EBMUD.

QO #	*QO Description*	*Past, Present & Future Plans*
N/A	N/A	N/A

Section 3: Best Management Practices (BMPs) for Agricultural Contractors

NOT APPLICABLE – AGRICULTURE ONLY

Section 4: Best Management Practices for Urban Contractors

(Due to the adoption of revised BMPs in December 2008, this section will be updated in Spring 2009.)

Standardized CUWCC BMPs reporting forms from the UWMP 2010 (Appendix I-1) are included in Attachment E.

EBMUD is using the traditional compliance option for BMP implementation in these CUWCC MOU activity reports. EBMUD self-certified for the UWMP 2010 that its water conservation achievements are on-track, ahead of schedule or have reached 100% completion for all established BMP requirements, and also can meet coverage requirements under the Flex Trak or GPCD compliance option.

A. Urban BMPs

1. *Utilities Operations*
   - *1.1 Operations Practices*
   - *1.2 Pricing*
   - *1.3*[3] *Metering*
   - *1.4 Water Loss Control*
2. *Education*
   - *2.1 Public Information Programs*
   - *2.2 School Education*
3. *Residential*
4. *CII*
5. *Landscape*

B. Provide a 3-Year Budget for Expenditures and Staff Effort for BMPs

1. Amount actually spent during current year.

Year 2010

BMP #	BMP Name	Projected Expenditures (not including staff hours)	Staff Hours
1.	Utilities Operations		
	1.1 Operations Practices	$350,000	13,200
	1.2 Pricing	$3,000	16,700
	1.3 Metering	$2,674,000	131,300
	1.4 Water Loss Control	$15,119,000	305,400
2.	Education		
	2.1 Public Information Programs	$1,900,000	22,350

[3] To satisfy the foundational BMP reporting requirements, EBMUD reports unbilled unmetered and apparent water losses in the CUWCC MOU report as "unmetered water deliveries" in the Institutional user category. Thus, in the 2010 CUWCC MOU Activity report on page I-1 in EBMUD's UWMP 2010, the 1,825 AF/year of unmetered water deliveries for institutional use consists of unbilled unmetered use (for authorized purposes that are not billed, such as for estimated hydrant and pipeline flushings), unauthorized consumption (theft, illegal taps, and unauthorized fire hydrant use), customer metering inaccuracies (meter error adjustments), and systematic data handling errors. Because the tables in this Water Management Plan focuses on only "urban customers," which EBMUD defines as customers who receive water deliveries and are all billed for the service, a variation in the information is expected between the tables reported in the WMP 2011 and the CUWCC MOU Activity Report, which captures both metered and unmetered water usage

2.2 School Education	$250,000	2,950
3. Residential	$1,750,000	13,100
4. CII	$300,000	460
5. Landscape	$450,000	1,000
Total	$22,796,000	506,460

2. Projected budget summary for 2nd year.

Year 2011 BMP # BMP Name	Projected Expenditures (not including staff hours)	Staff Hours
1. Utilities Operations		
1.1 Operations Practices	$209,000	10,900
1.2 Pricing	$1,000	19,100
1.3 Metering	$3,132,000	134,200
1.4 Water Loss Control	$13,984,000	277,400
2. Education		
2.1 Public Information Programs	$1,900,000	22,350
2.2 School Education	$250,000	2,950
3. Residential	$1,350,000	7,950
4. CII	$242,000	2,500
5. Landscape	$525,000	4,110
Total	$21,593,000	481,460

3. Projected budget summary for 3rd year.

Year 2012 BMP # BMP Name	Projected Expenditures (not including staff hours)	Staff Hours
1. Utilities Operations		
1.1 Operations Practices	$209,000	10,900
1.2 Pricing	$1,000	19,100
1.3 Metering	$3,132,000	134,200
1.4 Water Loss Control	$13,984,000	277,400
2. Education		
2.1 Public Information Programs	$1,900,000	22,350
2.2 School Education	$250,000	2,950
3. Residential	$1,597,500	9,290

4. CII	$505,000	1,660
5. Landscape	$825,000	3,610
Total	$22,403,500	481,460

Notes:
For fiscal year 2010, 2011, 2012:
Analyses do not include additional efforts dedicated to raw water conservation.
Estimates will be refined further in future Water Management Plans.

Year of Data	2010	Enter data year here

Table 1

Surface Water Supply

2010 Month	Federal Urban Water (acre-feet)	Federal Agric. Water (acre-feet)	State Water (acre-feet)	Local Water (acre-feet)	Other Water (define) (acre-feet)	Total (acre-feet)
January	0	0	0	12,788	0	12,788
February	0	0	0	11,323	0	11,323
March	0	0	0	13,237	0	13,237
April	0	0	0	13,093	0	13,093
May	0	0	0	16,416	0	16,416
June	0	0	0	19,793	0	19,793
July	0	0	0	22,265	0	22,265
August	0	0	0	21,701	0	21,701
September	0	0	0	20,337	0	20,337
October	0	0	0	17,584	0	17,584
November	0	0	0	13,028	0	13,028
December	0	0	0	12,373	0	12,373
TOTAL	0	0	0	193,938	0	193,938

Table 2

Ground Water Supply

2010 Month	District groundwtr (acre-feet)	Private groundwater (acre-feet)
January	0	
February	0	
March	0	
April	0	
May	0	
June	0	
July	0	
August	0	
September	0	
October	0	
November	0	
December	0	
TOTAL	0	0

*normally estimated

Table 3

Total Water Supply

2010 Month	Surface Water Supply (acre-feet)	District Groundwater (acre-feet)	Recycled M&I (acre-feet)	Total District Water Supply (acre-feet)
January	12,788	0	884	13,672
February	11,323	0	823	12,146
March	13,237	0	838	14,075
April	13,093	0	810	13,903
May	16,416	0	1,116	17,532
June	19,793	0	1,127	20,920
July	22,265	0	1,226	23,491
August	21,701	0	1,454	23,155
September	20,337	0	1,308	21,645
October	17,584	0	1,234	18,818
November	13,028	0	1,138	14,166
December	12,373	0	1,188	13,561
TOTAL	193,938	0	13,146	207,084

Recycled wastewater is treated urban wastewater that is reused

Table 4

Distribution System

2010 Area or Line	Length (feet)	Leaks (acre-feet)	Breaks (acre-feet)	Flushing/Fire (acre-feet)	Total (acre-feet)
EBMUD Service Area	22,001,760	6,682	1,120	157	7,959
	0	0	0	0	0
	0	0	0	0	0
	0	0	0	0	0
	0	0	0	0	0
	0	0	0	0	0
	0	0	0	0	0
	0	0	0	0	0
	0	0	0	0	0
	0	0	0	0	0
	0	0	0	0	0
TOTAL	22,001,760	6,682	1,120	157	7,959

Table 6

2010 District Water Inventory

Water Supply	Table 3		207,084
Environmental Consumptive Use		minus	0
Groundwater Recharge	(Perc ponds & recharge wells)	minus	0
Water Exchanges or Transfers	(into or out of the district)	minus / plus	(1,092)
Flushing / Fire	Table 4b	minus	157
Distribution System Leaks & Breaks	Table 4b	minus	7,802
Non-Urban (Agricultural) Deliveries	<2,000 AF	minus	0
	Water Supply Available for Sale		198,033
2010			
Actual M&I Water Sales	**From District Records**		**186,075**
Inside Use	Feb use x 12	minus	145,748
Landscape / Outside Use	(calculated)		40,327

Table 8

Annual Water Quantities Delivered Under Each Right or Contract

Year	Federal Urban Water (acre-feet)	Federal Agric. Water (acre-feet)	State Water (acre-feet)	Local Water (acre-feet)	Other Water (define) (acre-feet)	Total (acre-feet)
2001	0	0	0	241,824	0	241,824
2002	0	0	0	241,166	0	241,166
2003	0	0	0	240,205	0	240,205
2004	0	0	0	245,753	0	245,753
2005	0	0	0	233,228	0	233,228
2006	0	0	0	233,696	0	233,696
2007	0	0	0	229,996	0	229,996
2008	0	0	0	220,078	0	220,078
2009	0	0	0	199,603	0	199,603
2010	0	0	0	193,938	0	193,938
Total	0	0	0	2,279,486	0	2,279,486
Average	0	0	0	227,949	0	227,949

FIGURE 1

EBMUD SERVICE BOUNDARY

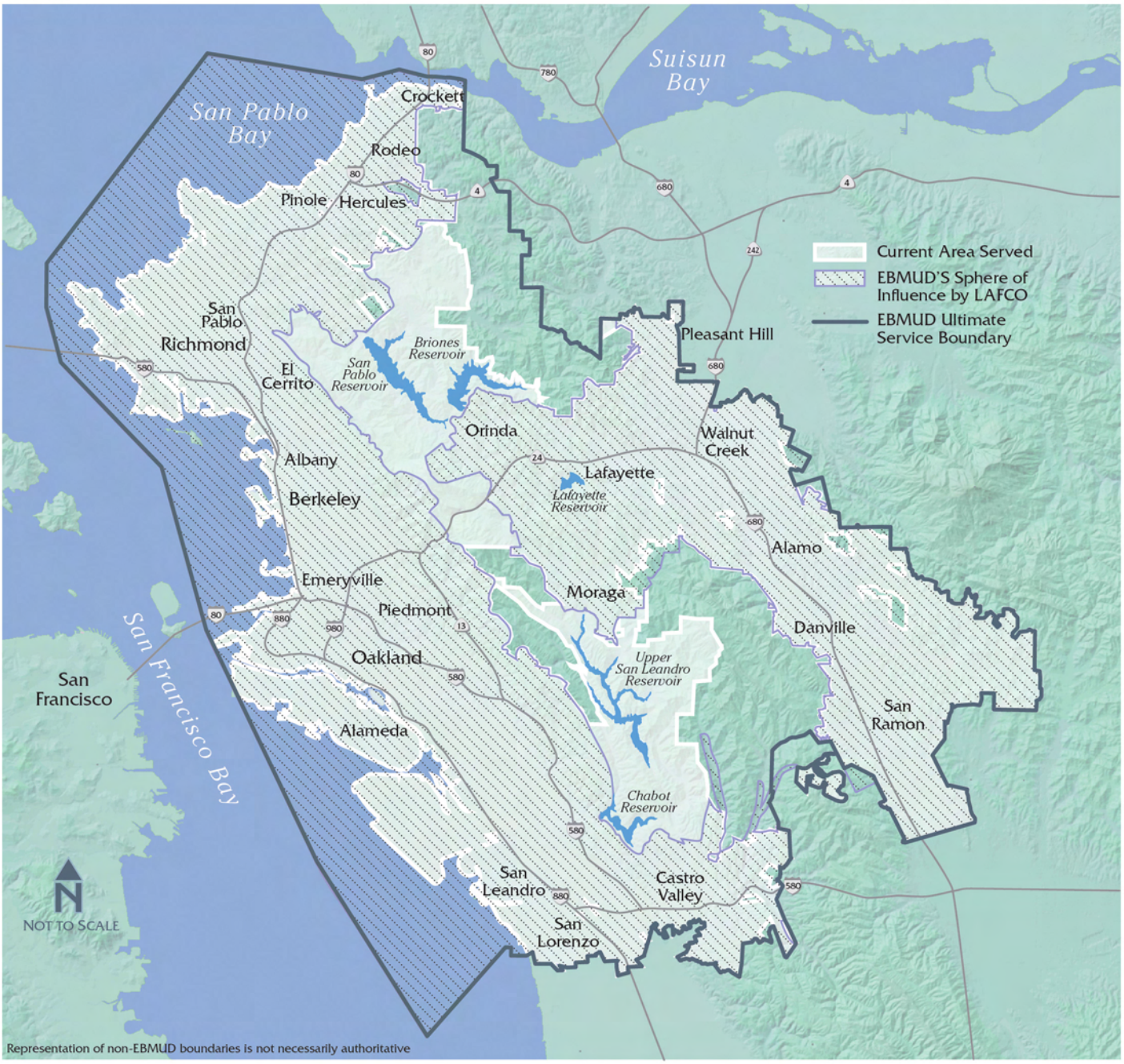


FIGURE 2

EBMUD WATER SUPPLY SYSTEM

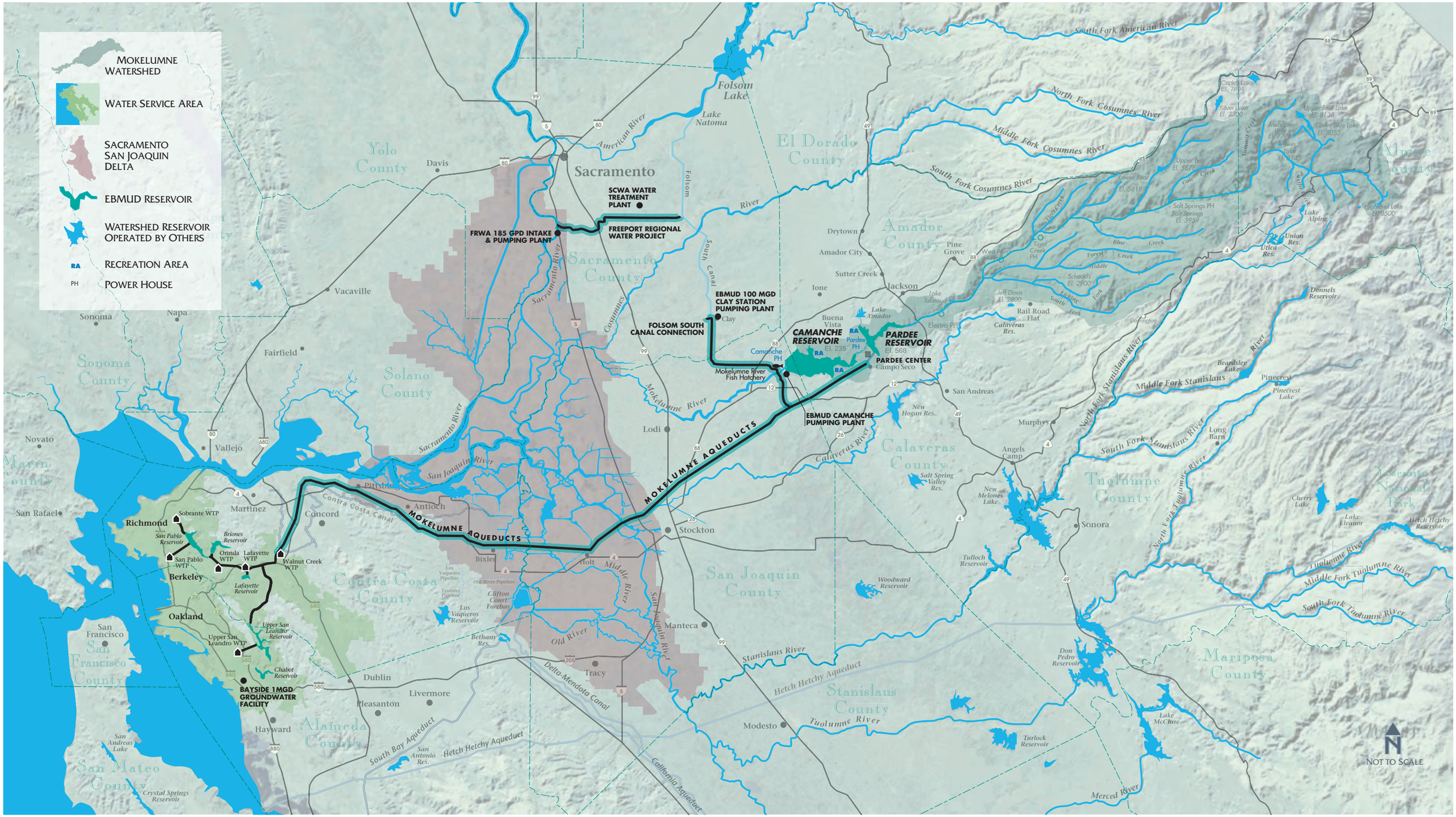


FIGURE 3 SOUTH EAST BAY PLAIN BASIN

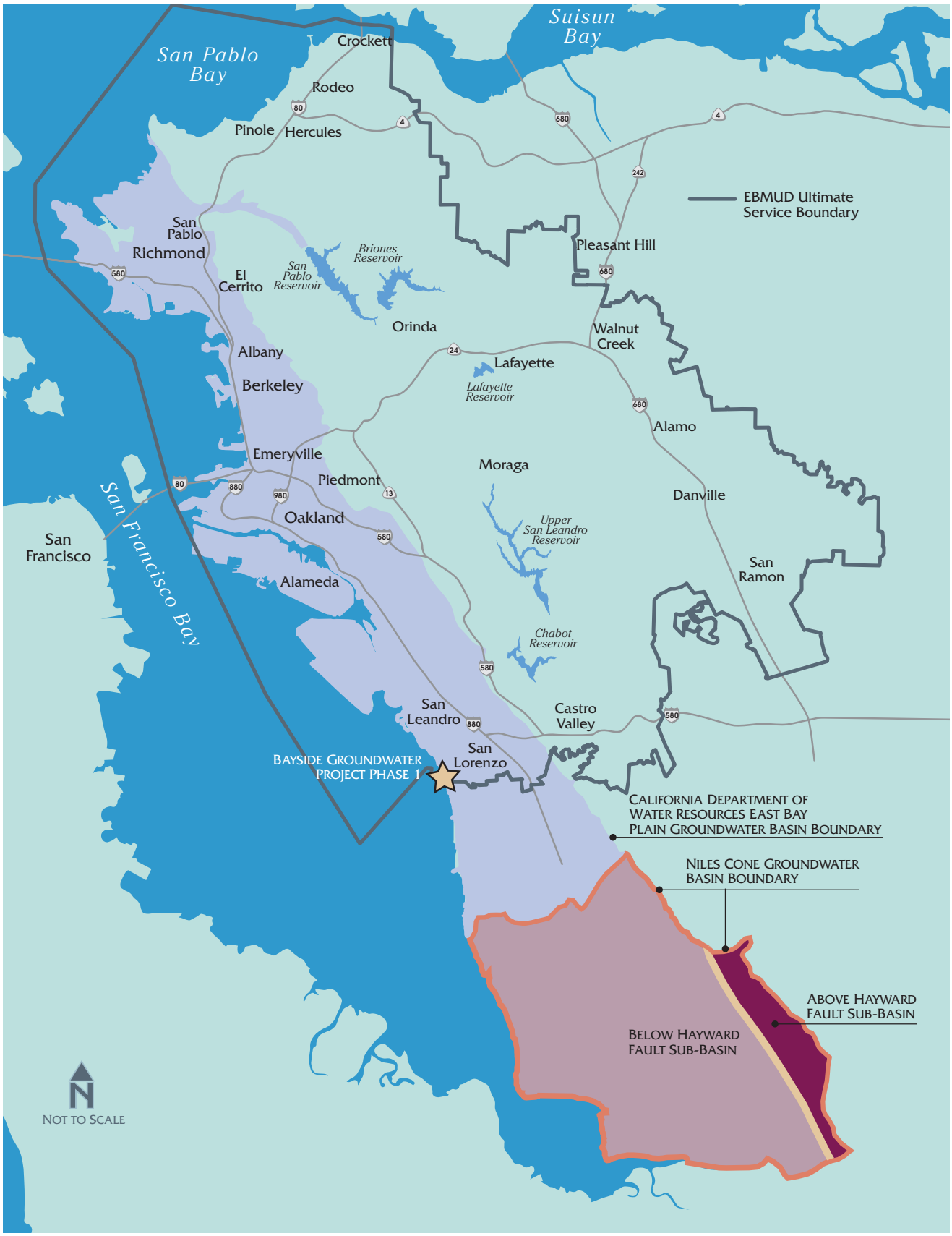
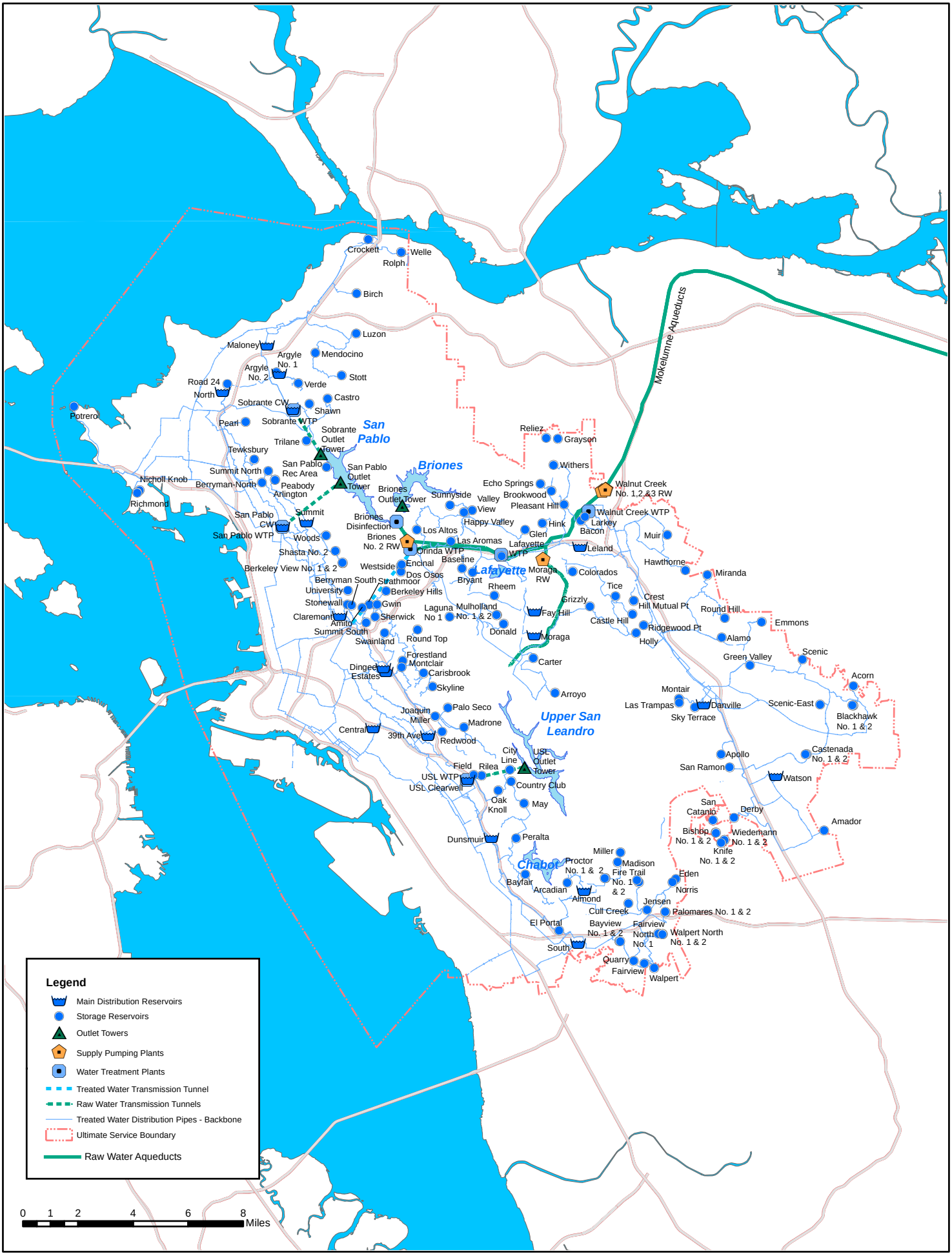


Fig 4. EBMUD Facilities and Water Conveyance System



Produced by Water Resources Projects and GIS units, December 2011.
File: G:\projects\USBR WMP\2011\2011-12-07 Water_Management_Plan.mxd

TABLE 1. STORAGE RESERVOIRS

FACILITY NAME	Capacity (mg)
39th Ave Reservoir	10.19
Acorn Reservoir	1.20
Alamo Reservoir	14.00
Almond Reservoir	6.62
Amador Reservoir	9.72
Amito Reservoir	0.67
Apollo Reservoir	0.20
Arcadian Reservoir	0.24
Argyle No. 1 Reservoir	2.84
Argyle No. 2 Reservoir	7.15
Arlington Reservoir	2.82
Arroyo Reservoir	1.00
Bacon Reservoir	1.02
Baseline Reservoir	2.84
Bayfair Reservoir	1.14
Bayview #1 Reservoir	2.85
Bayview #2 Reservoir	4.98
Berkeley Hills Reservoir	0.40
Berkeley View No. 1 Reservoir	1.02
Berkeley View No. 2 Reservoir	3.03
Berryman North Reservoir	0.62
Berryman South Reservoir	2.89
Birch Reservoir	1.02
Bishop No. 1 Reservoir	0.30
Bishop No. 2 Reservoir	0.30
Blackhawk No. 1 Reservoir	4.50
Blackhawk No. 2 Reservoir	4.50
Brookwood Reservoir	1.99
Bryant Reservoir	2.83
Carisbrook Reservoir	3.40
Carter Reservoir	0.25
Castenada No. 1 Reservoir	12.00
Castenada No. 2 Reservoir	12.00
Castle Hill Reservoir	3.00
Castro Reservoir	0.40
Central Reservoir	153.80
Chabot Golf Course Reclamation Reservoir	0.08
City Line Reservoir	1.02
Claremont Reservoir	8.09
Colorados Reservoir	2.84
Columbian Temporary Tank 0.13 MG	0.13
Columbian Temporary Tank 0.28 MG	0.28
Country Club Reservoir	2.49
Crest Reservoir	0.12
Crockett Reservoir	1.02
Cull Creek Reservoir	3.14
Danville Reservoir	14.53
Derby Reservoir	0.75
Dingee Reservoir	4.75

FACILITY NAME	Capacity (mg)
Donald Reservoir	1.03
Dos Osos Reservoir	0.26
Dunsmuir Reservoir	65.46
Echo Springs Reservoir	0.49
Eden Reservoir	1.57
El Portal Reservoir	2.82
Emmons Reservoir	5.50
Encinal Reservoir	0.25
Estates Reservoir	17.62
Fairview North No. 1 Reservoir	1.96
Fairview Reservoir	1.99
Fay Hill Reservoir	2.50
Field Reservoir	2.00
Fire Trail No. 1 Reservoir	0.50
Fire Trail No. 2 Reservoir	1.10
Forestland Reservoir	0.76
Glen Reservoir	0.18
Grayson Reservoir	5.00
Green Valley Reservoir	2.87
Grizzly Reservoir	5.13
Gwin Reservoir	0.50
Happy Valley Reservoir	1.50
Hawthorne Reservoir	3.60
Hill Mutual PT Reservoir	0.00
Hink Reservoir	0.50
Holly Reservoir	2.10
Jensen Reservoir	1.02
Joaquin Miller Reservoir	2.82
Knife No. 1 Reservoir	0.19
Knife No. 2 Reservoir	0.19
Lafayette Clearwell	0.34
Lafayette Water Treatment Plant Washwater Tank	0.20
Laguna No 1 Reservoir	0.50
Larkey Reservoir	3.04
Las Aromas Reservoir	1.02
Las Trampas Reservoir	0.26
Leland Reservoir	19.45
Los Altos Reservoir	5.03
Luzon Reservoir	2.40
Madison Reservoir	1.00
Madrone Reservoir	2.91
Maloney Reservoir	22.30
May Reservoir	0.19
Mendocino Reservoir	1.51
Miller Reservoir	0.50
Miranda Reservoir	2.50
Montair Reservoir	0.49
Montclair Reservoir	1.55
Moraga Reservoir	11.50
Muir Reservoir	0.30
Mulholland No. 1 Reservoir	0.30

FACILITY NAME	Capacity (mg)
Mulholland No. 2 Reservoir	0.40
Nicholl Knob Reservoir	0.40
Norris Reservoir	2.00
North Reservoir	73.49
North Richmond Water Reclamation Equalization Tank	1.70
Oak Knoll Reservoir	2.90
Orinda Water Treatment Plant Plant Washwater Tank	0.20
Palo Seco Reservoir	2.01
Palomares No. 1 Reservoir	0.55
Palomares No. 2 Reservoir	0.55
Peabody Tectank Temporary Tank 0.28 MG	0.28
Pearl Reservoir	0.50
Peralta Reservoir	1.02
Pinehaven No. 1 Reservoir	0.21
Pinehaven No. 2 Reservoir	0.50
Pleasant Hill Reservoir	1.03
Potrero Reservoir	1.01
Proctor No. 1 Reservoir	2.84
Proctor No. 2 Reservoir	1.96
Quarry Reservoir	2.07
Redwood Reservoir	2.85
Reliez Reservoir	0.42
Rheem Reservoir	1.02
Richmond Reservoir	11.38
Ridgewood PT Reservoir	0.00
Rilea Reservoir	4.60
Road 24 Reservoir	5.00
Rolph Reservoir	0.51
Round Hill Reservoir	0.60
Round Top Reservoir	0.65
San Catanio Reservoir	0.40
San Pablo Clearwell	5.43
San Pablo Recreation Area Reservoir	0.10
San Pablo Water Treatment Plant Washwater Tank	0.08
San Pablo Water Treatment Plant Wshwtr Tank No. 2	0.12
San Ramon Reservoir	5.06
Scenic East Reservoir	4.00
Scenic Reservoir	3.00
Shasta No. 2 Reservoir	2.07
Shawn Reservoir	0.75
Sherwick Reservoir	0.40
Sky Terrace Reservoir	1.50
Skyline Reservoir	1.04
Sleepy Hollow Temporary Reservoir	0.16
Sobrante Clearwell	8.18
South Reservoir	50.39
Stonewall Reservoir	0.21
Stott Reservoir	0.49
Strathmoor Reservoir	0.50
Summit North Reservoir	1.50
Summit Reservoir	36.99

FACILITY NAME	Capacity (mg)
Summit South Reservoir	1.51
Sunnyside Reservoir	0.30
Superior Temporary Tank 0.41 MG	0.41
Swainland Reservoir	2.00
Tewksbury Reservoir	1.06
Tice Reservoir	9.72
Trilane Reservoir	0.22
University Reservoir	0.50
USL Clearwell	6.62
Valley View Reservoir	1.02
Valory Reservoir	0.50
Verde Reservoir	1.00
Walnut Creek Clearwell	16.0
Walpert North No. 1 Reservoir	0.50
Walpert North No. 2 Reservoir	0.50
Walpert Reservoir	0.50
Watson Reservoir	10.00
Welle Reservoir	0.30
Westside Reservoir	0.36
Wiedemann No. 1 Reservoir	0.31
Wiedemann No. 2 Reservoir	0.31
Withers Reservoir	1.99
Woods Reservoir	3.05

ATTACHMENT B. DISTRICT SOILS MAP
(Not Applicable)

ATTACHMENT C. DISTRICT WATER SUPPLY OPERATING OBJECTIVES SUMMARY

Water Supply Engineering is responsible for scheduling operations of the District's Mokelumne and East Bay reservoirs, aqueducts and raw water pumping plants to maximize water yield and conform to water rights and contractual agreements. The following outlines the general framework for the water supply system operation.

Pardee Reservoir

Pardee Reservoir is operated with the intent of meeting the following objectives:

- Comply with water rights requirements
- Schedule transfer of water to the East Bay to meet in-line water treatment plant demands, and to meet East Bay Reservoir storage objectives
- Utilize gravity aqueduct flow whenever possible to minimize raw water pumping costs
- Comply with Jackson Valley Irrigation District water contract
- Implement temperature management practices for fishery and ecosystem benefits.
- Minimize impact to recreation
- Minimize impact to aquatic resources as affected by reservoir level fluctuations
- Operate in conjunction with Camanche Reservoir to meet flood control space requirements
- Operate in conjunction with Camanche Reservoir to meet downstream release requirements
- Schedule power generation to maximize generation revenue subject to all other objectives

Camanche Reservoir – General Operating Criteria

Camanche Reservoir is operated with the intent of meeting the following objectives:

- Comply with water rights requirements
- Comply with FERC approved Joint Settlement Agreement (JSA)
- Comply with contractual agreement with California Department of Fish and Game, Woodbridge Irrigation District and North San Joaquin Water Conservation District
- Comply with release rate ramping criteria
- Implement best practice temperature management for fisheries and ecosystem benefit.
- Operate the Hypolimnetic Oxygenation System (HOS) to reduce the likelihood of the natural formation of hydrogen sulfide near the dam
- Comply with flood control requirements of the Army Corps of Engineers, Camanche Dam and Reservoir Water Control Manual
- Maintain downstream dissolved oxygen levels below Camanche Dam
- Schedule power generation to maximize generation revenue subject to all other objectives

East Bay Reservoirs

East Bay Reservoirs are operated with the intent of meeting the following objectives:

- Maximize direct use of gravity flow water from Pardee Reservoir
- Maintain water surface elevation within established operating ranges.
- Transfer water to the East Bay Reservoirs to meet in-line water treatment plant demands

- Maintain emergency standby storage in Briones, San Pablo and Upper San Leandro Reservoirs.
- Pump water into Briones and/or Upper San Leandro Reservoirs when necessary to meet minimum storage requirements
- Minimize cost of raw water pumping
- Release water when inflows increase storages above the operating ranges
- Operate as source water supply for the District's Water Treatment Plants.

Policy 9.03

EFFECTIVE 14 JUN 11

SUPERSEDES 13 APR 10

WATER SUPPLY AVAILABILITY AND DEFICIENCY

IT IS THE POLICY OF THE EAST BAY MUNICIPAL UTILITY DISTRICT TO:

Evaluate the availability of the District's water supplies and determine the acceptable maximum level of annual customer demand for the District's service area based on limiting rationing up to a maximum of 15 percent of District-wide annual demand and implementation of current and proposed District conservation programs, recycled water programs and supplemental supply projects.

Annual Water Supplies Report

A review and report to the Board of Directors shall be made on the current and long-term adequacy of the District's water supplies before May 1st of each year. The report shall include an evaluation of the adequacy of the District's water supplies to satisfy customer demand for the current water year and a projection through the year 2040, based on the determination of the Allowable Maximum Level of Demand.

Long-Term Water Supply Reliability

An assessment of long-term water supply reliability through the year 2040 shall be made assuming:

- Water service will be provided in accordance with the District's Regulations Governing Water Service to Customers.
- Water conservation and water recycling programs will be implemented as provided in the District's current Urban Water Management Plan (UWMP).

Supplemental Supplies

The District shall pursue supplemental supplies if existing supplies are found to be inadequate either for the current year or through the year 2040 as provided in the District's current UWMP.

Rationing

The District shall have a goal of limiting customer rationing to a maximum of 15% of District-wide annual demand and will implement this policy consistent with the District's Drought Management Program Guidelines, as outlined in the current UWMP.

Notification Surplus Water

In accordance with the 1998 Joint Settlement Agreement when a determination of the availability of Mokelumne River water is made, the District will notify the Resources Agencies, specifically the United States Fish and Wildlife Services and the California Department of Fish and Game, of the availability of the additional water.

Definitions

Drought Planning Sequence (DPS) – Three year hydrology sequence presenting a worst case drought scenario derived from historical record.

Allowable Maximum Level of Demand (AMLD) – The allowable maximum level of customer demand, in MGD as an annual average, that the system can sustain under the DPS.

Authority

Amended by Resolution 31,246, May 14, 1985
Amended by Resolution No. 32,204, May 9, 1989
Amended by Resolution No. 33175-99, November 9, 1999
Amended by Resolution No. 33759-10, April 13, 2010
Amended by Resolution No. 33821-11, June 14, 2011

References

Policy 3.01 - Annexations
Policy 3.05 - Effects of Extension of Water Beyond the Ultimate Service Boundary
Policy 3.07 - Responsibility to Serve Water Customers
Procedure 900 – Water Supply Accounting and Reporting
Procedure 901 – Recycled Water Accounting and Reporting
Procedure 902 – Water Conservation Accounting and Reporting

EBMUD's Urban Water Management Plan

Policy 7.10

EFFECTIVE 25 JUL 06

SUPERSEDES 08 JUN 04

SOURCE WATER QUALITY

IT IS THE POLICY OF EAST BAY MUNICIPAL UTILITY DISTRICT TO:

Protect the public health of its customers by serving high quality water from the best available source in preference to reliance on additional treatment.

Best Available Source

Obtaining water from the best available source is consistent with sound public policy, state law and prudent water supply management.

Consistent with California and Federal safe drinking water regulations, EBMUD will take actions to minimize public health risks by protecting existing high-quality water sources and seeking the highest quality source water reasonably available for supplemental supplies.

Consistent with the District's statutory obligations and responsibilities to the customers of the District, highest priority shall be given to protecting the quality of drinking water supplies, compatible with protection of public trust resources.

Meeting Drinking Water Quality Standards

Supplying water from the highest quality source water available is the safest and most prudent way to enable the District to meet current and future state and federal health-based drinking water quality standards.

Given current and future increasingly stringent drinking water standards, EBMUD will minimize public health risks by seeking the best available water source, protected from potential degradation, thereby reducing the uncertainty of technology's ability to eliminate health risks and the potential for added risks from treatment byproducts.

Authority

Resolution 33039-97, April 22, 1997
As amended by Resolution No. 33027-02, September 24, 2002
As amended by Resolution No. 33429-04, June 8, 2004
As amended by Resolution No. 33550-06, July 25, 2006

Consistent with the Court decision in Environmental Defense Fund, Inc., et. al v. EBMUD (Alameda County Action No. 425955), providing high quality drinking water is a significant public policy that is furthered by diversion from the best available source.

SCHEDULE A

RATE SCHEDULE FOR WATER SERVICE

The following rates apply to water service received inside and outside District boundaries unless otherwise indicated.

A. ONE MONTH BILLING

Bills for all metered services shall consist of:

FIRST - A SERVICE CHARGE and A SEISMIC IMPROVEMENT PROGRAM SURCHARGE based on the size of a standard meter:

SIZE	SERVICE CHARGE AMOUNT	SEISMIC IMPROVEMENT SURCHARGE
5/8 and 3/4 inch meters	$10.13	$0.95
1 inch meter	16.28	2.38
1-1/2 inch meter	26.25	4.74
2 inch meter	38.34	7.59
3 inch meter	66.56	14.22
4 inch meter	106.86	23.70
6 inch meter	207.62	47.41
8 inch meter	328.53	75.85
10 inch meter	469.59	109.04
12 inch meter	650.96	151.70
14 inch meter	832.33	194.37
16 inch meter	1,054.00	246.52
18 inch meter	1,275.67	298.67

The service charge and seismic improvement program surcharge for a special type of meter or for a battery of meters installed on one service in lieu of one meter will be based on the size of a single standard meter of equivalent capacity as determined by the District.

The seismic improvement program surcharge is effective on each potable water bill through February 28, 2025. The seismic improvement program surcharge shall not be applied to nonpotable water service.

Effective July 1, 1997, when a meter larger than 4 inches is required for a single-family residential customer in order to maintain adequate water pressure, the maximum service charge amount and seismic improvement surcharge shall be set at the 4-inch meter level.

SCHEDULE A

RATE SCHEDULE FOR WATER SERVICE

A. ONE MONTH BILLING (Continued)

SECOND - A SEISMIC IMPROVEMENT SURCHARGE for each Single Family Residential or Multiple Family Residential account.

	SEISMIC IMPROVEMENT SURCHARGE PER ACCOUNT
Single Family Residential Accounts	$0.95
Multiple Family Residential Accounts	4.46

THIRD - A CHARGE FOR WATER DELIVERED and A SEISMIC IMPROVEMENT PROGRAM SURCHARGE based on one month meter readings for all water delivered per 100 cu. ft.:

	WATER DELIVERED CHARGE PER 100 CU. FT.	SEISMIC IMPROVEMENT SURCHARGE PER 100 CU. FT.
INSIDE DISTRICT BOUNDARIES		
Potable Water Service		
Single Family Residential Accounts:		
For the first 172 gpd	$2.00	$--
For all water used in excess of 172 gpd, up to 393 gpd	2.48	--
For all water used in excess of 393 gpd	3.04	--
Multiple Family Residential Accounts:		
For all water used	2.54	--
All Other Water Use:		
For all water used	2.62	.10

All individually metered multi-family dwelling units or individually metered mobile home residential units that receive District service shall be billed at the single family residential rate.

The seismic improvement program surcharge is effective on each potable water bill through February 28, 2025. The seismic improvement program surcharge shall not be applied to nonpotable water service.

SCHEDULE A

RATE SCHEDULE FOR WATER SERVICE

A. ONE MONTH BILLING (Continued)

	WATER DELIVERED CHARGE PER 100 CU. FT.
Nonpotable Water Service	
For all water used	$2.18

Nonpotable Water Use Incentive Rate

A customer for whom the District has determined, pursuant to Section 30 of the Water Service Regulations, that the provision of nonpotable water service is feasible and to whom the District has issued written notification that specifies a date by which the customer site must be ready to accept nonpotable water service, shall ready the site by the date specified or pay the Nonpotable Water Use Incentive Rate for all potable water used during the period of noncompliance. The Nonpotable Water Use Incentive Rate shall be charged at a rate 20 percent higher than the applicable potable water rate.

OUTSIDE DISTRICT BOUNDARIES

Charge per 100 cu. ft. will be twice the charge applicable for inside District Boundaries.

SCHEDULE A

RATE SCHEDULE FOR WATER SERVICE

B. TWO MONTH BILLING

Bills for all metered services shall consist of:

FIRST - A SERVICE CHARGE and A SEISMIC IMPROVEMENT PROGRAM SURCHARGE based on the size of a standard meter:

SIZE	SERVICE CHARGE AMOUNT	SEISMIC IMPROVEMENT SURCHARGE
5/8 and 3/4 inch meters	$20.26	$1.90
1 inch meter	32.56	4.76
1-1/2 inch meter	52.50	9.48
2 inch meter	76.68	15.18
3 inch meter	133.12	28.44
4 inch meter	213.72	47.40
6 inch meter	415.24	94.82
8 inch meter	657.06	151.70
10 inch meter	939.18	218.08
12 inch meter	1,301.92	303.40
14 inch meter	1,664.66	388.74
16 inch meter	2,108.00	493.04
18 inch meter	2,551.34	597.34

The service charge and seismic improvement program surcharge for a special type of meter or for a battery of meters installed on one service in lieu of one meter will be based on the size of a single standard meter of equivalent capacity as determined by the District.

The seismic improvement program surcharge is effective on each potable water bill through February 28, 2025. The seismic improvement program surcharge shall not be applied to nonpotable water service.

Effective July 1, 1997, when a meter larger than 4 inches is required for a single-family residential customer in order to maintain adequate water pressure, the maximum service charge amount and seismic improvement surcharge shall be set at the 4-inch meter level.

SECOND - A SEISMIC IMPROVEMENT SURCHARGE for each Single Family Residential or Multiple Family Residential account.

SCHEDULE A

RATE SCHEDULE FOR WATER SERVICE

B. TWO MONTH BILLING (Continued)

	SEISMIC IMPROVEMENT CHARGE PER ACCOUNT
Single Family Residential Accounts	$1.90
Multiple Family Residential Accounts	8.92

THIRD - A CHARGE FOR WATER DELIVERED and A SEISMIC IMPROVEMENT PROGRAM SURCHARGE based on two month meter readings for all water delivered per 100 cu. ft.

	WATER DELIVERED CHARGE PER 100 CU. FT.	SEISMIC IMPROVEMENT SURCHARGE PER 100 CU. FT.
INSIDE DISTRICT BOUNDARIES		
Potable Water Service		
Single Family Residential Accounts:		
For the first 172 gpd	$2.00	$--
For all water used in excess of 172 gpd, up to 393 gpd	2.48	--
For all water used in excess of 393 gpd	3.04	--
Multiple Family Residential Accounts:		
For all water used	2.54	--
All Other Water Use:		
For all water used	2.62	.10

All individually metered multi-family dwelling units or individually metered mobile home residential units that receive District service shall be billed at the single family residential rate.

The seismic improvement program surcharge is effective on each potable water bill through February 28, 2025. The seismic improvement program surcharge shall not be applied to nonpotable water service.

SCHEDULE A

RATE SCHEDULE FOR WATER SERVICE

B. TWO MONTH BILLING (Continued)

	WATER DELIVERED CHARGE PER 100 CU. FT.
Nonpotable Water Service	
For all water used	$2.18

Nonpotable Water Use Incentive Rate

A customer for whom the District has determined, pursuant to Section 30 of the Water Service Regulations, that the provision of nonpotable water service is feasible and to whom the District has issued written notification that specifies a date by which the customer site must be ready to accept nonpotable water service, shall ready the site by the date specified or pay the Nonpotable Water Use Incentive Rate for all potable water used during the period of noncompliance. The Nonpotable Water Use Incentive Rate shall be charged at a rate 20 percent higher than the applicable potable water rate.

OUTSIDE DISTRICT BOUNDARIES

Charge per 100 cu. ft. will be twice the charge applicable for inside District Boundaries.

SCHEDULE A

RATE SCHEDULE FOR WATER SERVICE

C. EXCEPTION TO TWO MONTH BILLING

Except as provided below, customer accounts will be subject to bi-monthly meter reading and customer billing schedules.

- Accounts for which the average monthly bill is estimated to exceed $1500; such account will be billed monthly.
- Accounts for which there are reasonable and justifiable customer requests for monthly billing.
- Accounts for which the average monthly bill is estimated to be between $100 and $1500, and the customer service manager recommends monthly billing based on an evaluation of credit and/or collection problems.

D. PRIVATE FIRE SERVICES

Effective July 1, 2005, the rates for Private Fire Services shall consist of:

FIRST - A MONTHLY SERVICE CHARGE and A SEISMIC IMPROVEMENT PROGRAM SURCHARGE based on the size of a standard meter:

SIZE	SERVICE CHARGE AMOUNT	SEISMIC IMPROVEMENT SURCHARGE
5/8 and 3/4 inch meters.....	$8.56	$0.95
1 inch meter	12.29	2.38
1-1/2 inch meter	18.36	4.74
2 inch meter	25.72	7.59
3 inch meter	42.89	14.22
4 inch meter	67.41	23.70
6 inch meter	128.72	47.41
8 inch meter	202.30	75.85
10 inch meter	288.14	109.04
12 inch meter	398.50	151.70
14 inch meter	508.86	194.37
16 inch meter	643.75	246.52
18 inch meter	778.64	298.67

SCHEDULE A

RATE SCHEDULE FOR WATER SERVICE

D. PRIVATE FIRE SERVICES (Continued)

The seismic improvement program surcharge is effective on each potable water bill through February 28, 2025. The seismic improvement program surcharge shall not be applied to nonpotable water service.

Effective July 1, 1997, when a meter larger than 4 inches is required for a single-family residential customer in order to maintain adequate water pressure, the maximum service charge amount and seismic improvement surcharge shall be set at the 4-inch meter level.

SECOND - A CHARGE FOR WATER DELIVERED based on two-month meter readings for all water delivered per 100 cu. ft.:

There shall be no charge for water used through such services extinguishing accidental fires, but any water lost through leakage or used in violation of the District's Regulations shall be paid for at double the rate for general use.

E. ELEVATION SURCHARGE

Elevation Designator	AMOUNT PER 100 CU. FT.
0 and 1	$0.00
2 through 5	0.38
6 and greater	0.77

Elevation surcharge is determined by the pressure zone in which the service connection is located. Pressure zones are identified by designations which include an elevation designator.

F. SUPPLEMENTAL SUPPLY SURCHARGE

Potable Water Service	Surcharge Amount
All potable water customer accounts	14% of the total Charge for Water Delivered for the Billing Period

The supplemental supply surcharge is effective on each potable water bill after the District Board declares a need to use the Freeport Project to deliver supplemental supplies from outside of the District's normal watershed. The supplemental supply surcharge shall not be applied to nonpotable water service.

Policy 3.07

EBMUD

EFFECTIVE	27 APR 10
SUPERSEDES	14 OCT 08

RESPONSIBILITY TO SERVE WATER CUSTOMERS

IT IS THE POLICY OF EAST BAY MUNICIPAL UTILITY DISTRICT TO:

Ensure that during times of water shortage, available water supplies are appropriately allocated to water customers.

Discussion

Water supplies that were available to EBMUD's customers were limited due to rationing necessitated by past drought conditions.

It is expected that the water available for supplying EBMUD's customers will vary over time depending on the following factors: diversions by Mokelumne River users with senior water rights, requirements for instream flows to protect fish and wildlife in the Mokelumne River, the Sacramento- San Joaquin River Delta, and the San Francisco Bay, as well as development of future supplemental supplies.

Water agencies are responsible for planning to meet the needs of their customers through periods of drought with minimal disruption to residential, commercial, and industrial activities within their service area.

Water Service Responsibility

EBMUD recognizes that when there is a water shortage or projected water shortage, EBMUD's responsibility to serve its customers and service area is prioritized as follows:

- First, to serve its existing customers within its existing service area.
- Second, to serve expected new customers within its existing service area, but only if this does not unacceptably impair EBMUD's ability to serve its existing customers.
- Third, to consider serving new customers outside of its existing service area, but only if this does not impair EBMUD's ability to serve existing and expected new customers within its service area.

In accordance with California Government Code, Section 65589.7, when new service connections are restricted by EBMUD's Board of Directors, priority shall be given to applicants for water service to proposed developments within EBMUD's existing service area that include housing units affordable to lower income households, pursuant to administrative procedures adopted and implemented by the General Manager. Applicants granted such priority shall comply with all of EBMUD's Water Service regulations and pay all requisite fees.

Restrictions on provision of new water service connections may be due to the following:

- A declaration of a water shortage emergency condition under California Water Code, Section 350, et seq.
- A determination by the Board of Directors, based on EBMUD's Urban Water Management Plan, that sufficient water supply is not available to support the granting of all requests for new service, as provided in California Government Code, Section 66473.7.

- A determination by the Board of Directors, based on a written engineering report, that EBMUD does not have sufficient water treatment or distribution capacity to serve the needs of proposed development.

- The imposition of a compliance order by the Department of Health Services limiting new connections.

Authority

Resolution No. 32867-94, June 28, 1994
As amended by Resolution No. 33443-04, September 28, 2004
As amended by Resolution No. 33543-06, June 27, 2006
As amended by Resolution No. 33687-08, October 14, 2008
As amended by Resolution No. 33763-10, April 27, 2010.

California Government Code, Section 65589.7

SECTION 29

PROHIBITING WASTEFUL USE OF WATER

A. REGULATIONS AND RESTRICTIONS ON WATER USE

It is hereby declared by the Board of Directors that in order to conserve the District's water supply for the greatest public benefit, and to reduce the quantity of water used by the District's customers, that wasteful use of water should be eliminated. Customers of the District shall observe the following regulations and restrictions on water use:

1. Residential Customers shall:

   a. Use water for lawn or gardening watering, or any other irrigation, in a manner which does not result in excessive flooding or runoff in gutters or other waterways, patios, driveways, walks or streets;

   b. Use water for washing sidewalks, walkways, driveways, patios, parking lots, tennis courts or other hard-surfaced areas in a manner which does not result in excessive runoff or waste;

   c. Use water for washing cars, boats, trailers or other vehicles and machinery, preferably from a hose equipped with a shutoff nozzle, in a manner which does not result in excessive runoff or waste;

   d. Reduce other interior or exterior uses of water to minimize or eliminate excessive runoff or waste; and

   e. Repair leaks wherever feasible.

2. Nonresidential Customers shall:

   a. Use systems which recycle water where feasible; Single pass cooling systems in new connections, non-recirculating systems in all new conveyer car wash and commercial laundry systems, and non-recycling decorative water fountains shall be prohibited;

   b. Use water for lawn or garden watering, or any other irrigation, in a manner which does not result in excessive flooding or runoff in gutters or other waterways, patios, driveways, walks or streets;

   c. Use water for washing sidewalks, walkways, driveways, patios, parking lots, tennis courts or other hard-surfaced areas in a manner which does not result in excessive runoff or waste;

   d. Limit sewer flushing or street washing with District water as much as possible, consistent with public health and safety needs; and

PROHIBITING WASTEFUL USE OF WATER
(Continued)

2. Nonresidential Customers shall (Continued):

   e. Reduce other interior or exterior water uses to minimize or eliminate excessive runoffs or waste; and

   f. Repair leaks wherever feasible.

B. EXCEPTIONS

Consideration of written applications for exceptions regarding regulations and restrictions on water use set forth in this Section shall be as follows:

1. Written applications for exceptions shall be accepted, and may be granted, by the Manager of the Customer Service Division.

2. Denials of applications may be appealed in writing to the General Manager;

3. Grounds for granting such applications are:

   a. Failure to do so would cause an unnecessary and undue hardship to the Applicant, including, but not limited to, adverse economic impacts, such as loss of production or jobs; or

   b. Failure to do so would cause a condition affecting the health, sanitation, fire protection or safety of the Applicant or the public.

C. ENFORCEMENT

1. The District may, after one written warning, order that a special meter reading or readings be made in order to ascertain whether wasteful use of water is occurring. Charges for such a meter reading or readings or for follow-up visits by District staff shall be fixed by the Board from time to time and shall be paid by the customer.

2. In the event that the District observes that apparently excessive water use is occurring at a customer's premises, the General Manager or the Manager of Administration may, after a written warning to the customer, authorize installation of a flow-restricting device on the service line for any customer observed by District personnel to be willfully violating any of the regulations and restrictions on water use set forth in this section.

3. In the event that a further willful violation is observed by District personnel, the District may discontinue service. Charges for installation of flow-restricting devices or for restoring service may be fixed by the Board from time to time.

EAST BAY MUNICIPAL UTILITY DISTRICT

EBMUD 1-866-40-EBMUD

H

YOUR ACCOUNT NO. IS: 00000004

PLEASE READ THIS IMPORTANT MESSAGE. THE EBMUD OFFICE AT 375 11TH ST DOES NOT HAVE OVER THE COUNTER BILL PAYMENT SERVICE. A PAYMENT DROP BOX IS AVAILABLE IN THE LOBBY. SEE THE BACK OF THIS BILL FOR INFORMATION ON PAY STATION LOCATIONS AND OTHER WAYS TO PAY YOUR WATER BILL.
YOUR PAYMENT IS DUE BY 09/16/10. NEXT BILL DATE IS 10/28/10

FLORENCE WATERS
1234 PIPELINE ST
OAKLAND CA 94607-1234

Billing Period	
From	To
07/01/10	08/31/10

For: 1234 PIPELINE ST OAK
PRIVATE RESIDENCE

		AMOUNT	TOTAL
PREVIOUS CHARGES AND CREDITS (DEDUCT IF PAID)			35.11
LATE PAYMENT PENALTY			2.46
WATER CHARGES - EBMUD			
WATER SERVICE CHARGE		21.78	
WATER FLOW CHARGE	15 UNITS @ 2.15	32.25	
	18 UNITS @ 2.67	48.06	
	1 UNIT @ 3.27	3.27	
WATER ELEVATION CHARGE	34 UNITS @ .41	13.94	
SEISMIC IMPROVEMENT PROGRAM SURCHARGE		4.08	123.38
WASTEWATER CHARGES - EBMUD			
WASTEWATER TREATMENT CHARGE		33.70	
SF BAY RESIDENTIAL POLLUTION PREVENTION		.40	34.10
CITY OF OAKLAND SEWER SERVICE			44.48

PLEASE SEE REVERSE SIDE FOR BILLING EXPLANATION

Please Pay This Amount Now Due ▶ $239.53

METER SIZE	ELEV. Band	METER READINGS Current	Previous	CONSUMPTION INFORMATION UNITS	Gallons	Days	Gal/Day
5/8"	2	1117	1083	34	25,432	61	416
			LAST YEAR	60	44,880	61	735

PLEASE DETACH AND RETURN THIS PAYMENT STUB WITH CHECK OR MONEY ORDER PAYABLE TO EBMUD

1234 PIPELINE ST OAK 07/01/10-08/31/10 ACCOUNT NO. 00000004

40388 35.11 204.42 239.53
00071

REMINDER: YOUR PAYMENT IS PAST DUE
PAY BY CREDIT/ATM/E-CHECK FOR A FEE. Call 1-800-690-4798

Mail payment to:

EBMUD PAYMENT CENTER
PO BOX 1000
OAKLAND CA 94649-0001

TOTAL PREVIOUS 35.11
TOTAL CURRENT 204.42

Please Pay This Amount Now Due ▶ 239.53

00000004200002395300000000004

Report Emergency • Customer Service **1-866-40-EBMUD**

Bill and Payment Information

Bill Information
Payment is due upon receipt of bill. Unpaid balances greater than $10 by the next billing date may be assessed a 1.5% late charge penalty (minimum $1). Questions? Call 1-866-40-EBMUD.

Seismic Improvement Surcharge
This surcharge is included on most bills to pay for improving the District's water storage and distribution systems to survive a major earthquake.

Supplemental Water Supply Surcharge
A 14% surcharge is applied to all water flow charges when water shortages require additional supplies from outside of EBMUD's normal watershed.

For more information, visit *www.ebmud.com* or call 1-866-40-EBMUD (1-866-403-2683)

Electronic Check Conversion
When you pay by check, you authorize EBMUD to use the information on your check to make a one-time electronic fund transfer from your account. When processed electronically, funds may be withdrawn from your account the same day that the payment is received and the checks will be destroyed. Notations on checks or accompanying materials will not rescind authorization.

Elevation Charge
EBMUD's water system serves customers at elevations from about sea level to about 1,500 feet. Because of these varying elevations and the increased power and facilities costs required to pump water, an elevation charge may be included on some water bills to ensure that all customers pay a fair share of the cost of delivering water to them.

Payment Methods

Direct Payment or E-Bill Sign up for direct payment or internet billing at *www.ebmud.com*

Credit card, debit card and electronic check payments online at *www.ebmud.com* or by phone at 1-800-690-4798

By Mail to: EBMUD Payment Center
PO Box 1000
Oakland, CA 94649-0001

In Person For pay station locations, visit *www.ebmud.com* or call 1-866-403-2683

Easy Ways to Save Water

Outdoors
- Water lawns and landscapes no more than three days per week.
- Water at night or early morning before dawn.
- Adjust sprinklers to only water plants and lawns, not pavement.
- Apply three to four inches of mulch to your garden.
- Use a broom, not a hose, to clean driveway and sidewalk.

Indoors
- Fix leaks, especially in toilet tanks.
- Run dishwasher and clothes washer with full loads only.
- Keep showers short or use less bath water.
- Upgrade to high-efficiency toilets, clothes washers and dishwashers (rebates are available).
- Put food waste in the trash and avoid using the garbage disposal.

water SMART

For more *WaterSmart* Tips and rebate information visit *www.ebmud.com* or call 1-866-40-EBMUD

$ Avoid Costly Delays

Help us avoid costly delays in processing your payment:

- Insert payment stub facing the front of the billing envelope so the address shows through the window.
- Insert your signed check facing the front of the envelope.
- Do not send cash. Check or Money Order only.
- Do not staple, fold or tape anything to check.
- Do not include correspondence with your payment stub nor write on it.

Thank you for your assistance.

C-013 • 02/10 (097713)

Urban Water Management Plan 2010

EBMUD

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Urban Water Management Plan 2010

This document provides an overview of water supply and usage, wastewater, recycled water, conservation and water supply shortage contingency plan at East Bay Municipal Utility District. This information represents East Bay Municipal Utility District's best efforts to promote efficient water use of available supplies consistent with the Urban Water Management Planning Act and the Water Conservation Act of 2009.

EBMUD

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■ Delta area
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■ Summer-dry climate landscaping
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■ Upper Mokulumne River, Pardee Reservoir Area
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For information contact EBMUD on the web at www.ebmud.com or call 1-866-403-2683

Table of Contents

Chapter 1 - General Information

Urban Water Management Planning Act 1-1

EBMUD's Urban Water Management Plan 1-1

East Bay Municipal Utility District 1-2

Report Format 1-6

Chapter 2 - Water Supply System And Water Resources Planning

Water Supply System 2-1

Vulnerabilities In Water Supply And System Reliability 2-6

Improving Water Supply And System Reliability 2-10

Chapter 3 - 2010 Water Shortage Contingency Plan

Introduction 3-1

Drought Planning Sequence 3-2

Water Supply Shortage Declaration 3-2

Water Supply Shortage Response 3-3

Water Supply Shortage Mitigation 3-6

Demand Reduction Methods 3-8

Consumption Reduction Monitoring 3-11

Financial Impact Analysis 3-12

Rate Change Notification 3-13

Chapter 4 - Water Demand

Past And Current Demand 4-1

Projected Water Demand 4-2

Supply-Demand Assessment 4-7

Chapter 5 - Wastewater And Recycled Water

Wastewater System 5-1

Recycled Water Program 5-3

Existing Recycled Water Projects 5-4

Future Recycled Water Projects 5-10

Non-Potable/Raw Water Projects 5-14

Encouraging Recycled Water Use 5-15

Recycled Water Optimization Plan 5-16

Chapter 6 - Water Conservation

Introduction 6-1

Water Conservation Master Plan 6-3

Estimated Water Savings And Program Budget 6-4

SBX7-7 Water Use Baseline And Targets 6-6

Demand-Side Conservation 6-8

Supply-Side Conservation 6-20

Best Management Practices 6-22

Conservation In The Future 6-23

Appendices

Appendix A. Urban Water Management Planning Act

Appendix B. Public Notice

Appendix C. Comments And Responses

Appendix D. Board Resolutions

Appendix E. South East Bay Plain Groundwater Basin Overview

Appendix F. EBMUD Policies And Rates

Appendix G. 2010 Water Shortage Contingency Plan Supplement

Appendix H. SBX7-7 20X2020 Baseline And Target Methodology

Appendix I. 2009-2010 CUWCC MOU Activity Reports And EBMUD Conservation Research Projects

Appendix J. Glossary

Figures

Figure 1-1 EBMUD Service Boundary 1-3

Figure 2-1 EBMUD Water Supply System 2-3

Figure 2-2 EBMUD Flow Commitments 2-5

Figure 2-3 Variability In Mokelumne Watershed Runoff 1970-2010 2-6

Figure 2-4 San Francisco Bay Area Region Faults 2-9

Figure 2-5 Upcountry Area Faults 2-10

Figure 2-6 Levee Failure On The Lower Jones Tract In 1980 2-10

Figure 2-7 Seismic Improvement Program 2-11

Figure 2-8 Mokelumne Aqueduct Interconnection Project 2-12

Figure 2-9 Water Treatment And Transmission Improvements Program 2-13

Figure 2-10 South East Bay Plain Basin 2-16

Figure 2-11 Potential Water Transfer Source Areas And Conveyance 2-18

Figure 2-12 Bay Area Regional Desalination Project 2-20

Figure 3-1 Emergency Interties For Short-Term Transfers And Exchanges 3-7

Figure 4-1 EBMUD Water Accounts And Total Demand 4-1

Figure 4-2 Water Use By Customer Category 4-2

Figure 4-3 EBMUD Water Accounts And Consumption 4-3

Figure 4-4 Winter And Summer Water Use By Customer Category 4-4

Figure 4-5 East-Of-Hills And West-Of-Hills Water Use By Customer Category 4-4

Figure 4-6 Historical Single-Family Residential Water Consumption by Region within the EBMUD Service Area 4-5

Figure 4-7 Average Single-Family Residential Household Indoor Water Use 4-6

Figure 4-8 Indoor And Outdoor Residential Water Use 4-6

Figure 4-9 Historical And Projected Demand 4-8

Figure 4-10 Projected (2040) Water Supply – 312 MGD 4-11

Figure 5-1 Wastewater Districts Within EBMUD's Water Service Boundary 5-2

Figure 5-2 EBMUD Recycled And Non-Potable Water Projects 5-9

Figure 6-1 Water Conservation And Goals 6-5

Figure 6-2 Cumulative Conservation Program Budget 6-6

Figure 6-3 SBX7-7 2020 Water Use Target 6-8

Figure 6-4 Monthly Water Use By Customer Category 6-10

Tables

Table 1-1 Urban Water Management Planning Act and Amendments 1-2

Table 1-2 EBMUD Service Area Climate Statistics 1-4

Table 1-3 Population Projections 1-5

Table 1-4 Mokelumne Basin Runoff And Climate Statistics 1-5

Table 2-1 Mokelumne Aqueduct System Characteristics 2-2

Table 2-2 Terminal Reservoir Characteristics 2-6

Table 2-3 Significant Bay Area Earthquakes (M>6.5) 2-8

Table 2-4 Existing Supplemental Water Supply Quantities 2-15

Table 3-1 Drought Committee Key Roles And Responsibilities 3-3

Table 3-2 Long-Term Drought Management Program Guidelines 3-4

Table 3-3 Drought Management Program Elements 3-5

Table 3-4 Example Of Customer Category Reduction Goals 3-10

Table 3-5 2008-2009 Drought Management Program Implementation Budget 3-12

Table 4-1 Water Demand Projections For Each Water Use Sector 4-6

Table 4-2 Water Demand Estimates For Lower Income Residential Accounts 4-7

Table 4-3 EBMUD Demand And Supply Projections 4-9

Table 5-1 Collected And Treated Wastewater Generated In EBMUD Service Area 5-3

Table 5-2 Non-Recycled Wastewater Treated And Discharged In The EBMUD Service Area 5-4

Table 5-3 EBMUD's Recycled Water Program Historical Highlights 5-5

Table 5-4 Comparison Of Recycled Water Uses: 2005 Projection vs. 2010 Actual 5-5

Table 5-5 Quantities Of Recycled Water Served For EBMUD Recycled Water Projects 5-7

Table 5-6 Recycled Water Use By Specific Type 5-10

Table 5-7 Existing EBMUD Non-Potable/ Raw Water Projects 5-14

Table 6-1 Water Conservation Program Historical Highlights 6-2, 6-3

Table 6-2 Water Conservation Program Measures 6-4

Table 6-3 Key Fiscal Year 2009 And 2010 Water Conservation Program Accomplishments 6-7

Table 6-4 SBX7-7 Baseline Water Use And Water Use Targets 6-7

Table 6-5 Water Conservation Partnerships 6-15, 6-16

Table 6-6 Water Conservation Research Activities 6-18, 6-19

Table 6-7 Distribution Water Losses And Raw Water Losses Accounting 6-20

Table 6-8 Foundational And Programmatic BMPs 6-22

Chapter 1. General Information

East Bay Municipal Utility District (EBMUD) supplies water and treats wastewater for significant parts of Alameda and Contra Costa counties. Every five years, EBMUD updates its Urban Water Management Plan (UWMP) by evaluating water supply and demand, water recycling projects, and demand management activities as required by the California Water Code Division 6, Part 2.6 (Urban Water Management Planning Act).

Urban Water Management Planning Act

EBMUD sponsored the Urban Water Management Planning Act (Act) that became part of the California Water Code with the passage of Assembly Bill 797 in 1983. As stated in the Act, water is a limited and renewable resource subject to ever-increasing demands. Section 10610.4 of the Act specifies that "urban water suppliers shall be required to develop water management plans to actively pursue the efficient use of available supplies." It is the State's policy to achieve conservation and efficient use of urban water supplies to protect both the people of the State and their water resources. The Act provides water utilities with an approach to assess their water resource needs and supplies by requiring that each urban water supplier providing more than 3,000 acre-feet of municipal water or supplying water directly or indirectly to more than 3,000 customers annually, shall prepare, update, and adopt an UWMP at least once every five years. Since 1983, the Act has been amended by various Assembly and Senate bills (see Table 1-1) which expanded the issues that are to be addressed in the UWMP. Amendments to the Act since 2005 include:

- SB 1087, Florez, 2005 (Water use projections and lower income households),
- AB 1420, Laird, 2007 (Water demand management measures),
- SBx7-7, Steinberg, 2009 (Water conservation), and
- AB 2409, Nestande, 2010 (Water shortage contingency analysis).

Appendix A contains the text of the act and its amendments.

EBMUD's Urban Water Management Plan

On November 26, 1985, after a period of public review and a public hearing, EBMUD adopted its first UWMP. Since 1985, the plan has been updated and adopted by EBMUD's Board of Directors every five years. This UWMP 2010, an update of the UWMP 2005, is designed to satisfy the requirements of the Urban Water Management Planning Act, and to provide the public with a report on EBMUD's progress in implementing conservation, water recycling programs, and securing supplemental water supply sources. In adopting its UWMP, the District commits to achieve conservation and efficient use of its water supplies to protect both its customers and its water resources by making every effort to ensure the appropriate level of water service reliability sufficient to meet various demands during normal, dry, and multiple dry years.

Public Participation and Adoption of Plan

EBMUD has actively encouraged the involvement of a diverse sector of the population in its urban water management planning efforts throughout the update process. EBMUD also made its UWMP available for public review and held a public hearing prior to adopting the UWMP 2010.

To encourage public involvement, EBMUD sent a notice of intent to update its UWMP to all cities and counties within its service area, local and neighboring water districts and agencies, and other relevant groups and organizations on January 14, 2011, more than 60 days prior to the public hearing. EBMUD also posted the notice of the intent to update on its website.

EBMUD's Draft UWMP 2010 was first distributed for review and comment beginning on April 12, 2011. As a result of the de-certification of the Water Supply Management Plan 2040 EIR, EBMUD updated the draft plan and released a revised Draft UWMP 2010 on May 6, 2011 and extended the comment period to end on May 20, 2011. In response to a request from the public, the comment period was extended for a second time to end on May 31, 2011.

Notice of the public hearing and the public comment period and intent to adopt was posted in relevant newspapers between April 12 and May 22, 2011. Copies of the public notices and a list of newspapers with dates on which the notices were published are included in Appendix B. A notice of the hearing and the public

comment period was also mailed to all parties included in EBMUD's UWMP 2010 mailing list on May 6, 2011, and was posted on EBMUD's website. In addition to the public hearing EBMUD held a public comment meeting on the Draft UWMP 2010 on April 21, 2011 to further encourage public involvement.

The UWMP 2010 was modified, where appropriate, to incorporate comments received from the public, interested organizations, and other agencies. Appendix C contains a summary of the comments received and EBMUD's responses to those comments.

At its meeting on June 28, 2011, the EBMUD Board of Directors adopted the UWMP 2010 and the 2010 Water Shortage Contingency Plan. A copy of the adoption resolution is included in Appendix D. By July 27, copies of the adopted UWMP 2010 were sent to the California Department of Water Resources (DWR), the California State Library, and cities and counties within EBMUD's service area and posted on EBMUD's website.

East Bay Municipal Utility District

Formation

East Bay Municipal Utility District, a public utility, was formed under the Municipal Utility District (MUD) Act, passed by the California Legislature in 1921. The MUD Act permits formation of multi-purpose government agencies to provide public services on a regional basis. In accordance with the MUD Act's provisions, voters in the San Francisco East Bay Area created EBMUD in 1923 to provide water service. In 1929, EBMUD first began water deliveries from the Sierra Nevada Mountains to the East Bay when construction of Pardee Dam and the first Mokelumne Aqueducts was completed.

Table 1-1 Urban Water Management Planning Act and Amendments

Bill	Introduced by	Chaptered
AB 2661	Klehs	1990
AB 11X	Filante	1991
AB 1869	Speier	1991
AB 892	Frazee	1993
SB 1017	McCorquodale	1994
AB 2853	Cortese	1994
AB 1845	Cortese	1995
SB 1011	Polanco	1995
AB 2552	Bates	2000
SB 553	Kelley	2000
SB 610	Costa	2001
AB 901	Daucher	2001
SB 672	Machado	2001
SB 1348	Brulte	2002
SB 1384	Costa	2002
SB 1518	Torlakson	2002
AB 105	Wiggins	2004
SB 318	Alpert	2004
SB 1087	**Florez**	**2005**
AB 1420	**Laird**	**2007**
SBx7-7	**Steinberg**	**2009**
AB 2409	**Nestande**	**2010**

The MUD Act was amended in 1941 to enable formation of special districts. In 1944, voters in six East Bay cities elected to form EBMUD's Special District No. 1 to treat wastewater from their jurisdictions prior to it being released into the San Francisco Bay. Wastewater treatment for those cities began in 1951 and later expanded to annex the Stege Sanitary District, which includes Kensington, El Cerrito, and parts of Richmond.

Board of Directors

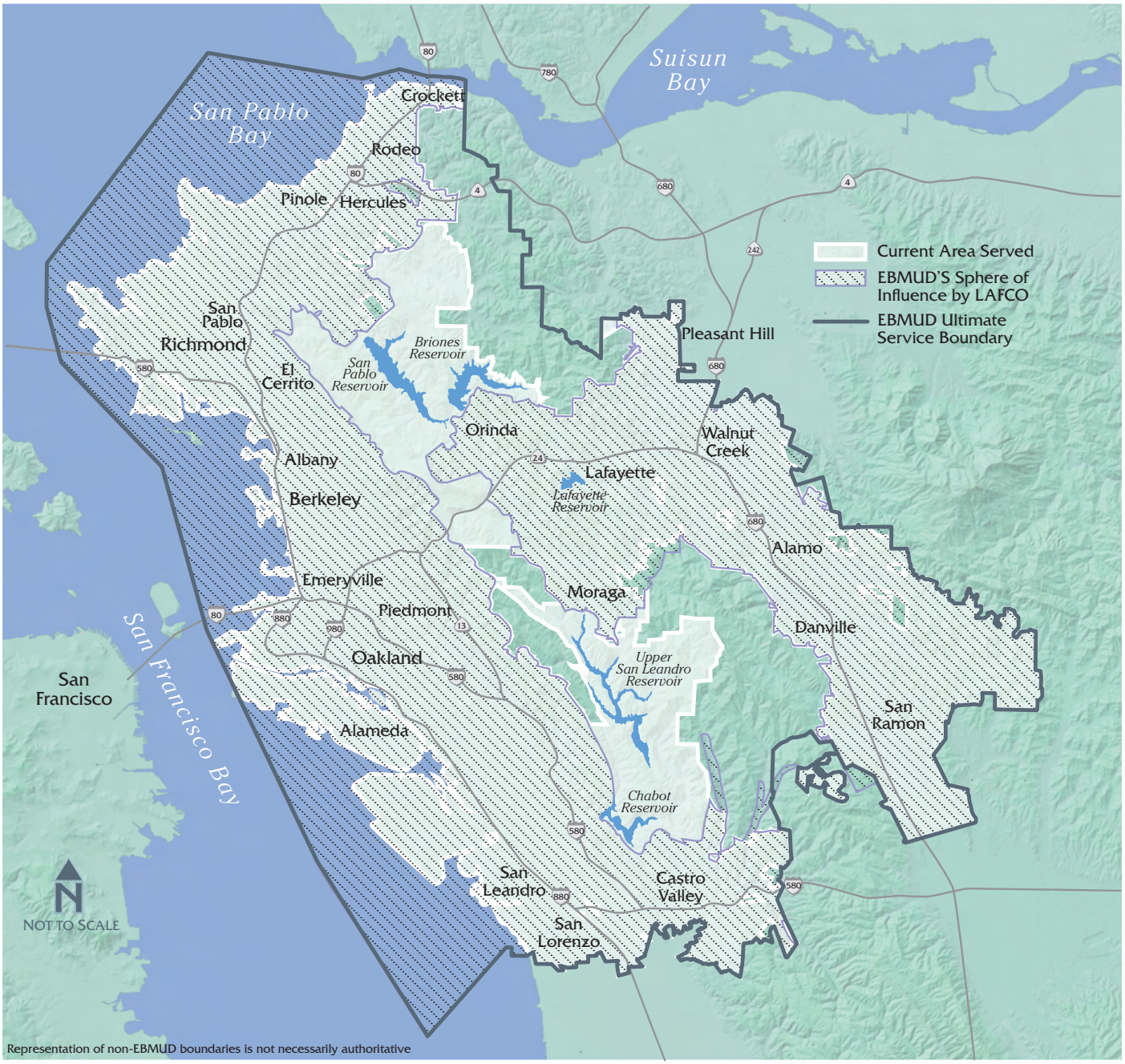
EBMUD is governed by a seven-member Board of Directors, publicly elected to four-year terms from wards within EBMUD's service area. The Board determines overall policies, which are implemented under the direction of the General Manager. Activities of EBMUD are guided by the following Mission Statement:

> *To manage the natural resources with which the District is entrusted; to provide reliable, high quality water and wastewater services at fair and reasonable rates for the people of the East Bay; and to preserve and protect the environment for future generations.*

Service Area

EBMUD supplies water and provides wastewater treatment for significant parts of Alameda and Contra Costa counties. Based on 2010 census data, approximately 1.34 million people are served by EBMUD's water system in a 332-square-mile area extending from Crockett on the north, southward to San Lorenzo (encompassing the major cities of Oakland and Berkeley), eastward from San Francisco Bay to Walnut Creek, and south through the San Ramon Valley. The wastewater system serves approximately 650,000 people in an 88-square-mile area of Alameda and Contra Costa counties along the Bay's east shore, extending from Richmond on the north, southward to San Leandro. EBMUD customers include residential, industrial, commercial, institutional and irrigation water users.

Figure 1-1 EBMUD Service Boundary



Boundary

The EBMUD service area encompasses incorporated and unincorporated areas within Alameda and Contra Costa counties. The current service area, illustrated in Figure 1-1, is the area that was established during EBMUD's formation, as modified by annexation, detachment, or other change of organization thereafter. The Ultimate Service Boundary (USB) is a boundary established by EBMUD to define its limit of future annexation for extension of water service.

The Local Agency Formation Commissions (LAFCOs) of Alameda and Contra Costa counties have established a Sphere of Influence (SOI) for EBMUD. The SOI, illustrated in Figure 1-1, defines the area that can be served by EBMUD, as defined by LAFCO.

Climate and Topography

Within the EBMUD service area there are significant differences in geography, climate, and land use. These characteristics are important as they influence how water

TABLE 1-2 EBMUD SERVICE AREA CLIMATE STATISTICS

	WEST OF HILLS				EAST OF HILLS			
MONTH	RAINFALL (IN)	MAXIMUM TEMPERATURE (°F)	MINIMUM TEMPERATURE (°F)	AVERAGE TEMPERATURE (°F)	RAINFALL (IN)	MAXIMUM TEMPERATURE (°F)	MINIMUM TEMPERATURE (°F)	AVERAGE TEMPERATURE (°F)
JAN	5.0	59	47	53	5.9	56	39	47
FEB	4.3	61	48	55	5.2	59	41	50
MAR	3.6	66	50	58	4.0	65	43	54
APR	1.9	66	51	59	2.0	66	44	55
MAY	0.7	71	55	63	0.8	73	49	61
JUN	0.2	74	58	66	0.1	79	53	66
JUL	0.0	76	60	68	0.0	82	56	69
AUG	0.1	76	60	68	0.1	82	56	69
SEP	0.3	76	59	68	0.3	82	54	68
OCT	1.5	74	56	65	1.4	74	50	62
NOV	3.3	66	52	59	3.4	64	44	54
DEC	4.6	59	47	53	5.2	56	40	48
ANNUAL	**25.5**	**69**	**54**	**61**	**28.4**	**70**	**47**	**59**

NOTE:
West-of-Hills climate data based on measurements from USL Water Treatment Plant station, and East-of-Hills climate data based on measurements from Lafayette Reservoir station. Rainfall is based on data from 1953-2009, and temperature is based on data from 2000-2009.

is used in various portions of the service area. These characteristics also are factors considered in future water demand projections.

Geographically, the EBMUD service area is divided by the Oakland/ Berkeley Hills that rise to about 1,900 feet above sea level. The area west of the Oakland/ Berkeley Hills (West-of-Hills) is characterized by a plain that extends from Richmond to Hayward and from the shore of the Bay inland. The terrain east of the Oakland/Berkeley Hills (East-of-Hills) is characterized by rolling hills as the land descends to about 100 feet above sea level near Walnut Creek. West of Hills areas border San Francisco Bay and experience a moderate climate that is tempered by ocean and Bay waters. In contrast, East-of-Hills areas, such as Lafayette, Walnut Creek, and the San Ramon Valley, experience greater extremes in climate. These areas are cooler in the winter and hotter in the summer. Average historical climate characteristics for East-of-Hills and West-of-Hills portions of the EBMUD service area are illustrated in Table 1-2.

Land Uses

Urban land uses in the EBMUD service area include residential (ranging from very low-density single-family lots to high density multi-family residences), commercial, industrial including petroleum refining and public facilities, such as parks and schools. A majority of the high-density urban growth within EBMUD has occurred along the Bay plain and includes residential, commercial, institutional, and industrial developments. Other urban development areas include Pleasant Hill, the San Ramon Valley, and Walnut Creek. Over the next 25 years, the increased water demand as projected would come mainly from increased densities in existing developed urban areas, as formerly lower consumption land uses are replaced with more intensive mixed use and other development. See Chapter 4 for more discussion on projected demands.

EBMUD owns and manages approximately 28,000 acres of land and water surface areas in the East Bay, comprising portions of the watershed lands of EBMUD's local reservoirs. While these protected watershed lands are located within EBMUD's USB, a large part is not located within EBMUD's service area. There are a number of land uses on EBMUD-owned lands. The predominant agricultural land use is livestock grazing which serves to reduce the danger of wildfires in the watershed and in areas near the wildland/urban interfaces. EBMUD also leases its watershed lands for other agricultural uses such as Christmas tree and hay farming. EBMUD is also in the early stages of evaluating the potential feasibility of establishing a mitigation/conservation bank on EBMUD-owned lands in the Pinole Valley watershed (3,000 acres of land not tributary to any EBMUD reservoirs) to protect and enhance habitat for endangered species.

Table 1-3 Population Projections

Region	2015	2020	2025	2030	2035
Bay Area	7,678,000	8,018,000	8,365,000	8,719,000	9,074,000
Alameda County	1,626,000	1,706,000	1,787,000	1,875,000	1,966,000
Contra Costa County	1,131,000	1,177,000	1,226,000	1,274,000	1,323,000
EBMUD Service Area	1,474,000	1,538,000	1,607,000	1,677,000	1,751,000
Service Area Within Alameda Co.	935,000	975,000	1,019,000	1,066,000	1,117,000
Service Area Within Contra Costa Co.	539,000	563,000	588,000	611,000	634,000

NOTES:
1. Source: ABAG Projections 2009.
2. Population estimates for EBMUD service area include the following areas: ALAMEDA COUNTY – incorporated cites of Alameda, Albany, Berkeley, Emeryville, Oakland, Piedmont, and San Leandro; and subregional study areas of Hayward, Castro Valley, Cherryland-Fairview, Ashland, and San Lorenzo; CONTRA COSTA COUNTY- city sphere of influence areas of Danville, El Cerrito, Hercules, Lafayette, Moraga, Orinda, Pinole, Pleasant Hill, Richmond, San Pablo and Walnut Creek; and subregional study areas of San Ramon, Crockett-Rodeo and Blackhawk-Alamo.
3. Populations for Hayward, Pleasant Hill and Walnut Creek were weighted according to the percent of total area within the service area: Hayward (2.6%), Pleasant Hill (21.1%) and Walnut Creek (63.6%).

Table 1-4 Mokelumne Basin Runoff and Climate Statistics

Month	Average Runoff[1] (FT^3/SEC)	Average Precipitation[2] (IN.)	Average Snow Depth [3] (IN.)	Average Temperature (°F)
Jan	889	8.9	49	27
Feb	1,090	7.9	69	27
Mar	1,360	7.1	77	30
Apr	2,110	4.1	60	35
May	3,150	2.2	27	42
Jun	2,010	0.8	2	50
Jul	456	0.2	0	57
Aug	87	0.3	0	57
Sep	60	0.8	0	51
Oct	96	2.5	1	43
Nov	322	5.5	8	34
Dec	629	8.0	24	29
Annual	**1,020**	**48.3**	**—**	**40**

[1] Average True Natural Flow at Mokelumne Hill Gaging Station, 1930-2009.
[2] EBMUD 4-station average, 1930-2009.
[3] Snow depth and temperature from NOAA Twin Lakes station (#49105), 1919-2000. Western Regional Climate Center (http://wrcc.dri.edu).

EBMUD's East Bay watershed provides extensive recreational opportunities. Three terminal reservoirs, Lafayette, San Pablo and Chabot, are open for recreation. Body contact recreational activities are prohibited to protect public health and safety. In EBMUD's undeveloped East Bay watershed, there is a 60-mile system of trails open for hiking and horseback riding (permit required).

Population Projections

By 2035, the Bay Area's population is forecasted to grow by nearly 25 percent, or by 1.7 million residents, for a total of 9 million people. Nearly 75 percent of this growth is projected to occur in three Bay Area counties including Alameda and Contra Costa, significant parts of which make up the EBMUD service area. Alameda and Contra Costa counties, along with Santa Clara County, will remain among the top three most populous in the region over the next several decades.

According to the Association of Bay Area Governments' (ABAG) Projections 2009, Alameda County alone is projected to grow by 416,500 people, for a total of nearly 2 million people by 2035. It is forecasted that 327,000 jobs also will be added during this period. Almost all jurisdictions in Alameda County are expected to see significant changes in population and especially employment, although most growth will occur in the communities closest to the San Francisco Bay. Some of the biggest population changes will occur in Emeryville and Oakland. The City of Oakland is forecasted to continue to have over 25 percent of the county's residents and jobs. Nearly 70 percent of the population growth in Western Alameda County is projected to occur in infill neighborhoods, where there is access to public transit.

By 2035, Contra Costa County's population is forecasted to be over 1.3 million, an increase of approximately 233,000. Nearly 180,000 jobs will be added county wide during this time period, for a total of over 555,000. Several jurisdictions, including Hercules will see their jobs more than double by 2035. Among the communities expected to see the most population change are San Ramon and Hercules; each will grow by more than one-third.

Table 1-3 depicts population projections for the Bay Area and the EBMUD service area over the next 25 years. The population projections are based on ABAG's Projections 2009.

Mokelumne Watershed and Hydrology

Based on historical average, about 90 percent of the water delivered to EBMUD's customers originates from the Mokelumne River watershed, and 10 percent originates as runoff from the protected watershed lands in the East Bay Area. The Mokelumne River watershed upstream of Camanche Dam is relatively narrow and steep and is located northeast of the Sacramento-San Joaquin River Delta on the western slope of the Sierra Nevada. Above Camanche Dam, the Mokelumne River drains over 600 square miles of mountains and foothills. The elevation in the watershed ranges from 235 feet at the dam to 10,000 feet in the headwater region.

Runoff Characteristics

Annual precipitation and stream flow in the Mokelumne River watershed upstream of Camanche Dam are extremely variable from month to month and from year to year. Most precipitation normally falls between November and May and very little falls between late spring and late fall (see Table 1-4). Peak flows in the Mokelumne River normally occur during winter storms or during the spring snow melt season from March through June. These flows decrease to a minimum in late summer or fall.

Snow melt from parts of Alpine, Amador, and Calaveras counties contribute to the Mokelumne River runoff. The primary tributaries are the North, Middle and South Forks of the Mokelumne River, with the North Fork tributary draining over 80 percent of the Mokelumne watershed. Smaller tributaries include Summit Creek, Bear Creek, Cole Creek, Moore Creek, Blue Creek, Tiger Creek, Panther Creek, Forest Creek and Licking Fork. The Mokelumne River watershed runoff is modified by various diversions and regulated by reservoir storage operations including a network of facilities operated by Pacific Gas and Electric Company. EBMUD collects the Mokelumne stream flow in Pardee Reservoir. A portion of the water stored in Pardee Reservoir is conveyed to the EBMUD service area via the Mokelumne Aqueducts, and to the Jackson Valley Irrigation District via the Jackson Creek Spillway outlet. The remainder of the water is released from Pardee Reservoir into Camanche Reservoir.

Land Uses

Most of the Mokelumne River watershed upstream of Camanche Dam is protected and undeveloped, consisting of open space and forest land with small concentrations of residential/commercial development along the major highways, and large tracts of designated wilderness. Forest land, located chiefly within the El Dorado and Stanislaus National Forests, accounts for about 75 percent of the watershed land. There are small agriculture areas, mainly orchards and vineyards, and several areas of recreational developments (including winter sports facilities). There are minor industrial and commercial uses in the watershed, and logging is the major land use activity.

Various forms of recreation such as camping and water-related activities are allowed at Pardee Reservoir (only non-body-contact activities allowed) and Camanche Reservoir (body-contact activities allowed). There also is an extensive system of Mokelumne area trails in the Sierra foothills such as the Coast-to-Crest trail across EBMUD land.

Report Format

The UWMP 2010 brings together important information and updates on EBMUD's water supply planning projects and studies, and recycled water and conservation program activities undertaken since 2005.

This report consists of the following chapters that satisfy the provisions of the Urban Water Management Planning Act:

Chapter 1 – General Information.

The chapter contains a discussion on the Urban Water Management Planning Act, as well as an overview of EBMUD;

Chapter 2 – Water Supply and Water Supply Planning.

The chapter contains an overview of EBMUD's water supply system, reliability of the water supply, and future water supply planning;

Chapter 3 – Water Shortage Contingency Plan.

The chapter contains specifics on EBMUD's Drought Management Program and its elements;

Chapter 4 – Water Usage.

The chapter contains a discussion on past, current and projected demand as well as an assessment of supply and demand for various scenarios as specified in the Act;

Chapter 5 – Wastewater and Recycled Water.

The chapter contains an overview of the wastewater system, current and planned recycled water projects, methods of encouraging recycled water use, and other existing non-potable water projects; and

Chapter 6 – Water Conservation.

The chapter contains an overview of EBMUD's demand-side and supply-side conservation programs, existing and future conservation projects, Best Management Practices, and EBMUD compliance with California's "20 percent by 2020" reduction in per capita urban water use requirement.

Appendices

Appendix A contains the UWMP Act and its amendments;

Appendix B contains the newspaper public notice that announced the public review period, time and place of a comment meeting and hearing, and a listing of those newspapers in which the notice was published with the dates of publication;

Appendix C contains the comments received during the public review period, the public comment meeting and public hearing and responses to those comments;

Appendix D contains the Board Resolution adopting the UWMP 2010 and the Water Shortage Contingency Plan;

Appendix E contains the South East Bay Plain Groundwater Basin Description;

Appendix F contains referenced governing EBMUD regulations, and the rate structures for water and wastewater services;

Appendix G contains the 2010 Water Shortage Contingency Plan Supplement;

Appendix H contains SBx7-7 Detailed Analyses;

Appendix I contains the 2009 and 2010 Annual Report of Best Management Practices submitted to the California Urban Water Conservation Council, and EBMUD Conservation Research Projects; and

Appendix J contains a glossary of terms used in the UWMP 2010.

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Chapter 2. Water Supply System and Water Resources Planning

EBMUD's water supply system extends from the Mokelumne River watershed on the western slope of the Sierra Nevada Mountains to the East Bay. The Mokelumne River water supply, in concert with aggressive conservation and recycled water programs, is sufficient during normal and wet years to meet the needs of EBMUD's customers; however, several factors affect the reliability of the water supply. EBMUD is investigating opportunities to improve the reliability of its water supply and close the gap between water supplies and water needs during multi-year drought periods.

Water Supply System

The EBMUD water supply system collects, transmits, treats, and distributes high-quality water from its primary water source, the Mokelumne River, to its customers in the San Francisco East Bay Area (see Figure 2-1). The Mokelumne Aqueducts convey the Mokelumne River supply from Pardee Reservoir across the Sacramento-San Joaquin River Delta (Delta) to local storage and treatment facilities. After treatment, water is distributed to 20 incorporated cities and 15 unincorporated communities in Alameda and Contra Costa Counties. The cities are Alameda, Albany, Berkeley, Danville, El Cerrito, Emeryville, parts of Hayward, Hercules, Lafayette, Moraga, Oakland, Orinda, Piedmont, Pinole, parts of Pleasant Hill, Richmond, San Leandro, San Pablo, San Ramon, and parts of Walnut Creek. The unincorporated communities include Alamo, Ashland, Blackhawk, Castro Valley, Cherryland, Crockett, Diablo, El Sobrante, Fairview, Kensington, North Richmond, Oleum, Rodeo, San Lorenzo, and Selby.

Existing Water Supply Sources

Since the late 1920s, EBMUD's primary source of water has been the Mokelumne River. For details on dry-year supplemental supply sources and infrastructure refer to the "Existing Supplemental Water Supply Sources" section in this chapter.

Mokelumne River

The Mokelumne River serves a variety of uses, including agriculture, fisheries, hydropower, recreation, and municipal and industrial use. Approximately 90 percent of the water used by EBMUD comes from the Mokelumne River watershed. EBMUD has water rights that allow for delivery of up to a maximum of 325 million gallons per day (MGD) from the Mokelumne River, subject to the availability of Mokelumne River runoff and to the senior water rights of other users, downstream fishery flow requirements, and other Mokelumne River water uses.

Figure 2-2 (see page 2-5) displays EBMUD's Mokelumne River flow commitments which are determined by hydrology; a variety of agreements between EBMUD and other Mokelumne River users; water rights priorities; agreements with State and Federal regulatory agencies; State Board orders and decisions; federal directives; court decrees; and numerous agreements both upstream and downstream of EBMUD's Mokelumne River facilities.

Amongst these factors, EBMUD's Mokelumne River flow commitments are generally tied to the variability in the Mokelumne River watershed rainfall and runoff patterns which govern the release requirements for the year. Figure 2-2 provides information regarding EBMUD's flow commitments during normal and 'dry' years. For comparison, the figure also provides information on the average runoff for various periods of historical records, EBMUD's maximum water rights appropriations, and other pertinent information that illustrate the complex nature of agreements and uses on the Mokelumne River.

As depicted in Figure 2-2, EBMUD continues to meet its commitment to protect the lower Mokelumne River by providing instream flow releases from EBMUD's Camanche Dam to improve fishery conditions, per the requirements of the 1998 Joint Settlement Agreement (JSA) among EBMUD, US Fish and Wildlife Service (USFWS), and the California Department of Fish and Game (CDFG).

In the long-term, during drought periods, the Mokelumne River cannot meet EBMUD's projected customer demands, even with an "up to 15 percent" rationing imposed under EBMUD's Board Policy 9.03 (see Appendix F) and use of existing dry-year supplemental supplies. Furthermore, EBMUD's Mokelumne River supply is expected to be reduced as demands on the Mokelumne River increase from the growing needs from users in Amador, Calaveras, and San Joaquin counties with water rights senior to those of EBMUD's.

Local Runoff

EBMUD's secondary water supply source is local runoff from the East Bay area watersheds that is stored in the terminal reservoirs located within the service area boundaries. The availability of water from local runoff is dependent on two factors: hydrologic conditions and terminal reservoir storage availability. Hydrologic conditions determine the amount of runoff in the local watershed. In dry-years, evaporation can exceed runoff, resulting in no net local supply. In addition, the amount of storage available for capturing local runoff is limited. Maintaining lower water levels in the terminal reservoirs would provide space for storing additional to supplement EBMUD's existing dry-year supplies. The collaborative effort has already resulted in a $25 million grant, and up to $12 million was allocated for the construction of the Freeport Regional Water Facility. local runoff. However, because these reservoirs also regulate EBMUD's Mokelumne River supply and provide emergency standby storage, limited space can be held for the variable local runoff. Average local supply that is used in the East Bay is 15 to 25 MGD during normal hydrologic years and is near zero during drought conditions.

Existing Water Supply Infrastructure

EBMUD's water supply system consists of a network of reservoirs, aqueducts (pipelines), water treatment plants (WTP), pumping plants, and other distribution facilities that convey Mokelumne River from Pardee Reservoir to EBMUD customers.

Pardee Dam and Reservoir

Pardee Dam and Reservoir are located approximately 38 miles northeast of Stockton near the town of Valley Springs, downstream from Pacific Gas and Electric Company's Mokelumne River Hydroelectric Project. Pardee Dam, constructed in 1929, is a concrete gravity arch structure rising 345 feet above the river bed. The reservoir has 37 miles of shoreline, a surface area of 2,222 acres, and a current capacity of 197,950[1] acre-feet (AF) at spillway crest elevation. A 27.8-megawatt (MW) Pardee Powerhouse, located at the base of the dam, was placed in service in 1930. It generates 140 million kilowatt hours (kWh) during a median runoff year.

Pardee Reservoir is used principally for EBMUD's municipal water supply, power generation, and as a supply source for Jackson Valley Irrigation District. Pardee Reservoir also is operated to provide recreational facilities to the public and to protect and enhance the fishery resources and ecosystem of the lower Mokelumne River.

[1] Licensed quantity to store in Pardee Reservoir is 209,950 AFY.
[2] Camanche Reservoir was originally constructed with a capacity of 431,500 AF

Camanche Dam and Reservoir

Camanche Dam is located on the Mokelumne River approximately 10 miles downstream from Pardee Dam. Camanche Dam, constructed in 1964, is a zoned earthen structure. Camanche Reservoir has 63 miles of shoreline, a surface area of 7,470 acres, and a current capacity of 417,120AF[2] at spillway crest elevation. An 11.25-MW Camanche Powerhouse, located at the base of the dam, was placed in service in 1983. It generates 45 million kWh during a median runoff year.

Camanche Reservoir is operated jointly with Pardee Reservoir to provide water supply benefits while maintaining numerous downstream obligations, including stream-flow regulation, water for fisheries and riparian habitat, flood control, and obligations to downstream diverters. It also provides power generation and recreation opportunities.

Mokelumne Aqueduct System

Raw water from Pardee Reservoir is transported approximately 91 miles to EBMUD WTPs and terminal reservoirs through the Pardee Tunnel, the Mokelumne Aqueducts, and the Lafayette Aqueducts. Water flowing by gravity from Pardee Reservoir takes 30 to 45 hours to reach the East Bay.

The Pardee Tunnel is a 2.2 mile, 8 foot high horseshoe structure constructed in 1929. The Mokelumne Aqueducts (see Table 2-1 for pipeline characteristics) are comprised of three 82 mile long pipelines that transport water from the end of Pardee Tunnel in Campo Seco to Walnut Creek at the east end of the two Lafayette Aqueducts. The Mokelumne Aqueducts have a total capacity of 200 MGD by gravity flow and up to 325 MGD with pumping at the Walnut Creek pumping plants.

Table 2-1 Mokelumne Aqueduct System Characteristics

Pipeline	Constructed	Diameter (inches)	Material
Mokelumne Aqueduct No. 1	1929	65	Steel
Mokelumne Aqueduct No. 2	1949	67	Steel
Mokelumne Aqueduct No. 3	1963	87	Steel

EBMUD Water Treatment Infrastructure

Water from Pardee Reservoir is transported to the EBMUD service area in the Mokelumne Aqueducts, which terminate in Walnut Creek. From Walnut Creek, the water is sent directly to EBMUD's three in-line filtration WTPs or to one or more of the EBMUD terminal reservoirs (see Figure 2-1).

Figure 2-1

EBMUD Water Supply System

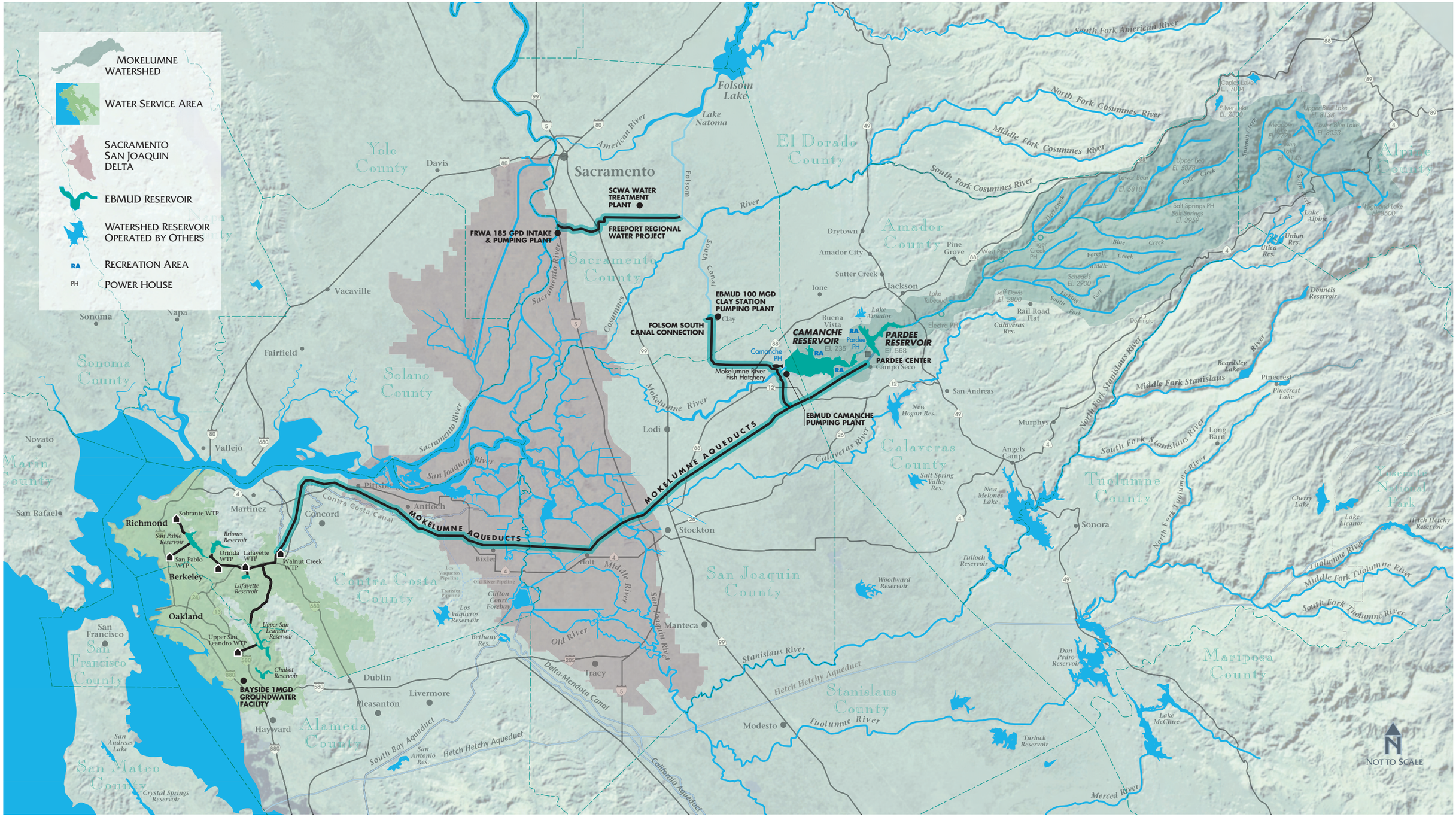

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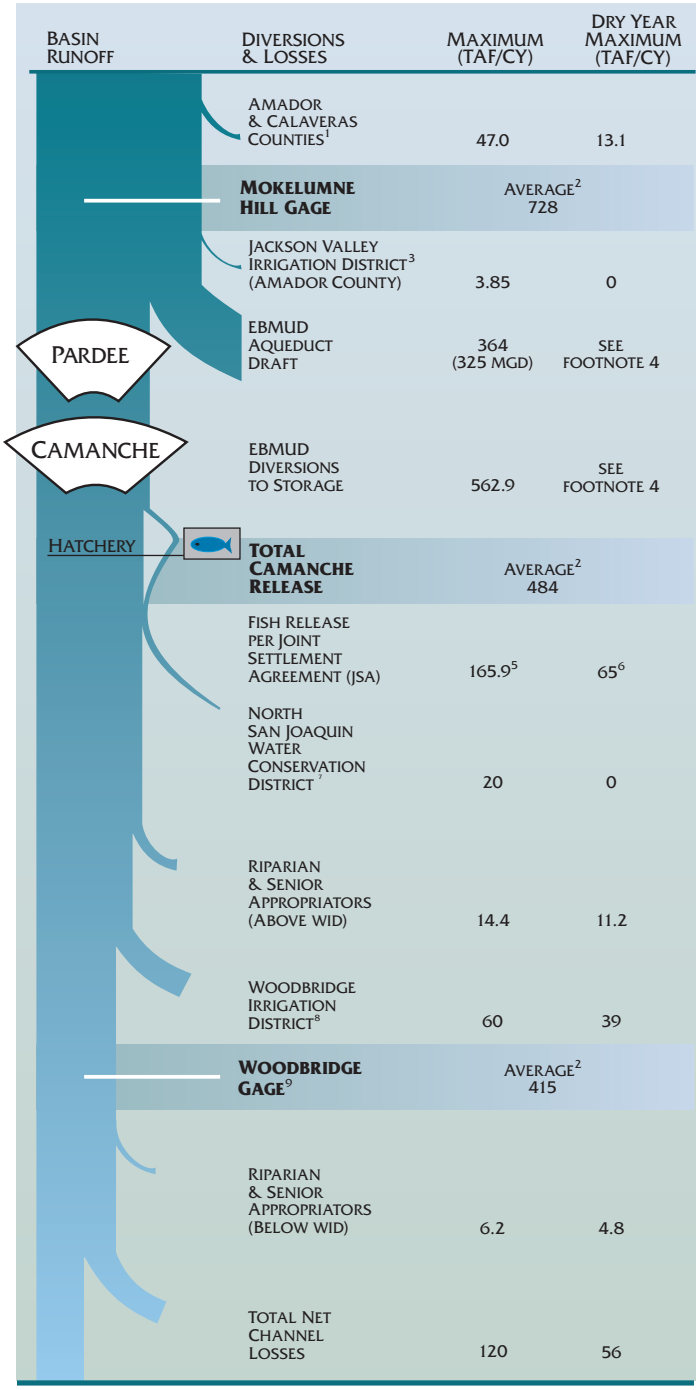
FIGURE 2-2 EBMUD FLOW COMMITMENTS



1. Amador County has 15 TAF of pre-14 rights, which could be exercised in dry years if there is sufficient runoff.
2. Average data provided for the various periods of historical record.
3. May be "0" if no water is available under JVID priority or Pardee elevation is below 550 ft.
4. Varies with runoff and storage conditions.
5. Water releases committed by EBMUD to protect fishery per "Normal and Above" water year type under JSA criteria.
6. Water releases committed by EBMUD to protect fishery per "Dry" water year type under JSA criteria. In critically dry years, the minimum releases could be as low as 22.5 TAF.
7. May be "0" if no water is available surplus to EBMUD needs.
8. EBMUD's obligation to release water to the Woodbridge Irrigation District is governed by a series of water rights settlement agreements to a maximum of 60 TAF/yr when inflow to Pardee is greater than 375 TAF.
9. Includes local runoff between Camanche and WID.

The in-line filtration plants that receive water directly from Pardee Reservoir are Walnut Creek WTP, Lafayette WTP, and Orinda WTP. Walnut Creek WTP and Lafayette WTP serve the area east of Oakland-Berkeley Hills and Orinda WTP serves primarily the central parts of the area west of the Oakland-Berkeley Hills. Three other plants, Upper San Leandro WTP, San Pablo WTP, and Sobrante WTP provide full conventional treatment and receive water from EBMUD's terminal reservoirs. These plants serve the northern and southern parts of the EBMUD distribution system west of the Oakland-Berkeley Hills.

EBMUD Terminal Reservoirs

Water that is not immediately put through the WTPs and distributed is stored in five EBMUD terminal reservoirs: Briones, Chabot, Lafayette, San Pablo, and Upper San Leandro reservoirs. The total maximum capacity of these reservoirs is 151,670 AF. The terminal reservoirs serve multiple functions that include:

- regulating EBMUD's Mokelumne River supply in winter and spring;
- augmenting EBMUD's Mokelumne water supply with local runoff;
- providing emergency sources of supply during extended drought or in the event of interrupition of delivery of the Mokelumne supply;
- providing environmental and recreational benefits to East Bay communities; and
- minimizing flooding.

Upper San Leandro, San Pablo and Briones reservoirs can supply water to EBMUD throughout the year, where as Lafayette Reservoir and Lake Chabot provide emergency standby supply. Lake Chabot also provides untreated water supply to several golf courses These two reservoirs are not used for regular domestic supplies and are used for public recreation (e.g. fishing, sailing, canoeing, hiking, jogging, bicycling, picnicking, walking, and nature observations). San Pablo Reservoir is also used for public recreation. Table 2-2 provides the capacities and water sources of the terminal reservoirs.

EBMUD Distribution Facilities

After the WTPs, water is distributed throughout EBMUD's service area, which is divided into more than 120 pressure zones ranging in elevation from sea level to 1,450 feet. Approximately 50 percent of treated water is distributed to customers by gravity. The water distribution network includes 4,100 miles of pipe, 140 pumping plants and 170

Table 2-2 Terminal Reservoir Characteristics

Reservoir	Constructed	Capacity (Acre-Feet)	Water Sources
Briones	1964	60,510	Mokelumne River, Bear Creek
Chabot	1875	10,350	Mokelumne River, San Leandro Creek, Upper San Leandro Reservoir, Miller Creek
Lafayette	1933	4,250	Lafayette Creek [1]
San Pablo	1920	38,600	Mokelumne River, San Pablo Creek, Bear Creek, Briones Reservoir
Upper San Leandro	1926	37,960	Mokelumne River, San Leandro Creek and tributaries

[1] The raw water line for the Mokelumne aqueducts was disconnected from the reservoir in 1971.

neighborhood reservoirs (tanks storing treated drinking water) having a total capacity of 830 million gallons.

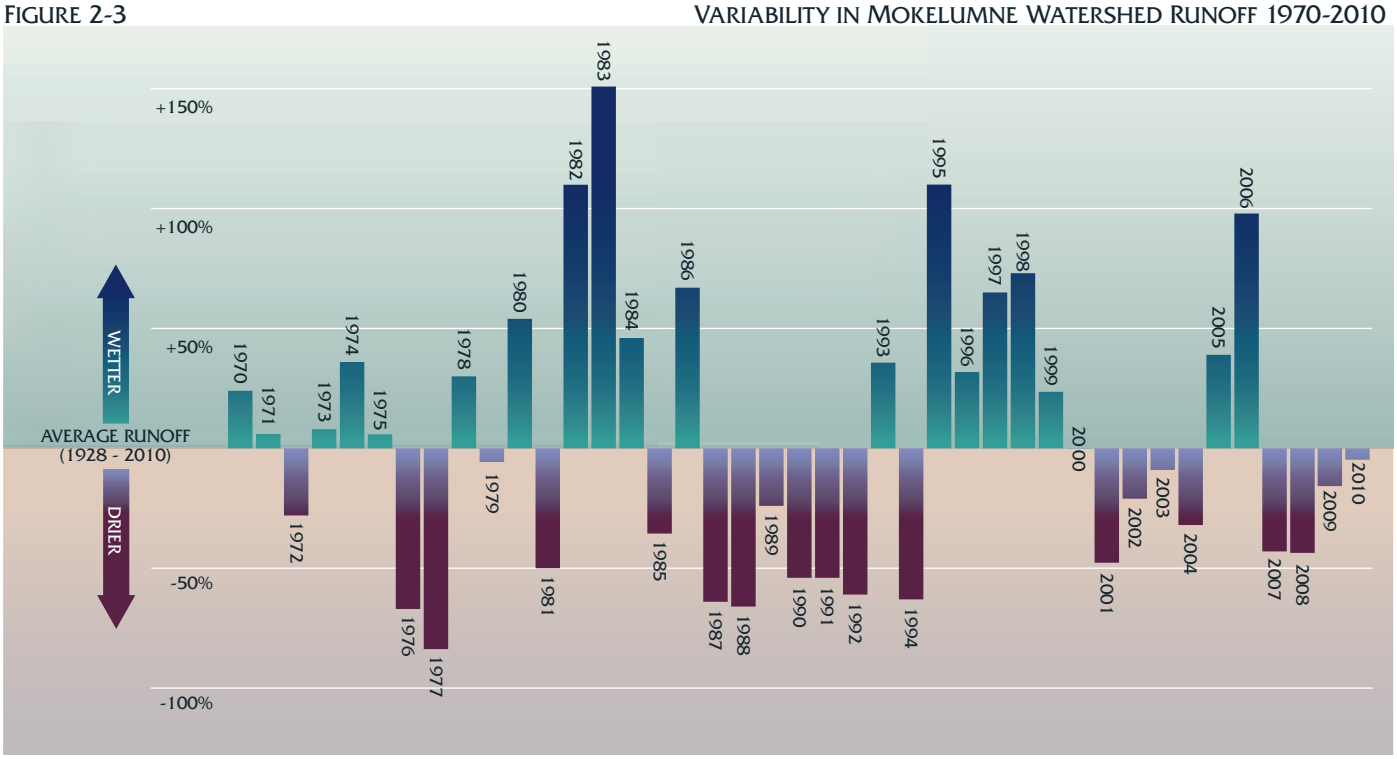
Vulnerabilities In Water Supply And System Reliability

The reliability of EBMUD's water supply sources and transmission system are affected by many factors. Droughts and climatic variations can adversely affect the availability of EBMUD's water supplies. In addition to such gradually-occurring phenomena, sudden catastrophic interruptions also can compromise the availability of water. Despite efforts to upgrade the system, the structural strength of the Mokelumne Aqueducts that cross the Delta region, could be undermined by a levee failure, especially during flooding and earthquakes. Federal authorities have warned the nation's major water suppliers that the integrity of their water supply systems could be compromised by terrorist attacks. Other factors that could affect the availability of water supply include periods of poor water quality from high turbidity, which affects the water treatment system; potential contamination of supplies; maintenance outages at terminal reservoirs; shortfalls in distribution system capacity; widespread power outage; fires; and civil disturbances.

Droughts

Northern California's water resources, including EBMUD's supplies, have been stressed by periodic drought cycles. Historical multi-year droughts have significantly diminished the supplies of water available to EBMUD's customers. The periodic drought cycles, including the most recent 2007-2009 hydrologic drought

Figure 2-3 Variability in Mokelumne Watershed Runoff 1970-2010



and high variability of runoff in the Mokelumne River watershed are illustrated in Figure 2-3.

During the early stages of a drought and throughout the drought period, EBMUD imposes drought management programs to reduce customer demands, thereby saving water for the following year in case drought conditions continue. Chapter 3 of the UWMP 2010 includes the details of EBMUD's drought management program; Chapter 4 provides an assessment of the reliability of water service for EBMUD customers during normal, single, and multiple dry-years.

Effects of Climate Change

Climate change is a growing threat to water resources. Although the full impact of climate change has not been felt, EBMUD has initiated the planning for climate change to ensure that it can continue to provide reliable, high quality water and wastewater services to its customers.

In 2008, EBMUD incorporated climate change into its Strategic Plan and issued its first Climate Change Monitoring and Response Plan. Both documents were updated in 2010. An interdisciplinary staff committee is reviewing the evolving science of climate change, assessing potential water supply impacts and vulnerabilities, and developing strategies for adaptation and mitigation.

In 2009 EBMUD evaluated the sensitivity of its current water supply system to potential climate change impacts. The results of the analysis are intended to help guide EBMUD in managing water supplies to meet demand with the maximum amount of flexibility and the ability to adapt to unknown future conditions, and show that:

- the water supply is most vulnerable to decreases in annual runoff volumes;
- an increase in air temperature may result in increases in the temperature of water flowing into Pardee Reservoir and in customer demand; and
- the frequency of rationing is sensitive to decreases in annual precipitation volume.

Although EBMUD may experience these changes in its Mokelumne River watershed supply in the future, due to the uncertainty in regional climate change projections, the severity of these impacts is unknown.

EBMUD also participates in external working groups focused on climate change, including the Climate Ready Water Utilities Working Group and the Climate Resilience Evaluation and Assessment Tool (CREAT) Working Group. These working groups are part of the Environmental Protection Agency's Climate Ready Water Utilities Program. The purpose of both groups is to increase utility awareness of climate change impacts, educate and prepare utilities for climate change, and identify and provide tools to assess and understand the impact of climate change.

The Climate Ready Water Utilities Working Group is charged with developing attributes for climate ready utilities; identifying tools, training, and products to address short and long-term needs; and facilitating the adoption of climate change adaptation and mitigation strategies. The CREAT Working Group guided the development of a computer based tool to support utilities with performing traditional risk based and scenario based assessments to evaluate the utilities resilience to climate change. Version 1 of the software was released by the EPA in 2010.

Regulatory Constraints

EBMUD's ability to use its full entitlement of Mokelumne River water is constrained by the limitations incorporated into the state issued licenses and permits that grant EBMUD the right to serve its customers 325 MGD from the Mokelumne River. Although EBMUD's water supply system was designed and constructed to deliver 325 MGD, in dry-years, the extent to which EBMUD's water rights can be exercised is further constrained by other Mokelumne River water users with water entitlements that are senior to those held by EBMUD.

In addition to the requirements set forth in the licenses and permits, EBMUD's water supply system operating goals and objectives must also conform to State Water Resources Control Board Decisions, Court Decisions, Federal Energy Regulatory Commission Orders, and water right settlement agreements. EBMUD is obligated to meet multiple operating objectives, including providing municipal water supply benefits, streamflow regulation, fishery/ public trust interests, flood control, temperature management, and obligations to downstream diverters.

In 2007, the State Water Resources Control Board (SWRCB) commenced a formal proceeding on EBMUD's petition for a time extension of its permit to put Mokelumne River water rights entitlement to full beneficial use. In accordance with the California Environmental Quality Act, EBMUD issued a Notice of Preparation of an Environmental Impact Report (EIR) for the permit extension in November 2008 with the Draft EIR expected to be released for public review at a later date.

Water Supply Quality

EBMUD consistently provides the highest quality water possible. EBMUD's primary water supply from the Mokelumne River requires only limited treatment to meet or surpass health standards, because it comes from a remote, mostly undeveloped watershed and is transported within two days to the EBMUD's service area in large steel pipes. EBMUD has further protected water quality at Pardee Reservoir through the purchase of conservation easements in areas with significant potential for residential development adjacent to Pardee Reservoir. As a result, the Mokelumne River supply is minimally exposed to common sources of contaminants such as pesticides, agricultural or urban runoff, municipal sewage discharges, or industrial toxics.

EBMUD and county health departments have posted health warnings to notify the public about fish consumption and elevated mercury levels. Mercury in the foothills including Pardee and Camanche Reservoirs has been associated with historical gold mining activity. However it is important to note that mercury has never been detected in EBMUD's drinking water supply from Pardee or Camanche Reservoirs at levels above the California Public Health Goal (PHG) of 1.2 ug/L.

On certain occasions, turbidity in Pardee reservoir can exceed the water quality limits that the District water treatment plants can treat adequately and reliably to meet regulatory water quality standards. The degradation in water quality has historically been attributed to extreme weather or unusual watershed emergencies such as landslides. In those situations, the Mokelumne Aqueducts must be shutdown or throttled to low flow until the water quality in Pardee Reservoir sufficiently improves. The District's local reservoir supply is the primary source of supply in these emergency situations. Since 1982 the aqueducts were taken out of service at least three times because of poor raw water quality (i.e. high turbidity) in Pardee Reservoir, caused by winter storm runoff or landslides. The longest recorded shutdown duration was for a period of 65 days in 1997 when a landslide occurred on January 7, on a slope of the Mokelumne River in the Upper Mokelumne River watershed.

As performance regulations for drinking water treatment become more stringent, recovery from poor water quality events is expected to take longer, resulting in longer aqueduct shutdowns or reduced flows.

When the aqueducts are shut down because of severe water quality events, EBMUD implements water management plans, which are already in place. Terminal reservoirs are normally operated to provide 180 days of standby storage at reduced consumption, and EBMUD meets its service area demands by relying on this supply when the Mokelumne River supply is temporarily unavailable. After water quality has returned to acceptable levels, the terminal reservoirs are refilled as soon as practical by the Mokelumne Aqueducts to meet standby storage levels.

EBMUD WTPs that process the water supplied by local terminal reservoirs are designed to handle high turbidity conditions that can be caused by severe local storms. Consequently, water quality variations do not limit the water supply available from terminal reservoirs.

Earthquakes

Potential seismic events pose a significant threat to the delivery of water in the San Francisco Bay Area. Within or near EBMUD's service area, several earthquake faults, including the San Andreas, San Gregorio, Hayward, Calaveras, Concord, Antioch, Greenville, Mt. Diablo Thrust, Midland, and others, as depicted in Figure 2-4, pose varying degrees of risk to the water distribution system and to the Mokelumne Aqueducts in the Delta area. The most significant seismic threat comes from the Hayward Fault that crosses the Claremont Tunnel, which is the most critical conduit of treated water to the East Bay plain. See Table 2-3 for a list of significant earthquakes that have occured in the Bay Area since 1836.

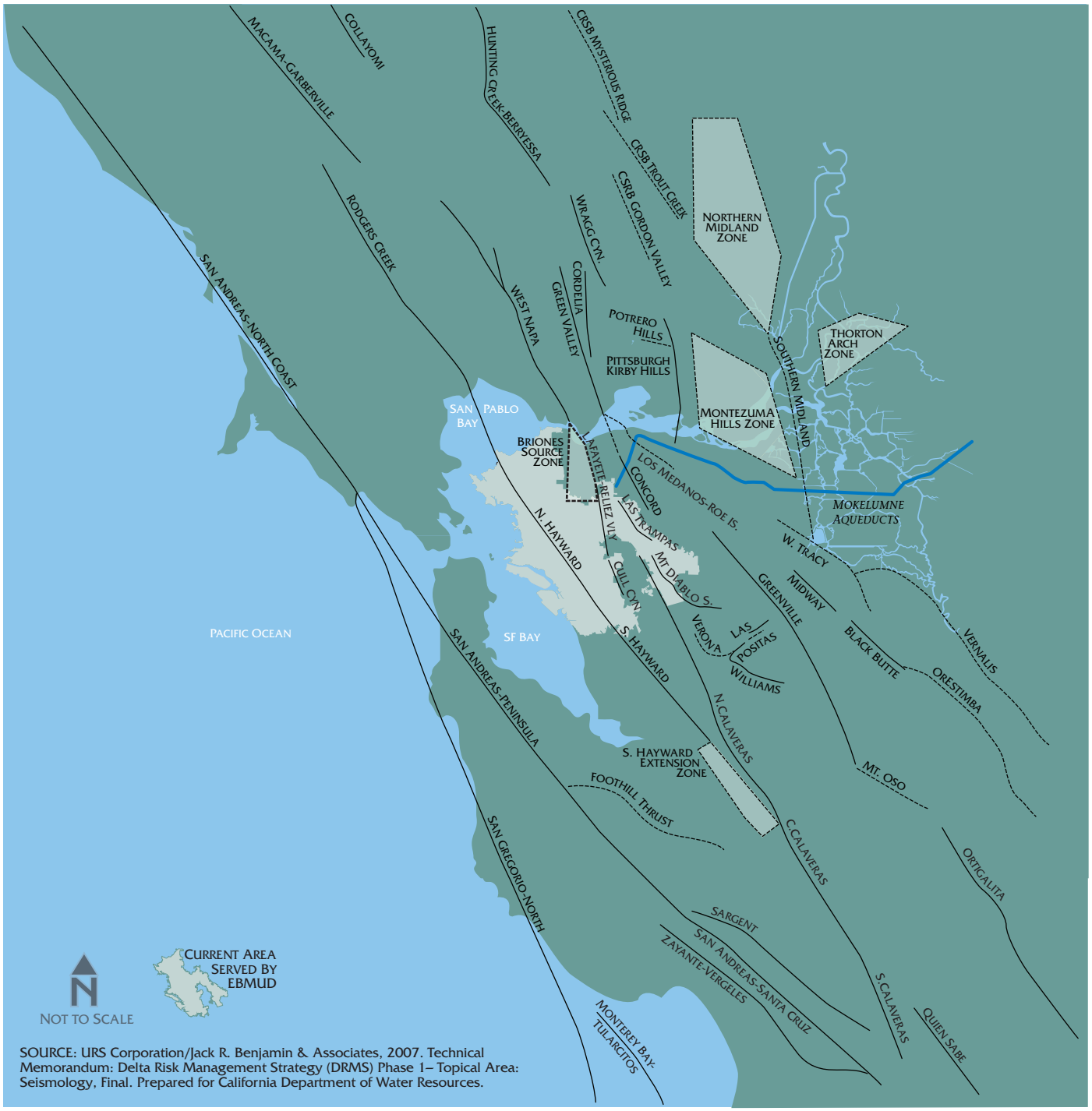
EBMUD's Mokelumne River facilities are also located in a seismically active area. Pardee Dam is located within three miles of the Bear Mountain Fault zone (see Figure 2-5); however, according to analyses completed in 1992, it will not be adversely impacted by a seismic

Table 2-3 Significant Bay Area Earthquakes (M>6.5)

Year	Fault	Richter Magnitude
1836	Hayward	6.75
1838	San Andreas	7.0
1865	San Andreas	6.5
1868	Hayward	7.0
1892	Undetermined	6.5
1898	Undetermined	6.5
1906	San Andreas	8.25
1911	Calaveras	6.5
1989	San Andreas	7.1

Source: http://seismo.berkeley.edu/seismo.baseis.html

Figure 2-4 San Francisco Bay Area Region Faults



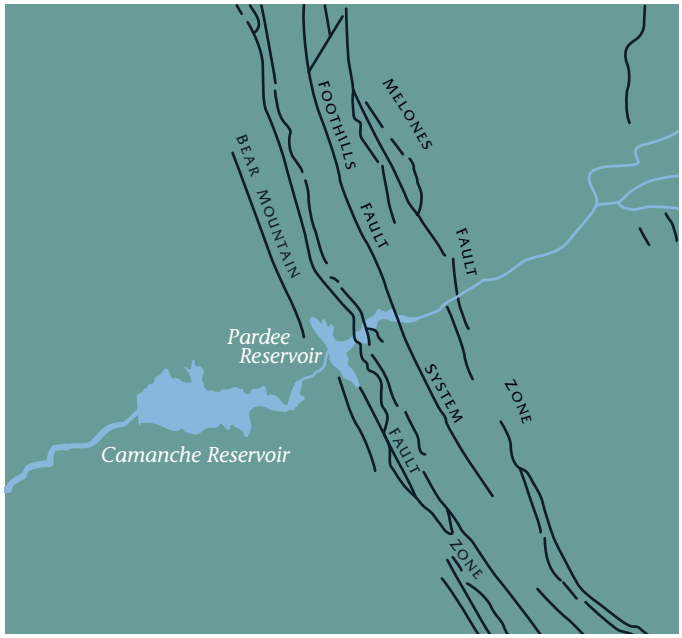
SOURCE: URS Corporation/Jack R. Benjamin & Associates, 2007. Technical Memorandum: Delta Risk Management Strategy (DRMS) Phase 1– Topical Area: Seismology, Final. Prepared for California Department of Water Resources.

event on that fault. A seismic study of Camanche Dam completed in 2010 concluded that a major earthquake on the Bear Mountain Fault zone could cause liquefaction of the tailings materials under the Camanche Main Dam embankment. The resultant deformation would be limited to the downstream toe area and would not affect the overall dam stability nor lead to dam overtopping.

Delta Floods

There is a long history of levee failures in the Delta, including the region where the Mokelumne Aqueducts cross. EBMUD experienced a near-catastrophic event in 1980 when Lower Jones Tract flooded and the railroad embankment adjacent to the aqueducts subsequently failed, allowing floodwater

FIGURE 2-5 UPCOUNTRY AREA FAULTS



to flow into Upper Jones Tract (see Figure 2-6). This event nearly undermined the aqueduct supports in the area. Necessary repairs were made.

In June 2004, a structural failure in the levee at the Upper Jones Tract 1.5 miles south of the Mokelumne Aqueducts caused a levee breach. The resulting flood submerged about 5.25 miles of the elevated Mokelumne Aqueducts for several months while the island was being drained. Nevertheless, the aqueducts remained in full operation during the entire time. Subsequent investigation of the damage concluded that the aqueducts and their supports were structurally sound, and the maintenance road and drainage systems for the aqueducts sustained damage to their exterior coatings.

IMPROVING WATER SUPPLY AND SYSTEM RELIABILITY

To prepare for conditions that may affect the availability of water, EBMUD implements infrastructure related programs and projects that improve the reliability of its water supply. Among these are supplemental water supply projects that not only reduce the frequency and magnitude of water rationing required of customers during droughts, but also provide EBMUD customers with greater assurance against other possible adverse situations, such as emergency water shortages. In addition to pursuing supplemental water supply sources, EBMUD also maximizes resources through continuous improvements in the delivery and transmission of available water supplies, and investments in ensuring the safety of its existing water supply facilities.

FIGURE 2-6 LEVEE FAILURE ON THE LOWER JONES TRACT IN 1980

INFRASTRUCTURE IMPROVEMENT PROJECTS

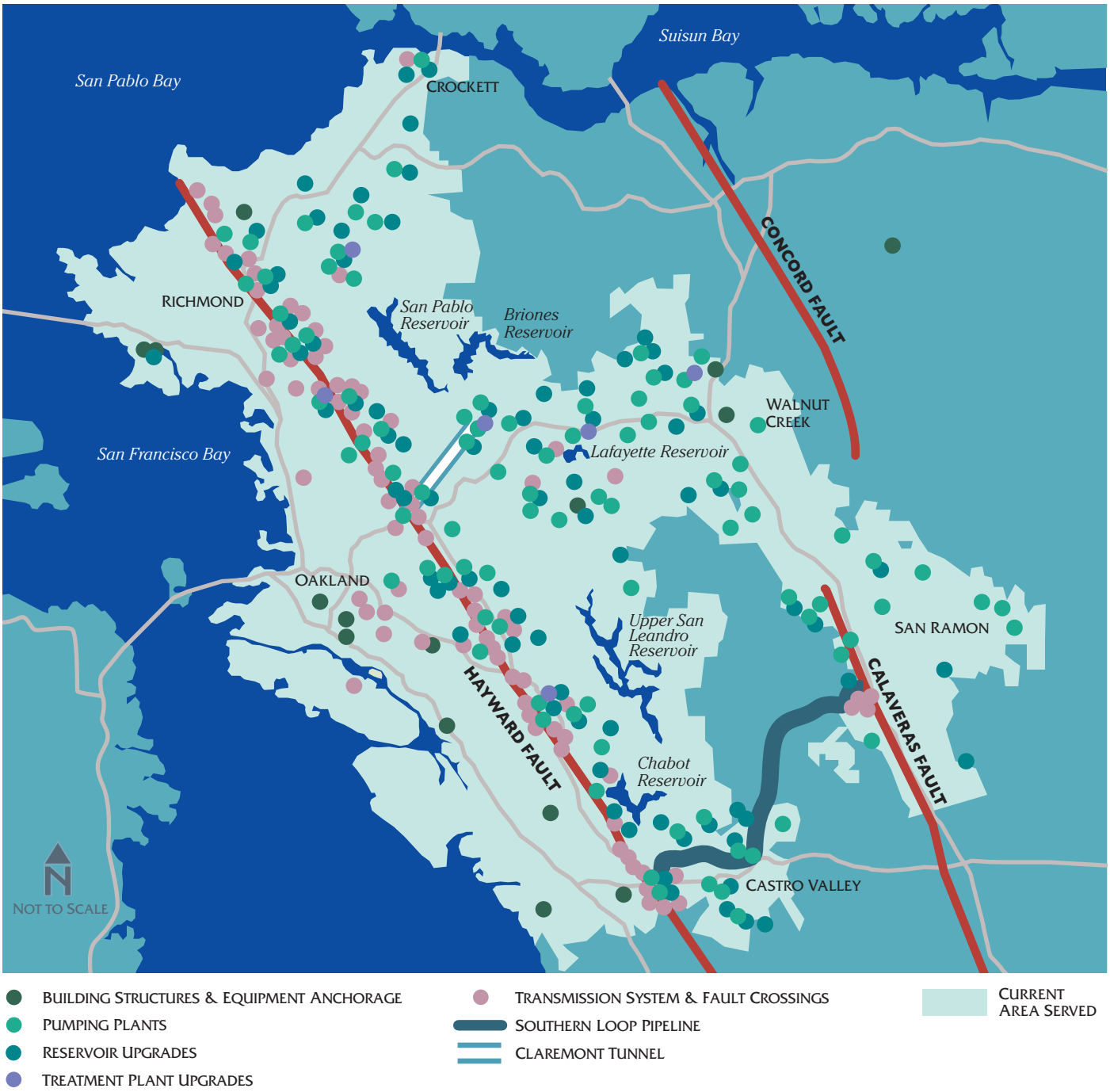
Seismic Improvement Program

EBMUD is internationally recognized for its proactive approach to minimizing seismic risk. A Seismic Improvement Program completed in 2007, made EBMUD the first water agency in the United States to retrofit its facilities on a comprehensive scale. The program was designed and implemented to protect public safety and preserve the regional economy by making improvements that would allow EBMUD to partially restore water service to its customers following a major earthquake within 30 days. The seismic improvements improved the system's operational flexibility and reliability and put in place the necessary tools for rapid response, repairs, and recovery. As illustrated in Figure 2-7, the program included installation of an 11-mile pipeline at the southern end of the service area to create an alternate transmission route, upgrades and retrofits to more than 300 critical facilities, and an innovative bypass tunnel through the Hayward Fault zone for the Claremont Tunnel, a critical facility that brings water through the Oakland-Berkeley hills to approximately 800,000 customers.

Mokelumne Aqueduct Seismic Upgrade

The Mokelumne Aqueducts convey the Mokelumne River supply from Pardee Reservoir across the Delta to EBMUD's service area. The aqueducts are buried for most of their length. At Delta river and slough crossings, they are buried from 10 to 40 feet below the channel bottoms or levee crests. The remaining above-ground sections are supported on timber, reinforced concrete or steel bents for approximately ten miles as the aqueducts cross the islands in the Delta. The

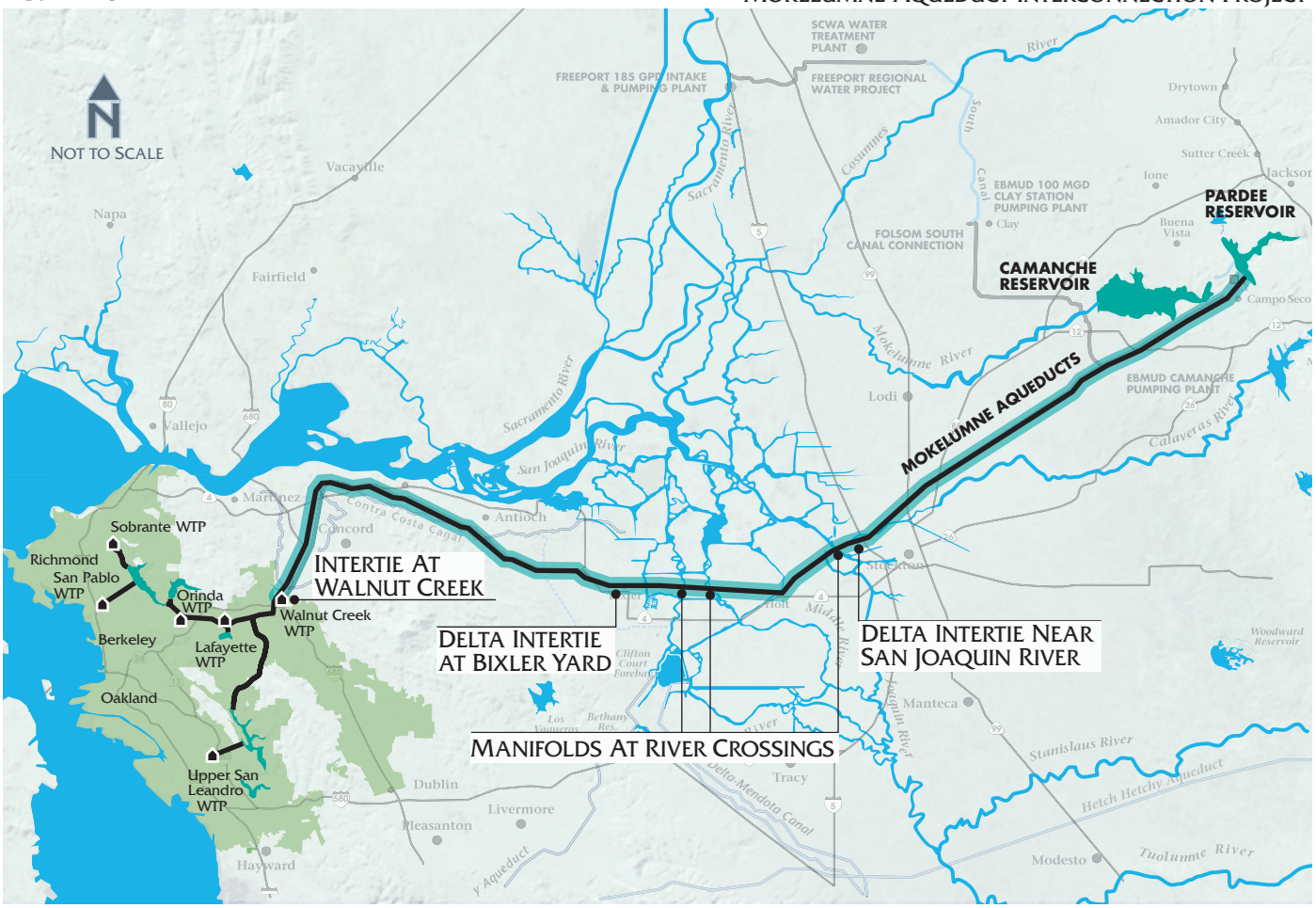
FIGURE 2-7 SEISMIC IMPROVEMENT PROGRAM



aqueducts also cross non-engineered levees constructed in the late 1800s, which provide little support.

In the 1990s, EBMUD began the Mokelumne Aqueduct Seismic Upgrade Project, as part of the comprehensive Mokelumne Aqueduct Security program, to improve the seismic performance of the aqueducts in the Delta and to ensure that raw water deliveries can be partially restored within 180 days after a major earthquake. The project improved the seismic performance of the Mokelumne Aqueduct No. 3, by strengthening of levees at aqueduct crossings and of pipe foundations at river crossings; reinforcing all pipe joints on buried portions of the pipe; and the strengthening of pipe support structures on elevated portions of the aqueduct. The project also included replacement of all low strength

FIGURE 2-8 MOKELUMNE AQUEDUCT INTERCONNECTION PROJECT



bolts with high strength bolts on elevated portions of Mokelumne Aqueduct No. 2 and No. 3. The final phase of this program was completed in 2005.

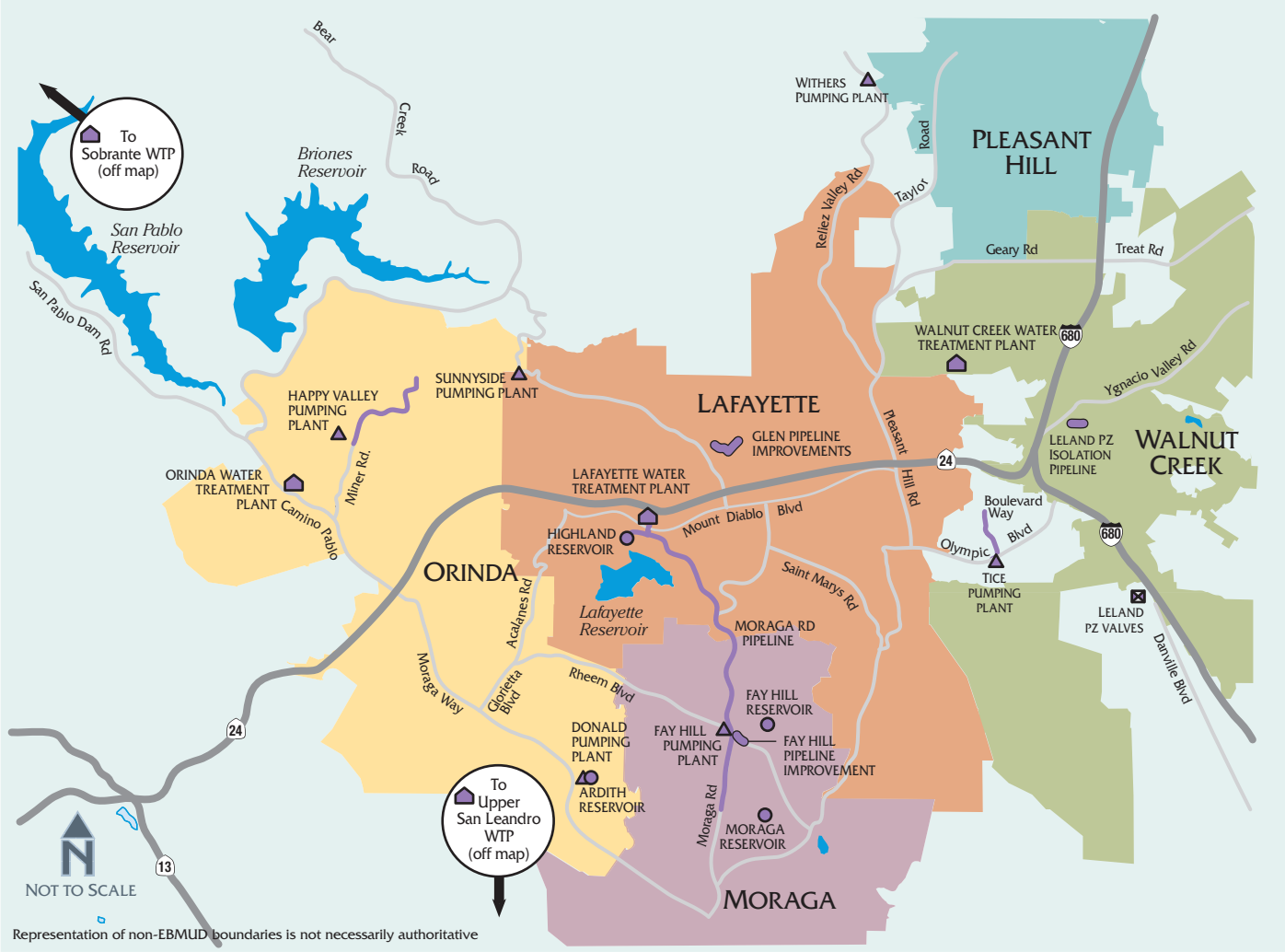
EBMUD prepared an Aqueduct Section Emergency Plan that will be activated in the event of an aqueduct or levee failure. The type and magnitude of the failure will determine whether the EBMUD Emergency Operations Plan should be activated. If the water supply to the service area is impacted, the Water Shortage Contingency Plan (see Chapter 3) will also be activated.

Mokelumne Aqueduct Interconnection Project

EBMUD is currently in the design phase of the Mokelumne Aqueduct Interconnection Project that will further improve the reliability of its water supply delivered through the Mokelumne Aqueducts. The project includes the addition of interconnections between the aqueducts in two locations in the Delta area and near Walnut Creek, and adding emergency piping manifolds to Mokelumne Aqueduct No. 3 at the Delta river crossings (see Figure 2-8). The interconnections in the Delta will allow the District to bypass segments of the Mokelumne Aqueducts that may be damaged following a levee failure or seismic event, and thus, maximize flows through surviving segments of the aqueducts. The interconnection near Walnut Creek will allow for isolation and bypassing at the two tunnels that are at the end of the Mokelumne Aqueducts to improve operational flexibility. Following an emergency event, the piping manifolds on Mokelumne Aqueduct No. 3 at the Delta river crossing will allow water to temporarily bypass these three main river crossings in the Delta, where the Mokelumne Aqueduct No. 3 is more susceptible to damage, until permanent repairs can be made.

The project is funded by a Proposition 84 grant from the California Department of Water Resources (DWR) in the amount of $10 million as part of the State's Integrated Regional Water Management Program (IRWMP).

Figure 2-9 Water Treatment and Transmission Improvements Program



Walnut Creek–San Ramon Valley Improvement Project

The Walnut Creek–San Ramon Valley Improvement Project increased system reliability in the eastern portion of the service area, improving water pressure and water availability during prolonged seasonal hot periods while maintaining adequate reserves for fire flows. This project was completed in the mid-2000s. It included capacity expansion and upgrades to the Walnut Creek WTP, construction of 4.4 miles of large diameter transmission pipeline (including a one-mile tunnel) from Walnut Creek to Alamo, and expansion of the Danville Pumping Plant in Alamo.

Water Treatment and Transmission Improvements Program

The Water Treatment and Transmission Improvements Program (WTTIP) addresses regulatory issues, maintenance needs, and water treatment and transmission capacity needs in Lafayette, Moraga, Orinda, western Walnut Creek, and parts of unincorporated Contra Costa County. The program will allow EBMUD to reliably and efficiently meet current and projected 2030 water demands of the WTTIP area. It includes improvements to the Lafayette, Orinda, Walnut Creek, Sobrante, and Upper San Leandro WTPs, four new or upgraded storage tanks, nine new or upgraded pumping plants, and approximately 5.5 miles of new pipeline, as illustrated in Figure 2-9. The WTTIP EIR and recommended projects was approved by the Board in December 2006.

One of the WTTIP components, the Moraga Road Pipeline, a new three mile 36-inch and 48-inch diameter pipeline, was placed in-service in December 2008. Highland Reservoir, a new 2.7 million gallon reservoir is scheduled to be placed in-service by the end of 2011. The Walnut Creek WTP project completion is expected in 2012, and includes construction of two new filters, a new 34 MGD distribution system pumping plant and backwash water recycling system improvements.

West-of-Hills Master Plan

The West-of-Hills Master Plan was completed in 2010 and addresses regulatory issues, existing maintenance needs, and existing and future water treatment and transmission capacity needs for the western portion of the EBMUD service area. This regional master plan was undertaken to better understand WTP and transmission capacity limitations, integrate long-range plans with the WTTIP, and develop strategies to resolve competing needs from individual pressure zones. The proposed improvements include expansion and upgrades to Orinda, Sobrante, and Upper San Leandro WTPs, five water storage reservoirs, two pumping plants, and 23 miles of new transmission pipeline projects ranging in size from 30-inches to 72-inches in diameter. Some of components of the West-of-Hills Master Plan will be completed as needed, when future development and projected water demand growth materialize.

Dam Safety Program

EBMUD maintains a comprehensive Dam Safety Program. Instrumentation monitoring, monthly visual inspections, and periodic dam safety reviews are conducted to prevent loss of life, personal injury and property damage from dam failures. EBMUD staff utilizes the latest technology in geotechnical, structural and earthquake engineering to conduct monitoring, inspection, and evaluation of the dams. While most EBMUD dams are under the jurisdiction of the California Division of Safety of Dams (DSOD), Pardee and Camanche Dams also are monitored by the Federal Energy Regulatory Commission (FERC) because they produce hydropower. DSOD and FERC conduct their annual dam inspections independently of EBMUD monitoring and inspection.

FERC uses the Potential Failure Mode Analysis (PFMA), a component of its Dam Safety Performance Monitoring Program, to identify, evaluate, and categorize potential failure modes for dams that are under FERC jurisdiction. In 2008, in compliance with FERC's regulatory requirements, an independent consultant and project team conducted the PFMA for Pardee and Camanche Dams. The results of the analysis show that Pardee and Camanche Dams were well designed, constructed, instrumented, monitored, and maintained by EBMUD. Based on results of the analyses, FERC recommended that EBMUD continues to implement its comprehensive Dam Safety Program for both dams.

In 2004 and 2005, EBMUD completed stability evaluations for San Pablo, Chabot, and Lafayette Dams. Based on the results, EBMUD completed seismic upgrades at San Pablo Dam by improving the foundation materials with cement deep soil mixing technology and a larger downstream buttress, and plans to start seismic upgrade work at Chabot Dam in the coming decade. The embankment of Lafayette Dam was found to be seismically adequate; however, its outlet tower may require seismic upgrades. EBMUD is working with DSOD to identify the appropriate measures. The seismic evaluation of Upper San Leandro Dam is currently underway and it is expected to be completed in 2011.

Security

Working with law enforcement and utility industry security experts, EBMUD has established a comprehensive security program to protect its water supply. Acting on the recommendations of the Federal Bureau of Investigation, the American Water Works Association, and the California Emergency Management Agency, EBMUD continually reviews and updates emergency response plans, and guards its water and wastewater systems.

As required by the Federal "Bioterrorism Preparedness and Response Act, Public Law 107-188," EBMUD submitted its Vulnerability Assessment to the Unite States Environmental Protection Agency (EPA) in 2003, and established a Security and Emergency Preparedness Section (SEPS) to coordinate its security efforts. Since 2003, the SEPS has continued to stay abreast of security developments and been prepared to respond to security issues that might arise. EBMUD's SEPS has trained and certified EBMUD staff in compliance with all legal requirements.

EBMUD has continually improved its ability to deter and delay criminal activity; to detect such activity when it does happen; to assess alarm and potential security breach conditions; and to dispatch responders to security incidents promptly. Physical improvements to key EBMUD facilities include, but are not limited to, re-keying locks, fencing, access control systems, lighting, alarms (interior and exterior), motion detectors, cameras, video recorders, monitors, and all related required appurtenances to complete the security systems. Operational improvements

included updating the security response section of EBMUD's Emergency Operations Plan (submitted to the EPA in 2003). In 2009, the SEPS revised the Emergency Operations Plan for full compliance with the National Incident Management System (NIMS). In addition, per EBMUD's FERC license, periodic security inspections are conducted and specific requirements have to be met to ensure the security of the FERC licensed hydropower project. EBMUD also maintains and annually updates its Emergency Action Plan for Pardee and Camanche Reservoirs to comply with current FERC requirements. EBMUD continues to adjust and improve security measures as warranted to protect against potential terrorism and other security concerns experienced by EBMUD.

Ensuring the safety of public water supplies is EBMUD's top priority. EBMUD uses an all-hazard, multi-barrier approach with physical, chemical, and operational controls to safeguard the drinking water provided to consumers. This approach is advocated by national industry and homeland security experts. In response to a threat or situation in which the quality of the water supply is potentially affected or compromised, EBMUD follows a systematic approach to assess the threat or likelihood of potential contamination, to investigate the event, and to respond appropriately to protect the public and the water system. EBMUD has plans in place and is ready to issue all required and appropriate public notices if there is a question or concern regarding the safety of its public water supplies.

EBMUD's Emergency Operations Team (EOT) is ready to respond quickly and appropriately to any emergency with other public safety and first responder agencies. The EOT manages emergency responses, meets, trains, and conducts exercises routinely. EBMUD's EOT utilizes the California Standardized Emergency Management System that incorporates all NIMS requirements, and is very well integrated with other utilities directly, by agreement, and by its active engagement with the California Utilities Emergency Association. See Chapter 3 for details on inter-agency emergency support.

Existing Supplemental Water Supply Sources

EBMUD's long-term water supply goals include improving water supply reliability and diversifying its water supply portfolio. Since the UWMP 2005 update, two critical steps toward realizing those goals were completed when EBMUD finished the construction of the Freeport Regional Water Facility and the Bayside Groundwater Facility. These facilities provide additional water to augment EBMUD's water supply during drought periods.

Freeport Regional Water Facility

The Freeport Regional Water Facility is a result of a regional water supply project undertaken by Freeport Regional Water Authority (FRWA), which was created by exercise of a joint powers agreement between Sacramento County Water Agency (SCWA) and EBMUD. The City of Sacramento is an associate partner. The facility, as shown in Figure 2-1, (see page 2-3) enables delivery of water diverted from the Sacramento River near the town of Freeport to EBMUD customers during dry-years and will provide water in all years for the Sacramento County. It will be used to supplement EBMUD's aggressive water conservation and recycling programs to reduce the potential for severe water rationing and associated economic losses during droughts.

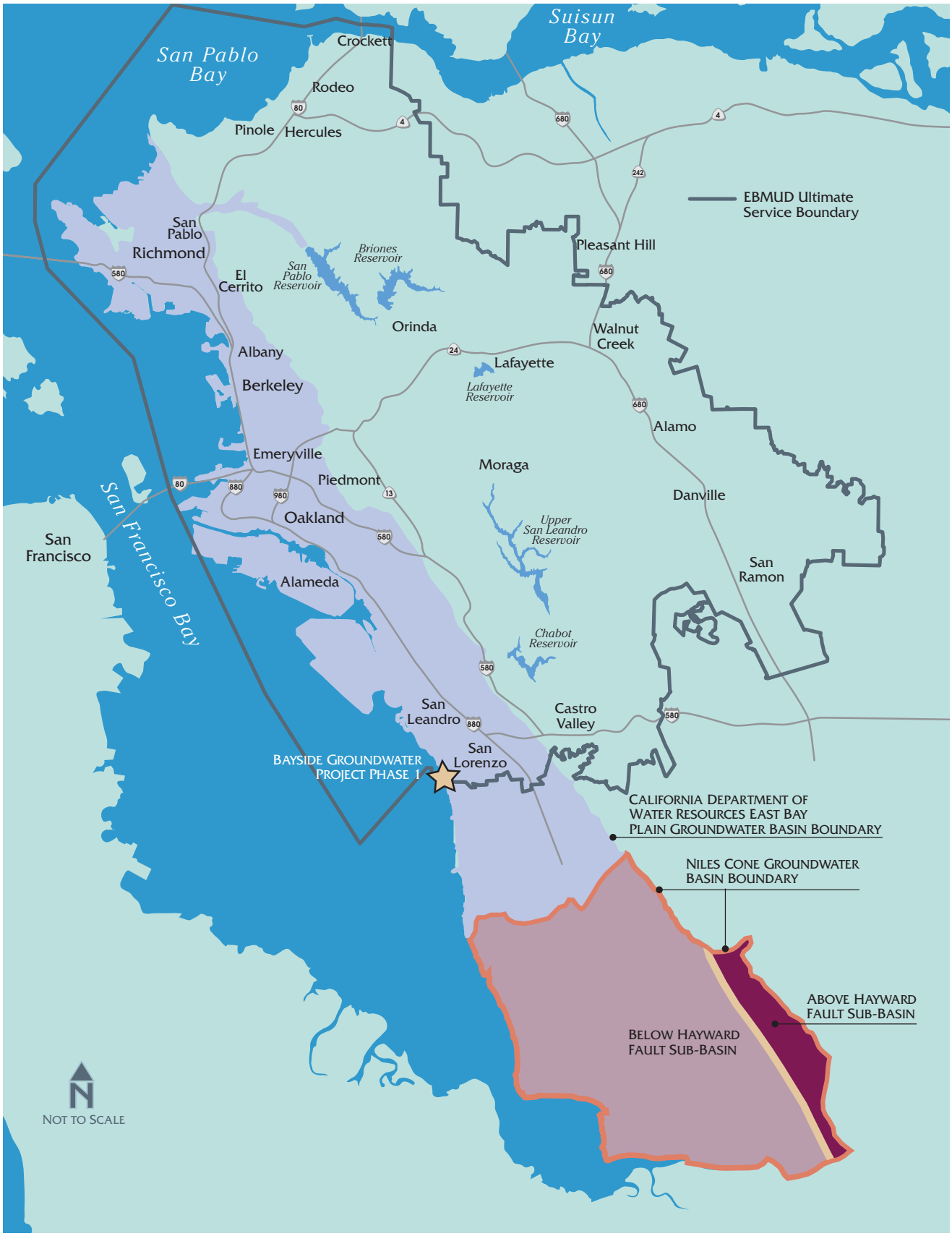
Stemming from its effort to identify additional sources of supply to meet its long-term water demand since the mid-1960s, EBMUD executed a contract in 1970 with the United States Bureau of Reclamation (USBR) for delivery of Central Valley Project (CVP) water from the American River. Years of litigation followed, preventing construction of the infrastructure necessary to deliver this water supply to EBMUD. In 2000, USBR, EBMUD, and Sacramento parties reached an agreement to modify the contract and to develop a joint water supply from the Sacramento River, rather than from the American River. FRWA was created in 2002, to implement the development of the Freeport facility. The facility, as illustrated in Figure 2-1, includes:

Table 2-4 Existing Supplemental Water Supply Quantities (in acre-feet per year)

Sources	Normal Year	Maximum Single Dry Year	Multiple Dry Years Year 1	Year 2	Year 3
Freeport Regional Water Facility	0	Up to 112,000 [1]	165,000 over three years		
Bayside Groundwater Facility	0	1,120	1,120	1,120	1,120

[1] Contractual single-year limit of supply from USBR is 133,000 AF. Continuous operation at 100 MGD, EBMUD's allocation capacity in the FRWP, yields a maximum annual delivery of 112,000 AF. Supply from the FRWP is also limited by the availability of CVP water during dry-years.

FIGURE 2-10 SOUTH EAST BAY PLAIN BASIN



- 185-MGD water intake and pumping plant (with state-of-the-art fish screens) on the Sacramento River near Freeport;
- 72- to 84-inch diameter pipeline to transport water eastward from the Sacramento River to the existing Folsom South Canal and to SCWA's treatment plant, which is presently under construction;
- the aforementioned WTP in central Sacramento County; and
- approximately 20 miles of 72-inch diameter pipeline and two 100 MGD pumping plants to transport water from the southern end of the Folsom South Canal to EBMUD's Mokelumne Aqueducts.

The project became operational in February 2011. EBMUD's ability to take delivery of water through the Freeport facility is based on its Long Term Renewal Contract (LTRC) with the USBR, which provides for up to 133,000 AF in a single dry-year, not to exceed a total of 165,000 AF in three consecutive dry-years. Under the LTRC, the CVP supply is available to EBMUD only in dry-years when EBMUD's total stored water supply is forecast to be below 500 TAF on September 30 of each year (See Chapter 3 and Appendix G for further details). Table 2-4 illustrates the supplemental supply quantities provided to EBMUD by the Freeport facility.

Bayside Groundwater Facility

The Bayside Groundwater Facility was built to enable EBMUD to inject potable drinking water into the deep aquifer of the South East Bay Plain Groundwater Basin (SEBPB) during wet years until its subsequent recovery, treatment and use during times of drought. The facility supplies supplemental water to EBMUD customers only when supplemental water is needed, and overall, the quantity of water injected into the aquifer of the SEBPB will exceed the quantity of water extracted. See Figure 2-10 for basin location.

Groundwater from the SEBPB is available only to a limited extent as part of the implementation of the injection/extraction system associated with the Bayside Groundwater Facility. Because it is possible that some extractions may include native groundwater, which will subsequently be treated, EBMUD has started the process for preparing a groundwater management plan for the SEBPB (see SEBPB Groundwater Management Plan Development section of this Chapter), but EBMUD has not yet adopted a groundwater management plan. The native groundwater of the SEBPB is not available as a significant source of water to EBMUD.

The groundwater facility became operational in 2010. The facility consists of a new water treatment facility and associated pipelines linking the treatment plant to the injection/ extraction well, subsidence monitoring system, and a network of groundwater monitoring wells. The project will supply water to EBMUD customers only when supplemental water is needed because of drought conditions.

The injection/ extraction system uses a 600-foot deep well, located on property leased from the Oro Loma Sanitary District in San Leandro. When operated in injection mode, treated water from EBMUD's distribution system is directed through the project well into the deep aquifers of the SEBPB. The injection mode operation will take place during wet years when surplus water is available for storage. During droughts water will be extracted and treated to meet all federal and state drinking water standards prior to distribution to the customers. A permit from the Department of Public Health, which is pending, is required before the groundwater can be extracted and treated for municipal use.

The project is designed to yield 2 MGD over a 6-month period, resulting in an average annual production capacity of 1 MGD or 1,120 acre-feet per year (AFY). The supplemental supply quantities available to EBMUD as a result of operation of the project are presented in Table 2-4. EBMUD's long-range plan calls for investigating potential expansion of the Bayside Groundwater Facility in the future.

Potential Supplemental Water Supply Sources

Short-Term Potential Supplemental Water Supply Projects

EBMUD will meet future growth in projected customer demand with aggressive conservation and recycled water development, and, as necessary, by implementing additional supplemental supply components. These supply components will lower the customer rationing burden during droughts and thereby decrease direct impacts on EBMUD customers.

EBMUD has established aggressive targets for conservation and recycling, and these two actions will meet a total of 50 MGD of future demand, as described in detail in Chapter 5 and Chapter 6, respectively, of the UWMP 2010. The supplemental supply components that

Figure 2-11 Potential Water Transfer Source Areas and Conveyance

EBMUD may pursue in order to enhance its supplies during dry-years include, but are not limited to, water transfers, and groundwater banking/ exchange efforts.

EBMUD will simultaneously pursue supplemental supply projects to meet future water needs consistent with the resources management strategies presented in DWR's 2009 California Water Plan. By considering a broad mix of projects, with inherent scalability and the ability to adjust implementation schedules for a particular component, EBMUD will be able to minimize the risks associated with future uncertainties such as project implementation challenges and global climate change. If EBMUD is able to successfully develop one component, this could result in deferral of other additional supplemental supply components over the planning period. EBMUD is interested in partnering with other agencies and other water rights owners in exploring projects to ensure the water supply for the future. Partnerships offer the best potential solutions that are environmentally sound, cost-effective, and sustainable. Separate project-level environmental documentation will be prepared, as appropriate, for specific components as they are developed in further detail and implemented in accordance with EBMUD's water supply needs.

Because EBMUD's extensive conservation savings have limited the ability to ration in dry and critical dry years without extensive cost to customers, EBMUD has set the rationing goal to up to 15 percent during multi-year droughts. As a practical matter, EBMUD may be unable to reduce rationing to 15 percent until it has developed sufficient dry-year supply to meet the demands during any particular drought. As new supplemental supplies are secured, EBMUD will be able to gradually reduce the amount of rationing it imposes upon its customers.

Northern California Water Transfers

EBMUD is interested in exploring a water transfer program to secure up to 13 MGD of dry-year water supply through voluntary water transfers. The purpose of EBMUD's Water Transfer Program is to develop and implement water transfer and exchange opportunities throughout northern California. EBMUD plans to use the Freeport facilities, illustrated in Figure 2-11, to convey the transfer water to EBMUD's service area.

Due to recent demand reductions resulting from economic downturn and drought and in combination with the District's rationing policy, EBMUD's water supplies are currently sufficient in the near-term. Therefore, EBMUD's primary interest is exploring partnership opportunities with willing parties within the Sacramento River Watershed on long-term or permanent water transfer arrangements. In the future, EBMUD's Water Transfer Program also may pursue short-term transfer arrangements, as needed, to help reliably meet EBMUD's dry-year water supply needs.

Bayside Groundwater Project Expansion

EBMUD plans to examine the potential expansion of the Bayside Groundwater Facility that was completed in 2010. EBMUD plans to utilize information gained from the operation of the facility to help determine whether and how to proceed with the expansion. EBMUD would prepare a project specific EIR for Phase 2 prior to the development of the project.

Phase 2 is envisioned to have an annual capacity ranging between 2 and 9 MGD and to use the South East Bay Plain Groundwater Basin (SEBPB), although details regarding proposed capacity, locations, and configuration of Phase 2 facilities will not be developed until Phase 1 is operated for a period of time. As planning for Phase 2 moves forward, EBMUD will work with the Bayside Community Liaison Group to address community concerns.

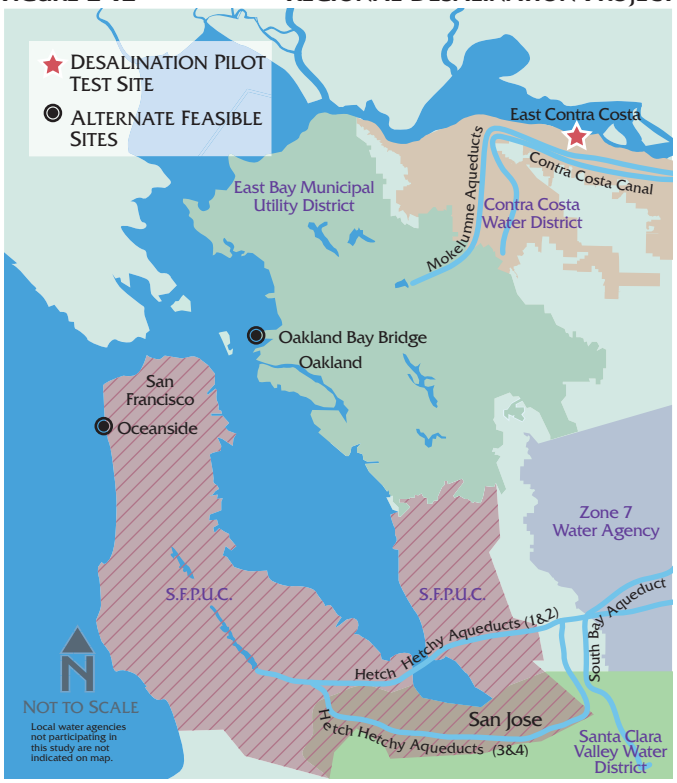
SEBPB Groundwater Management Plan Development

With the completion of the Bayside Groundwater Facility and the potential expansion of the facility, local groundwater resources have become a key component of EBMUD's future supplemental supply strategy. Because the groundwater facility relies on the SEBPB, EBMUD plans to develop a Groundwater Management Plan (GMP) in collaboration with local stakeholders as a tool to manage basin water quality and quantity. In accordance with the Urban Water Management Act, a description of the East Bay Plain Basin is provided in Appendix E of the UWMP 2010.

The SEBPB GMP development is anticipated to include a hydrogeologic review to gain a deeper understanding of basin characteristics, working with stakeholders, and setting basin management objectives. The GMP will be consistent with commitments made in the Bayside Groundwater Project EIR Mitigation Monitoring and Reporting Plan.

The first step in GMP development will be a stakeholder assessment. A collaborative workgroup will be formed and detailed objectives of the GMP will be collectively developed. As per AB 3030, the GMP development process will solicit public involvement and outreach will likely include workshops and public meetings. The GMP work effort will also include updating studies to

Figure 2-12 Bay Area Regional Desalination Project



define the basin boundaries and characteristics. Some studies were conducted for the Bayside Phase 1 efforts. Additional technical studies may be used to update basin groundwater modeling, basin yield and storage estimates, and water quality characterizations. The GMP planning effort began in 2010. It is anticipated that the GMP development will take about two years to complete.

Long-Term Conceptual Supplemental Water Supply Projects

Bay Area Regional Desalination Project

The Contra Costa Water District (CCWD), EBMUD, San Francisco Public Utilities Commission (SFPUC), Santa Clara Valley Water District (SCVWD), and the Alameda County Flood Control and Water Conservation District - Zone 7 are jointly exploring the development of regional desalination facilities that would benefit over 5.6 million Bay Area residents and businesses served by these agencies. The Bay Area Regional Desalination Project (BARDP) would consist of one or more facilities, as shown in Figure 2-12, with an estimated capacity range of 10 to 50 MGD. Up to a maximum of 22,400 acre-feet per year of ocean/ bay/ brackish water would be made available to EBMUD for municipal use.

BARDP goals and benefits:

- provide a reliable water supply source that is available even during contract delivery reductions, extended droughts, and emergencies such as earthquakes or levee failures;
- allow other major facilities such as treatment plants, water pipelines, and pump stations, to be taken out of service for maintenance or repairs;
- minimize the potential for adverse environmental impacts; and
- leverage existing and contiguous infrastructure to meet needs and minimize costs.

Three potential sites have been identified where a regional desalination facility could be located: a site in the eastern part of Contra Costa County (East Contra Costa); a site in Oakland near the Bay Bridge (Oakland Bay Bridge); and a site in San Francisco near Oceanside (Oceanside). A feasibility study was completed in 2007 and a six month pilot test was completed in 2009 at the East Contra Costa site (CCWD's Mallard Slough Pump Station site). The project's pilot testing collected data on technical feasibility (pretreatment options, membrane performance, and design parameters) and the environmental impacts (brine disposal and marine life). The pilot testing confirmed:

- membrane pre-treatment and desalination can produce desired water quality;
- sensitive species, such as the Delta and Longfin smelt, may be present during certain times of the year; and
- brine, a salty by-product produced at the desalination plant, did not have a significant negative impact on local species.

Regional Desalination Project would require an assessment of potential environmental impacts and would undergo an extensive and complex regulatory review process. Implementation of the Regional Desalination Project would involve significant public outreach, hearings and negotiations to obtain a number of permits from many different agencies.

Inter-Regional Groundwater Banking/Exchange

EBMUD is investigating long-range options for combined use of groundwater and surface water sources beyond the East Bay service area. Groundwater storage is being explored in Sacramento County and San Joaquin County. Water banked underground would benefit either location, as it would help address the over-

drafted groundwater basins in both regions, while providing a potential dry-year supply for EBMUD.

A Sacramento County groundwater project option would most likely be located adjacent to a stretch of EBMUD's pipeline from the Freeport facility (a pipe which traverses the central and southern portion of Sacramento County) or the Folsom South Canal. A San Joaquin County groundwater storage project option would most likely be located in the proximity of EBMUD's Mokelumne Aqueducts (which traverse the northern portion of San Joaquin County along a west-to-east route). The proximity of the projects to existing EBMUD conveyance facilities would allow efficient transport of stored groundwater to the EBMUD service area.

Entities in both locales have discussed the potential to develop groundwater storage and banking projects in partnership with other water agencies in the IRWMP prepared for the respective regions (i.e., American River Basin IRWMP, the Mokelumne/ Amador/ Calaveras IRWMP and Northeastern San Joaquin Groundwater Banking Authority's IRWMP) .

Inter-Regional Conjunctive Use Project

The Mokelumne River Forum (Forum) is made up primarily of water agencies, local governments, and non-governmental organizations with an interest in the Mokelumne River. In April 2005, the Forum members signed a Memorandum of Understanding with the DWR and committed to seek mutually beneficial and regionally focused solutions that meet water management needs in the Sierra Foothills, San Joaquin County, and the portion of the East Bay served by EBMUD. A result of those discussions is the Mokelumne River Inter-Regional Conjunctive Use Project (IRCUP). The IRCUP envisions conjunctive use on a regional scale, with the potential to provide water supply and environmental benefits to a broad range of Mokelumne River basin stakeholders. Benefits would include:

- storage and supplies for drought protection and to meet the future water needs of the citizens of Amador and Calaveras Counties;
- long-term drought protection for areas of Alameda and Contra Costa Counties served by EBMUD;
- drought protection, replenishment of the groundwater basin, and water to create a hydraulic barrier to prevent further saline intrusion for San Joaquin County citizens; and
- enhanced cold water pool to benefit water temperatures and therefore fish in the Lower Mokelumne.

The IRCUP project elements, as currently envisioned, include the capture of excess surface water during wet years (potentially within expanded existing Mokelumne reservoirs and/ or within new off-stream reservoirs) and the diversion of water to groundwater storage/ recharge facilities that could be located in San Joaquin County and/ or western Calaveras County. During dry-years, previously stored groundwater would be extracted to supplement surface water supplies. Conveyance would be accommodated through use of existing and new systems (pipelines). EBMUD plans to continue participating with other Forum members in further refining the IRCUP concept. There are no plans to move into a project-specific stage of development until the concept is better understood and support is garnered within the region that would benefit from the IRCUP.

Expansion of Surface Water Storage

In the future, EBMUD plans to explore a wide range of options to improve reliability of its supply during droughts and to meet future needs, including examination of participation in the Los Vaqueros Expansion. If Los Vaqueros Expansion becomes feasible as a short-term potential supplemental water supply project, then the 2015 UWMP will incorporate and quantify the project. Enlargement of EBMUD's existing facilities on the Mokelumne River may be pursued in the long-term as part of an interrelated set of upcountry projects with a common set of partners. Enlargement of the Lower Bear Reservoir could also be pursued on a regional basis, and the enlargement would increase the surface water storage capacity within the upper Mokelumne watershed. If regional upcountry actions are pursued in the future, additional negotiations, as well as planning, design and environmental review, will have to be conducted.

Partnerships in Regional Management Plans

EBMUD partners with other water agencies to develop integrated water resources management strategies that would supplement existing water supplies. EBMUD participates in several consensus-based regional water management efforts with stakeholders in the San Francisco Bay Region as well as the Mokelumne and American River Basins to explore regional and statewide water resource issues.

San Francisco Bay Area Regional Partnerships

As a member of the Bay Area Water Agencies Coalition (BAWAC), EBMUD continues to work with local agencies under a Letter of Mutual Understanding to update an IRWMP that was drafted in 2007 for the nine Bay Area counties. The goal is to systematically combine water supply reliability, water quality, storm water and wastewater management, and environmental restoration planning. Integrating regional water management and planning benefit the San Francisco Bay Area Region through facilitated implementation of innovative, cost-effective and efficient multi-objectives water management solutions. Through an integrated plan, the Bay Area has been able to compete more effectively for funding from broader sources such as state bond funds and federal appropriations.

Through BAWAC, EBMUD partners with other local member agencies (Alameda County Water District, Bay Area Water Users Association, CCWD, SCVWD, and SFPUC) to formulate and support a mutually agreeable set of actions to improve water quality and supply reliability in the San Francisco Bay Area. Examples of such collaboration include: the ongoing study of a regional desalination project, in cooperation with the SFPUC, CCWD and SCVWD and (as of 2010) the Zone 7 Water Agency; completion of the SFPUC-Hayward-EBMUD Intertie Project between SFPUC, Hayward, and EBMUD; completion of the FRWP; and preparation of numerous regional grant applications submitted between 2005 through 2010 that resulted in the utilization of state funds (funds as made available through Proposition 50 and Proposition 84) to implement a broad range of supplemental supply projects, conservation programs, recycling projects, and additional regional planning work.

Mokelumne River Basin Partnerships

In collaboration with the Upper Mokelumne River Watershed Authority (UMRWA) partners from Alpine, Amador, and Calaveras counties, EBMUD received approximately $1 million in grants to complete a watershed assessment and a plan for the Upper Mokelumne (above Pardee Reservoir) watershed. That plan was completed in 2008. The project collected and assembled watershed data, conducted additional monitoring, developed a model for assessing changes in the watershed, and involved all stakeholders. Historically, watershed protection has been the most efficient and cost-effective mechanism for protecting drinking-water quality at the tap. By effectively managing its watershed lands, EBMUD can ensure that protection of the water supply is maximized, treatment costs are minimized, and natural resources are protected and sustained. Moving forward, UMRWA has taken over the development of updates to the Mokelumne/ Amador /Calaveras IRWMP, as was prepared by a range of upcountry stakeholders in 2006. UMRWA intends to apply for grant funding to support this work and work on water-saving measures such as distribution system leak detection and repairs that would benefit the entire UMRWA community.

EBMUD is also an active participant in the Mokelumne River Forum, as described in the "Inter-Regional Conjunctive Use Project" section in this Chapter.

American River Basin Partnerships

EBMUD, along with a number of water agencies and interest groups in Sacramento County, prepared the American River Basin (ARB) IRWMP in 2006/ 2007. EBMUD's participation is consistent with a 2005 agreement between SCWA and EBMUD to evaluate the potential to develop additional water supplies for both agencies through conjunctive use of surface and groundwater in the area and to transfer and deliver surface water supplies

Water Supply Management Efforts

EBMUD is in the process of developing a Water Supply Management Program that will analyze means of serving its long-term projected demands though the year 2040. EBMUD is presently supplementing the environmental analysis of the Water Supply Management Program 2040, and the District plans to adopt the Water Supply Management Program 2040 after considering the supplemental information regarding impacts and alternatives for securing supplemental supplies. This action will likely take place in 2012.

Chapter 3. 2010 Water Shortage Contingency Plan

This chapter constitutes EBMUD's 2010 Water Shortage Contingency Plan, which is adopted with the resolution adopting the UWMP 2010. During times of extreme shortages, including a catastrophic interruption of water supply, EBMUD implements the Water Shortage Contingency Plan. EBMUD evaluates the availability and reliability of its supply each year in accordance with its Water Supply Availability and Deficiency Policy.

Introduction

Section 10632 of the California Water Code requires UWMPs to include an urban water shortage contingency analysis, which is incorporated into an Urban Water Shortage Contingency Plan (Contingency Plan). The relevant section of the Code is included in Appendix A. In 1992, EBMUD adopted its first Contingency Plan in Resolution 32568 as required by the Water Code. This chapter constitutes an update to that 1992 Contingency Plan as a result of the following:

- a significant increase in the population in EBMUD's service area;
- the drought management program in 2007-2010;
- the completion of the Freeport Regional Water Project (FRWP);
- a change to EBMUD's customer rationing policy;
- the increased use of technologies for broader customer outreach;
- the increased uncertainty in water supply reliability due to climate change, the regulatory environment, and water system security challenges; and
- the consideration of planning recommendations from the Urban Drought Guidebook 2008 Updated Edition.

Chapter 1 of the UWMP 2010 discusses the process for the public review, meeting, and hearing for the Contingency Plan. At its meeting on June 28, 2011, the EBMUD Board of Directors adopted its 2010 Urban Water Shortage Contingency Plan as part of the UWMP 2010. A copy of the Board Resolution is included in Appendix D of this UWMP 2010.

Purpose of a Water Shortage Contingency Plan

The EBMUD water supply system, like other large systems, is vulnerable to droughts and disasters, such as earthquakes, floods, regional power outages, and water contamination, that result in water shortages. Extreme water shortage events resulting from these disasters could compromise EBMUD's ability to supply water for drinking, fire fighting, and treating wastewater.

The Contingency Plan guides the planning and response to these emergencies through prudent management of the water supply. It lays out an orderly process for EBMUD to collect information on water supply availability, to assess conditions, and to respond appropriately based on the severity of the situation. The Contingency Plan describes EBMUD's broad powers to implement and enforce regulations and restrictions for managing a water shortage when it declares a water shortage emergency under the authority of the Water Code. It also describes EBMUD's predetermined actions to manage supply and demand before and during a water shortage to ensure a reliable water supply system. In an emergency, EBMUD dedicates the water supply to meeting essential health, safety, and fire fighting needs.

As required by the Water Code, the Contingency Plan addresses the following elements:

- stages of action in response to water shortages;
- estimated minimum supply available for three consecutive dry years (Chapter 4);
- catastrophic supply interruption preparation and response;
- prohibitions, penalties, and consumption reduction methods;
- analysis of revenue and expenditure impacts due to reduced water sales and mitigation measures;
- water shortage contingency resolution (Appendix D); and
- water reduction monitoring procedure.

The Contingency Plan also outlines EBMUD's local agency level responsibilities to manage water shortage conditions, which support both regional and statewide efforts to manage water in an emergency. The section on Emergency Preparedness Program details EBMUD's roles and responsibilities to provide mutual aid and highlights expected coordination efforts with State agencies. This coordination fits the State strategy to prepare for, respond to, and recover from droughts and water shortages as

discussed in the California Drought Contingency Plan (CDCP), November 2010. As a product of the California Water Plan development process, the CDCP is anticipated to minimize drought impact, enhance recovery, foster communication, and coordinate among agencies/organizations. The CDCP defines roles and responsibilities of state agencies, establishes the structure for integrating state interagency planning, and identifies an integrated regional approach to assessing droughts, drought action levels, and appropriate agency responses as drought severity changes.

Drought Planning Sequence

During some historical dry periods when runoff from the Mokelumne River Basin was insufficient to meet service area demands, EBMUD relied on stored water in its reservoirs to meet most of its customers' water needs. The worst hydrologic drought event in EBMUD's history was the 1976-77 drought, when runoff was only 25 percent of average and total reservoir storage decreased to 39 percent of normal. In September 1977 (at the end of the 1977 "water year") with an uncertain precipitation and runoff forecast for the following year, EBMUD continued to mandate rationing to avoid depleting the system storage. Fortunately, a very wet year (beginning in 1978) followed the critically dry year of 1977 and contributed to the system's rapid recovery. If the drought continued into the third dry year in 1978 and rationing had been lifted, EBMUD would not have had sufficient water to meet customer needs or its downstream obligations.

Three consecutive extremely dry years could occur. To plan for the possibility of such an event, EBMUD uses a three year "drought planning sequence" to assess the adequacy of its water supply. This maximum credible drought event defines EBMUD's need for additional water in its integrated water resources planning. The first and second years of this drought planning sequence are modeled with the runoff that occurred in 1976 and 1977, the driest recorded two-year period. The runoff in the third year is assumed to be 185 thousand acre-feet (TAF), which is an average of the runoff from 1976 and 1977. EBMUD's water planning model further assumes that such a severe drought would not continue beyond the third year of this sequence and that all accessible storage would be depleted during the third drought year.

Chapter 4 of this UWMP 2010 provides an assessment of EBMUD's supply and demand during normal and drought periods.

Water Supply Shortage Declaration

Drought Committee

EBMUD begins drought preparations early in the calendar year when a water shortage appears possible. Beginning each January, the senior staff member responsible for water supplies takes the lead in monitoring water supplies and, if a shortage is possible, convenes the District's Drought Committee. This committee includes senior staff representing key functions that are affected by and involved in customer response to drought. As warranted by the water supply status, this group initiates response activities necessary for addressing a potential shortage or drought and sets timelines for these activities. This multi-disciplinary team develops staff recommendations regarding water shortage and drought programs and services, manages program implementation, and monitors and reports on results. A second multi-disciplinary team of mid-level staff advises the leadership team and guides program implementation throughout the organization. Key tasks organized by function are shown in Table 3-1.

Water Supply Availability and Deficiency Policy

By May 1 of each year, EBMUD prepares a report that evaluates the adequacy of its current and long-term water supply in accordance with its Water Supply Availability and Deficiency Policy 9.03 (Appendix F). The report provides the Board with the basis for determining whether to enact a Drought Management Program (DMP).

EBMUD adopted its first Water Supply Availability and Deficiency Policy in 1985. Since 1989 when EBMUD revised that policy, water rationing had been limited to a maximum of 25 percent of total customer demand until 2010 when the Board adopted Policy 9.03. That policy lowered the customer rationing threshold to a maximum of 15 percent of total annual demand if additional supplemental supplies are developed. The new policy is designed to lessen the burden of rationing during extended droughts on customers. On-going water conservation and recycling have decreased the flexibility customers have to further reduce demand during droughts. However, unless dry-year supplemental supplies (as discussed in Chapter 2) are secured, and water conservation and recycled water initiatives are fully carried out, EBMUD may not be able to limit rationing to 15 percent.

Table 3-1 Drought Committee Key Roles and Responsibilities

Communications
■ Explain the reasons why the water shortage occurred, the elements of EBMUD's DMP, and what is expected of customers and employees.
■ Provide opportunities for public input and feedback on customer actions as the drought response continues.
Customer Service Management
■ Provide conservation services to help customers save water.
■ Bill customers consistent with drought regulations and help customers understand charges.
■ Enforce water use restrictions through Board-approved fees and/ or service interruption.
■ Enforce water use prohibitions (e.g. irrigation restrictions, no new meters, no hydrant meters.)
Data Management
■ Complete programming to set customer water use allocations, update the billing structure, and modify EBMUD's website to accommodate drought-related programs and services.
■ Prepare and run reports that provide data to manage and evaluate drought programs and services.
Financial Management
■ Analyze costs of providing drought services and perform rate analyses to recommend drought rates and charges.
■ Monitor budgetary impacts.
Legal Support
■ Clarify legal authority and restrictions on EBMUD drought programs.
■ Advise on water use restriction enforcement.
Recreation Management
■ Plan for recreational impacts of lowered reservoir levels and communicate issues to users.
Water Operations
■ Provide updated information as needed on the water supply.
■ Assure all EBMUD facilities and maintenance activities use water efficiently and avoid water waste.
Water Recycling Operations
■ Make recycled water available for construction and other uses.

Water Supply Shortage Response

Drought Management Program

EBMUD's Drought Management Program (DMP) is designed to minimize drought impacts on EBMUD customers while continuing to meet stream flow release requirements and obligations to downstream water users. In conjunction with Policy 9.03, the DMP provides guidelines to manage demand so that customer needs can be met in the following year with carryover storage at no more than 15 percent deficiency in the system. The DMP guided EBMUD in successfully managing demand during mandatory and voluntary rationing periods in calendar years 1976-1978, 1987-1994, and 2007-2010 when supplies were limited. Under the previous policy, water rationing was anticipated to not exceed 25 percent of total annual customer demand despite a supply that could drop below 50 percent of normal, such as during the 1976-1977 and 1987-1992 hydrologic droughts.

Stages of Action

The supply storage projected in April for the end of a water year in the Water Supply and Availability Report determines the need for requiring customers to change their water use. The DMP level of rationing is dependent on supply storage, modeled after the DMP guidelines established in the 1992 Contingency Plan and modified to reflect the maximum 15 percent rationing goal as adopted by the Board in October 2009. The DMP follows this process:

- based on water year runoff predicted in April, estimate total system storage that will be available at end of water year (September 30);
- if total system storage is projected to be less than 500 TAF, prepare and implement a DMP; and
- adjust the DMP as conditions change during an extended dry period.

The resulting Long-Term Drought Management Program Guidelines are shown in Table 3-2.

TABLE 3-2 LONG-TERM DROUGHT MANAGEMENT PROGRAM GUIDELINES

STAGE	APRIL PROJECTION OF TOTAL SYSTEM STORAGE[1] ON SEPTEMBER 30[2]	PERCENT OF MAXIMUM SYSTEM STORAGE[3]	RATIONING REDUCTION GOAL	VOLUNTARY/ MANDATORY
NORMAL	500 TAF OR MORE	65% OR GREATER	NONE	
MODERATE	500 – 450 TAF	59% TO 65%	0 TO 10%	VOLUNTARY
SEVERE	450 – 300 TAF	39% TO 59%	10 TO 15%	MANDATORY
CRITICAL	LESS THAN 300 TAF	39% OR LESS	15%	MANDATORY

[1] Total System Storage represents total storage in Pardee, Camanche, and Terminal reservoirs.
[2] Without consideration of supplemental supplies that may be available.
[3] Maximum system storage represents the maximum Total System Storage capacity of approximately 767 TAF.

Effective in 2010, EBMUD implemented Interim DMP Guidelines (Appendix G-2.1), which reflect the temporary reduction in customer demand resulting from the residual effects of the recent drought and the adverse economic conditions, and account for dry-year water available from EBMUD's Central Valley Project (CVP) contract through the Freeport Regional Water Facility. The revised guidelines will remain in effect until the economy recovers and post-drought consumption rebounds to demand planning levels in the 2040 Demand Study.

Typical actions that may be undertaken during each stage of a drought are presented in Table 3-3. EBMUD's response to the Severe Drought Stage is applicable for system storage at less than 50 percent of maximum.

Central Valley Project Public Health and Safety Supply

EBMUD, like all CVP contractors, receives an allocated CVP supply from the United States Bureau of Reclamation (USBR) during shortage conditions. If drought conditions become severe, cutbacks in allocations may have to be limited to sustain a "Public Health and Safety" (PH&S) level of supply. The USBR determines the quantity of CVP water needed to supplement EBMUD's supply up to that PH&S level during a critical drought. Appendix G-1, as part of this Contingency Plan, discusses operating principles for the EBMUD system to be recognized in estimating EBMUD's available supply from non-CVP sources in a critical drought. An illustration is also provided on EBMUD's approach for determining the minimum CVP supply required to meet PH&S needs in a critical drought when the USBR's initial allocation is less than the amount requested by EBMUD.

EMERGENCY PREPAREDNESS PROGRAM

Under Policy 7.03 (Appendix F), EBMUD maintains an active emergency preparedness program and coordinates emergency responses with other public and private organizations. EBMUD's Security and Emergency Preparedness Section coordinates and publishes the EBMUD Emergency Operations Plan (EOP), which details the internal organizational structure used in the response to all emergencies, including regional power outages and earthquakes. The EOP was last revised in 2009 and fully complies with the California Standardized Emergency Management System (SEMS), which includes all National Incident Management System (NIMS) guidance for federal emergency operations plans. EBMUD also prepared Business Continuity plans for all key departments and functions in coordination with EOP actions.

In response to an emergency incident or an event requiring significant planning for a potential emergency, a well-trained team of EBMUD personnel will form the Emergency Operations Team (EOT) to carry out the five SEMS functions (Command/ Management, Operations, Planning, Logistics, and Finance/ Administration). Operating under the EOP, the Operations Section Chief establishes response priorities based on the nature of the emergency, focusing on actions to address life safety, incident stabilization, restoration of normal operations, and working with the Planning Section to determine the needs for mutual aid/ assistance resources, the scope of work to be done, and the planning objectives to accomplish this work.

Inter-Agency Emergency Support

Mutual Assistance and Coordination With Other Agencies

Effective coordination with state and local agencies is critical in responding to a catastrophic event that interrupts water supplies. As one of the eight major water suppliers in the San Francisco Bay Area, EBMUD, as do the other agencies, recognizes that in the event of a regional catastrophic event, assistance from other local agencies is not guaranteed. To mitigate the risk of limited access to local mutual aid, EBMUD entered into an agreement with Los Angeles Department of Water and Power (LADWP) to mutually supply as much of the requested resources as

Table 3-3 Drought Management Program Elements

Drought Stage	Actions
Moderate Shortage <10%	■ Establish voluntary or mandatory water use goals and determine use restrictions needed and services that will be offered to help customers comply with the restrictions. ■ Initiate a public information campaign to explain the water supply issues and what customers need to do. Work with the media and key stakeholder groups to promote customer awareness of the shortage. Increase advertising of water-saving devices provided free to customers and other free conservation services. ■ Increase efficiency of system water supplies, e.g. Intensify enforcement of hydrant-opening regulations; increase meter-reading efficiency and meter maintenance; and intensify leak detection and repair program. ■ Prepare and disseminate educational information (web site information, bill inserts, etc.) that explain the water shortage and ways in which customers can save water. ■ Conduct outreach to specific customer types on ways to save water.
Severe 10% < Shortage <15%	■ Declare a water shortage emergency (depending on available supplies for future years). ■ Implement rate and water restriction changes appropriate to shortage. ■ Intensify all of the moderate stage steps. ■ Institute rate changes to promote conservation, if mandatory water use restriction program is in place. Explain new rate schedules to customers. Explain further reductions planned for succeeding rationing stages. ■ Seek and procure a supplemental water supply (depending on available supplies for future years.)
Critical Shortage >15%	■ Intensify all of the severe stage steps.

possible to the other agency, if a regional disaster impacts only one of the agencies. EBMUD is also a member of the Water Agency Response Network (WARN), which is an Omnibus Mutual Aid/ Assistance Agreement with water agencies throughout the state. The signatories may be called upon during an emergency to provide available resources.

Coordination Among Local, County, Regional, State, and Federal Governments

EBMUD and other special districts, such as schools and parks are considered local government agencies, which coordinate resources and manage operations in an emergency at the local level and interface with the Operational Area Emergency Management Agency. In California, each county is responsible for maintaining the Operational Area Emergency Management Agency. The State is divided into six regions, each of which is responsible for maintaining a Regional Operations Center (REOC). The State of California, which regulates SEMS, maintains the Emergency Management Agency that oversees these REOCs and the Operational Areas at the State Operations Center (SOC).

SEMS was mandated by Government Code 8607 following the 1991 East Bay Hills Firestorm. Reimbursement for claims filed after a disaster requires that all EBMUD emergency plans, procedures, and training follow the SEMS regulations, and that they directly correlate with the EOP. The SEMS in California and the guidelines for training for all emergency responders roll up from the states to the federal government under the national response framework. Each state has a Principle Coordination Official assigned by the federal government to coordinate planning and response under the Emergency Support Functions (ESF) established by the federal government.

In 1995, EBMUD partnered with 14 federal, state, and public agencies to develop procedures for obtaining potable water in an emergency. This California Potable Water Task Force published its January 1996 Multi-Agency Emergency Response Procedures for Potable Water Procurement and Distribution report. In 2007, EBMUD spearheaded the efforts of a working group that includes the eight largest water agencies in the Bay Area, Operational Area, and Bay Area Regional Emergency Management Agencies to update this document. Published in its second edition and formally adopted by the State of California for the first time, this document is intended to allow water agencies to request assistance from city, county, or regional SEMS response levels to acquire and distribute potable water during a state or local emergency in California. This allows water agencies that sustain heavy damage to focus on rebuilding and returning their system to a level of service that can be depended upon.

WATER SUPPLY SHORTAGE MITIGATION

In addition to managing demand, EBMUD devotes significant effort to supply-side conservation measures to extend the water supply. As part of its long-term planning, EBMUD will undertake several supplemental water supply initiatives as identified in Chapter 2. These ongoing efforts to secure supplemental supplies will provide customers not only with partial relief from frequent and severe water rationing during droughts, but also with greater assurances against other possible adverse situations, such as emergency water shortages.

However, during extreme and catastrophic water shortage conditions, EBMUD may need to explore supplemental water supply options that temporarily augment supply. Constraints, such as obtaining environmental and regulatory approvals in time to alleviate drought effects, can be overcome with streamlined planning. Temporary supplemental water supply options include:

- trucking recycled water to replace potable water use;
- drawing from reserve supplies (180 days of standby storage normally available in the terminal reservoirs);
- drawing down Camanche Reservoir dead storage (about 4,000 AF available below the low-level intake structure elevation); and
- emergency transfers.

WATER RESERVE DRAWDOWN

EBMUD's terminal reservoirs are normally operated to maintain a sufficient amount of emergency standby storage that can meet rationed customer demand for 180 days if the Mokelumne River supply is disrupted. After the emergency ends, the Mokelumne River supply is used as soon as practical to refill the terminal reservoirs to meet minimum standby storage levels. Emergency supplies through interties with the Contra Costa Water District (CCWD), San Francisco Public Utilities Commission (SFPUC), Dublin San Ramon Services District (DSRSD), and City of Hayward (Hayward) also help EBMUD's recovery in re-establishing that 180 day standby storage level.

SUPPLY-SIDE WATER USE EFFICIENCY

Supply-side conservation is part of EBMUD's standard operating practices, and includes maintaining aggressive water distribution system leak detection and repair programs, regularly testing and replacing meters, and implementing on-going pipeline replacement projects. During droughts and water shortages, EBMUD expands potential supply-side programs during droughts by including system pressure management and visible conservation strategies at District facilities, such as limiting irrigation and use of water features.

INTERTIES AND AGREEMENTS FOR TRANSFERS AND EXCHANGES

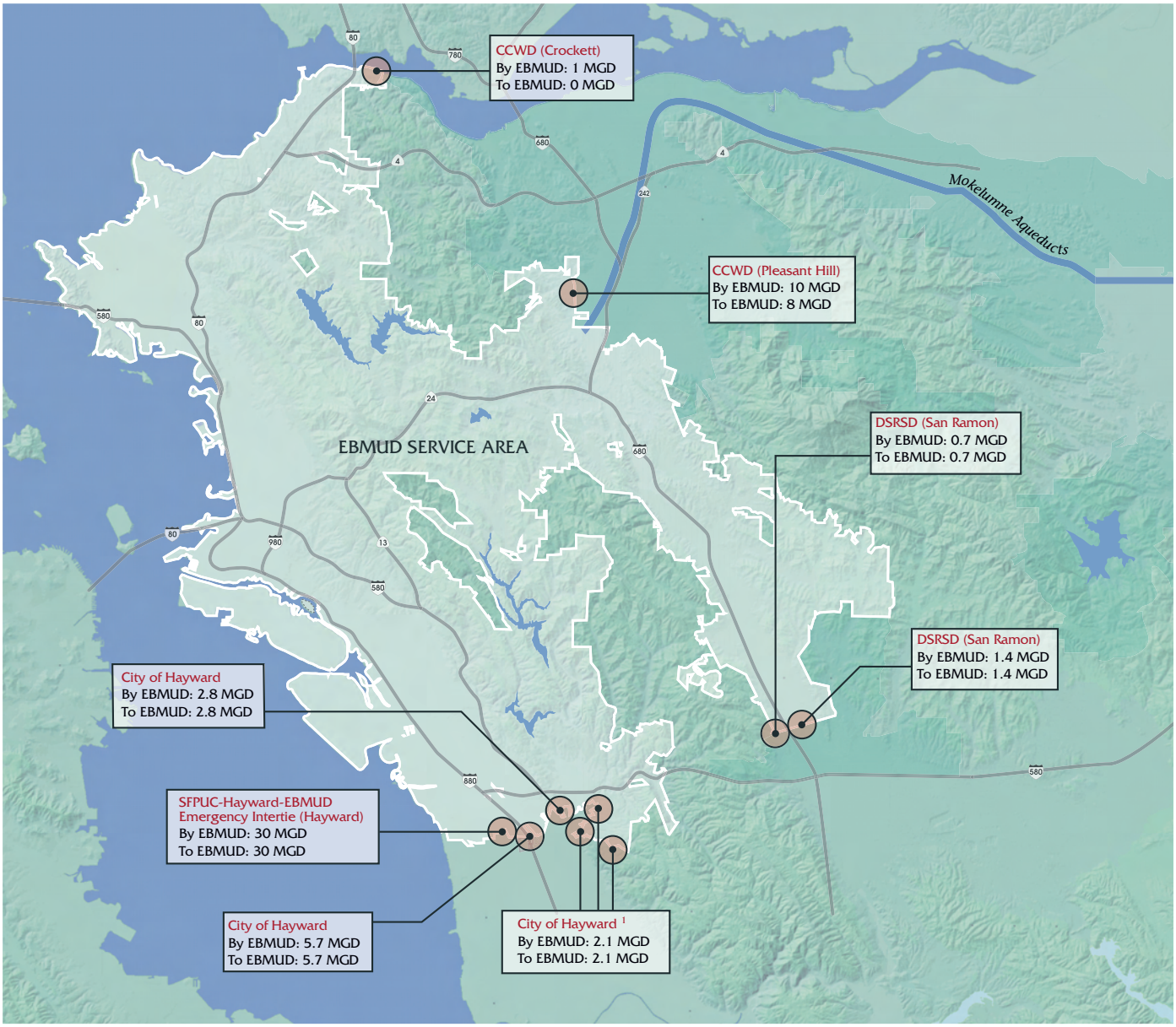
Through its involvement in the Bay Area Water Agencies Coalition, EBMUD continues its efforts to formulate and to support mutually agreeable actions, including the development of interties that improve water quality and supply reliability for the Bay Area. As a partner agency in providing mutual aid, EBMUD has limited, short-term water sharing agreements for emergencies with several neighboring agencies, including SFPUC, DSRSD, Hayward, and CCWD. Transfer/ exchanges are made only for a short-term period of one year or less. These agreements would provide an alternate source of water during planned facility outages and for emergency mutual aid to the parties, but situations involving a shortage of water due to high demand or drought do not apply. Figure 3-1 illustrates these emergency interties for transfers/ exchanges in EBMUD's service areas and lists the agreed upon quantities for transfer/ exchange with water service agencies during emergencies. EBMUD, the Freeport Regional Water Authority, County of Sacramento, and Sacramento County Water Agency entered into a long-term non-emergency agreement for water delivery with CCWD and separately with Santa Clara Valley Water District (SCVWD) as part of the negotiated settlement of the Freeport Regional Water Project (FRWP) EIR/ EIS.

Agreement for Emergency Water Services With SFPUC-Hayward-EBMUD

In 2002, EBMUD formed a regional partnership with SFPUC and Hayward to construct the SFPUC-Hayward-EBMUD Intertie Project (Intertie Project). This project increases water service reliability by allowing EBMUD and SFPUC to obtain a short-term water supply during emergencies or planned outage of critical facilities. Up to 30 MGD could be provided to either EBMUD or SFPUC and Hayward through the intertie. The Intertie Project included a new pump station and 1.5 miles of pipeline within Hayward, with minor improvements in EBMUD's and SFPUC's water systems. Construction was completed in 2007.

FIGURE 3-1

EMERGENCY INTERTIES FOR SHORT-TERM TRANSFERS AND EXCHANGES
WITH MAXIMUM FLOWS



[1] Emergency Water Transfers/Exchanges to City of Hayward are supplied through connections between fire hydrants instead of through dedicated constructed appurtenances.

Agreement for Emergency Water Services with City of Hayward

EBMUD has two locations earmarked for connecting smaller interties (2.8 and 5.7 MGD) with Hayward's water system under a 2000 agreement, and three additional sites for treated water transfer through fire hydrants (2.1 MGD each) under a 1994 agreement. Interconnections are made only for a short-term basis by mutual consent and under emergency conditions, and are not substitutes for standby or reserve sources of water for normal operations. Hayward's and EBMUD's personnel would connect the systems during a declared emergency in accordance with the conditions outlined in the agreements. Supplied water would be metered, and expenses would be billed to each agency as outlined in the agreements.

Agreement for Emergency Services with DSRSD

The 1990 agreement with the DSRSD identified two locations available for transferring treated water between the two agencies at up to 1.4 MGD at one and up to 0.7 MGD at the second location. The process and billing are outlined in an agreement similar to that with Hayward.

Agreement for Emergency Services with CCWD

Per the 2002 agreement with CCWD, intertie locations can be added, removed, or modified as mutually agreed upon by each agency. Currently two intertie locations are identified. Up to 1 MGD could be provided to CCWD at one location. The second location could allow transfer of up to 10 MGD to CCWD and up to 8 MGD to EBMUD. One agency will provide the other with water quantities that will reasonably meet needs during the emergency without endangering the supplying agency's system and overall supplies.

Agreement for Non-Emergency Services with CCWD

The 2004 agreement allows CCWD to request and receive from EBMUD 3,200 acre-feet per year (AFY) at a maximum rate of 100 MGD of water wheeled via EBMUD through the Freeport Regional Water Facilities. Wheeling cannot occur if there are unavoidable capacity-limiting conditions that prohibit either EBMUD or the Freeport Regional Water Authority (FRWA) agencies from meeting the request. CCWD, which completed construction of the interconnection facilities at the intersection of the Mokelumne Aqueducts and Los Vaqueros Pipeline in Brentwood in 2007, would pay wheeling costs for water received. The rate of delivery of the wheeled water is determined annually and concurrently with the wheeling schedule.

Agreement for Non-Emergency Services with SCVWD

The 2003 agreement entitles the SCVWD to 6.5 TAF of EBMUD's CVP contract allocation in the first year the supplemental supply from the Freeport Regional Water Facility is invoked. At EBMUD's request, the SCVWD will return the water in the second or third dry year if the drought continues. If the drought does not continue (i.e. EBMUD's Total System Storage at the end of September exceeds 500 TAF), the SCVWD will compensate EBMUD for the 6.5 TAF of CVP water taken in the first dry year. The cost of water for EBMUD and the SCVWD will be in accordance with the terms specified in each agency's USBR water service contract. The SCVWD will take delivery of EBMUD's CVP water at the Tracy Pumping Plant, and EBMUD will take delivery of the SCVWD's CVP water at the Freeport Regional Water Facility.

DEMAND REDUCTION METHODS

DROUGHT COMMUNICATION PLAN

During a water shortage emergency, EBMUD implements an aggressive public education program to promote water use reductions and improved efficiencies. The campaign explains the potential impacts of a water shortage, methods to reduce water consumption, and customers' responsibilities during a shortage. At the onset of a water shortage, EBMUD develops a detailed Drought Communication Plan (DCP) (a component of the DMP) to relay clear information to customers and other stakeholders. Components of an effective DCP include a set of well-defined, focused key messages and an action plan detailing all communication activities. The DCP outlines general and targeted communication methods. General communication methods focus on creating a strong advertising campaign, intensifying media and stakeholder outreach, and making available helpful information to customers via the web, through mailings with customer bills, and through the customer contact center. Targeted communication methods focus on increasing direct contact with high-volume water users, proactively offering more support to customers through conservation training and tools, and increasing EBMUD's interactions with customers about their water use.

General Communication Methods

Advertising Campaign and Media Outreach

Advertising campaigns used in past droughts included broadcasting conservation messages throughout the EBMUD service area on radio and cable television, in local newspapers and magazines, on bus exteriors, and on EBMUD billboards. In these campaigns, EBMUD expressed appreciation for customers' response and offered continual encouragement to customers to save water and money by fixing leaks and installing efficient outdoor landscape irrigation. EBMUD also has participated in regional advertising campaigns on radio and television when the messages between EBMUD and the region were consistent.

Customer Service on the Phone and Web Site

To ensure a continuous level of quality customer service during a water shortage, EBMUD invests in systems that support customer contacts and customer billing functions. Drought periods increase the customer contact center volume, and EBMUD ensures adequate staffing to respond to customers' questions and requests for assistance. Drought periods increase web site use by customers, and

in recent campaigns the web has proven to be an effective tool to disseminate information to customers and the media on demand.

Targeted Communication Methods

Increased Customer Direct Contact

During water shortage periods, EBMUD initiates significantly more direct customer contacts and responds to significantly more contacts from customers. Water conservation and field services staff monitor the service area and distribute drought messages and water savings devices, encourage water savings, assist customers in changing their water use, and educate customers on voluntary program requirements, and enforce mandatory requirements. Direct mail is used to deliver specific messages about water conservation targeted to specific user groups. "Out-dial" calls are used to alert customers to the start of the drought program and request curtailed water use during especially prolonged hot weather.

Increased Public Outreach

EBMUD routinely conducts outreach to civic, community, non-governmental and business groups, homeowner associations, nurseries, schools, and local officials. This work expands when the need to communicate shortages or drought information to customers develops. EBMUD educates local stakeholder groups and seek their assistance in communicating with their constituents, which generates a multiplier effect as they share the information with additional customers.

Water Use Restrictions

Prohibitions and Penalties

EBMUD has two regulations that prohibit water waste. Section 29 (Prohibiting Wasteful Use of Water) of the *Regulations Governing Water Use by Customers of the East Bay Municipal Utility District* in Appendix F is continuously in force. Section 28 (Water Use During Water Shortage Emergency Condition) is adopted when the EBMUD Board of Directors declares a Water Shortage Emergency.

Section 29 describes on-going actions that residential and non-residential customers must observe to eliminate wasteful use. Under normal water conditions, the provisions of Section 29 are enforced through customer education. Under this program, EBMUD responds to customer and field staff reports of over-watering and water waste. Water conservation and field services personnel apprise the responsible customer of the wasteful conditions and provide recommendations on repairing leaks or using water more efficiently. If the customer cannot be located, and the water loss is significant, staff may turn off the water at the meter until the customer is contacted or the problem is resolved. The ongoing provisions in Section 29 are supplemented temporarily with additional water use restrictions invoked through Section 28 when a DMP is adopted.

Section 28 identifies water use rules and provides guidance to customers on reducing water use during a declared water shortage emergency. Provisions in that section are tailored to the severity of the water shortage. Section 28 defines water use allocations and reduction goals based on customer account type, prohibits certain types of water uses, provides guidelines on efficient water use, provides for enforcement measures, and may include drought rates. It may also include restrictions on annexations and new connections in conjunction with Section 31 on Water Efficiency Requirements for new water services (see Appendix F). These regulations are enforced with warnings, installation of flow restrictors, and, finally, disconnection of service. Drought rates under Section 28 are implemented using a two-step rate setting process through public notification and adoption at a public hearing.

Section 28 was adopted in May 2008 in response to a severe water shortage emergency and subsequently rescinded in June 2009 when the water supply condition improved. Examples of prohibitions enforced during the recent drought included:

- filling and operating decorative ponds, lakes, and fountains;
- washing vehicles using hoses without shutoff nozzles;
- washing hard-surfaced areas not required for public health and sanitation;
- irrigating outdoor lawns frequently;
- creating wasteful run-off;
- flushing sewers, hydrants, or washing streets with potable water not for essential operations; and
- using potable water for construction, soil compaction, and dust control instead of available alternatives (e.g. recycled water).

Water Waste Restriction Enforcement

During a water shortage, staff monitors the service area to encourage water savings, assists customers in changing their water use, and enforces program requirements and water waste prohibition rules. In the recent shortage, EBMUD developed a Water Savings Team staffed by EBMUD employees that patrolled the service area

responding to reports of water waste, placing warning hangers on doors, educating customers to save water, and assisting customers with conservation activities, such as identifying leaks and installing water-efficient fixtures and appliances.

During shortages, a higher volume of calls are received from neighbors who report water waste within their communities via the EBMUD website and Water Waste Hotline. The location and nature of the waste are reported to the Water Savings Team, who follows up on necessary corrections. The reporting system also helps staff adjust priorities for responding to reported distribution system leaks.

WATER CONSUMPTION REDUCTION

EBMUD partners with its customers to implement customer-oriented rationing programs that produce significant and sustained demand reductions. In past droughts, EBMUD has encouraged water consumption reduction using a combination of a tiered-volume rate structure for single family residents and uniform rate increases for other customers. In addition, surcharges have been applied to individual accounts when consumption exceeded water use allocations. Incentives and rebate programs that encouraged greater water use efficiency and enforcement of water waste restrictions further supported customer water savings efforts. Appendix G-3 details actions implemented during the 2008-2009 DMP and lessons learned that could be applied in future droughts. The specific response to each impending drought will continue to be developed with community input.

Maximum Rationing Targets

EBMUD will implement a maximum rationing level of up to 15 percent of total annual customer demand in conformance with Policy 9.03. Table 3-4 lists example customer category reduction goals that EBMUD estimates would be required to achieve this district-wide rationing target. Specific reduction goals by customer class are set by EBMUD's Board of Directors after the Board declares a drought.

TABLE 3-4 EXAMPLE OF CUSTOMER CATEGORY REDUCTION GOALS

CUSTOMER CATEGORY	REDUCTION GOAL*
SINGLE-FAMILY RESIDENTIAL	19%
MULTI-FAMILY RESIDENTIAL	11%
COMMERCIAL	12%
INSTITUTIONAL	9%
INDUSTRIAL	5%
IRRIGATION	30%
TOTAL CUSTOMER DEMAND RATIONING GOAL	**15%**

*Annual average goals estimated to achieve 15% reduction of year 2040 total demand.

The reduction goals are based on an analysis of the total demand of each customer category, the outdoor water use of each category, and the potential aggregate economic impact on the service area. Several factors are considered: drought management principles; analysis of historical consumption; and likelihood that customers in each category can achieve their water use reduction goals through indoor and outdoor demand management. The distribution of rationing varies across customer categories, and the actual savings from each customer category could vary due to several factors, including methods of implementation and enforcement. Modeled from the experience of the 2008-2009 DMP, key assumptions and data for setting customer goals are:

1. Balancing water use reductions across customer categories based on four principles:
   - emphasizing reductions in non-essential uses of water;
   - avoiding and limiting impacts to the economy and the environment;
   - safeguarding water supplies for uses that meet public health needs; and
   - considering the perceived equity of water use reduction expectations.
2. Evaluating each customer category's actual historical consumption:
   - determining the percent of total water demand by customer category, and
   - determining the percent of indoor and outdoor demand by customer category.
3. Gauging customer response to water savings measures:
   - assessing the likelihood of achieving the potential savings from each measure;
   - assessing research on customer ability and willingness to comply with measures; and
   - considering previous EBMUD experience in managing and monitoring measures.

Water Use Allocation

During the 2008-2009 DMP, individual water use allocations and baseline uses were printed on water bills for each billing cycle to help customers gauge their progress toward meeting their conservation goals. A

discussion of the process used in the 2008-2009 DMP for determining baselines and allocations is included in Appendix G-3. As rationing begins in the second half of the year following the first recognition of drought conditions in April when the annual Water Supply Availability and Deficiency report is prepared, allocations are set at one-half of the year's reduction goals in the first dry year for practicality. This allocation is also considered in the water supply management and planning process. During the 2008-2009 DMP, private fire service, hydrant meter, recycled and raw water accounts were exempt from water use allocation assignments.

Drought Rate Structure

When a DMP is adopted, EBMUD considers increasing water rates and adding drought surcharges both to give customers a financial incentive to conserve water and to maintain adequate system revenue during periods of reduced water sales. Drought rates and surcharges are uniquely determined for each drought event. Appendix G-3 includes a discussion of the drought rate structure adopted for the 2008-2009 DMP, which is provided as a past example, but does not necessarily reflect future planned actions.

In 2008-2009, the drought rate structure increased water volume charges across the three existing tiered inclining rates for Single Family Residential (SFR) customers but exempted those SFR customers whose usage did not exceed 100 gallons per day in a billing period. This structure provides an incentive to conserve water since the rate and total charges are directly proportional to water use. Higher drought volume charges also apply to the existing single-tier rate for non-SFR customers.

The 2008-2009 drought surcharge added an additional water volume charge to each customer's consumption that exceeded their allotted water use. Some customers affected by special circumstances were eligible for exemptions to the drought surcharge. Exceptions for residential customers included medical requirements, incorrect customer classification, inappropriate basis of historical use from change in ownership or tenancy, and change in occupancy. Exceptions for non-residential customers included creation of unnecessary and undue hardship including adverse economic impacts, and causing an emergency condition affecting sanitation, fire protection, or customer/ public health and safety. Recycled water customers, who met their needs by substituting potable water with sufficiently available recycled water sources, were also exempt. In addition, raw water customers were exempt from the drought rate structure for reasons similar to the recycled water customers.

Potentially an additional surcharge will be imposed on all potable water consumed whenever supplemental water is delivered to EBMUD through the Freeport Regional Water Facility. EBMUD will develop the specific approach for each future drought. Supplemental water benefits all customers by increasing water supplies to reduce the need for water rationing and drought restrictions. A surcharge recovers the added Freeport operating costs. The duration of the applied surcharge will be adjusted to recover the actual operating costs.

Consumption Reduction Monitoring

EBMUD monitors customer consumption during a drought to assess the effectiveness of its DMP in reducing water use. The consumption data helps determine the need to propose refinements to the drought rate structure or to adjust public outreach efforts to garner greater response.

Customer Consumption and Water Production Monitoring

During a DMP, EBMUD evaluates both billed consumption and daily water production data relative to reduction goals. Using this process, staff gauges EBMUD's effectiveness in managing overall demand and customers' responsiveness to conserve. The results are presented to the EBMUD Board of Directors in regular drought management reports. The reporting frequency depends on the level of activity occurring and the severity of the drought.

EBMUD customers' accounts are metered, providing bi-monthly (single-family residential) and monthly consumption data that can be evaluated by customer category characteristics. Water production data tracks treated water input to the distribution system leading to customers' taps. Temperature variations are also tracked with water production to observe the effects of weather conditions on consumption behavior. Using financial records summarized from customer bills, EBMUD analyzes whether customer groups are reaching their conservation targets based on the distribution of customers affected by drought surcharges and higher drought rates.

EBMUD assesses the effectiveness of its demand management programs on the projected water supply in each report. This ensures timely action can be taken to recommend improvements to the DMP for Board consideration if results fall short of EBMUD's water use reduction goals.

Water Bill Monitoring

The success of a DMP depends on customers reducing their water use. Experience shows that providing clear feedback on consumption relative to goals, benchmarking efficient water use among customer sectors, clearly stating the financial penalties for overuse, and acknowledging customers' efforts to save water all reinforce prudent behavior. EBMUD uses its Customer Information System (CIS) to inform customers of their current and past water uses and allocations through printed messages on customer water bills. This information helps customers monitor their individual rationing efforts and encourage adjustments to usage.

In 2008-2009, each customer received a customized bill that compared current use to the consumption baseline, customer category goal, and the individual customer allocation goal that would trigger a drought surcharge if the goal was not met. The bill itemized charges at the drought rate and applicable drought surcharges for use that exceeded the allocation goal.

Financial Impact Analysis

Water sales provide approximately 76 percent of EBMUD's operating revenues. The balance includes fees and charges, taxes, hydropower sales revenue, and interest. Appendix F includes the water rates.

In addition, EBMUD sells bonds and maintains financial reserves. These funding sources affect EBMUD's annual operating budget and corresponding rate analysis for water sales. EBMUD's budget and related rates and charges are determined by two types of project costs associated with disaster preparation and drought-related water shortages: the multi-year large capital project costs to mitigate disaster and drought-related water shortages, and annual costs for projects in the drought management programs adopted under water shortage emergencies.

EBMUD prepares for disaster or drought-related shortages by investing in major capital improvements that are funded by several different revenue sources. The diversity minimizes impacts on customers and distributes the costs equitably to both existing and future customers through water rates, fees and charges. For example, infrastructure improvements include EBMUD's recently completed Seismic Improvement Program and other major capital projects, such as the seismic strengthening of the Mokelumne Aqueducts, as well as development of EBMUD's supplemental water supply, which are discussed in Chapter 2 of this UWMP 2010.

Impact Analysis of Reduced Sales on Revenues and Expenditures

EBMUD includes an assessment of water availability or deficiency in its financial planning and annual rate review process for budgeting purposes. When the assessment recommends implementing mandatory water use reductions to promote conservation, EBMUD adopts a revenue schedule to allow increasing the volume rate, adding a drought surcharge, and using the contingency and rate stabilization reserve fund to fully recover costs of providing ongoing water service, mitigate expenses of implementing the DMP, and recover lost revenues from lower water consumption. However, when revenues were suppressed in the absence of a drought emergency during the voluntary water use reduction and post-drought demand recovery period from FY10 to FY11, the budget was balanced by reducing expenditures through a hiring freeze, operational efficiencies, and deferred capital projects.

The rates and charges implemented through EBMUD's DMP are designed to distribute the financial impacts equitably to each customer category and to avoid long-term financial impacts to EBMUD. Consumption analyses helps determine the reduction goals for each customer category and the rate adjustments needed to recover revenue.

Revenue recovery covers the increased expenses of the DMP. As an example, Table 3-5 lists items from the $5.2 million 2008-2009 DMP implementation budget.

The actual costs for program elements were under budget for the 2008-2009 DMP as a result of overall management of program costs and strong customer drought response. Costs for the DMP were partially offset by leveraging use of

Table 3-5 2008-2009 Drought Management Program Implementation Budget

Advertising campaign and media outreach	$2,175,000
Increased direct contact with customers, additional staff hires, and conservation rebates, devices and kits	$2,084,000
Increased outreach to community leadership groups and to schools, additional staff hires	$435,000
Ensure high quality customer service on the phone and web site, including additional staff hires	$520,000
Total	**$5,200,000**

existing personnel and equipment and expanding ongoing outreach. EBMUD can selectively reallocate and reassign current employees based on compatible skill sets to different duties to address priorities of the DMP. These functions include responding to outside inquiries, modifying billing software, and conducting and responding to leak surveys. The District's routine public outreach activities also were redirected to focus heavily on drought management.

Increased Resource Demands

Additional resources and revenues are needed to implement a DMP to meet goals and to support expanding personnel and equipment resources, increasing outreach efforts, and offering more water conservation rebates and free devices for distribution.

Human Resources

Employing temporary staff increases salary costs. During a DMP, fiscal year budgets may be amended mid-year to hire temporary staff to increase outreach to include informing customers of their water reduction use goals and conservation tips, assisting them in meeting their goals, and managing and enforcing the drought activity program. Duties may include:

- providing administrative support to respond to customer and media inquiries;
- providing field support to perform water use audits;
- assisting customers in monitoring leaks and conducting water use audits;
- providing information technology support for bill adjustments; and
- assisting with outreach efforts using mass media.

Outreach Efforts

Outreach is intensified during a DMP. Costs and funding increase for media advertisement, web services, publications, automated "out-dial" phone calls, informational and outreach mailings, conservation-related devices offered free to the public, and seminars stressing conservation tips in meeting water use reduction goals. These efforts enable EBMUD to heighten awareness of water use prohibitions, emphasize individual customer responsibilities in the drought, and assist customers with coping with the drought.

Distribution of Water Conservation Devices, Kits, and Rebates

Drought revenues fund DMPs to promote conservation and to assist customers with changing their water use habits. During droughts, EBMUD will distribute more water saving devices and water conservation kits to customers. Devices include showerheads, faucet aerators, small irrigation equipment, sprinkler spray heads, drip irrigation equipment, and soil sensors. Kits include dye tabs, water measurement bags, indoor and outdoor WaterSmart saving tips, and publications. Additional costs are also incurred for increased rebates to improve water conservation and efficiency, such as for toilets and clothes washers, high-efficiency fixtures/ equipment, and water-efficient commercial equipment.

RATE CHANGE NOTIFICATION

Proposition 218 Notice Requirements for Rate Changes

Proposition 218, approved by California voters in 1996, added Article XIII C (taxes) and D (fees and assessments) to the California Constitution. Proposition 218 establishes specific rules for implementing new rates or adjusting rates that apply to EBMUD and other water suppliers proposing to adopt drought rates. Proposition 218 requires that charges cannot exceed the proportional cost of service, written notice of the proposed charges be mailed, a public meeting be held not less than 45 days after the mailing, and if written protests are presented by a majority, the agency cannot impose the fee or charge.

By implementing drought rates in a timely manner, EBMUD increases its ability to successfully manage water supplies during the upcoming warm dry months of the year. Proposition 218 notification requirements control the schedule for selecting and implementing drought rates and charges. Consequently, EBMUD must consider options for drought rate structures prior to the anticipated start of a drought program. Efforts will be coordinated with the water supply forecast and drought planning process of EBMUD's Water Supply Availability and Deficiency report presented by May. This approach provides sufficient time for public input, alternative feasible drought rate design reviews, and deliberation prior to issuing a Proposition 218 notice so that drought rates can be promptly implemented to curtail water use at the height of summer in the affected year.

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Chapter 4. Water Demand

Currently, water consumption within the EBMUD service area has dropped as a result of an economic downturn in the Bay Area, suppressed demand in response to the drought management program, and unusually cool weather. In looking out to year 2040, EBMUD's water supply is not sufficient to meet customer demand during single- and multi-year drought periods. A supply and demand assessment was done based on a land-use based method to forecast demands.

Past and Current Demand

Historical water use within the EBMUD service area is illustrated in Figure 4-1. Total demand has remained relatively constant with some variance despite the increase in the number of water service accounts (or service connections). Water use dipped significantly during periods of drought rationing in calendar years 1976-78, 1987-94, and recently in 2007-2010.

Many factors contributed to the reduced water use from the amount that would otherwise be anticipated including:

- water restrictions imposed for drought management in 1976-78, 1987-94, and recently in 2007-2010;
- EBMUD's aggressive water conservation and recycling activities;
- changed consumption demographics to a variety of land use conversions, many of which also have high efficiency water use patterns;
- legislative changes including new plumbing efficiency standards, landscape ordinances, the 1992 and 2005 Federal Energy Policy Act; and
- the economic downturn within EBMUD's service area and the region that has continued since 2007.

Figure 4-2 displays how total metered water consumption is distributed among different customer categories. The single-family residential customer category is the largest water user category followed by multi-family residential, industrial and petroleum, commercial, irrigation, and institutional users. Approximately 63 percent of the historical total water consumption was delivered to

Figure 4-1 EBMUD Water Accounts and Total Demand

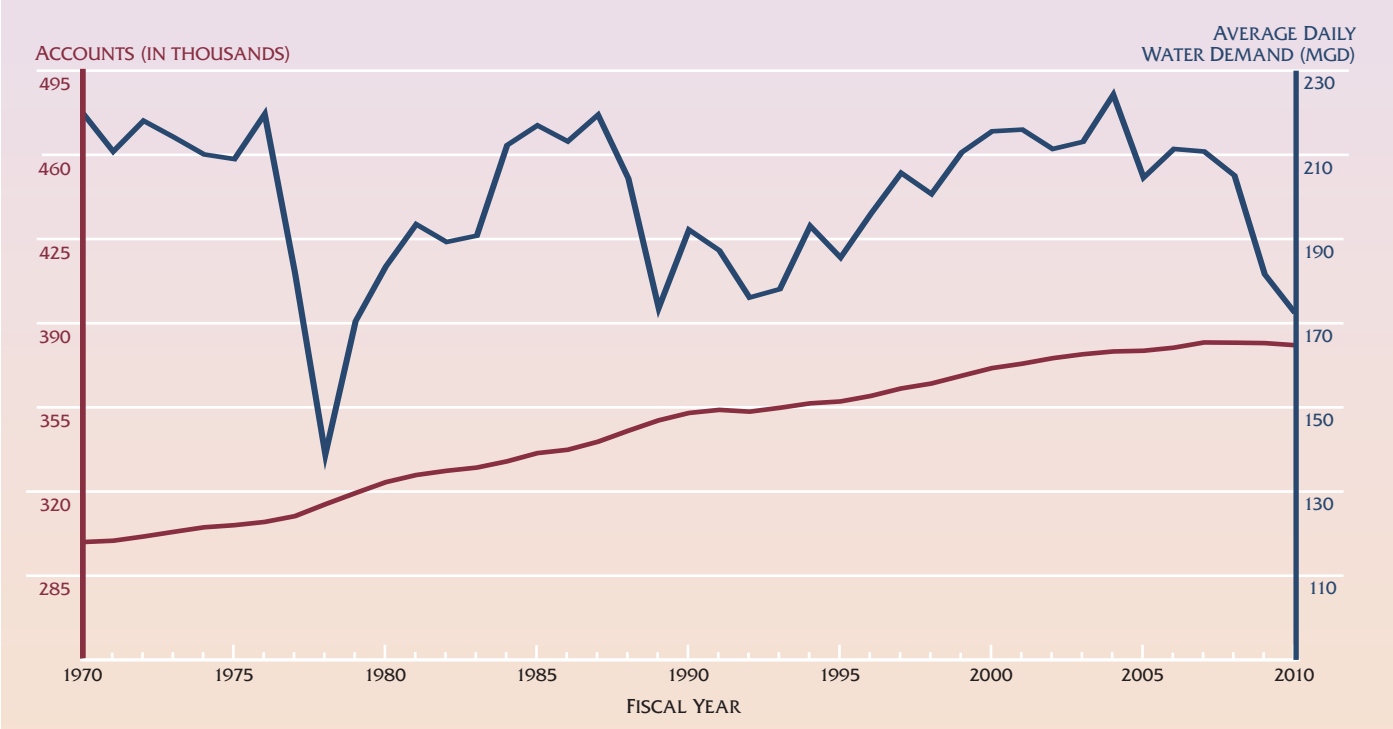
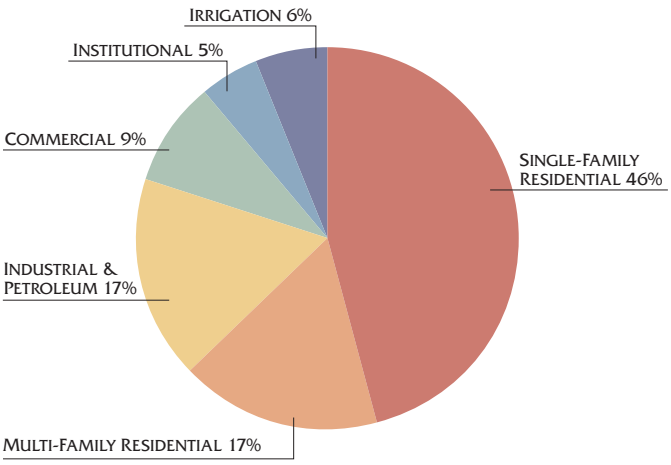


Figure 4-2 Water Use By Customer Category



NOTE:
Based on Calendar Year 1975-2010 consumption data.

EBMUD's residential customers. Historical water use for each EBMUD customer land use category is presented in Figure 4-3. It illustrates the number of accounts and metered water consumption for single-family residential, multi-family residential, industrial and petroleum, commercial, institutional, and irrigation customer categories from 1975-2010.

Other characteristics of historical water use (also from 1975-2010) are illustrated in Figures 4-4 through 4-5. In Figure 4-4, winter season water use is compared to summer season water use for each customer category. In Figure 4-5, water consumption for each customer category is differentiated between accounts situated east and west of the Oakland-Berkeley Hills. Figure 4-6 illustrates the regional variations in historical daily average water use per account for the single-family residential category within the EBMUD service area relative to the historical District-wide average.

Figures 4-7 and 4-8 illustrate residential water use characteristics. In Figure 4-7, indoor water use for an average single-family residential household is presented by specific use categories based on most recent available data from calendar year 2009 (for a drought affected year in a down economy). In Figure 4-8, indoor residential water use in calendar year 2010 averaged 68 percent of the total residential water use, and outdoor residential use averaged 32 percent.

Projected Water Demand

EBMUD's water demand projections are based on the *2040 Demand Study*, which was completed in 2009. The 2040 Demand Study uses a land-use based method to project average annual water demands of the distribution system out to year 2040.

The land-use based methodology relies on existing land uses and existing water consumption data for the study area. Demand projections were based on consumption data from year 2005, which provided the last complete year of conservation and water consumption data preceding development of the 2040 Demand Study and is unaffected by distribution system operation anomalies. The land use and water consumption data were used to calculate Land use Unit Demands (LUDs), a measure of water consumption per acre for each land use category. The 2005 LUDs were adjusted for historical weather effects (i.e. dry vs. wet year) and non-weather effects (e.g. economic conditions) to produce a "normalized" year. Additional adjustments to LUDs included accounting for unmetered water and future density growth. These LUDs were then applied to acreages of projected land uses that were determined by local planning agencies. The land use categories consisted of seven residential, four mixed-use (residential above commercial in the same building), and 12 non-residential. The demand projections were made for years 2010, 2015, 2020, 2025, 2030, and 2040.

The land use, consumption data, adjustment factors, and demand projections were developed in a geographic information system database, which allows for the spatial allocation of data. For example, consumption data was allocated by meter location and future growth adjustments by demand model regions (EBMUD service area is divided into 11 regions). The end result consists of demand projections that can be aggregated by land use and location.

The 2040 Demand Study relied on the adopted general plans of the cities and counties in the EBMUD service area and on a series of meetings with local planning agencies regarding the timing and direction of future development in their respective communities. The district-wide land use analysis was conducted during a period reflecting an expectation of continued economic expansion. Although the economy began a period of recession in December 2007, the Demand Study projections are consistent with the anticipated level of developments in the general plans. Therefore, instead of reflecting the highest potential water demands, the demand projections in this analysis reflect

Figure 4-3

EBMUD Water Accounts and Consumption

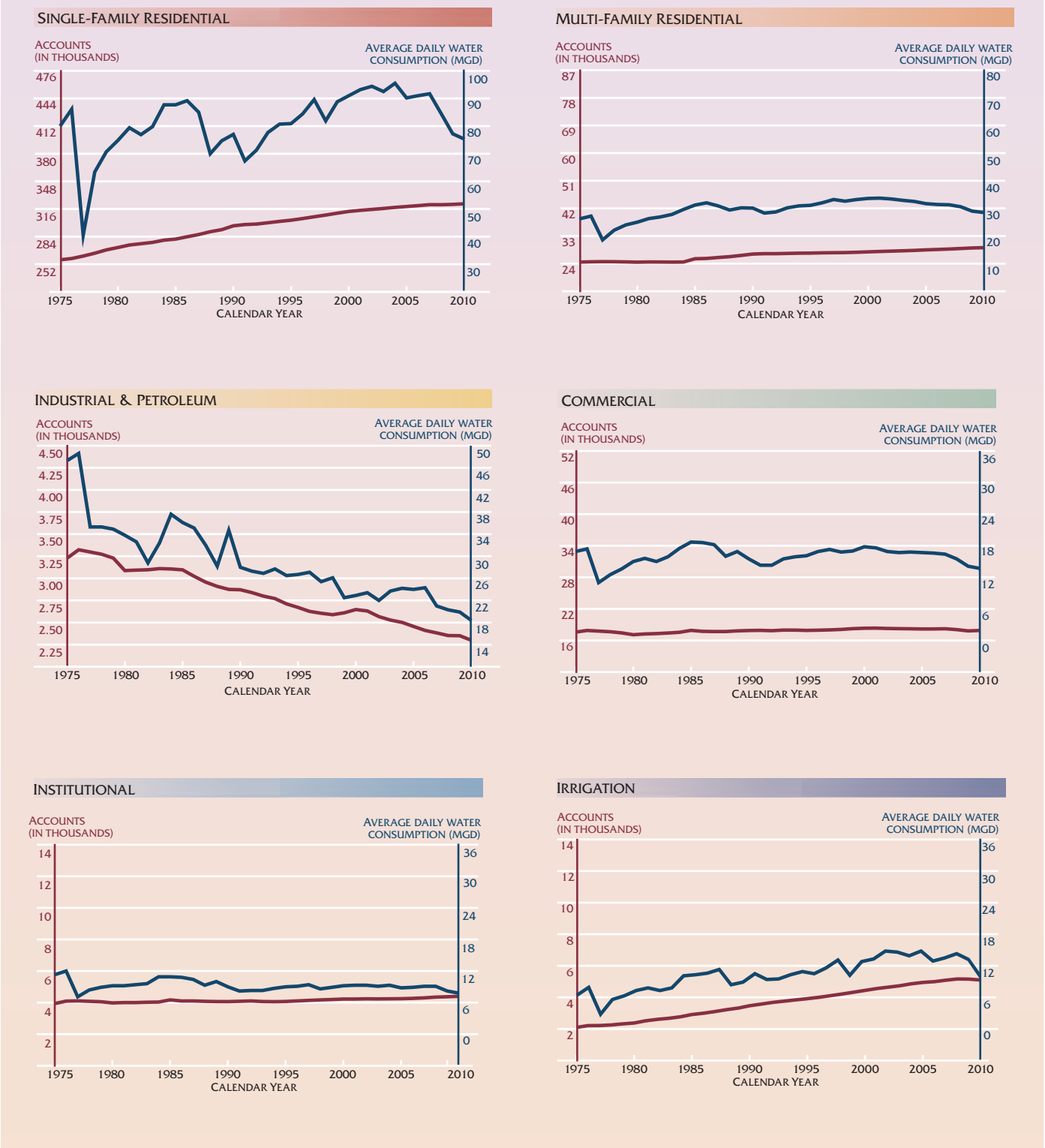
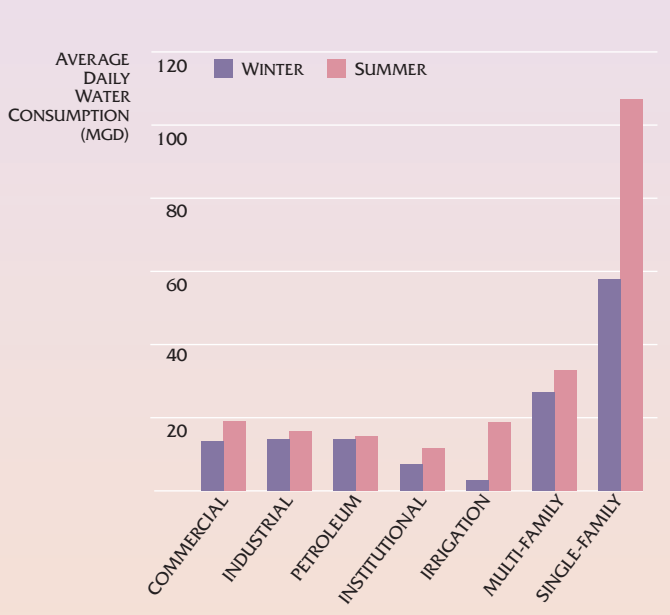


FIGURE 4-4

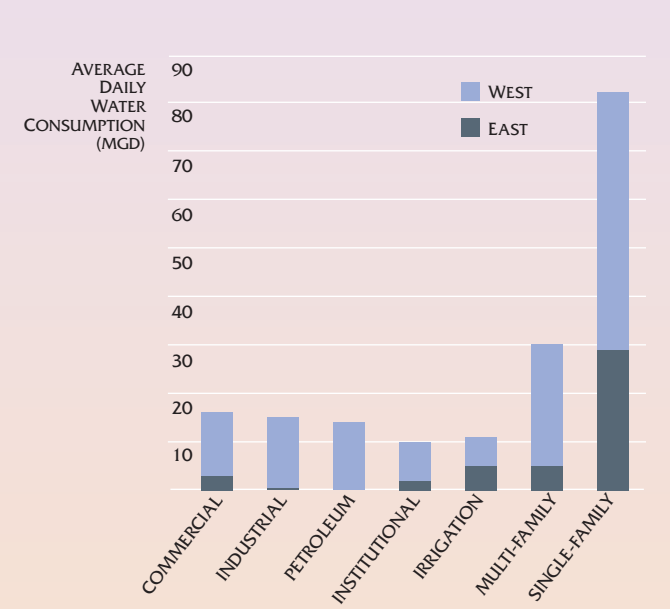
WINTER AND SUMMER WATER USE BY CUSTOMER CATEGORY



NOTES:
1. Based on Calendar Year 1975-2010 consumption data
2. Summer use based on July, August, and September consumption data
3. Winter use based on January, February, and March consumption data

FIGURE 4-5

EAST-OF-HILLS AND WEST-OF-HILLS WATER USE BY CUSTOMER CATEGORY



NOTE:
Based on Calendar Year 1975-2010 consumption data.

current planning policy by land use agencies. Higher demand projections may be associated with other forecasting techniques. These include long range population projections or demands based on assumptions that most land uses will increase in density over time, which do not specifically reflect community policy. While the actual developments and the associated increase in water demand will very likely be realized more slowly in the near term until 2020, the 2040 Demand Study still reflects a reasonable expectation for growth over the long term for demand in year 2040. Future Demand Studies will reflect updates of the general and specific plans of the cities and counties within the EBMUD service area.

The 2040 Demand Study forecasts an unadjusted customer demand of 312 million gallons per day (MGD) for the year 2040. Assuming that cumulative savings since implementation of the WCMP in 1994 of 62 MGD is achieved through existing and future conservation efforts and cumulative savings of 20 MGD is achieved through existing and future recycled water programs, the adjusted 2040 forecasted planning level of demand is 230 MGD. As a long-term planning tool, the planning level of demand remains unchanged through the current drought or other events that may temporarily impact demands. Chapters 5 and 6 of this UWMP 2010 provide further details on projected recycled water and conservation savings goals, respectively.

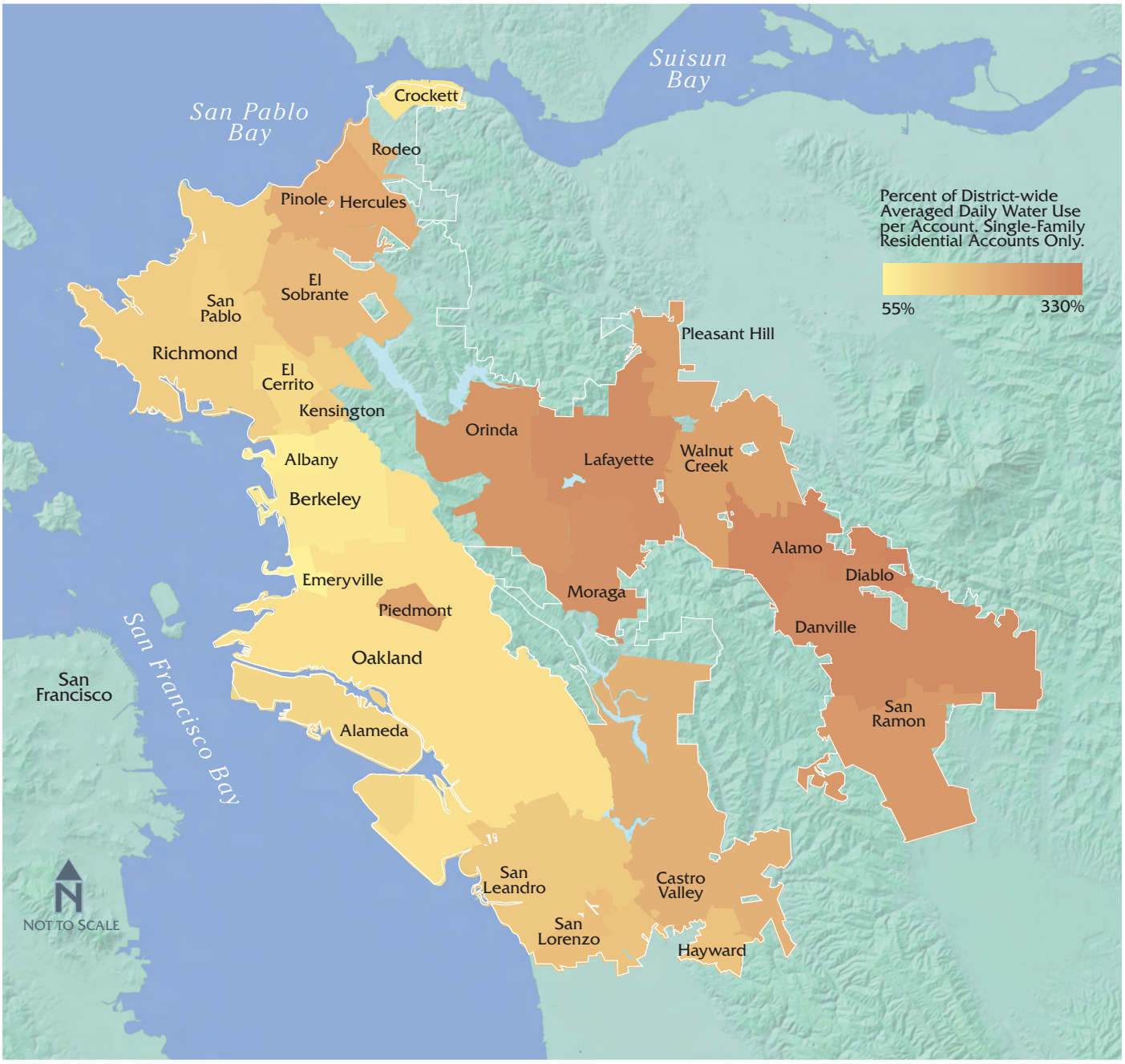
Table 4-1 illustrates water demand projections for each customer category (or water use sector): single- and multi-family, commercial, industrial, institutional, and irrigation users. The demand projections for the six customer categories are consolidated from the 23 land use categories, based on the predominant customer category found in each land use category.

WATER DEMAND PROJECTIONS FOR LOWER INCOME HOUSING

Water Code Section 10631.1 requires an estimate of projected water use needed for lower income single-family and multi-family residential housing within the EBMUD service area, which is summarized in Table 4-2. The estimated lower income water demand is based on available housing data published by the Association of Bay Area Governments (ABAG), consumption data from EBMUD water accounts, and EBMUD's water demand projections. The most recent 2008 housing data from ABAG and its projected 2007-2014 housing needs data are derived from the housing element portion of city and county general plans. The percentage of lower income housing units (4.4%) within the total housing stock in

Figure 4-6

Historical Single-Family Residential Water Consumption by Region Within the EBMUD Service Area

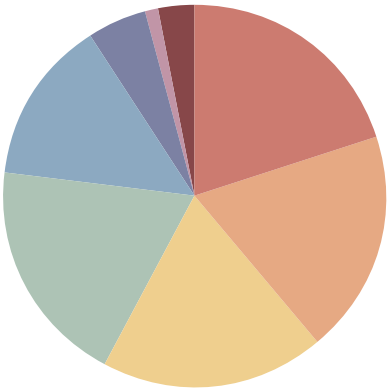


Potable water accounts only. Based on historical daily average consumption, 1975-2010
Representation of non-EBMUD boundaries is not necessarily authoritative

EBMUD's service area in year 2008 as estimated by ABAG is assumed the same as the percentage of lower income accounts that make up EBMUD's residential accounts in 2008. This estimated number of lower income accounts will be the 2008 baseline from which extrapolations will be made. Using an annualized average growth rate (5.85%) derived from ABAG's projection of lower income housing growth for years 2007-2014, EBMUD extrapolated the number of lower income EBMUD accounts for years 2015 to 2040. The total lower income water demand was estimated by assuming that water use for each account is equivalent to the average use of an EBMUD Customer Assistance Program (CAP) account in 2008. Income qualified single-family and multi-family (homeless shelter) accounts that enroll in the CAP receive discounted water rates. However, income eligibility requirements for CAP,

FIGURE 4-7

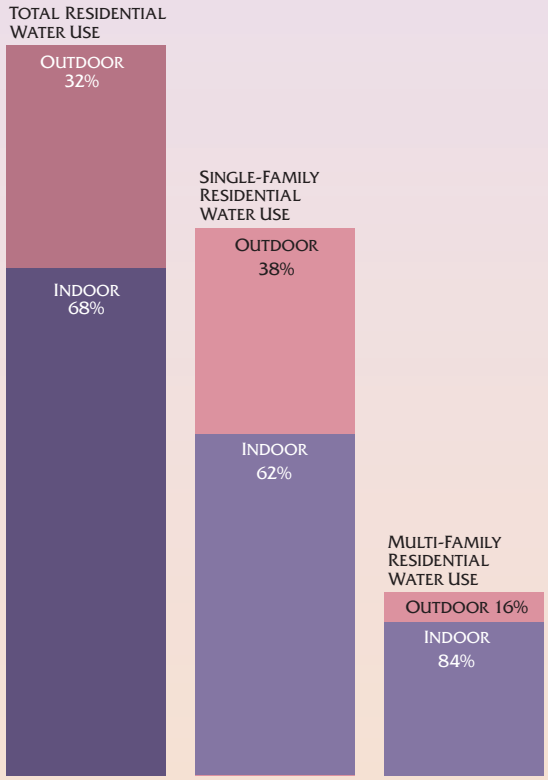
AVERAGE SINGLE-FAMILY RESIDENTIAL HOUSEHOLD INDOOR WATER USE



ELEMENT OF INDOOR USE	CALENDAR YEAR 2009 USE PER HOUSEHOLD (GAL/DAY/HH)	PERCENT OF USE
TOILET	35.3	20
CLOTHES WASHER	33.5	19
SHOWER	33.3	19
FAUCETS	33.2	19
LEAKS	25.6	14
BATH	9.7	5
DISHWASHER	2.3	1
OTHER	5.7	3
TOTAL	178.6	100

FIGURE 4-8

INDOOR AND OUTDOOR RESIDENTIAL WATER USE



NOTE:
Based on Calendar Year 2010 consumption data.

TABLE 4-1

WATER DEMAND PROJECTIONS FOR EACH WATER USE SECTOR
AVERAGE ANNUAL DEMANDS (MGD)[1]

CALENDAR YEAR	SINGLE-FAMILY	MULTI-FAMILY	COMMERCIAL	INDUSTRIAL	INSTITUTIONAL	IRRIGATION	TOTAL
2010 [2]	120	31	26	22	8	9	216
2015 [3]	121	36	26	23	8	9	223
2020	118	41	26	20	8	8	221
2025	117	47	26	19	7	8	224
2030	117	53	26	18	7	8	229
2035 [4]	117	54	26	18	7	7	229
2040	117	54	27	18	7	7	230

[1] Demand represents the Planning Level of Demand.
[2] 2010 demands are based on projections, which differ from actual water consumption.
[3] 2015 demands are based on projections and do not reflect the demand during the recovery period. The slight increase in total demand as compared to 2010 and 2020 is due to implementing conservation and recycled water projects later than anticipated as the customer demand recovers in the post-drought and from the economic downturn.
[4] 2035 values are interpolated from 2030 and 2040 demand projections.

which are based on the California Life Line Annual Income schedule, is a subset of the classification of "lower income households" as defined in Section 50079.5 of the California Health and Safety Code. Based on the ratio of projected demand between single- and multi-family categories derived from Table 4-1, EBMUD applied the same ratios to the total lower income water demand for each reporting year to estimate the appropriate allocation of the single- and multi-family categories. EBMUD's Water Service Policy 3.07 (in Appendix F) ensures that priority for new water service connections during restrictive periods is given to lower income households and that their demands are met first. This policy assures that the portion of overall water demands, as provided in Table 4-1, for lower income single-family and multi-family residential households can be met.

Effect of SBx7-7 Requirements on Projected Demand

Senate Bill No. 7 (SBx7-7) that establishes the program known as the Water Conservation Act of 2009 and often referred to as '20 by 2020,' creates a framework for future planning and actions by urban and agricultural water suppliers to reduce California's water use and requires urban water agencies to assist in reducing statewide per capita water consumption by 20 percent by the year 2020. Specifically, among other requirements, this bill establishes four methods for urban water suppliers to select from to achieve the statewide goal of a 20 percent reduction in urban water use. The act requires urban water suppliers to set an interim urban water use target for 2015 and meet the overall target by 2020.

As a water supplier, EBMUD is required to comply with the requirements of this bill to be eligible for water related state grant funding or loans. Chapter 6 and Appendix H discuss the development of the water use baseline and the targets. The projected demand of 221 MGD in year 2020 is expected to meet the requirements of SBx7-7.

Supply-Demand Assessment

In order to meet its customers' water needs now and in the future, EBMUD must balance water supply and customer demand. Both supply and demand vary seasonally and become critical during drought periods which can last several years. For planning purposes and looking to the year 2040, EBMUD's current supply is insufficient to meet customer needs during single- and multi-year droughts despite EBMUD's aggressive water conservation and recycled water programs.

Past and Current Supply-Demand

EBMUD's water demand in 1970 reached as high as 220 MGD. Subsequently, demand dropped sharply as a result of cutbacks during the three most recent drought rationing periods when drought-related programs were in effect in 1976-1978, 1987-1994, and 2007-2010. Demand was low in wetter years that immediately followed the first two droughts. This temporary event reflected changed customer water use behavior, successfully implemented conservation practices, and delayed post-drought recovery in customer consumption. As time progressed, demand recovered to pre-drought levels. Current demand levels remain lower than the planning level of demand as a result of residual effects from the 2007-2010 drought, a depressed economy, and unusually cool temperatures. In FY10, EBMUD's system demand was on average 174 MGD.

Table 4-2 Water Demand Estimates for Lower Income Residential Accounts

	Single-Family		Multi-Family		Total Residential	
Calendar Year	Demand (MGD)	% of Sector Demand	Demand (MGD)	% of Sector Demand	Demand (MGD)	% of Total Residential Sector Demand
2015	2.4	2%	0.7	2%	3.1	2%
2020	3.1	3%	1.1	3%	4.2	3%
2025	3.9	3%	1.6	3%	5.5	3%
2030	5.1	4%	2.3	4%	7.4	4%
2035	6.7	6%	3.1	6%	9.8	6%
2040	8.9	8%	4.1	8%	13.0	8%

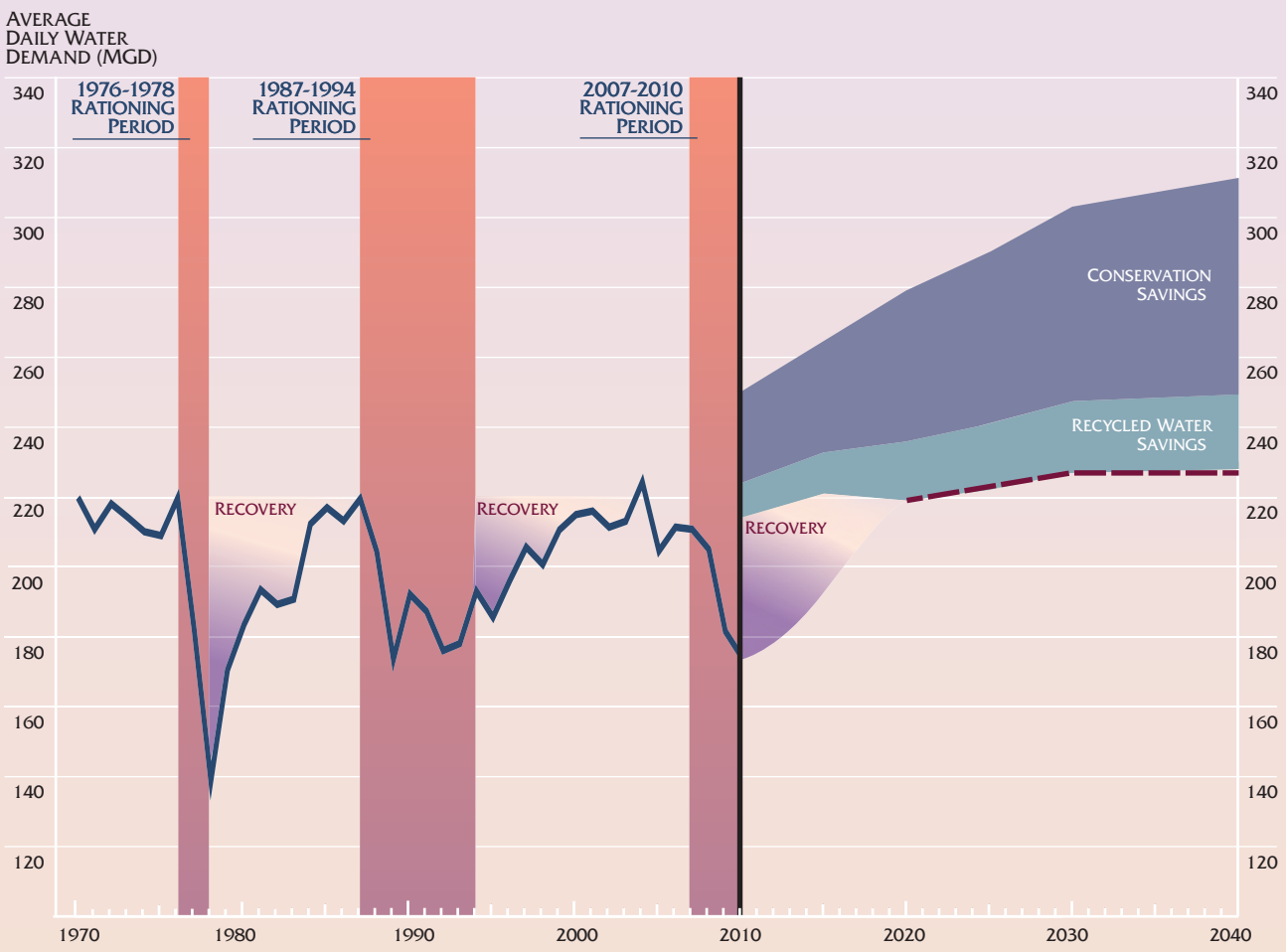
PROJECTED SUPPLY-DEMAND

Planning Level of Demand

The planning level of demand does not include the short-term reduction and rebound in demand caused by the multi-year drought and the downturn in the economy. The planning level of demand is used to assess demands as dictated by community policies. The 2040 Demand Study projected, on average, less than a one percent growth each year in customer demand through 2030 followed by a much lower increase thereafter to a 2040 planning level of demand of 230 MGD after applying reductions from conservation and recycled water savings. However, due to the current suppressed demand that is lower than estimated in the 2040 Demand Study, some planned recycled water projects and conservation programs will be deferred until the end of the anticipated recovery period. Consequently, the projected planning level of demand for 2015 has been revised to 223 MGD and is reflected in Table 4-3. Figure 4-9 shows both historical and projected demands and projected recycled water and conservation savings from 2010 to 2040.

A summary of EBMUD's demand and supply projections over the next thirty years is provided in Table 4-3. The

FIGURE 4-9 HISTORICAL AND PROJECTED DEMAND



NOTES:

1. Rationing periods include both voluntary and mandatory use restrictions imposed as part of the adopted Drought Management Program.
2. Within the projected drought recovery period following 2010, demand estimates are based on observed trends from the two past drought recovery periods and are subject to change depending on actual conditions.
3. Refer to Table 4-3 for the projected demand, projected conservation and recycled water program savings values.
4. Historical demand is plotted for fiscal years whereas projected demand is plotted for calendar years.

Table 4-3 EBMUD Demand and Supply Projections

	2010	2015	2020	2025	2030	2035 [1]	2040
Projected Demand (MGD)							
Customer Demand [2]	251	266	280	291	304	308	312
Adjusted for Cumulative Conservation [3]	(26)	(32)	(43)	(49)	(56)	(59)	(62)
Adjusted for Recycled Water [4]	(9)	(11)	(16)	(18)	(19)	(20)	(20)
Planning Level of Demand	216	223	221	224	229	229	230
Projected Available Supply and Need For Supplemental Supply (MGD)[5]							
Normal Year	>216	>223	>221	>224	>229	>229	>230
Supplemental Supply Need	0	0	0	0	0	0	0
Single Dry Year (Multiple Dry Years – Year 1)							
Available Supply	211	217	215	218	223	222	222
Customer Rationing [6]	2%	3%	3%	3%	3%	3%	4%
Supplemental Supply Need [7]	5	6	6	7	7	8	8
Multiple Dry Years – Year 2							
Available Supply	183	189	188	190	194	194	195
Customer Rationing [6]	15%	15%	15%	15%	15%	15%	15%
Supplemental Supply Need [7]	21	21	21	21	22	22	22
Multiple Dry Years – Year 3							
Available Supply	183	189	188	190	183	164	144
Customer Rationing [6]	15%	15%	15%	15%	15%	15%	15%
Supplemental Supply Need [7]	21	21	21	21	33	53	73
Three-Year Drought							
Total Supplemental Supply Need (TAF)[7]	53	54	54	55	69	93	115

[1] Projected demand for 2035 is interpolated.

[2] Customer demand values are based on the demand projections from the "2040 Demand Study," Feb 2009. These projected water demands are based on land use in EBMUD's ultimate service area and is unadjusted for conservation and non-potable water. The values are also unadjusted for the current suppressed demand due to the 2007-2010 rationing period and the economic downturn.

[3] Existing conservation saving from the "1994 Water Conservation Master Plan" and planned conservation program savings based on the "2011 Water Conservation Master Plan".

[4] Existing recycled water achieved per the "1993 Water Supply Management Program" and planned recycled water program savings as outlined in Chapter 5 of the UWMP 2010.

[5] Projected available supply data includes dry year supply deliveries from the Freeport Regional Water Project (FRWP) and Bayside Groundwater Project, Phase 1. Delivery rules for the FRWP follow the rules as developed in the Freeport EIR, 2003.

[6] Rationing reduction goals are determined according to projected system storage levels in the Long-Term Drought Management Program guidelines per Table 3-2 in Chapter 3 of the UWMP 2010.

[7] The supplemental supply need is based on EBMUDSIM modeling studies. It is the amount of water needed based on EBMUD's updated demand projections, the provisions of the 1998 Joint Settlement Agreement and the rationing policy stated in Table 3-2, Chapter 3 of the UWMP 2010. The actual need will be dependent on antecedent conditions and the severity of actual drought conditions. Supplemental supply stored during the initial year of the drought could be later released, diminishing supplemental supply needs. During the drought that continued into 2010, the combined effects of water rationing and an economic downturn suppressed demand below the planning level of demand to maintain a sufficient water supply and deferred the need for supplemental water. However, if the drought had continued into its second year, most likely supplemental supplies would have been obtained from the Freeport Regional Water Facility as anticipated in the Interim Drought Management Program Guidelines discussed in Appendix G-2.

demand data is based on EBMUD's 2040 Demand Study (as discussed in the Projected Water Demand section of this chapter) and revised projections. The supply data is derived from EBMUD's water supply system Simulation Model (EBMUDSIM).

EBMUD evaluates and forecasts water supply availability for any calendar year based on forecasted runoff and existing storage levels in the reservoirs. A "normal year" is a year in which EBMUD does not need to implement a Drought Management Program. For a normal year, the April projection of the total system storage at the end of September would be 500 thousand acre-feet (TAF) or greater (as shown in Table 3-2). EBMUD can meet customer demands through the year 2040 during normal year conditions; therefore, the available supply is considered equal to or greater than demand. However, as discussed in Chapter 2, unless supplemental water supplies are developed and while EBMUD's Mokelumne River supply continues to decrease, the frequency of normal year-types will decrease in the future. The frequency of dry years that require customer rationing is expected to increase.

In evaluating its water supply availability, EBMUD takes into account diversions of both upstream and downstream water right holders and fishery releases. The available water supply shown in Table 4-3 in years one, two, and three of a multiple-year drought is derived from EBMUDSIM analyses with the following assumptions:

- EBMUD's drought planning sequence is used for 1976, 1977, and 1978 (as discussed in Chapter 3);
- total system storage is depleted to minimum operating levels by the end of the third year of the drought planning sequence;
- EBMUD will implement its Drought Management Program when necessary (as described in Chapter 3);
- the diversions by Amador and Calaveras counties upstream of Pardee Reservoir continues to increase up to 47 TAF in 2040;
- releases from Camanche are sufficient to meet the requirements of downstream senior water right holders;
- minimum instream flow requirements for the Lower Mokelumne River are in accordance with the 1998 Joint Settlement Agreement;
- dry-year supply of CVP water, through the Freeport Regional Water Facility, is available beginning in 2010; and
- Bayside Groundwater Project, Phase 1, is available beginning in 2010.

In Table 4-3, "Single Dry Year" (or Multiple Dry Years - Year 1) is a year in which EBMUD would implement Drought Management Program elements at the "moderate" stage with the goal to achieve a reduction between zero to ten percent in customer demand (as shown in Table 3-2). Based on this EBMUD rationing policy, rationing in the first year of a drought is estimated at two percent of the planning level of demand in 2010 and four percent in 2040 only if additional supplemental supplies beyond the dry-year supply available through the Freeport Regional Water Facility and through the Bayside Groundwater Facility are obtained. Therefore, deficiencies continue to exist unless additional supplemental supplies are obtained.

Year 2 of "Multiple Dry Years" is a year in which EBMUD would implement Drought Management Program elements at the "severe" stage with the goal to achieve between 10 to 15 percent reduction in customer demand (as shown in Table 3-2). Year 3 of "Multiple Dry Years" is a year in which EBMUD would implement Drought Management Program elements at the "critical" stage. Despite water savings from EBMUD's aggressive conservation and recycling programs and rationing of up to 15 percent, additional supplemental supplies beyond those provided through the Freeport Regional Water Facility and the Bayside Groundwater Facility will be needed during Years 2 and 3 of a three year drought. In Table 4-3, the term "Supplemental Supply Need" is the additional amount of water necessary to limit customer rationing to 15 percent during droughts while meeting the requirements of senior downstream water right holders and the provisions of the 1998 Joint Settlement Agreement. The forecasted need for supplemental supply ranges from 21 MGD in 2010 to 73 MGD by 2040 during Year 3 of a three year drought.

As indicated in Table 4-3, EBMUD has a total supplemental supply need of 69 TAF over multiple dry years for 2030 level demands, beyond the current supplemental supplies provided through the Freeport Regional Water Facility and the Bayside Groundwater Facility. EBMUD plans to meet this need by relying on short-term supplemental supply sources that include the Northern California Water Transfers (expected to provide up to 13 MGD (15 TAF/yr) of dry-year water) and the Bayside Groundwater Project Expansion (expected to provide up to 9 MGD (10 TAF/yr) of dry-year water) as described in Chapter 2. Beyond 2030 and outside the current required 20-year planning horizon of the UWMP, EBMUD's supplemental supply needs will be met by implementing long-term conceptual supplemental supply sources, whose project capacities can only be quantified in subsequent UWMPs through refined project developments. Chapter 3 discusses how EBMUD would plan for and manage a water supply shortage.

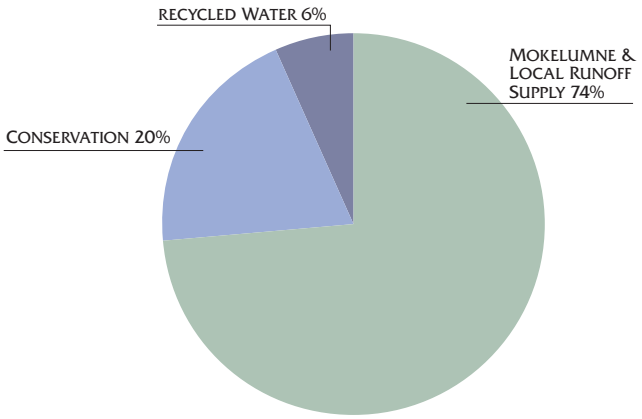
Figure 4-10 illustrates the projected water supply available to EBMUD by 2040. In a normal year, conservation and recycled water programs will play a very important role in future reliability of EBMUD's supply. In a normal year for a 312 MGD demand, conservation is expected to offset about 20 percent of the needed supply, and recycled water programs will offset about 6 percent. For a 312 MGD demand in an average drought year of a three year drought sequence projected for year 2040, rationing and supplemental supply will account for 25% and the projected shortfall to be met by developing supplemental water supply sources will be about 11%.

Interim Level of Demand

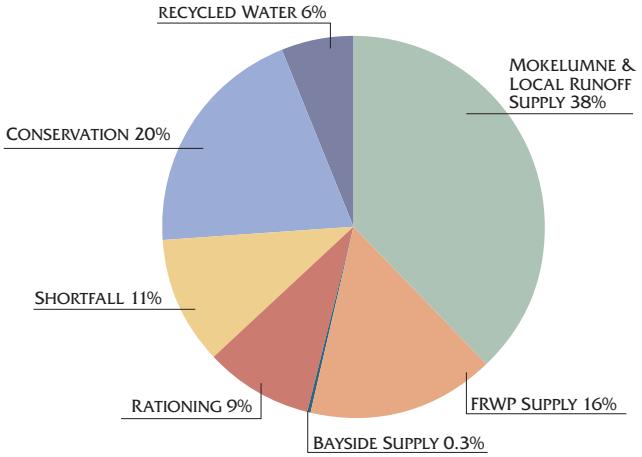
During the recent 2007-2010 rationing period, EBMUD customers were subjected to mandatory and voluntary water use restrictions. The residual rationing effect of the recently ended drought management program and the suppressed demand from the downturn in the economy has led EBMUD to adopt interim drought management program guidelines. These interim guidelines recognize that demand is below the planning level during the recovery period as depicted in Figure 4-9. During this time, when demand remains significantly suppressed, below the planning level of demand, the existing water supply is sufficient, which defers the need for any supplemental drought year water supply. Appendix G-2 provides further discussion on the interim drought management program guidelines.

FIGURE 4-10 PROJECTED (2040) WATER SUPPLY — 312 MGD

NORMAL YEAR



THREE YEAR DROUGHT AVERAGE YEAR



NOTE:
Numbers may not add to 100% due to rounding.

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Chapter 5. Wastewater And Recycled Water

EBMUD and several other wastewater utilities collect and treat wastewater in the EBMUD water service area. Currently four wastewater treatment facilities provide recycled water to EBMUD customers. Recycled water use reduces the demand for EBMUD's potable water supplies. Successful partnerships with the public, recycled water users, water and wastewater utilities, and state and federal agencies that provide funds to support resource conservation projects continue to help advance EBMUD's water recycling projects.

Wastewater System

EBMUD's wastewater service district (known as Special District No. 1, or SD-1) was established as a separate wastewater district within EBMUD's water service area in 1944. SD-1 is governed by EBMUD's Board of Directors and is administered by EBMUD's Wastewater Department.

SD-1 treats domestic, commercial and industrial wastewater for the cities of Alameda, Albany, Berkeley, Emeryville, Oakland and Piedmont, and for the Stege Sanitary District, which includes El Cerrito, Kensington and parts of Richmond. Each of these communities operates sewer collection systems that discharge into one of five EBMUD sewer interceptors (Adeline, Alameda, North, South, and South Foothill) as illustrated in Figure 5-1.

Wastewater Generation, Collection and Treatment

Based on 2010 census data, approximately 1.34 million people are served by EBMUD's water service district. Within this service area as shown in Figure 5-1, there are several wastewater utilities operating in addition to EBMUD's SD-1. SD-1 serves approximately 650,000 people in an 88 square-mile area of Alameda and Contra Costa counties along the east shore of the San Francisco Bay, extending from Richmond in the north to San Leandro in the south. Table 5-1 lists wastewater utilities shown on Figure 5-1 with their capacities and average dry weather wastewater flow projections from 2010 to 2040. Some of these districts, such as Dublin San Ramon Services District (DSRSD) and Oro Loma Sanitary District, are similar to SD-1 because they operate and maintain intercepting sewers that receive and transport wastewater from collection systems, which are owned and operated by communities within these districts. The cities of San Leandro, Pinole, Richmond, Rodeo and Hercules own and maintain both the collection systems and the interceptor systems within their respective utility districts.

Wastewater Collection System

EBMUD's collection facilities are comprised of the interceptor system and collection system pumping stations. The interceptors consist of 29 miles of reinforced concrete pipes ranging from 12 inches to 9 feet in diameter. They collect wastewater from approximately 1,400 miles of sewers owned and operated by the communities in the SD-1 service area. Fifteen collection system pumping stations, ranging in capacity from 0.5 to 54.7 MGD, lift wastewater throughout the interceptors as it travels to the Wastewater Treatment Plant.

Wastewater Treatment System

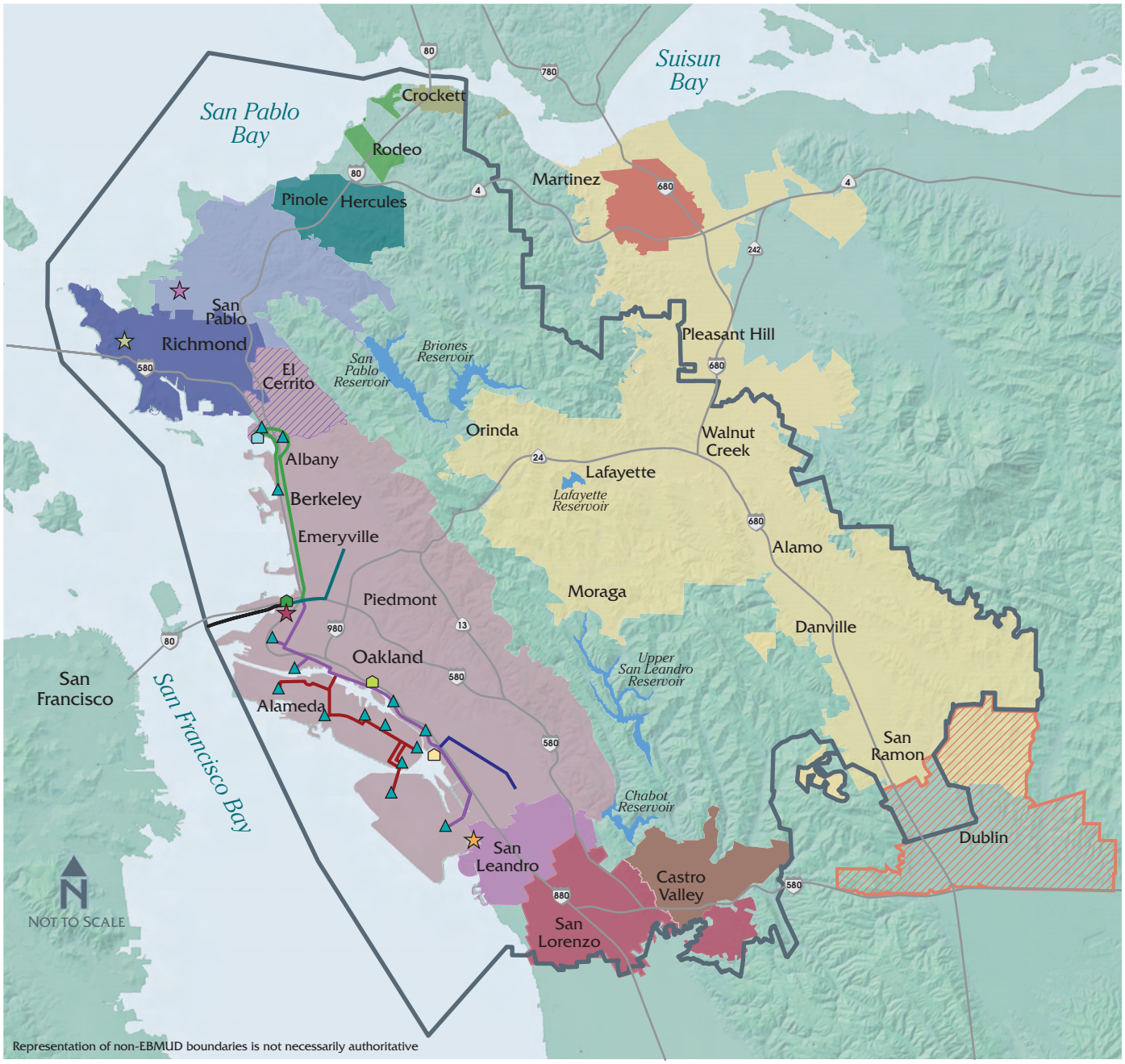
Wastewater collected by the interceptors flows to EBMUD's Main Wastewater Treatment Plant (MWWTP), which is located in Oakland near the foot of the San Francisco-Oakland Bay Bridge. The plant provides secondary treatment for a maximum flow of 168 MGD. Primary treatment can be provided for up to a peak flow of 320 MGD. The average annual daily flow is approximately 65 MGD.

Primary treatment removes floating materials, oils and greases, sand and silt and organic solids heavy enough to settle in water. Secondary treatment biologically removes most of the suspended and dissolved organic and chemical impurities that would deplete life-giving oxygen from the waters of the Bay if allowed to decompose naturally. The treatment steps are pre-chlorination (for odor control), screening (to remove large objects), grit removal, primary sedimentation, secondary treatment using high-purity oxygen-activated sludge, final clarification, sludge digestion, and dewatering. The treated effluent is then disinfected, dechlorinated and discharged through a deep-water outfall one mile off the East Bay shore into San Francisco Bay.

Wastewater Disposal

Treated wastewater produced by the wastewater treatment plants within the EBMUD water service area is discharged through pipelines or outfalls to San Francisco Bay, Suisun Bay, or to San Pablo Bay and also provides a supply for recycled water programs. Table 5-2 illustrates characteristics of treated wastewater and the projected

Figure 5-1 Wastewater Districts Within EBMUD's Water Service Boundary



Wastewater Districts

- SD-1
- Stege Sanitary District
- City of Richmond Sanitary District
- West County Wastewater District
- City of Pinole/Hercules
- Rodeo Sanitary District
- Crockett Community Services District
- Mountain View Sanitary District
- Central Contra Costa Services District
- Dublin -San Ramon Services District
- Castro Valley Sanitary District
- Oro Loma Sanitary District
- City of San Leandro

Facilities

- Oakport Wet Weather Facility
- San Antonio Creek Wet Weather Facility
- Main Wastewater Treatment Plant
- Point Isabel Wet Weather Facility
- San Leandro Recycled Water Facility
- East Bayshore Recycled Water Facility
- North Richmond Recycled Water Facility
- RARE Water Project
- EBMUD Pumping Station

EBMUD Ultimate Service Boundary

EBMUD Interceptors

- South
- Foothill
- Alameda
- Adeline
- North
- Main WWTP

Table 5-1 Collected and Treated Wastewater Generated in EBMUD Service Area[1]

Agency	Wastewater Treatment Plant Characteristics: Location (City)	Wastewater Treatment Plant Characteristics: Capacity (MGD)	Current Treated Wastewater Disposal Method	Collected and Treated Wastewater Flows (MGD)[2] 2010	2015	2020	2025	2030	2035	2040
EBMUD Special District No.1	Oakland	168	Discharged & Recycled	74	74	74	74	74	74	74
City of San Leandro	San Leandro	9.7	Discharged & Recycled	5	5.34	5.68	6.02	6.36	6.7	7
Dublin San Ramon Services District	Pleasanton	11.5	Discharged & Recycled	11.7	12.43	15.64	17.56	18.45	18.71	18.71
Central Contra Costa Sanitary District	Martinez	70	Discharged & Recycled	37	39	41	43	46	48	50
City of Pinole/Hercules	Pinole	4.06	Discharged & Recycled[3]	3.5	4	4	4	4	4	4
City of Richmond	Richmond	16	Discharged	8.5	8.5	8.5	8.5	8.5	8.5	8.5
West County Wastewater District	Richmond	12.5	Discharged & Recycled	6.6	8	8	8	8	8	8
Rodeo Sanitary District	Rodeo	1.14	Discharged & Recycled[3]	0.55	0.65	0.65	0.65	0.7	0.7	0.7
Oro Loma Sanitary District[4]	San Lorenzo	20	Discharged & Recycled	13.5	14	14.5	15	17	17	17
Crockett Sanitary Department[5,6]	Crockett	1.78	Discharged	0.7	0.7	0.7	0.7	0.7	0.7	0.7
TOTAL[7]				**161.0**	**166.6**	**172.7**	**177.4**	**183.7**	**186.3**	**188.6**

[1] Data obtained through personal communication with staff in each of the Districts.
[2] Collected and treated wastewater flows represent average dry weather flows.
[3] The Rodeo Sanitary District and City of Pinole/Hercules utilize a joint outfall. Recycled water use from this joint outfall is anticipated post 2010.
[4] Wastewater flows for Oro Loma Sanitary District includes flows generated in Castro Valley Sanitary District, which operates a sewer collection system and does not operate a wastewater treatment system.
[5] Crockett Sanitary Department includes flows from C & H Sugar.
[6] Crockett Sanitary Department was formerly known as Crockett-Valona Sanitary District.
[7] Total values have been rounded.

average dry weather flows of the portion of treated wastewater that are not recycled and that are discharged from each wastewater treatment plant within EBMUD's water service area. Many of these treatment plants recycle water for washing down filters and for other in-plant operations.

RECYCLED WATER PROGRAM

Recycled water is highly treated wastewater that is suitable for a variety of beneficial uses. Recycled water is stringently regulated by Title 22 of the California Code of Regulations, which dictates the level of treatment and use of recycled water in California.

The California Department of Public Health (CDPH) has the authority and responsibility under California law to establish health-related standards for water recycling and reuse. The California Water Code provides for the nine California Regional Water Quality Control Boards (RWQCBs) to establish water quality standards, to prescribe and enforce waste discharge requirements, and, in consultation with the CDPH, to prescribe and enforce water recycling requirements. Thus, the regional boards enforce CDPH's water recycling criteria, and each water recycling project must have a permit from the appropriate RWQCB conforming to CDPH criteria. As is the case in many states, local health agencies have independent authority and may, if they deem necessary, impose requirements more stringent than those specified by CDPH or RWQCBs. All EBMUD recycled water projects must comply with California's recycled water regulations, which are considered to be some of the strictest in the nation.

Recycled water use is a critical element of EBMUD's water supply management policies and stretches EBMUD's limited, high-quality drinking water supply, as any demand met with recycled or non-potable water reduces the demand for potable water supply. In addition to increasing water supply reliability and lessening the effect of extreme rationing during droughts, recycled water use delays or eliminates the need for more potable water facilities, sustains the economy with increased water supply reliability, protects San Francisco Bay by reducing treated wastewater discharges, safeguards community and private investments in parks and landscaping with a drought-proof or drought-resistant water supply, and contributes to a green and healthy environment.

EBMUD initiated water recycling programs that reduce demand on drinking water supplies in the early 1970s. EBMUD has been recycling water for landscape irrigation

Table 5-2 Non-Recycled Wastewater Treated and Discharged in the EBMUD Service Area[1]

Agency	Current Disposal Method	Current Level of Treatment for Disposed Wastewater[3]	Non-Recycled Wastewater Flows (MGD)[2]						
			2010	2015	2020	2025	2030	2035	2040
EBMUD Special District No.1	Discharged to San Francisco Bay	Secondary	72.5	72.5	69.1	67.3	67.3	67.3	67.3
City of San Leandro	Discharged through EBDA Pipelines to S.F. Bay	Secondary	1.25	1.34	1.42	1.5	1.59	1.68	1.75
Dublin San Ramon Services District	Discharged through LAVWMA/ EBDA Pipelines to S.F. Bay	Secondary	1.9	1.47	1.77	0.77	0	0	0
Central Contra Costa Sanitary District	Discharged to Suisun Bay	Secondary	37	38.8	40.6	42.4	45.4	47.3	49.3
City of Pinole/ Hercules	Discharged to Pinole/Hercules/Rodeo Outfall Then to San Pablo Bay	Secondary	3.5	4	1.2	1.2	0.3	0.3	0.3
City of Richmond	Discharged to San Francisco Bay	Secondary	8.5	8.5	8.5	8.5	8.5	8.5	8.5
West County Wastewater District	Discharged through City of Richmond to San Francisco Bay	Secondary	0	0	0	0	0	0	0
Rodeo Sanitary District	Discharged to Pinole/Hercules/Rodeo Outfall Then to San Pablo Bay	Secondary	0.55	0.65	0.65	0.65	0.7	0.7	0.7
Oro Loma Sanitary District[4]	Discharged through EBDA Pipelines to S.F. Bay	Secondary	13.24	13.74	14.24	14.74	16.74	16.74	16.74
Crockett Sanitary Department[5]	Discharged to Crockett	Secondary	0.7	0.7	0.7	0.7	0.7	0.7	0.7
TOTAL[6]			**139.1**	**141.7**	**138.2**	**137.8**	**141.2**	**143.2**	**145.3**

[1] Data obtained through personal communication with staff in each of the Districts.
[2] Assumes that non-recycled flow discharged is the difference between the average dry weather flow of the wastewater and the maximum day demand for the recycled water.
[3] There is a potential to directly use disposed of treated wastewater for recycled water applications provided that it receives further treatment to meet recycled water standards.
[4] The Rodeo Sanitary District and City of Pinole/Hercules utilize a joint outfall. Recycled water use from this joint outfall is anticipated post-2011. For this table, the recycled water demand from the outfall is attributed to City of Pinole/Hercules only.
[5] The Crockett Sanitary Department was formerly known as Crockett-Valona Sanitary District.
[6] Total values have been rounded.

and in-plant processes at its main wastewater treatment plant since 1971, and began its first golf course recycled water irrigation project in 1984. Highlights of EBMUD's recycled water program are chronicled in Table 5-3.

Stressing the importance of recycled water as part of the overall water supply picture, EBMUD's Board of Directors adopted the Non-potable Water Policy No. 9.05 (amended November 14, 2006, see Appendix F). The policy requires that EBMUD customers use non-potable water (recycled water and other non-potable water sources) for non-domestic purposes when it is of adequate quality and quantity, available at reasonable cost, not detrimental to public health, and not injurious to plant life, fish or wildlife. It is EBMUD's current practice to promote recycled water to its customers for appropriate non-potable uses.

During calendar year 2010, EBMUD provided more than 9 million gallons a day (MGD) of recycled water for non-residential landscape irrigation and industrial uses including reuse at its main wastewater treatment plant. Table 5-4 compares the actual recycled use in 2010 with recycled water use as projected in the UWMP 2005. By 2040, EBMUD anticipates providing 20 MGD of recycled water.

Existing Recycled Water Projects

EBMUD's Water Recycling Program has grown significantly since EBMUD began producing and using recycled water at its MWWTP in 1971. Table 5-5 (see page 5-7) lists the characteristics of EBMUD's ten existing recycled water projects, as well as the quantity of recycled water they supplied in 2010, and the quantity they are expected to supply through 2040. In 2010, these recycled water projects supplied an average of 9.3 MGD of recycled water. The Richmond Advanced Recycled Expansion Water Project (RARE), which commenced operations in 2010, is projected to provide an additional 3.5 MGD of recycled water.

Recycled water for these projects is used for various industrial purposes and for irrigating landscape. Wastewater sources for EBMUD's existing recycling projects come from four wastewater treatment facilities owned and operated by four different agencies. In addition

Table 5-3 EBMUD's Recycled Water Program Historical Highlights

1970s	
1971	First use of recycled water at EBMUD's Main Wastewater Treatment Plant
1980s	
1984	First commercial recycled water customer - the Richmond Country Club
1987	EBMUD nonpotable water policy mandates the use of nonpotable water
1988	Office of Water Recycling is established
1990s	
1993	EBMUD Water Supply Management Plan incorporates water recycling goals
1994	Board adopts Water Conservation and Recycling Master Plans
1995	Joint Powers Authority (DERWA) forms in order to create the San Ramon Valley Recycled Water Program
1996	North Richmond Water Reclamation Plant provides recycled water to the Chevron Refinery
1999	Federal Water Resource Development Act of 1999 (WRDA) authorizes $15 million for the San Ramon Valley Recycled Water Program
2000s	
2000	Water Recycling in Landscaping Act adopted by the State of California
2002	Award winning recycled water customer training videos and manual created
2002	U.S. Army Corps of Engineers and DERWA partner to design some San Ramon Valley Recycled Water Project facilities
2003	Pipeline construction begins for the East Bayshore and San Ramon Valley recycled water projects
2004	EBMUD Board of Directors improves financial incentives for using recycled water
2004	California State Water Resources Control Board increases grants and low-interest loan funding for EBMUD recycled water projects to $44.3 million
2006	San Ramon Valley Recycled Water Project (Phase 1) provides recycled water to irrigation customers
2007	WRDA authorizes $25 million for EBMUD's recycled water program.
2007	Department of Water Resources awards a $2.1 million grant for the Richmond Advanced Recycled Expansion (RARE) Water Project
2008	East Bayshore Recycled Water Project provides recycled water to customers in Oakland
2008	Recycled Water Truck Program begins operation
2008	Construction begins on the RARE Water Project
2009	EBMUD received $3.5 million in Economic Stimulus Funding for the San Ramon Valley Recycled Water Program
2010	RARE Water Project Phase 1 begins operation at the Chevron Refinery
2010	Construction begins on San Ramon Valley Phases 2 to 4

Table 5-4 Comparison of Recycled Water Uses: 2005 Projection vs. 2010 Actual

Type of Use	2005 Projection for 2010 (MGD)	2010 Actual Use (MGD)
Agriculture	-	-
Landscape Irrigation	2.7	1.8
Wildlife Habitat	-	-
Wetlands	-	-
Industrial	9.2	7.5
Groundwater Recharge	-	-
Commercial	0.01	0.01
Indirect Potable Use	-	-
Total	**11.9**	**9.3**

NOTES:
1. Recycled water use for 2010 is a best estimate of actual use as of the publication of the UWMP 2010.
2. Total values have been rounded.

to EBMUD's MWWTP, the wastewater is supplied through external partnerships with the West County Wastewater District (WCWD), the City of San Leandro, and Dublin San Ramon Services District. Figure 5-2 depicts water recycling sites within the EBMUD service area.

Richmond Country Club

In 1984, EBMUD began operating its first golf course irrigation project at the Richmond Country Club using recycled water supplied from the WCWD's wastewater treatment plant. One hundred fifty acres are irrigated with recycled water. The WCWD treatment plant provides pretreatment, primary clarification, activated sludge secondary treatment, and chlorination. It produces a secondary effluent which meets Title 22 standards for restricted golf course irrigation. In 2010, Richmond

Country Club used an average of 0.18 MGD of recycled water. EBMUD contracts the maintenance and operation of the pump station to WCWD.

San Leandro Reclamation Facility

In 1988, EBMUD constructed the San Leandro Reclamation Facility (SLRF) to serve EBMUD's recycled water customers with treated wastewater produced by the City of San Leandro's Water Pollution Control Plant (WPCP). Dual media filtration followed by disinfection with sodium hypochlorite is used to meet Title 22 standards for restricted irrigation applications. The water recycling treatment facilities include a high head pumping station, chlorination and dechlorination facilities, and surge control systems. Customers currently served by the SLRF include the Metropolitan Golf Links complex in Oakland, the Chuck Corica Golf Complex in Alameda, and the Harbor Bay Parkway in Alameda.

In 1988, EBMUD began serving the Metropolitan Golf Links (formerly Galbraith Golf Course). The SLRF delivered an average of 0.01 MGD of disinfected secondary effluent to the golf course in 2010. It should be noted that this customer mainly uses groundwater for irrigation purposes and uses recycled water for backup or for blending.

In 1991, EBMUD extended the SLRF to include the Chuck Corica Golf Complex (formerly Alameda Golf Complex). Expansion of the facilities included minor control modifications to the City of San Leandro's WPCP and installation of more than three miles of pipeline. The project delivered an average of 0.37 MGD to the Golf Complex in 2010.

As part of the SLRF expansion, EBMUD also added piping to serve the nearby Harbor Bay Parkway. The average delivery was 0.02 MGD for roadway greenbelt irrigation in 2010.

Chevron Refinery

The Chevron Refinery is the largest single user of recycled water in EBMUD's service area. In 1996, EBMUD began supplying recycled water to the Chevron Refinery for the operation of recirculating water cooling towers. Secondary effluent from WCWD is treated to tertiary levels at EBMUD's North Richmond Water Reclamation Plant (NRWRP) and then piped to the refinery. The NRWRP treats the secondary effluent in reactor clarifiers to remove calcium, phosphorus and magnesium using caustic soda softening technology. The water is then neutralized with sulfuric acid and passed through a sand filter to remove any remaining particles. The recycled water is disinfected with sodium hypochlorite to meet tertiary treatment levels for use in Chevron's cooling towers. EBMUD and Chevron have worked together to implement improvements to recycled water service to Chevron, and have brought the average use of recycled water service up from 2 MGD in 2004 to 4 MGD in 2010. The RARE Water project, detailed below, which became operational in 2010, will increase this usage significantly.

EBMUD's Main Wastewater Treatment Plant Water Recycling

In 1971, EBMUD constructed treatment facilities to maximize the use of recycled water for plant processes and landscape irrigation at it's MWWTP. In addition, recycled water for use as equipment wash down and construction projects was made available at the plant in the 1970s and during 1987-94 when EBMUD implemented a Drought Management Program. EBMUD continues to use recycled water for in-plant processes and landscape irrigation. In 2010, the average in-plant recycled water use was 3 MGD. Recycled water use at the EBMUD MWWTP is not included in the EBMUD recycled water goal of 20 MGD by 2040. Historically, the EBMUD MWWTP had not used potable water for processes and irrigation, and as a consequence current recycled water use does not offset potable water demand at the EBMUD MWWTP.

San Ramon Valley Recycled Water Program– Phase 1

The San Ramon Valley Recycled Water Program (SRVRWP) is a partnership between EBMUD and the Dublin San Ramon Services District. Phase 1 of this multi-phased project was completed in 2006 and now delivers approximately 0.7 MGD to landscape irrigation customers in San Ramon. The project will eventually serve an annual average of 2.4 MGD of recycled water to EBMUD irrigation customers in portions of Blackhawk, Danville and San Ramon. See "Projects Under Construction" section in this chapter for more details.

Richmond Advanced Recycled Expansion Water Project – Phase 1

EBMUD's newest recycled water project, the RARE Water Project, builds on EBMUD's existing partnership with the Chevron refinery in Richmond. In collaboration with Chevron, EBMUD completed construction of the RARE Water Treatment Plant in 2010. Located within the refinery, the new RARE plant treats secondary effluent from WCWD via microfiltration and reverse osmosis to produce the high purity water quality required by the refinery's boilers.

Table 5-5

Quantities of Recycled Water Served for EBMUD Recycled Water Projects

Project And Location	Type of Use	Year Initiated	Wastewater Supply Source	Capital Cost in FY10 in Millions	Average Daily Recycled Water Use (MGD) 2010[1]	2015	2020	2025	2030	2035	2040[2]
Existing Projects											
Richmond Country Club [Richmond]	Golf Course Irrigation	1984	West County Wastewater District WWTP	—	0.18	0.18	0.18	0.18	0.18	0.18	0.18
Metropolitan Golf Links [Oakland]	Golf Course Irrigation	1988	City of San Leandro WPCP	—	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Chuck Corica Golf Complex [Alameda]	Golf Course Irrigation	1991	City of San Leandro WPCP	—	0.37	0.37	0.37	0.37	0.37	0.37	0.37
Harbor Bay Parkway [Alameda]	Landscape Irrigation	1991	City of San Leandro WPCP	—	0.02	0.02	0.02	0.02	0.02	0.02	0.02
Chevron Refinery [North Richmond]	Cooling Tower Water (Industrial)	1996	West County Wastewater District WWTP	—	4	4	4	4	4	4	4
San Ramon Valley Recycled Water Program – Phase 1 [Contra Costa County]	Landscape Irrigation	2006	DSRSD WWTP	—	0.7	0.7	0.7	0.7	0.7	0.7	0.7
East Bayshore Recycled Water Project – Phase 1A [Alameda County]	Industrial, Landscape Irrigation, Toilet Flushing, in Commercial Buildings	2008	EBMUD Main WWTP	—	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Richmond Advanced Recycled Expansion (RARE) Water Project – Phase 1 [Contra Costa County]	Industrial	2010	WCWD WWTP	—	3.5	3.5	3.5	3.5	3.5	3.5	3.5
Recycled Water Truck Program	Construction water needs, sewer flushing, other non-potable uses	2008	EBMUD WWTP	—	0.003	0.003	0.003	0.003	0.003	0.003	0.003
EBMUD Wastewater Treatment Plant (In-Plant Uses) [Oakland][3]	Plant Processes (Industrial) and Landscape Irrigation	1971	EBMUD Main WWTP	—	3	3	3	3	3	3	3
Total Existing Customer Recycled Water Use[3]					**9.3**	**9.3**	**9.3**	**9.3**	**9.3**	**9.3**	**9.3**
Planned Under Construction											
San Ramon Valley Recycled Water Program — Phases 2 – 4 [Contra Costa County]	Landscape Irrigation	2015	DSRSD WWTP	$13	—	0.7	1.3	1.7	1.7	1.7	1.7
Total Planned Under Construction					**0**	**0.7**	**1.3**	**1.7**	**1.7**	**1.7**	**1.7**
Additional Planned											
Richmond Advanced Recycled Expansion (RARE) Water Project— Future Phases [Contra Costa County]	Industrial	2015	West County Wastewater District WWTP	Not Yet Determined	0	0.5	0.5	1.5	1.5	1.5	1.5
Satellite Recycled Water Projects [Alameda County/Contra Costa County]	Landscape Irrigation	2015	Satellite Facility	$42	0	0.2	0.2	0.4	0.4	0.7	0.7
East Bayshore Recycled Water Project — Phase 1B2 [Alameda County]	Landscape Irrigation, Industrial, Toilet Flushing, in Commercial Buildings	2020	EBMUD Main WWTP	$37	0	0	1.2	1.8	1.8	1.8	1.8
San Leandro Water Reclamation Facility Expansion Project [Alameda County][4]	Landscape Irrigation	2020	City of San Leandro WPCP	$16	0	0	0.5	0.5	0.5	0.5	0.5
Conocophillips Recycled Water Project [Contra Costa County]	Industrial	2020	Pinole/Hercules/Rodeo WWTPs (combined discharge)	$42	0	0	2.8	2.8	3.7	3.7	3.7
Reliez Valley Recycled Water Project [Contra Costa County]	Landscape Irrigation	2020	CCCSD WWTP	$3	0	0	0.2	0.2	0.2	0.2	0.2
San Ramon Valley Recycled Water Project Phases 5–6 [Contra Costa County]	Landscape Irrigation	2030	DSRSD WWTP	$9	0	0	0	0	0.3	0.5	0.5
Total Additional Planned					**0**	**0.7**	**5.4**	**7.2**	**8.4**	**8.9**	**8.9**
Total of All Projects [3,5]					**9.3**	**10.7**	**16**	**18.2**	**19.4**	**19.9**	**19.9**

[1] The 2010 recycled water use amount shown in this table includes the projected initial phases of San Ramon Valley and East Bayshore recycled water projects once completed. RARE Phase started up in 2010.
[2] EBMUD will implement the most cost-effective of these recycled water projects in order to meet recycled water goals of 20 MGD by 2040
[3] Recycled water use at the EBMUD Main WWTP is not factored into the EBMUD recycled water goal of 20 MGD, and is not included in the Total Existing Customer Recycled Water Use in the table. Historically, in-plant uses at the EBMUD Main WWTP had not used potable water for processes and irrigation. Consequently, current recycled water use does not offset potable water demand at the EBMUD MWWTP.
[4] Capital cost amount only includes the cost of EBMUD's project. Recycled water use amounts include both EBMUD and the City of San Leandro's project.
[5] Total values have been rounded.

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Figure 5-2 EBMUD Recycled and Non-Potable Water Projects

The initial phase of RARE will produce up to 3.5 MGD of recycled water, thereby offsetting an equivalent amount of potable water. In the future, as additional source water becomes available, EBMUD and Chevron may expand the project to provide 4.0 MGD or even 5.0 MGD of recycled water.

EBMUD is responsible for operating and maintaining the treatment plant and influent pump station. Chevron is responsible for transmission mains through the refinery and for boiler feedwater operations.

East Bayshore Recycled Water Project - Phase 1A

The East Bayshore Recycled Water Project (EBRWP) is a multi-phased project that will provide up to 2.3 MGD of tertiary-treated recycled water from EBMUD's MWWTP to customers in parts of Alameda, Albany, Berkeley, Emeryville, and Oakland. A new 4.4-mile long recycled water transmission pipeline along the Eastshore Freeway (I-80) and up to 24 miles of distribution pipelines, separate from the drinking water system, will distribute the recycled water to customers.

Table 5-6 Recycled Water Use By Specific Type

Type of Use	Treatment Level	Recycled Water Use (MGD)						
		2010[1]	2015	2020	2025	2030	2035	2040
Agriculture	-	-	-	-	-			
Landscape Irrigation	Secondary and Tertiary	1.8	2.7	5.2	6.4	6.7	7.2	7.2
Wildlife Habitat	-							
Wetlands								
Industrial	Tertiary	7.5	8	10.8	11.8	12.7	12.7	12.7
Groundwater Recharge	-							
Commercial	Tertiary	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Total[2,3]	**-**	**9.3**	**10.7**	**16**	**18.2**	**19.4**	**19.9**	**19.9**

1 2010 estimate provided as of August 2010.
2 Recycled water use at the EBMUD Main WWTP is not factored into the EBMUD recycled water goal of 20 MGD by 2040. Historically, in-plant uses at the EBMUD Main WWTP had not used potable water for processes and irrigation. Consequently, current recycled water use does not offset potable water demand at the EBMUD Main WWTP.
3 Total values have been rounded.

The recycled water will be used for landscape irrigation of parks, common planted areas within homeowner associations, greenbelts, roadway medians, and schools. Several industrial and commercial users will be served with recycled water for cooling towers and toilet flushing in office buildings. Wetlands restoration is another potential use of recycled water from this project.

Phase 1A is anticipated to provide approximately 0.5 MGD of recycled water to new and existing customers in portions of Albany, Berkeley, Emeryville, and Oakland. EBMUD began construction of Phase 1A distribution pipeline in the West Oakland area in 2003. Construction of the plant at the MWWTP was completed in 2008 and the first delivery of recycled water occurred on April 22, 2008 to customers in Oakland. The remainder of Phase 1A will be completed once funding is secured. EBMUD is in planning for Phase 1B, which will serve customers in Alameda.

New recycled water tertiary treatment facilities at the MWWTP in Oakland were completed in 2008 and include a pump station and 1.5 million gallons of storage. The plant filters and disinfects treated wastewater before it is used as recycled water. Tertiary treatment of secondary effluent includes microfiltration followed by disinfection with sodium hypochlorite to produce recycled water that meets California Department of Health Services standards for "disinfected tertiary recycled water" as defined in Title 22.

EBRWP has received state funding from the State Water Resources Control Board (SWRCB), which approved a $4.4 million grant and $20.1 million in low interest loans to help fund design and construction costs of the first phase of the project.

Recycled Water Truck Program

In 2008, in response to the 2007-2010 period when EBMUD implemented a Drought Management Program, the District began a recycled water truck program (RWTP) to make recycled water available to truck customers for approved uses. Through this program, EBMUD operates two recycled water filling stations, one at the MWWTP and one at the NRWRP. These filling stations provide recycled water to permitted customers for uses which include dust control, soil compaction, power washing, decorative fountains and ponds, landscape irrigation, street washing and sewer flushing. Although EBMUD has since declared the drought over, the RWTP continues to operate. Currently the RWTP offers recycled water free of charge.

Future Recycled Water Projects

Water recycling is a key element of EBMUD's current and future water supply portfolio. EBMUD's goal is to provide a total of 20 MGD of recycled water by 2040. Table 5-6 summarizes the quantity of recycled water use by specific type of use for 2010-2040. Projected quantities are based on average usage by existing projects and potential average delivery of planned recycled water projects. EBMUD's plan is to identify and implement the most cost-effective recycled water projects in order to meet its recycled water goal.

Although the majority of the wastewater generated within EBMUD's water service area is not recycled, recycled water use is anticipated to steadily increase over the next thirty years. Recycled water will be used primarily for industrial and landscape irrigation applications, as shown in Table 5-6, and some commercial applications. EBMUD continues to seek opportunities to use recycled water for wetlands and wildlife enhancement. At this time EBMUD does not anticipate using recycled water to recharge the existing groundwater supply.

Eight major water recycling projects are currently planned to help EBMUD meet its goal of recycling 20 MGD by 2040. One project is currently in construction and seven are in

planning phases. All projects will produce recycled water treated to the highest level (tertiary), which allows for unrestricted reuse. The project objectives include maximizing delivered volumes of recycled water to meet customer demands for non-residential irrigation, commercial, and industrial uses, thereby reducing potable demand while maintaining economic viability.

Recycled water project currently under construction is:

- San Ramon Valley Recycled Water Program (SRVRWP) - Phases 2-4.

The seven projects currently in planning phases are:

- RARE Water Project - Future Phases,
- Satellite Recycled Water Treatment Plant Project (Alameda and Contra Costa counties),
- East Bayshore Recycled Water Project (EBRWP) - Future Phases,
- San Leandro Water Reclamation Facility Expansion Project,
- San Ramon Valley Recycled Water Project - Phases 5 and 6,
- ConocoPhillips Recycled Water Project, and
- Reliez Valley Recycled Water Project.

The initial operational phases of the SRVRWP and EBRWP were completed in 2006 and 2008 respectively with additional phases anticipated in the future. The RARE Water Project became operational in 2010. The remaining projects are anticipated to be implemented by 2040. The locations of the eight planned projects are illustrated in Figure 5-2.

The Water Recycling Program identifies, funds, and implements projects in the most cost-effective manner. The scope and implementation schedules of the project elements are subject to ongoing modification and prioritization in order to provide the most cost-effective recycled water supply needed to meet the 20 MGD goal.

Project Under Construction

EBMUD completed construction of the initial phase of the SRVRWP, which began deliveries in early 2006. Table 5-5 (see page 5-7) summarizes this project's features and the quantity of recycled water it supplied in 2010, and the quantity it is expected to supply through 2040.

San Ramon Valley Recycled Water Program – Phases 2-4

The SRVRWP is a multi-phase, joint regional project between EBMUD and the Dublin San Ramon Services District (DSRSD). The two agencies formed a Joint Powers Authority in 1995 called the DSRSD-EBMUD Recycled Water Authority (DERWA) to implement the program which serves recycled water to their customers within portions of the Blackhawk, Danville, Dublin, and San Ramon areas. DERWA's mission is to provide a safe, reliable, and consistent supply of recycled water, and to maximize the amount of recycled water delivered. The project will provide 5.7 MGD of recycled water from a tertiary-treatment facility located at the DSRSD Wastewater Treatment Plant that consists of either sand filtration or microfiltration followed by ultraviolet light and chemical disinfection. DSRSD customers will receive up to 3.3 MGD, and EBMUD customers will receive up to 2.4 MGD. EBMUD's initial Phase 1 now delivers approximately 0.7 MGD to existing landscape irrigation customers located in San Ramon. Future EBMUD customers include large irrigation users in parts of Blackhawk, Danville, Dublin, and San Ramon such as golf courses, parks, common planted areas within homeowner associations, roadway medians and greenbelts, schools, and office complexes.

DERWA and its member agencies developed agreements regarding specific responsibilities for recycled water supply and sales and for facilities operation. DERWA's role is to design, build, and operate the recycled water treatment facilities, as well as the main backbone transmission system which includes pipelines, pump stations and storage reservoirs. Since the project is located in both EBMUD's and DSRSD's water service areas, each of DERWA's member agencies is responsible for designing and constructing their own recycled water distribution infrastructure within each respective service area and marketing recycled water to its respective customers.

In order to receive federal funding, DERWA partnered with the U.S. Army Corps of Engineers in 2002 to design the remaining backbone facilities. The federal Water Resource Development Act of 1999 authorized $15 million for the SRVRWP. To date, Congress has appropriated funds totaling $14.5 million for design and construction assistance through the U.S. Army Corps of Engineers. SRVRWP has received both federal and state funding. The SWRCB approved a $5 million grant and a $24.8 million low-interest loan for the first phase of the DERWA backbone facilities.

DERWA's Phase 2 construction is anticipated for completion in FY11. EBMUD's Phases 2, 3, and 4 design for the SRVRWP was completed in FY10. Construction of the pipelines for portions of Phases 2 and 3 and Phase 4 are anticipated to be completed in FY11/FY12. Completion of the remaining portions of pipeline in Phases 2 and 3 and the pump stations in Phases 3 and 4 will depend on additional outside funding assistance.

Additional Planned Projects

EBMUD has seven additional planned recycled water projects that increase the potential for more recycled water deliveries. The projects include the following:

- RARE Water Project Future Phases,
- Satellite Recycled Water Treatment Plant Project,
- East Bayshore Recycled Water Project (EBRWP) - Future Phases,
- San Leandro Reclamation Facility Expansion Project,
- San Ramon Valley Recycled Water Project - Phases 5 and 6,
- Conoco Philips Recycled Water Project, and
- Reliez Valley Recycled Water Project.

These planned projects are scheduled for implementation by 2040 to meet EBMUD's water recycling goal. They are expected to provide 8.9 MGD of savings by 2040, in addition to savings provided by existing projects (9.3 MGD) and projects under construction (1.7 MGD), for a total of 20 MGD by 2040. Most projects will provide recycled water use for landscape irrigation and industrial purposes. Table 5-5 (see pages 5-7) summarizes these projects' features and the quantity of recycled water use for each identified recycled water project from 2010 to 2040.

Richmond Advanced Recycled Expansion Water Project - Future Phases

The initial RARE Water Project was completed in 2010, and provides 3.5 MGD recycled water for boiler feedwater applications at the Chevron Refinery in Richmond. This second phase of the RARE project would increase the capacity to 4.0 MGD by installing additional Microfiltration membranes modules. Like the initial RARE project, this expansion may utilize wastewater from the WCWD water pollution control plant. However, if WCWD supply were unavailable, the RARE expansion project may take water from the Chevron Refinery's wastewater effluent stream. Depending on supply, this project may be operational by 2015.

A third phase, potentially operational by 2025, depending on source water supply, would build out the RARE treatment plant to increase the project's ultimate capacity to 5.0 MGD.

Satellite Recycled Water Treatment Plant Project

Satellite recycled water treatment plants, which take raw sewage from a sewer pipeline and treat it to meet the Title 22 tertiary recycled water quality requirements at the location of use, can cost-effectively serve large water users that are located a remote distance from a centralized treatment facility. Satellite treatment plants avoid the need for costly infrastructure required to move recycled water from a centralized treatment facility to distant customers.

In 2009, EBMUD evaluated five satellite recycled water treatment plant projects, each yielding from 50-200 AFY. Each project would treat raw sewage on-site for local use, which in these cases would be for irrigating cemeteries, landscaping and golf courses. The five projects that were evaluated are:

- Rolling Hills Cemetery - 45 acres, 50-200 AFY
- Diablo Country Club - 200 AFY
- Mountain View and St. Mary's Cemeteries, Oakland - 40 acres, 100-200 AFY
- Rossmoor Golf Course, Rossmoor Valley - 100-150 AFY
- Moraga Country Club, Moraga - 100 - 200 AFY

After the project-level environmental documentation process is completed, design and construction of the first of these facilities is anticipated to be completed by 2015, pending funding assistance.

East Bayshore Recycled Water Project - Future Phases

The EBRWP Phase 1B will expand recycled water deliveries by 1.2 MGD to customers in Alameda. Final design and construction of Phase 1B is pending outside funding assistance. A future Phase 2 expansion will connect additional customer and new developments in the Oakland area (0.6 MGD).

San Leandro Water Reclamation Facility Expansion Project

The current San Leandro Reclamation Facility provides approximately 0.4 MGD of secondary-treated and disinfected recycled water produced by the City of San Leandro's WPCP for irrigation at the Metropolitan Golf

Links in Oakland, the Chuck Corica Golf Complex and Harbor Bay Parkway in Alameda. When expansion of the San Leandro Reclamation Facility is complete, the expanded delivery of recycled water by an additional 0.5 MGD is anticipated to begin by 2020.

In addition to EBMUD's project, the City of San Leandro may also expand recycled water delivery to irrigate its public areas within EBMUD's water service area. If successfully implemented, the City's expansion project will offset approximately 0.1 MGD of EBMUD's potable water, which will help EBMUD reach its goal of recycling 20 MGD by 2040.

ConocoPhillips Recycled Water Project

The ConocoPhillips Recycled Water Project (previously known as the Rodeo Recycled Water Project) could potentially supply up to about 3.7 MGD of recycled water to the ConocoPhillips Refinery in Rodeo. The recycled water for this project would come from the combined wastewater discharge of Pinole-Hercules and Rodeo wastewater treatment plants. EBMUD and ConocoPhillips have entered into a Memorandum of Understanding (MOU) to evaluate the feasibility of developing this project. High purity recycled water would replace potable water currently used in plant processes.

The first phase project, which could provide up to 2.8 MGD, is in planning phases, and could be operational by 2020. The second phase could provide an additional 0.9 MGD.

San Ramon Valley Recycled Water Project - Phases 5 and 6

The SRVRWP is a joint regional program between EBMUD and Dublin San Ramon Services District (DSRSD). Phase 1 of this project was completed in 2006 and Phases 2 - 4 are scheduled to be implemented in 2010 to 2025. Phases 1 - 4 are planned to provide up to 2.4 MGD of recycled water for landscape irrigation for EBMUD customers by 2040. The source water comes from the DSRSD WWTP. The project serves tertiary treated recycled water to both EBMUD and DSRSD customers.

Phases 5 and 6, using the same water source and the same treatment facilities, are now in conceptual phases of development and will serve additional landscape irrigation uses in the San Ramon Valley area. Phase 5 would provide an average of 0.3 MGD by 2030 and Phase 6 would provide an average of 0.2 MGD of recycled water by 2035.

Reliez Valley Recycled Water Project

For this potential project, EBMUD would partner with Central Contra Costa Sanitary District (Central San) to obtain recycled water from their existing system and distribute it to two cemeteries, a golf course and to the city of Pleasant Hill for landscape irrigation. This project could supply 0.2 MGD of recycled water, reducing the demand for potable water. It is now in the conceptual planning phase, and could be operational as early as 2020.

Recycled Water Projects Implementation Challenges

EBMUD's goal is to identify and implement the most cost-effective recycled water projects so as to provide a total of 20 MGD of recycled water by 2040. As EBMUD continues to explore opportunities for implementing recycled water projects, it is faced with a number of technical challenges, which could impact the economic feasibility of the projects. One of the major challenges is the added cost associated with installing recycled water distribution systems that are separate from EBMUD's potable water distribution systems. In order to help improve the economics of recycled water projects, EBMUD seeks opportunities to coordinate construction of distribution pipelines with other construction projects, such as street maintenance projects. EBMUD also considers re-use of pipelines, reservoirs and other facilities which are no longer needed by other utilities for distributing recycled water to customers. The need for separate plumbing at each customer location is another technical and economic challenge for recycled water projects. It is more economical to install a separate plumbing system for a new project during the initial construction of the facility than it is to retrofit the project. To minimize the costs of retrofits associated with separate plumbing systems, EBMUD reviews applications for new potable water services to assess the suitability of the projects to use recycled water.

Another technical challenge for recycled water projects is determining the level of treatment needed for the recycled water. CDPH standards require certain levels of treatment for protection of public health based on the application of the recycled water. In addition, specific customer needs may dictate a higher level of treatment than prescribed by CDPH. When a distribution system serves a number of customers with varying uses, an appropriate level of treatment must be selected to meet the needs of all customers within the system. To reduce the cost of building new treatment facilities and the annual increased

chemical costs attributed to a higher level treatment, EBMUD considers the implementation of satellite treatment plants at specific customer locations. EBMUD constantly seeks to find creative solutions to the technical challenges inherent in recycled water projects in order to improve the economic viability of its projects.

Non-Potable/Raw Water Projects

EBMUD has a number of existing projects that utilize raw or non-potable water, as illustrated in Figure 5-2. These projects do not use treated wastewater (i.e. recycled water). Instead, they use raw, untreated water for irrigation and other purposes. Existing raw/ non-potable water projects, listed in Table 5-7, reduce demands on EBMUD's potable water supply by almost 2 MGD.

Water Filter Plant Washwater Reclamation

Facilities for recycling filter backwash water from most of EBMUD's water filter plants were constructed in the late 1970s to comply with federal discharge requirements. The National Pollutant Discharge Elimination System (NPDES) permit required the majority of suspended solids to be removed from the washwater prior to discharge into a receiving stream. Rather than discharge this wastewater, EBMUD treatment plants instead recycle it, resulting in a net gain in potable water supply. The treatment plants operate sedimentation facilities to collect solids from the washwater and recover the clarified overflow which is then recycled through the potable water treatment process. The operation of filter plant recycled water facilities saves EBMUD approximately 1.7 MGD.

The ability to treat and recycle about 5 MGD of washwater at the Orinda Filter Plant became available in 1988; however, because direct discharge of washwater to the San Pablo Creek replenishes the San Pablo Reservoir and becomes available for use at the Sobrante and San Pablo Filter Plants, no additional water savings would be realized.

Lake Chabot Golf Course

This project, completed in 1991, provided an average of 0.09 MGD of water in 2009 to irrigate the City of Oakland's Lake Chabot Golf Course. Facilities include a pump station, 9,500 feet of supply pipeline and a surge tank/storage reservoir. Since the water is drawn directly from Chabot Reservoir, which is a standby terminal reservoir of EBMUD not connected to the distribution system, demand for potable water supply is reduced. In addition, by reducing the demand for potable water, this project eliminates the need to construct the proposed Peralta No. 2 potable water reservoir.

Willow Park Golf Course

This project, completed in 1991, withdrew an average of 0.07 MGD of water from Lake Chabot in 2009 to irrigate the Willow Park Golf Course in Castro Valley. Facilities include a submersible pump station and 8,500 feet of distribution pipeline. Like the Lake Chabot Golf Course project, raw water is also taken from the Chabot Reservoir, reducing demand for potable water supply.

Sunset View Cemetery Landscape Irrigation

This project, completed in 1998, uses raw water from EBMUD's San Pablo Reservoir to irrigate the Sunset View Cemetery, which is adjacent to the EBMUD San Pablo Filter Plant, in Kensington. In 2009, the project used an average of 0.07 MGD of non-potable water.

Lake Chabot Raw Water Expansion Project

This project would be an expansion of the Lake Chabot Golf Course and Willow Park Golf Course projects, described above. It would expand the use of raw water from the Chabot Reservoir and provide this water for irrigation and other non-potable uses at a nearby country club, the Oakland Zoo and other nearby customers. It would provide up to 1.4 MGD during peak irrigation months, or an average of up to 0.4 MGD.

Table 5-7 Existing EBMUD Non-Potable/Raw Water Projects

User	Water Supply Source	Non-Potable/ Raw Water Use	Average Daily 2010 Demand (MGD)	Year Initiated
Water Treatment Plants	Washwater Reclamation in EBMUD Water Treatment Plants	Recycle filter backwash	1.7 (estimated)	1970s
Lake Chabot Golf Course	Chabot Reservoir	Golf Course Irrigation	0.10	1991
Willow Park Golf Course	Chabot Reservoir	Golf Course Irrigation	0.03	1991
Sunset View Landscape Irrigation	San Pablo Filter Plant	Cemetery Irrigation	0.05	1998

Encouraging Recycled Water Use

In general, EBMUD prices recycled water to provide an economic incentive to customers. EBMUD also uses state and federal funding, when available, to make recycled water projects more cost effective.

Incentive Program

A major incentive for customers to use recycled water is the reliability and availability of the supply during a drought. During a drought, the recycled water supply should not be significantly impacted.

In addition, EBMUD has provided a number of incentives to encourage customers within EBMUD's service area to use recycled water. These have been primarily in the form of subsidized costs, reduced rates for recycled water and penalties for refusing recycled water when available.

Subsidized Costs

To promote the use of recycled water, EBMUD funds cost-effective site retrofits that accommodate the use of recycled water for existing customers. EBMUD also funds the training of customers' staff in the proper use of recycled water and provides free technical support to customers who receive recycled water.

Rate Discounts

The connection fees charged to new recycled water customers are lower than those charged to new potable water customers. This is reflective of the fact that, unlike EBMUD's existing potable water distribution systems, the new recycled water distribution systems do not require upgrades and seismic retrofits. The current policy offers new recycled water customers a 20 percent volumetric rate discount for the recycled water as compared to the adopted potable water rate. For existing customers who have funded retrofits in the past and have individual contracts with EBMUD, EBMUD provides recycled water at a rate lower than the potable water rate. This lower rate is established through the individual contracts with these customers.

Grants and Low Interest Loans

Historically, EBMUD has provided low interest rate loans to customers who funded facility retrofits required to accommodate the use of recycled water and also has funded retrofit costs that were determined to be cost-effective. To help reduce the overall cost of recycled water projects, EBMUD actively pursues grant funding and low interest loans that are available for these types of projects. The grants have been applied toward the planning, design and construction phases of the projects, whereas the low interest rate loans have been used to help reduce the overall cost of constructing the projects. Some of the sources of these monies have included the State Water Bond Bill (Proposition 13 passed in March 2000), the Federal Water Resources Development Act (WRDA), the SWRCB Revolving Fund program, and the Water Reuse Financing Authority for low interest loans, and the Department of Water Resources Integrated Regional Water Management Plan (IRWMP) implementation grants. In 1999, WRDA authorized up to $15 million in grant funds for the San Ramon Valley Recycled Water Project. In 2007, WRDA authorized up to $25 million for EBMUD's recycled water program.

Grant funds from the SWRCB have been used in the planning, design, and construction phases of the EBRWP and the SRVRWP. In addition, the construction of EBMUD's NRWRP was made possible through a low interest rate loan provided through the SWRCB's low interest rate loan program. Additionally, EBMUD's RARE facility received a $2.1 million grant from the California Department of Water Resources, through the Integrated Regional Water Management Program, for the purchase of the microfiltration system. EBMUD will continue to seek outside funding sources for recycled water projects in order to help reduce the overall cost of recycled water to EBMUD customers.

Long-Term Contracts

The majority of the recycled water distributed by EBMUD is recycled water from treatment plants which are owned and operated by other utilities. It is therefore very important for EBMUD to enter into long-term agreements with the utility districts that provide the treated effluent for use by EBMUD to ensure both the stability of the price of the recycled water and the reliability of the source of the recycled water. EBMUD's Policy 9.05 requires, wherever possible, that agreements with other agencies have a term of twenty years or more. Policy 9.05 also states that the agreements should include provisions governing facilities operation and maintenance responsibilities. EBMUD has entered into long-term agreements for those existing projects that are dependent upon another agency as a source of the recycled water, and intends to maintain this policy for all future projects.

Regional Planning

As a member of the Bay Area Water Agencies Coalition (BAWAC) and Bay Area Clean Water Agencies (BACWA) EBMUD participated in a regional effort to develop a Bay Area IRWMP. This IRWMP includes EBMUD's water recycling program and provides a venue for maximizing water recycling in the Bay Area using a regional planning

perspective. EBMUD has also been a partner and active participant in the San Francisco Bay Area Regional Water Recycling Program (BARWRP). BARWRP was a cooperative effort among numerous Bay Area water and wastewater agencies and state and federal organizations. Its efforts were directed at developing a long-range Regional Water Recycling Master Plan for five Bay Area counties, namely Alameda, Contra Costa, San Francisco, San Mateo and Santa Clara. A number of the near-term recycled water projects identified in the Master Plan are in EBMUD's service area. These projects involve EBMUD partnering with other agencies, as well as one project where EBMUD will utilize its own recycled water supplies. Through its involvement with BARWRP, EBMUD was able to support the use of recycled water regionally.

In addition to participating in long-range planning efforts through BAWAC, BACWA, and BARWRP, EBMUD works with planning groups within other local planning agencies and utilities that are located in EBMUD's water service area to identify opportunities to implement recycled water projects.

Public Education/Information

In order to encourage the increased use of recycled water, EBMUD is committed to educating and informing the public that recycled water is safe for the public and for the environment. Through presentations to community groups and at conferences, coordinating workshops, meetings with potential customers, and local planning agencies, and distribution of educational materials, EBMUD is increasing public awareness of the benefits of using recycled water. EBMUD also provides information on recycled water in general and on the EBMUD's recycled water program specifically both in print and electronically through EBMUD's website at *http://www.ebmud.com.*

EBMUD developed an award-winning Recycled Water Irrigation Customer Training Program in order to provide training to irrigation customers in the safe and effective use of recycled water. This program consists of a manual and two videos covering health and safety and landscape best management practices in using recycled water. EBMUD continues to provide appropriate training and support to its recycled water customers.

Prohibit Specific Fresh Water Uses

Consistent with the California Water Code, Section 13550, EBMUD's policy is to discourage "waste or unreasonable use of [potable] water if recycled water is available which meets specified conditions."

Require Recycled Water Use

EBMUD's Policy 9.05 (consistent with California Water Code, Section 13550) requires the use of recycled water for non-domestic purposes when it is of adequate quality and quantity, available at reasonable cost, not detrimental to public health and not injurious to plant life, fish or wildlife. To date, however, EBMUD has been effective in providing incentives to use recycled water, rather than mandating its use.

EBMUD proactively utilized the Water Recycling in Landscaping Act to promote the use of recycled water by new development or redevelopment approved by local cities or counties. EBMUD was able to encourage a number of cities to adopt dual-plumbing ordinances that would require new development or redevelopment to separately plumb for appropriate recycled water uses if it is determined that EBMUD would be able to provide recycled water for these uses.

Recycled Water Optimization Plan

EBMUD's goal is to maximize the cost-effectiveness of recycled water projects while maximizing the volume of water delivered. This requires detailed assessments of future recycled water customer needs. It also requires careful planning in order to develop cost-effective distribution systems that will maximize the quantity of recycled water delivered to customers. By encouraging local planning agencies to require separate recycled water plumbing during the permitting process, a customer base will be generated and be ready to use recycled water as soon as the water is available in the area. By ensuring the installation of separate plumbing while the project is initially being designed and constructed, the cost and disruption associated with facility retrofitting can be minimized. Long-term contracts with other agencies will also be an important component of future recycled water projects. Additionally, continued public education and outreach programs will be essential to the success of EBMUD's recycled water program.

Over 160 MGD of wastewater is currently generated within EBMUD's service area, and that quantity is expected to increase to nearly 190 MGD by the year 2040. By tapping into this resource and working jointly with other agencies to make recycled water available to customers in EBMUD's water service area, EBMUD has the ability to greatly increase its water supply resources.

Chapter 6. Water Conservation

Water conservation is a major component of EBMUD's water supply portfolio designed to increase water supply reliability. EBMUD's long-standing water conservation program continually makes an aggressive push to educate its customers on water-efficiency and to increase their conservation efforts. EBMUD monitors water demand, new technology, and changes in consumer preferences, and works closely with other local, regional, state and national entities to enhance its water conservation services. California's 2009 legislation (SBx7-7) calling for a statewide 20 percent reduction in per capita water consumption by 2020 sets new water conservation standards that EBMUD is prepared to meet.

Introduction

Since the 1970s demand management has been an important part of EBMUD's water practices and policies, designed to promote reasonable and efficient use of supplies. EBMUD's water conservation efforts and water conservation actions are chronicled in Table 6-1. This chapter specifically discusses EBMUD's water conservation efforts following the implementation of its first Water Conservation Master Plan (WCMP) adopted in 1994.

EBMUD's water conservation program addresses both supply-side (water supplier) and demand-side (customer) measures. Demand-side water conservation measures improve customer water use efficiency and include incentives for residential and non-residential customers, education and outreach activities, market support activities and regulatory programs. Supply-side water conservation measures, which improve water use efficiency before and after use by the customer, include distribution system leak detection and repair programs and water recycling programs (discussed in greater detail in Chapter 5).

In 2011, EBMUD is developing its WCMP to include existing and planned efforts in support of meeting long-term water conservation planning goals to the year 2040. The WCMP is designed to achieve cost-effective and sustained water savings going forward, while maintaining high-quality savings achieved from past EBMUD conservation efforts implemented since the 1970s. The established and future water conservation approach includes identified conservation measures, implementation strategies, and budgetary resources required to meet the need-for-water and drought management program goals to minimize customer rationing during a water shortage. Conservation measures include, for example, greater customer outreach, expanded water use surveys, increased technical and financial incentives, device distribution, and new water efficiency regulations. The WCMP presents a phased implementation of conservation measures based on threshold water production and customer demand levels designed to achieve a cumulative 62 million gallons per day (MGD)[1] of water savings by 2040.

A list of about 100 conservation measures considered potentially appropriate for the EBMUD service area was developed from known technology and services that would save water. Fifty-three selected conservation measures were further analyzed and combined into multiple component programs of increasingly higher water savings and implementation costs. The conservation savings are based on 10 percent to 90 percent market saturation for existing accounts and new development ordinances (account participation). A summary of the long-term water conservation program measures is listed in Table 6-2.

During the recent multi-year (2007-10) rationing period, EBMUD imposed voluntary and mandatory rationing within its drought management program. During the mandatory rationing program, EBMUD set a 15 percent average water savings goal. EBMUD emphasized educating customers on water conservation activities that return quick savings, while reinforcing the long-term hardware, infrastructure and behavioral changes that residential and business customers can make to realize savings for years to come. The drought management program dramatically increased water conservation staffing, outreach activities, services, and incentives; and customers responded with water savings of 36 MGD[2] in fiscal year (FY)10. A Water Saving Team of technicians, who supplemented existing conservation efforts with a supportive field presence, investigated water waste and distributed informational materials. EBMUD also launched a comprehensive $1.8

[1] The WCMP adopted in 1994 provided measures that resulted in 23 MGD savings as of 2008.

[2] The reduced demand is compared relatively to the average demand of FY05-07 and includes the effect of drought, local economic conditions, and mandatory conservation.

Table 6-1 Water Conservation Program Historical Highlights

Pre-1970	
	All EBMUD customers have always been metered.
1961	Distribution system leak detection and pipe replacement program begins.
1970s	
1974	School education program begins. Over 1.5 million students have received material and training since 1974.
1976	Community speakers bureau is formed.
1977	Drought response program. EBMUD customers achieve 39 percent annual reduction in use.
1978	Filter plant backwash recycling begins.
1980s	
1982	First four in a series of water-conserving demonstration gardens is dedicated.
1983	EBMUD sponsors the California Urban Water Management Planning Act (Assembly Bill 797).
1984	First of five golf courses begins using recycled water.
	Water Conservation Administrator is hired to implement broad-based conservation program.
1985	UWMP is adopted and implementation is initiated.
1986	EBMUD sponsors first Northern California Xeriscape Conference.
	EBMUD *Water Conserving Plants and Landscapes for the Bay Area* book is released.
1987	Residential and large landscape site water use surveys are offered.
	Landscape plan reviews are offered.
1988	Public Landscape Advisory Committee is formed.
	First weather station is installed with telephone hotline for landscape water requirement information.
	Water service regulation Section 29 is adopted prohibiting wasteful water use practices.
	Landscape video is developed with Sunset Magazine and 28 other agencies.
	Community water conservation portable display program is initiated (40 sites).
1989	Quarterly Landscape Advisory Newsletter is initiated.
	Meter discount program initiated for public agencies installing water-conserving landscapes.
1990s	
1990	Irrigation rebate program is offered to irrigation customers.
	Conservation "Welcome" packet program for new homeowners offered at model home sites.
1991	Study is conducted on performance/savings of 1.6 gallon per flush toilets and water-saving showerheads.
	Four landscape recycled water projects initiated, saving 0.65 MGD.
1992	Industrial, commercial, and institutional water use surveys are offered.
	Project Firescape initiated with two demonstration gardens and brochure promoting fire safety/ water conservation.
	Urban Water Shortage Contingency Plan adopted.
1993	Board adopts Water Supply Management Program 2020.
	Board directs staff to develop Water Conservation and Water Reclamation Master Plans.
	EBMUD signs statewide CUWCC MOU regarding implementation of Best Management Practices.
1994	Board adopts Water Conservation Master Plan and Reclamation Implementation Plan.
	Toilet rebate program is offered.
	Water Conservation Baseline Study conducted to establish monitoring and evaluation program.
1995	EBMUD industrial water recycling project completed, capacity of 5.4 MGD.
	Rate study is completed and Board adopts new residential tiered water-conserving rate structure.
	Commercial, industrial, and institutional rebate program is offered.
	Non-residential plan review program is initiated.
1996	Clothes washer rebate program offered to single-family customers.
1998	Landscape rebate program offered to single-family customers (for irrigation and graywater systems, plant material).
	Graywater study is completed.
	Market penetration study of toilets, showerhead and faucet aerators is conducted.
1999	Clothes washer rebates offered to all customer groups.

Table 6-1 Water Conservation Program Historical Highlights Continued

2000s	
2000	EBMUD named to California Urban Water Conservation Council (CUWCC) Steering Committee.
	EBMUD named to CALFED Water Use Efficiency Subcommittee.
2001	EBMUD sponsors successful passage of Senate Bill 221, linking water supply and land use planning.
2002	EBMUD re-elected to CUWCC Steering Committee.
2003	Launched WaterStart™ conservation certification and product labeling program.
	EBMUD Residential End-Use Study Completed.
	Initiated Strategic Marketing Plan for Water Conservation and Recycling.
	Demand Management Advisory Committee Report Completed.
2004	New edition of EBMUD plant book *Plants and Landscapes for Summer Dry Climates* is published.
	EBMUD National Multi-Family Residential Sub-meter Study completed.
2005	Awarded $1 million in grants for various water conservation studies/ projects.
2006	Launched Weather-Based Irrigation Controller Rebate Program.
	EBMUD re-elected to CUWCC Steering Committee.
2007	Awarded $1.9 million in grants for various water conservation studies/ projects.
	Established water service regulations/ efficiency requirements for all new water service accounts.
2008	EBMUD publishes Water Smart guidebook for businesses.
	Water Savings Team patrols conduct drought response.
	EBMUD re-elected to CUWCC Steering Committee.
	Pipeline and Aqueduct leak detection studies launched.
2009	EBMUD adopts individual metering requirements for new multi-family residential and commercial uses.
	EBMUD Water Smart Business Certification Program launched.
2010	EBMUD re-elected to CUWCC and AWE Boards of Directors.
	Development of the Water Conservation Master Plan initiated.

million marketing campaign using television, radio, and print media to inform customers of the severe water shortage, rationing goals, and ways to conserve.

As a result of its customers' efforts and ample spring rainfall in 2009, EBMUD ended mandatory rationing in June 2009 and maintained 10 percent voluntary rationing to further protect future supplies and to support Governor Arnold Schwarzenegger's request for water savings from all Californians. The voluntary restrictions were lifted in May 2010 due to the positive water supply outlook and customers' continuing conservation efforts. See Chapter 3 for further details on EBMUD's Drought Management Program.

Water Conservation Master Plan

The WCMP details water conservation programs and methodologies and goals that are established in water supply planning and mandated by regulation or statute. The primary purpose of the WCMP is to define the implementation strategies, objectives, and tactics required to achieve long-term water conservation savings. The 2011 WCMP will highlight a ten-year implementation plan designed to achieve savings that meet EBMUD's adopted per capita demand reduction targets identified in the UWMP 2010 required under SBx7-7 legislation (2009) and under the California Urban Water Conservation Council (CUWCC) Memorandum of Understanding (MOU) for Statewide Urban Water Conservation in the year 2020 and beyond.

Existing and expanded EBMUD water conservation programs include water use surveys, water-saving device distribution, financial incentives, targeted education and outreach, market support, new technology research, and regulatory activities. To be eligible for water service, new EBMUD customers must meet rigorous indoor and outdoor water-efficiency standards for plumbing fixtures, appliances, landscaping, and for commercial processes that use water. Additional savings are expected to result from "natural replacement." Natural replacement occurs through EBMUD-supported market advancement in technology, standards and codes, and water use practices, such as the installation of increasingly efficient hardware (toilets, showerheads, and faucets) and landscape conversions.

Table 6-2 Water Conservation Program Measures

Residential Measures	Commercial, Institutional or Industrial Measures
Artificial Turf SF Residential	CII Rebates to Replace Inefficient Equipment
Cisterns	CII Surveys
Condo Surveys	CII Surveys with AMS
Condo Water Surveys with Automated Meter Systems (AMS)	Dental Vacuum Pump
Garbage Disposal SF	High-Efficiency Urinal Rebate (<0.25 gallon)
Graywater New SF	Irrigation Water Surveys
Graywater Retrofit SF	Require 0.5 gal/flush urinals in new buildings
High-Efficiency Toilet (HET) Rebates (Expanded)	Require Plan Review for new CII
High-Efficiency Toilet (HET) Rebates	Water Brooms
Multi-Family Submeter Incentive	**Irrigation Measures**
Multi-Family Toilet Ordinance	Artificial Turf Sports Fields
Multi-Family Surveys	Irrigation Water Budgets
Multi-Family Surveys with AMS	Require Landscape and Irrigation Requirements
Multi-Family Washer Rebate	Updated Irrigation Water Budgets w/ AMS on existing accounts
Multi-Family Washer Rebate (Expanded)	**Measures for All Customers**
Public Information Program	Financial Incentives for Irrigation Upgrades
Require Efficient Dishwashers	Financial Incentives for Irrigation Upgrades (Expanded)
Require High-Efficiency Clothes Washers	Install AMS
Require High-Efficiency Faucets and Showerheads	Real Water Loss Reduction – I
Require High-Efficiency Toilets (HET)	Real Water Loss Reduction – II
Require Hot Water on Demand	Real Water Loss Reduction – III
Require Multi Family Submetering on New Accounts	**Residential and Irrigation Measures**
Require Plumbing for Future Gray Water Use	Smart Irrigation Controller Rebates
Require Smart Irrigation Controllers and Rain Sensors	
Single-Family Toilet Ordinance	
Single-Family Water Surveys I	
Single-Family Water Surveys I with AMS	
Single-Family Water Surveys II	
Single-Family Water Surveys II with AMS	
Single-Family Water Surveys III	
Single-Family Water Surveys III with AMS	
Washer Rebates	
Washer Rebates for High-Efficiency Machines	

Estimated Water Savings and Program Budget

Water savings from conservation programs, especially those that rely on customer behavioral changes, diminish or "depreciate" at varying levels over time. Despite EBMUD's efforts to encourage water-saving behavior, customer behaviors are expected to change over time, and savings from hardware replacements can degrade with product wear. EBMUD reports on total conservation savings efforts that incorporate depreciation to reflect a more conservative estimate of achieved annual savings toward meeting the long-term conservation goal of 62 MGD through 2040. Water savings estimates are summarized by program participation according to individual customer accounts, rather than by customer class levels, to improve estimate accuracy. Methods of water savings estimates are based on previous EBMUD research, pilot studies, and water consumption monitoring. Savings calculations include measuring site-specific savings from implemented conservation measures, using standard industry values from scientifically established savings rates for each fixture or appliance, and applying a percentage reduction in actual (average) pre-intervention consumption.

Since adoption of the WCMP in 1994, EBMUD has achieved an estimated additional conservation savings of 26 MGD through 2010 year-end (see Figure 6-1). Since the 1970s EBMUD has invested more than $65 million for implementation of customer-targeted water conservation programs. EBMUD's WCMP five-year budgetary plan

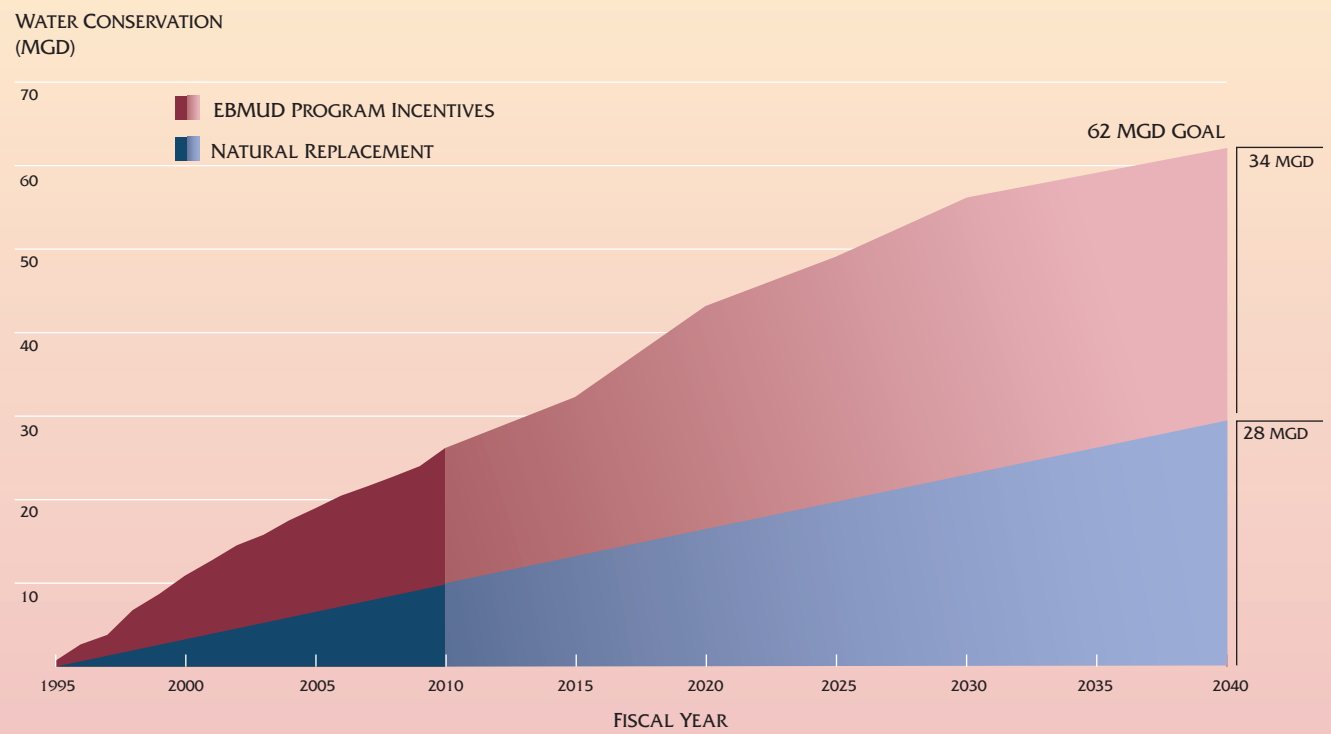
through FY15 includes an additional $18.3 million for water conservation program funding, as shown in Figure 6-2. By 2015, EBMUD will have invested more than $60 per capita on customer-targeted conservation programs since 1970. Water Conservation Program expenditures do not include additional expenditures for EBMUD funded conservation-related activities, such as distribution system leak detection, meter testing and replacement, or other field service customer assistance and education efforts.

EBMUD water rates and charges support the cost of implementing the conservation program and continued investments in achieving water use efficiencies as outlined in the WCMP. The water rates and rate structure are established biennially by the EBMUD Board of Directors. Any increases in the cost of the conservation program would be reflected in proposed water rate changes, subjected to a procedure of public notice and hearing to allow for input from the public and rate payers.

Key EBMUD water conservation program accomplishments in FY09 and FY10 are listed in Table 6-3 and include:

- nearly 36,000 rebates totaling more than $4.5 million were distributed to EBMUD customers;
- nearly 125,000 free water-saving devices (e.g. showerheads, faucet aerators) were distributed;
- more than 16,000 water use site surveys and self-survey kits were completed;
- more than 2,000 water waste reports were handled during the drought;
- more than 66,000 restaurant tent cards, hotel and health club stickers were distributed to some 800 restaurants and 30 health clubs to announce the drought and ask customers to use water efficiently and sparingly; and
- EBMUD sold more than 3,500 copies of its award-winning book Plants and Landscapes for Summer Dry Climates.

Figure 6-1 Water Conservation and Goals

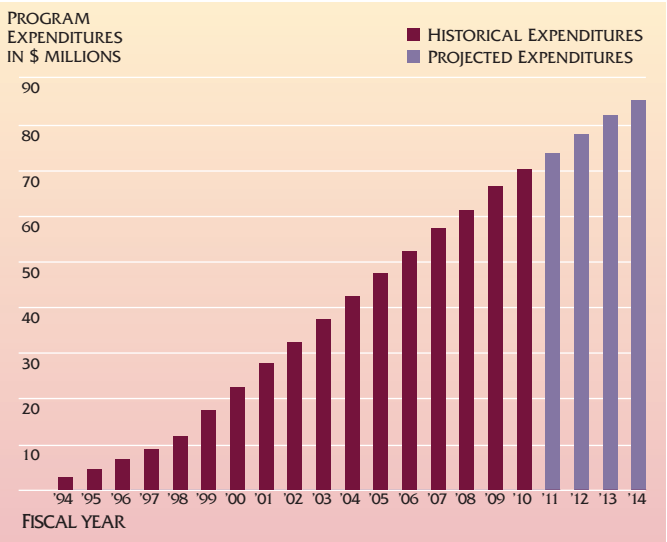


NOTES:

1. This figure depicts EBMUD's conservation efforts since the implementation of the Water Conservation Master Plan in 1994 and projected in the 2011 Water Conservation Master Plan, and it excludes savings associated with prior conservation efforts implemented in the 1970s.

FIGURE 6-2

CUMULATIVE CONSERVATION PROGRAM BUDGET



SBX7-7 WATER USE BASELINE AND TARGETS

Senate Bill No. 7 (SBx7-7) established the Water Conservation Act of 2009 program that is often referred to as "20x2020." The legislation calls for a 20 percent reduction in per capita water use statewide by the year 2020. All urban water agencies are required to report their baseline per capita water use and reduction targets in their 2010 UWMP.

Since the 1970s, demand management has been an important part of EBMUD's water practices and policies to promote reasonable and efficient use of supplies. Figure 6-3 of the Draft UWMP shows that EBMUD has made significant strides in decreasing historical daily per capital water demand as a result of EBMUD's aggressive water conservation and recycling efforts and other factors. Gross overall water demand has remained relatively consistent as the number of accounts has grown steadily. This continuous effort has resulted in more than a 25% reduction in daily per capita water use and goes beyond the short-term focus on consumption reduction as required through SBx7-7.

To allow agencies including EBMUD to capture previously realized conservation and recycled water savings, SBx7-7 was designed with flexibility to allow suppliers to select one of four methods for establishing its SBx7-7 targets. EBMUD researched each of the four target methodologies and selected a target method that would allow EBMUD to:

- be credited for its aggressive water conservation and recycling programs;
- implement demand management program budgets that are appropriately tailored to customer usage;
- anticipate the post-drought and economic rebound; and
- account for anticipated demand hardening in consumption behavior.

The three alternative target methodologies, which EBMUD did not use, are not suitable to the EBMUD service area as the per capita use targets could perpetuate the economic downturn and subject customers to further hardship.

In conformance with the reporting requirements of SBx7-7, Table 6-4 summarizes EBMUD's analyses of its baseline daily per capita water use and water use targets for 2015 and 2020. Because EBMUD's recycled water supply makes up less than ten percent of its measured retail water demand for 2008, EBMUD meets the criteria for applying the ten year baseline period to developing the target levels of per capita water use. The selected ten-year period is calendar years 1995-2004. Figure 6-3 illustrates the historical daily per capita water demand and the 2020 target demand for EBMUD's selected target method. Detailed calculations supporting the analyses of the baseline and target water use to meet the requirements of SBx7-7 are presented in Appendix H. The target water use will be finalized in the next UWMP submittal in 2015, and compliance reporting will be presented in future Urban Water Management Plans beginning in 2015.

To comply with SBx7-7, EBMUD will achieve its target water use by implementing recommendations for conservation programs as outlined in the WCMP and for recycled water programs as discussed in Chapter 5 of this UWMP 2010. The conservation and recycled water programs are based on long-term water supply planning levels.

EBMUD's 2020 water use target of 175 gallons per capita per day (GPCD) is calculated using Target Method No. 2. As a result of the 2020 target being greater than the minimum 5% reduction from EBMUD's 2003-07 five-year baseline, EBMUD will pursue a lower target of 150 GPCD. EBMUD's 2015 interim target is 158 GPCD. Implementing its planning level programs, EBMUD projects a lower demand level of 151 GPCD for year 2015. In addition, EBMUD's UWMP 2010 planning level programs project an even more aggressive and lower 2020 demand level of 144 GPD.

Table 6-3 Key Fiscal Year 2009 and 2010 Water Conservation Program Accomplishments

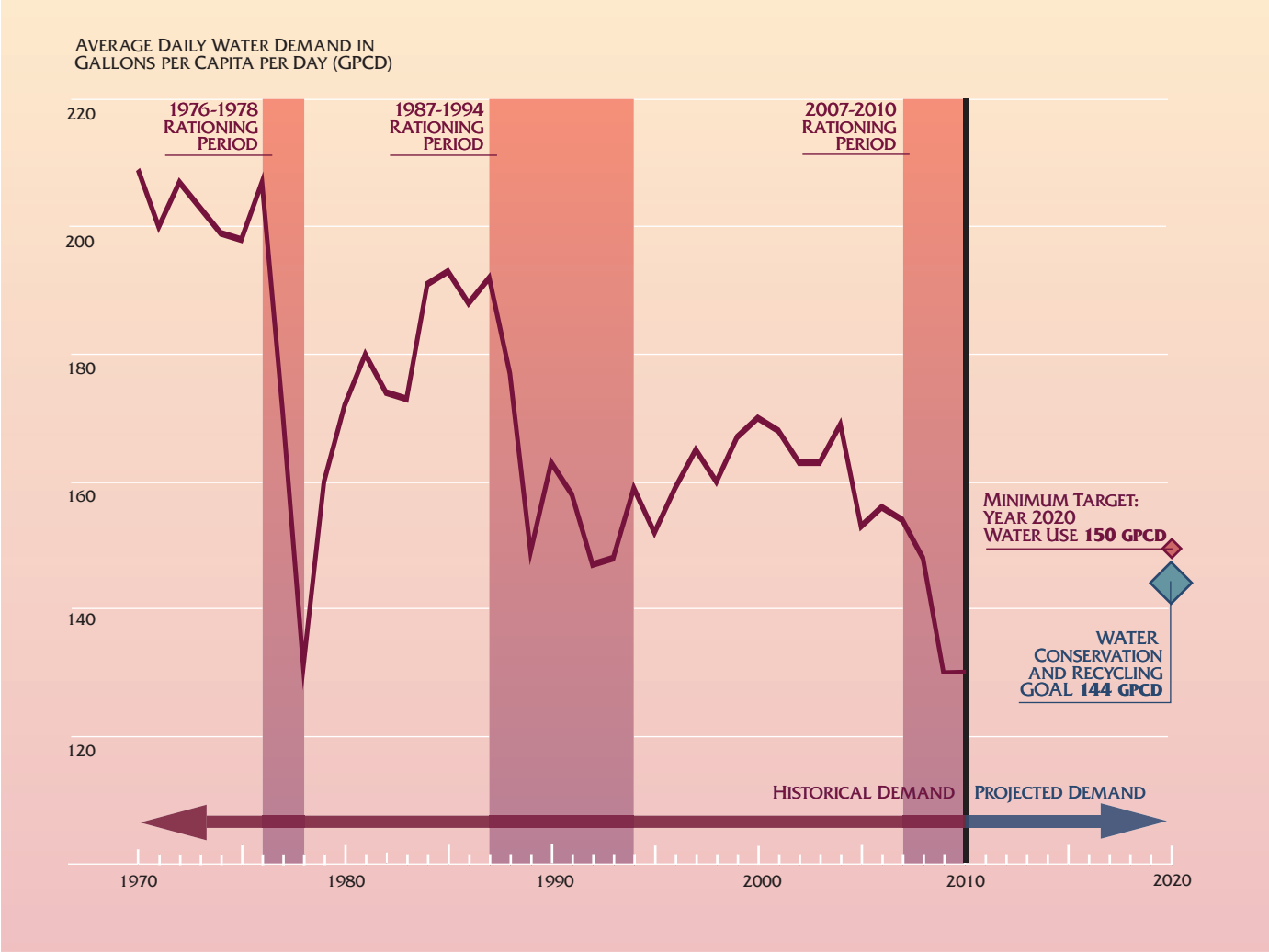
Program Description	Activity or Accounts	Incentives ($)	Water Savings (gpd)
Residential Services			
Single-Family Surveys	812	NA	56,000
Multi-Family Surveys	931	NA	165,400
CYES Student Surveys	1,283	NA	83,500
Home Water Use Do-it-Yourself Survey Kits	16,152	NA	174,100
Leak Detection Advice	11	NA	1,000
Residential Incentives			
High-Efficiency Clothes Washer Rebates	21,179	$2,310,510	400,300
High-Efficiency Toilet Rebates	13,000	$1,650,710	290,400
Residential Landscape Rebates	175	$129,509	8,900
Free Device Distribution	124,412	$190,000	78,400
Subtotal Residential Program Savings/Incentives	**177,955**	**$4,280,729**	**1,258,000**
Non-Residential Services			
Commercial Surveys	372	NA	32,700
Industrial Surveys	20	NA	2,200
Institutional Surveys	79	NA	10,700
Leak Detection Advice	7	NA	39,500
Non-Residential Incentives			
Commercial Clothes Washer Rebates	96	$18,300	10,000
Custom Non-Residential Rebates	208	$9,198	1,600
Commercial Dishwashing Spray Valves	27	$810	3,000
Toilet/Urinal Rebates	639	$68,551	16,100
Subtotal Non-Residential Program Savings/Incentives	**1,448**	**$96,859**	**115,800**
Irrigation Services/Incentives			
Irrigation Surveys	416	NA	233,000
Irrigation Reduction Information System	486	NA	90,300
Landscape Irrigation Upgrade Rebates	92	$97,446	75,200
Irrigation Controllers (Residential & Commercial)	158	$38,997	38,400
Subtotal Irrigation Savings/Incentives	1,152	$136,443	436,900
Total EBMUD Program Incentives/Savings FY09 &10	**180,555**	**$4,514,031**	**1,810,700**

Water savings rounded to 100 gpd

Table 6-4 SBX7-7 Baseline Water Use and Water Use Targets

	Daily per Capita Water Use (GPCD)
10-yr Average Baseline (Calendar Years 1995–2004)	165
Selected Target Method #2 (55 gpcd Residential indoor; 70-80% ET_o outdoor Landscape Use; 10% CII reduction)	175
5-yr Average Baseline (Calendar Years 2003–2007)	158
Minimum Water Use Reduction Requirement (5% Reduction)	150
Year 2015, Interim Target	158
Year 2020, Using Minimum Water Use Reduction Requirement	150

FIGURE 6-3 SBX7–7 2020 WATER USE TARGET



DEMAND-SIDE CONSERVATION

RESIDENTIAL WATER CONSERVATION PROGRAMS

EBMUD's array of demand-side water conservation programs and services covers all customer categories. Residential water conservation programs are designed to offer customers water conservation incentives and to educate them about water supply, water use habits, and water-saving technologies and behaviors. Programs and services include free water surveys and water-savings devices, incentives for installing water-saving plumbing fixtures, appliances, and irrigation equipment, lawn conversion, water-efficiency plan review requirements for new water services, and education and outreach programs. EBMUD continually monitors these programs to ensure that conservation objectives are being met. The importance of water conservation is emphasized to customers not only during droughts, but also every year, whether or not a drought is occurring, as water conservation stretches limited resources and plays a crucial part in EBMUD's water supply portfolio.

Water Conservation Survey Programs

Single-Family Water Surveys

Water surveys for single-family residential customers include measuring and assessing indoor and outdoor end uses of water and offering customized recommendations on how to save water in and around the home. Targeting high water use customers is key to maximizing water savings from delivery of this service. WCMP conservation program implementation identifies a target of 2,500 surveys annually. To achieve this target, staff will expand existing delivery mechanisms and develop outreach

initiatives to enlist customer participation. Existing delivery mechanisms include self-survey kits, telephone surveys, and in-person surveys.

Home Water Use Do-It-Yourself Survey Kits

In advance of a scheduled in-person survey, EBMUD provides customers with free self-survey kits to help guide them through a step-by-step self-assessment of their water use. Customers who return completed self-surveys identifying high-water using devices, such as showerheads or faucet aerators, may request free first-time water-efficient replacements from EBMUD.

Self-surveys are currently made available to customers in print and online via the EBMUD WaterSmart Center as downloadable files. The customer is directed to check for indoor and outdoor leaks, take inventory of water-using hardware and equipment, and measure flow rates. While potentially more cost-effective than in-person surveys, this survey delivery mechanism limits the customization of water saving recommendations and results in only minimal data collection for the small percentage of customers that complete and return survey forms.

Self-guided surveys will be expanded through development of an interactive web-based user interface comprised of simple step-by-step instructions for completing a home water uses assessment. Development of an online interactive self-survey via the EBMUD WaterSmart Center will help customers assess their water usage, compare personal usage to benchmarks, and view available technical information, water conservation tips, rebates, and incentives based on their individual responses. The online service will also include an irrigation scheduling calculator that incorporates imagery of individual parcels and a measurement tool to allow customers to measure irrigated areas and establish landscape water budgets.

An automated online service will give customers access to water services during all days and times rather than just during EBMUD business hours and automate program data collection and entry. Envisioned future development of online applications for mobile devices would allow customers to move throughout their home/ site while conducting self-surveys. Development of a self-guided user interface and functionality requires a robust database and the integration of existing EBMUD information systems. Therefore, it is a substantial software application development project dependent upon the availability of EBMUD information system development resources. In the near term, the existing manual self-survey process will be updated and marketed and will serve as a basis for developing online content and automation.

Telephone Surveys

EBMUD customers can currently obtain telephone consultation and advice regarding their water consumption and conservation tips. Most of these interactions are initiated by customers as high bill complaints and are handled by a Customer Service Representative in EBMUD's Contact Center. Customers needing additional consultation are referred to Water Conservation staff for more detailed consultation where staff assists the customer in reviewing and assessing their water consumption and end uses of water. Planned enhanced services include separate tracking of customer contacts generated in the Contact Center and revising the process for conducting telephone surveys to improve data collection, documentation of outcomes, and EBMUD-initiated follow-up within EBMUD's Customer database.

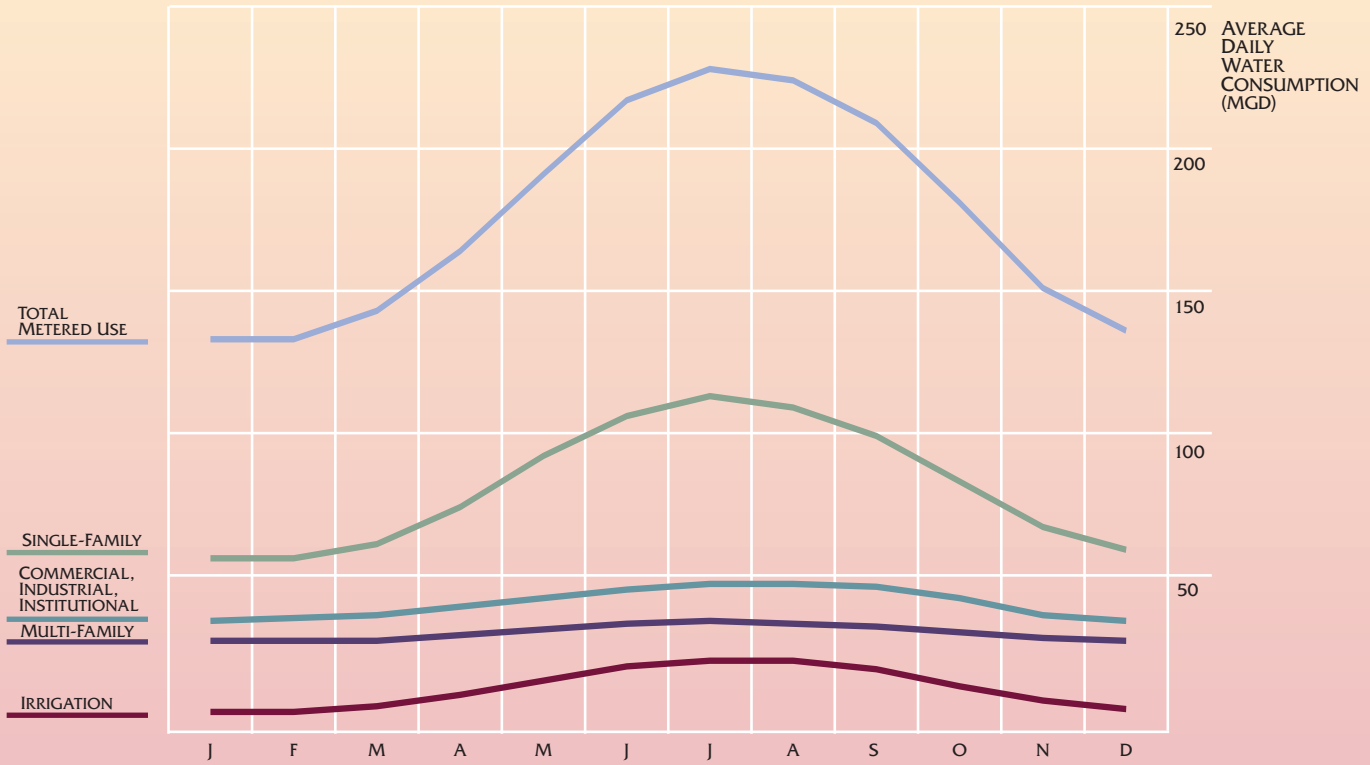
In-Person Surveys

Currently, EBMUD customers can schedule free in-person water surveys with EBMUD staff. A site visit, which typically lasts up to one hour, includes a meeting with a resident/ homeowner to review water consumption history, a test for leaks, an assessment of indoor water using fixture flow rates, and outdoor landscape irrigation. Recommendations for water-efficiency improvements and informational brochures are provided as needed. While all EBMUD customers are eligible for in-person surveys, a number of customers are initially directed to self or telephone surveys. As online and telephone survey delivery mechanism are further developed, higher-cost in-person services will be de-emphasized in favor of more cost-effective and interactive delivery mechanisms.

Landscape Consultations

Landscape consultations are in-person surveys with additional emphasis on efficient landscape irrigation scheduling, irrigation hardware efficiency, automatic irrigation controller programming, and sustainable landscape design and maintenance. Landscape consultations are scheduled at sites with high dry-season water and automatic irrigation systems. While available to all customers, the majority of sites that benefit from this service are in communities with low-density housing on large lots with installed landscapes. Development of interactive online tools to assess outdoor use will automate and improve the ability to assess landscape water use efficiency by customers but will not completely replaced the need for in-person services. This service will be

FIGURE 6-4 MONTHLY WATER USE BY CUSTOMER CATEGORY



NOTES:
1. Based on Calendar Year 1975-2010 consumption data.
2. Total metered use includes water, fire and hydrant use by all customer categories, including petroleum.

increasingly targeted to high-water use sites with pre-identified irrigation usage. Figure 6-4, which illustrates monthly water use by customer category, emphasizes residential consumption as the single largest component of total consumption and highlights the difference in residential use in winter months versus summer months.

Multi-Family Water Surveys

Multi-family water surveys target existing multi-family residential customers at sites with five or more units. WCMP water conservation planning targets 200 accounts and approximately 3,400 dwelling units annually. Surveys are provided in-person through scheduled appointments with property managers and apartment building owners. The survey includes the same elements as single-family audits. At each site, representative samples of dwelling units are inspected and assessed for indoor water use efficiency. Outdoor water use served by mixed-use (indoor and outdoor) water meters is also assessed. Sites with high-water use and multiple sites under the same ownership or manager are targeted for this service. On-site surveys are required for high volume water-saving device distribution, and free devices are delivered as part of this service.

Rebate and Incentive Programs

Incentives and rebates for indoor water-efficient appliances, plumbing fixtures, and outdoor irrigation systems (irrigation controllers and drought-tolerant landscaping), and distribution of devices (clothes washers, high-efficiency toilets, free water-efficient showerheads, faucet aerators, and quick-closing toilet flappers) are offered to residential customers. These rebates to residential customers totaled nearly $4.3 million in FY09 and FY10.

Residential Landscape Consultations and Rebate Program

Implemented in February 1998, the Residential Landscape Program promotes outdoor water use efficiency in the single-family residential sector. EBMUD offers residential customers free on-site landscape consultations to help

with new plantings and improvements to their landscape irrigation efficiency. The consultations emphasize proper irrigation scheduling, low water use plant selection, and other sustainable landscape practices such as mulching and proper maintenance. In FY09 and FY10, EBMUD continued to offer rebates to qualifying residential customers for converting lawns to sustainable landscaping and coordinated an online mulch coupon offer with local retailers. There is a strong educational component to the program; pre- and post-conversion site visits include in-person education regarding water conservation, water-efficient landscape design, irrigation scheduling, and maintenance practices.

Residential High-Efficiency Clothes Washer Rebate Program

EBMUD's Residential Clothes Washer Rebate Program, one of the first such programs offered in the nation, has been available to EBMUD's residential customers since 1996. EBMUD continues its participation in a regional initiative with Pacific Gas and Electric and with Bay Area water agencies to offer combined water and energy efficiency rebates for high-efficiency clothes washers and increase program visibility regionally among customers and appliance retailers.

EBMUD is among the first water agencies to enhance its clothes washer rebate with tiered rebates based on the water-efficiency level of eligible clothes washer models. Tiered rebates influence consumers to purchase appliance models that meet or exceed higher efficiency standards. FY09 and FY10 were the two single highest years of EBMUD customer participation with more than 21,000 clothes washers rebated that totaled more than $2.3 million in incentives distributed and saved an estimated 146 million gallons of water annually. EBMUD has rebated more than 77,000 clothes washer purchases since the program began in 1996. EBMUD also offers rebates for the installation of family-sized clothes washers in multi-family housing.

High-Efficiency Toilet Rebate Program

Since 1995, EBMUD has offered its residential customers rebates and free installations of new toilets to support replacement of higher water-volume models. The current program rebates the purchase of high-efficiency toilet (HET) models that use 20 percent less water than the standard 1.6 gallons per flush ultra low-flow toilets. As a United States Environmental Protection Agency (USEPA) WaterSense Partner, EBMUD promotes WaterSense labeled products through home improvement retailers, manufacturers, and distributors throughout its service area. EBMUD and other water agencies working directly with manufacturers, distributors, and retailers encourage expanded production and distribution of water-efficient toilets. In FY09 and FY10, HET retrofits were popular with customers, with households receiving 13,000 rebates totaling more than $1.6 million. Those toilets save an estimated 290,000 gallons of water or more every day or nearly 106 million gallons annually.

Device Distribution Program

EBMUD has been distributing free low-flow showerheads, faucet aerators, and other water-saving devices to customers since the 1980s. The devices are distributed primarily during customer water use surveys, through direct mail, and over the counter at EBMUD offices. A Market Penetration Study completed in FY02 found that EBMUD's service area was effectively "saturated" with low-flow showerheads and faucet aerators. Much of this high saturation can be attributed to EBMUD's ongoing free distribution program. Nearly 80,000 water-efficient devices and products were distributed to EBMUD customers during the FY09-FY10 period.

Non-Residential Water Conservation Programs

EBMUD tailors an array of demand-side water conservation programs to commercial, industrial, institutional and landscape irrigation customers to assist with improving their indoor and outdoor water use efficiency. Non-residential water conservation programs include free water surveys, water-saving device distributions, technical consultations, plan reviews, and life-cycle cost and savings estimates. Financial incentives support the installation of water-efficient appliances, plumbing fixtures, and process equipment. In FY09 and FY10 nearly 1,400 non-residential customer surveys and over 1,200 conservation rebates saved more than 550,000 gallons per day (GPD) or more than 200 million gallons annually.

East Bay businesses helped with water savings during the recent drought through their own indoor and outdoor water savings initiatives, as well as working with EBMUD to install water-efficient appliances, plumbing fixtures, process equipment, and irrigation systems. Business customer water use was down an average of five million gallons per day compared to the pre-drought three-year average from 2005 to 2007.

Water Conservation Survey Programs

Commercial, Industrial, and Institutional Surveys

Commercial, Industrial, and Institutional (CII) surveys are designed to help businesses and institutional customers use water more efficiently. CII water surveys consist of free on-site visits conducted by EBMUD staff. Staff works with consultants and landscape and facility managers to identify opportunities to increase water use efficiency and achieve associated benefits in reduced energy use, wastewater discharge, chemicals, and downsized treatment facilities. Irrigation water surveys include a review of current and past water use efficiencies, on-site inspection of irrigation equipment, tests for system leaks and sprinkler uniformity, training of landscape personnel in principles of efficient irrigation systems, assistance with irrigation scheduling, and recommendations for improving irrigation system efficiency. If the surveyor determines that existing devices are not efficient, first-time free water-efficient devices are provided, which include quick-closing toilet flapper valves, water-conserving showerheads, low-flow faucet aerators, and commercial dishwashing spray valves.

Businesses with relatively simple end uses of water have successfully used self-survey kits. Small metering devices are available for loan to verify water use characteristics before implementing conservation measures. This approach allows the customer and EBMUD to identify the most cost-effective measures, including opportunities that may qualify for rebates.

Irrigation Water Surveys

EBMUD offers free surveys and incentives for business customers to improve irrigation efficiency. Irrigation audits include an evaluation of current and past water use, on-site inspection of irrigation systems, tests for sprinkler uniformity, training landscape personnel on principles of efficient irrigation, and recommendations for increasing water use efficiency. Irrigation water surveys are targeted at nearly 5,000 EBMUD irrigation accounts where landscape irrigation comprises most or all of the use at the site.

Homeowners associations (HOA) continue to represent a large participant sector. Two strategies have proven successful in helping to secure customer participation in both the water use survey and irrigation system upgrade programs: targeted presentations by EBMUD staff and telephone contacts via high-water consumption billing inquiries.

Rebate and Incentive Programs

EBMUD offers non-residential customers financial incentives in the form of customized rebates, free water-efficient device distributions, and fixed rebates for water-efficient products, including plumbing fixtures, commercial appliances, process and cooling equipment, and irrigation system upgrades.

Toilet/Urinal Replacement Program

EBMUD administers both a fixed and customized rebate program for the purchase of qualifying high-efficiency toilet (HET) and high-efficiency urinal (HEU) models. EBMUD continued a long-term assessment of HEU products through installation within its own facilities.

Commercial Clothes Washer Rebates

EBMUD offers rebates for the installation of commercial-grade units in common area laundries, businesses or institutions with on-premise laundry facilities, and coin laundry stores.

Commercial Landscape Irrigation Upgrade Program

This program seeks to minimize customer water consumption and utility costs, and to introduce customers to new efficient irrigation technology to help large-landscape irrigators improve the efficiency of their existing irrigation systems.

Irrigation Reduction Information System

EBMUD's Irrigation Reduction Information System (IRIS) continues to be a leader in landscape water budget programs across the state. The Geographic Information System (GIS) based program is designed to inform EBMUD irrigation customers on how much water should have been used during a billing period. Water use estimates are based on actual irrigated landscape areas and real time weather data from local weather stations. The IRIS program prints the water budget on every water bill that the customer receives after joining the program. The information helps customers improve management of their irrigation systems by reducing water use and increasing cost savings. In FY10, over 20,000 landscape water budgets were printed on water bills for more than 3,300 irrigation customers.

Device Distribution Program

Since the early 1980s, EBMUD has been distributing free low-flow showerheads, faucet aerators, high-efficiency hose nozzles, "water brooms," and low-volume toilet flush valve retrofit kits. Devices are provided to customers primarily through water use surveys. Some water-efficient hardware and devices are loaned to customers for testing in their business settings.

Water-Efficient Fixtures and Appliance Incentives

EBMUD provides rebates to business customers for purchasing water-efficient plumbing fixtures such as high-efficiency gravity and pressurized toilets, low or zero-water using urinals, commercial-grade clothes washers, and pre-rinse dishwashing spray valves.

Custom Financial Incentives

EBMUD offers custom financial and technical assistance to businesses that undertake specialized water-efficiency projects. Rebates offset a portion of the initial costs of installing water-saving equipment and systems, and they shorten the payback period for the customer's investment in equipment upgrades. Rebate values are based on estimated water savings and may be up to 50 percent of the costs of implementing hardware or process changes that demonstrate improved water use efficiency. Incentives covered multiple technologies and practices, such as boiler-less food steamers, air-cooled ice machines, and recirculating cooling systems, dishwashing, water treatment, wash down equipment, and others.

On a case-by-case basis, EBMUD also partners with business and industrial customers on joint research to develop new technologies and water management practices that demonstrate and promote cost-effective water savings. Each custom project is required to enter into a performance contract with EBMUD and achieve a project-defined water budget to be eligible for EBMUD financial assistance.

Education and Outreach Activities

Education and outreach activities support all other conservation programs and increase both customer awareness and acceptance of EBMUD conservation efforts. EBMUD has a long history of providing customers with educational services including publications, newsletters, school curricula, public workshops and events, and demonstration projects. To make its water conservation programs and services more visible, EBMUD works cooperatively with other agencies and organizations by participating in trade shows and community events. Outreach activities include general and targeted marketing, community presentations and workshops, and participation in regional and statewide conservation organizations.

Education

Publications are a valuable educational tool for promoting conservation practices. In 2004 EBMUD published its award-winning *Plants and Landscapes for Summer-Dry Climates of the San Francisco Bay Region*. The book is a modern, updated reference on low water use and drought adapted plants for Mediterranean climates and further establishes EBMUD as a leader in outdoor conservation education. The book describes over 630 plants adapted to summer-dry climates and features over 540 stunning color photographs of plants and landscapes. Charts provide quick reference, and lists identify plants for special situations such as hot, dry sites, and dry shade. Articles contributed by notable horticulturists bring to life the weather, seasons, and design principles that shape the summer-dry landscape. The publication is both part of a growing awareness of climate compatible and resource-conserving landscaping and an educational tool to further the application of a cutting-edge garden aesthetic within and beyond EBMUD's communities.

Recognizing its many educational benefits, EBMUD expanded its school outreach programs to help increase water-efficiency at schools to save water and money; provided school community outreach and support; and educated students on responsible water use and environmental protection. Since 1974, EBMUD has provided water conservation curricula and supplemental materials to teachers and students as part of its Project WATER (Water Awareness Through Education and Research) school program. The program is free to public and private schools within the EBMUD service area and includes K-12 curricula and watershed service learning with EBMUD Rangers/ Naturalists. In 2000, EBMUD also initiated a School Garden Grant Program in partnership with the nonprofit Watershed Project to support local Kids in Gardens projects. These projects were popularized by the California Department of Education's initiative to create "a garden in every school." Through workshops sponsored by both EBMUD and other agencies, educators and their students learn how to reduce water and pesticide use in the garden.

Outreach

EBMUD continues to market its water conservation programs in two overarching ways: general and specific. The "general" or broad-based marketing approach communicates the value of water and the importance of efficient water use. The "specific" approach includes

interactions with individual customers or groups of customers and marketing of EBMUD conservation programs, technologies, and services tailored to them.

Examples of marketing tools that EBMUD has used include:

- web-based resources;
- bill inserts;
- newspaper and magazine ads;
- billboards;
- AC Transit posters;
- BART billboards;
- promotional items at community events;
- theater ads;
- cable television;
- EBMUD WaterSmart™ Business Certification Program; and
- support of WaterSense product labeling initiatives.

EBMUD initiated a strong public information campaign to spread the word about ways with which the customers could save water in their homes and businesses. In FY09, EBMUD expanded its website and online *Drought Help Center*, a one-stop education resource. Online videos highlighted what customers were doing in their own homes and yards to save water, and weekly conservation tips showcased simple changes that could add up to significant savings. Customers could view the historical water use and projected allocations, as well as place web orders for free water-saving devices such as showerheads, faucet aerators, hose shut-off nozzles, and conservation publications.

In 2003, EBMUD initiated its long-term strategic Marketing Plan to enhance the branding and marketing of EBMUD's water conservation and recycling programs. The WaterSmart program is designed to brand water conservation services that inform customers and retailers of the best available technology and management practices to help EBMUD achieve its conservation goals. In FY09, EBMUD formally launched its WaterSmart Business Certification Program following development and focus group testing. Mirrored closely to other green business certification programs, EBMUD's program is designed to heighten awareness of water (and energy) conservation benefits by recognizing businesses that implement water-efficiency measures and reach or exceed defined efficiency benchmarks. EBMUD staff work one-on-one with businesses, green business certification programs, and the local energy provider to promote changes that not only help customers save money by lowering water use, but also save energy and chemical costs. The WaterSmart Certification Program was developed specifically to:

- improve branding of water-efficient EBMUD services;
- promote water-efficient products and technologies through product labeling, analogous to the USEPA's WaterSense and ENERGY STAR programs; and
- register and recognize those businesses and customers that meet or surpass EBMUD demand management goals and objectives.

In FY09, EBMUD partnered with the CUWCC to conduct WaterSmart Guidebook training workshops in northern and southern California. In FY10, EBMUD continued to market its WaterSmart Business Development Guidebook to promote the latest water-efficient technologies, products, and best practices to city planners, water professionals, and commercial, industrial, and institutional customers.

SUPPORT ACTIVITIES

Support activities are those that support the implementation of the water conservation program. These activities include database monitoring, studies/ research, committee and association work, identification of funding sources, cooperative efforts, and the submittal of internal and external reports.

EBMUD regularly partners with a number of California, U.S., and international water agencies, energy utilities, green business organizations, and other research entities to study water use and pilot new water-efficiency programs and technologies. EBMUD is active in statewide water conservation venues and is represented in all significant industry-related discussions involving state and federal agencies, public interest groups, and professional associations. For example, EBMUD is a member of the Bay Area Water Agencies Coalition (BAWAC) established by several Bay Area water agencies to act in a unified manner on water planning activities. EBMUD also remains an active Board member of the CUWCC, California Urban Water Agencies (CUWA), and the national Alliance for Water Efficiency.

Partnerships

EBMUD recognizes that partnerships broaden the visibility of conservation programs, create cost-sharing opportunities and potential economies of scale, and can

Table 6-5 Water Conservation Partnerships

Landscape Advisory Committee

Formed in 1988, the Landscape Advisory Committee (LAC) brings together green-industry professionals representing the landscape designers, contractors, nurseries, sod producers, educators and product manufacturers and distributors. Committee members assist staff in identifying best principles and practices for smart landscaping. The LAC has been meeting annually to provide comments on District conservation programs, new technologies, industry trends, and presentations.

The Green Business Program

EBMUD contributes funding to both the Alameda County and the Contra Costa County Green Business Programs, and conducts water conservation surveys at local businesses interested in becoming a certified Green Business. The Program began targeting automobile repair shops, printing facilities, and office buildings, and now has expanded to nearly all small and medium sized businesses. Through this partnership, EBMUD helped certify over 400 businesses since the inception of the Green Business Program.

StopWaste

A project of the Alameda County Waste Management Authority, StopWaste targets larger industries for comprehensive assessments to help implement environmental solutions. EBMUD staff coordinates outreach and water use surveys with environmental assessments, and helps to provide customers with one-stop shopping for waste management and resource conservation services. Bay-Friendly Landscape is a program of StopWaste that promotes resource conservation, waste reduction, and pollution prevention in the design and maintenance of urban landscaping. EBMUD promotes and leverages Bay-Friendly Landscape informational resources in customer outreach, lends expertise to workshops and educational presentations, and is pursuing co-branding and joint outreach initiatives to the nursery industry.

Bay-Friendly Landscape Coalition

The Bay-Friendly Landscape Coalition is an initiative to promote Bay-Friendly Landscape Principles regionally. EBMUD is a signatory to the Bay-Friendly Landscape Principles and a founding sponsor of a developing non-profit organization. EBMUD sponsored and participated in two regional conferences in 2008 and 2010.

The Food Service Technology Center (FSTC)

The Center is a primary resource for food service operators, designers, consultants, vendors and manufacturers. It promotes efficient design and operation of food service facilities. EBMUD partnered with the FSTC to offer workshops for food service providers and to develop performance specifications for water and energy-efficient spray valves used in dishwashing operations. EBMUD has partnered with FSTC and other water purveyors to monitor and measure the water and energy savings potential of the new "connectionless" commercial food steamers and commercial ice machines. EBMUD continues to partner with FSTC on dual audits of large kitchen facilities.

California Youth Energy Services (CYES)

EBMUD partners with local schools and community groups to support youth training projects that educate students about water resources and water conservation. EBMUD contributes financially and through in-kind services to California Youth Energy Services, a local non-profit, to provide students involved in job training projects with water conservation information, educational activities, and support for residential and business water conservation retrofit projects. These partnerships build communities of youth with passion for resource conservation and community service and the know-how to accomplish real water and energy savings. Since the beginning of this partnership, over 5,000 student surveys have been performed.

Water Agencies

Joint grant applications, primarily with water utility partners, improve the likelihood that proposals for conservation funding will be awarded. EBMUD customers who participate in the grant funded programs directly benefit from the supplemental funding for rebates, installations, and on-going water savings. EBMUD was among the water agency's Prop. 50 grant recipients in support of the regional clothes washer water and energy initiative implemented with Pacific Gas and Electric Company (PG&E). EBMUD continued to host and participate in meetings of the Bay Area Water Conservation Coordinators, an informal group of regional water utility water conservation practitioners who meet to share information about research and implementation, and to discuss emerging technologies and issues impacting water use efficiency.

TABLE 6-5 WATER CONSERVATION PARTNERSHIPS CONTINUED

BAY AREA WATER AGENCIES COALITION (BAWAC)

BAWAC represents a coalition of Bay Area water agencies collaborating on comprehensive water management strategies and innovative approaches for securing a reliable, high quality Bay Area water supply. Shared efforts include, but are not limited to, water quality and treatment, demand management (conservation and recycling), and watershed protection. In FY10, EBMUD was among several water agencies that initiated preparation of a Prop. 84 Integrated Regional Water Management Plan grant proposal with water conservation, recycling, and green infrastructure components.

THE CALIFORNIA URBAN WATER AGENCIES (CUWA)

CUWA is a non-profit corporation providing a forum for its member agencies to study and promote the need for a reliable, high quality water supply for the state's current and future urban water needs. EBMUD is active on a number of agency supported committees and worked closely with the CUWA Conservation Committee on a number of research projects to identify potential urban water conservation savings and implementation barriers toward achieving those savings.

CALIFORNIA URBAN WATER CONSERVATION COUNCIL (CUWCC)

The Memorandum of Understanding (MOU) Regarding Urban Water Conservation in California created and implemented a broadly supported agreement specifying urban water conservation Best Management Practices (BMPs). CUWCC, a non-profit organization consisting of urban water suppliers, environmental organizations, and other interested parties, is charged with overseeing the best practices implementation process. EBMUD staff actively participated in the 2007-09 BMPs revision process, and served on the organization's governing Board and subcommittees. EBMUD funded work performed by the CUWCC to develop and improve plumbing standards that impact water use efficiency. EBMUD sponsors CUWCC through membership dues and staff participation, and its Water Conservation Program complies with MOU requirements. In FY09 and FY10, EBMUD staff supported CUWCC's role in the statewide SBx7-7 implementation.

DELTA PLAN DEVELOPMENT

In November 2009, the comprehensive "Delta Legislative Bill Package" was enacted, effectively replacing the CALFED Bay-Delta Program and imposing a new urban conservation goal of 20 percent per capita reduction in water use by 2020 in SBx7-7. EBMUD staff is directly engaged with DWR and other stakeholders in developing the regulatory framework for this law. With the implementation of the stringent conservation and recycling goals for long-term planning, EBMUD anticipates full compliance with SBx7-7.

THE WATERSHED PROJECT

The Watershed Project works to promote environmental responsibility and to preserve and protect the environment for future generations through education and outreach to teachers, students, and the community. From FY05 through FY08, EBMUD co-sponsored teacher workshops within the East Bay and funded teacher-action grants for school projects that emphasize water conservation. The Kids in Gardens program promotes watershed stewardship by encouraging educators to create and use healthy, low-maintenance gardens to teach pesticides-free gardening methods and the importance of water conservation and urban runoff pollution prevention.

THE WATER CONSERVATION SHOWCASE

Each March since 2004, EBMUD along with PG&E's Pacific Energy Center and the U.S. Green Building Council, Northern California Chapter, have joined together to present the Water Conservation Showcase. The Water Conservation Showcase has included over 90 presentations by water experts from the Bay Area and nationwide. Presentations over the Showcase's seven year history have addressed almost every water conservation topic, from innovative water treatment techniques to infrastructure development. Additional topics have included California's water history, water reuse solutions, water quality, and water rights.

expand customer benefits by addressing multiple conservation areas such as water, energy, wastewater, and solid waste. In FY10, EBMUD continued its co-sponsorship with Pacific Gas and Electric, and the U.S. Green Building Council of the 2010 Water Conservation Showcase at the Pacific Energy Center in San Francisco. Each year the event draws a larger audience, and more vendor exhibitors showcase water-efficient technologies and services. Other FY10 EBMUD partnerships are listed in Table 6-5.

Demand Management Advisory Committee

In mid-2001, EBMUD's Board of Directors established a "Demand Management Advisory Committee" (DMAC). The committee's charge was to review the water conservation and recycling programs and assist staff in identifying cost-effective demand management approaches and partnerships. The DMAC was composed of seventeen members with broad representation from local government, the green industry, environmental interests, the business community, taxpayer groups, and nonprofit organizations. The DMAC reviewed EBMUD's water conservation programs and generally concurred with its objectives and approach. Many of the DMAC recommendations are reflected in current and planned future incentives. More recently during the water supply planning process, a Community Liaison Community (a community stakeholder group) also reviewed and advised the Board on programs of interest, including conservation that were incorporated into EBMUD's water supply plan.

National Multi-Family Residential Sub-Meter Study

EBMUD actively supports research and technical studies to enhance understanding of water use patterns, conservation potential, and the impacts of conservation measures and programs. In June 2004, EBMUD completed a National Multi-Family Residential Sub-Meter Study. The study was conceived, organized and administered by EBMUD, and was developed in cooperation with the USEPA, nine water utilities in seven states, and two national apartment associations. The study represents a nationwide assessment of conservation potential and other policy issues associated with metering and/ or submetering within the multi-family sector.

Residential End-Use Studies

EBMUD has completed a number of residential end-use studies to quantify end uses of water by sector, water-using technology, and climate and consumer demographics. These studies help quantify current demand and future potential conservation savings from applied technology retrofits and behavioral change. In 2003 EBMUD monitored water use at 33 single-family homes to assess end uses of water, and measured the impacts of conservation retrofits. The study found that while indoor per capita single-family use varied, the average use could be reduced approximately 20-25 percent to approximately 55 GPD. Study findings will be used to estimate water savings more accurately from incentives programs, to assist in marketing customer benefits from conservation measures, and to prioritize EBMUD conservation budgeting.

EBMUD is participating in a statewide study to evaluate the current water use patterns and the current state of water-efficiency in single-family homes. This study will be used to make generalized projections of the remaining potential for water conservation and to better facilitate water supply planning efforts. 120 participating EBMUD customers were selected at random to represent water usage patterns typically found in the service area. During March and April of 2007, these homes were equipped with datalogger devices which were used to help determine the end uses within each home and how much water was used in each application. Participants were also asked to complete surveys describing the types of appliances they have within their homes. The California Department of Water Resources (DWR) co-sponsored this program along with ten participating water agencies. In FY10, EBMUD participated in draft research report review and field data verification.

Advanced Metering Studies

EBMUD is conducting several small advanced metering infrastructure (AMI) pilot studies in its service area to test new metering technologies that can collect, record, and remotely transmit monthly, daily, and hourly water consumption data to improve customer water-efficiency practices. The pilot studies are co-funded by grants from DWR and the United States Bureau of Reclamation (USBR).

Other Studies

EBMUD conducted numerous market saturation studies (1995, 1998, and 2001) to collect data on water conservation attitudes and behaviors, determine the types and market saturation of water-conserving hardware, assess water conservation potential for identified market sectors, and compare current and previous study findings.

EBMUD partnered with other water utilities, such as the USEPA and the California Urban Water Conservation Council. They completed the study conducted by the

TABLE 6-6 WATER CONSERVATION RESEARCH ACTIVITIES

METER TECHNOLOGY STUDY

EBMUD continues its metering technologies research to provide customers and conservation staff with instantaneous or "real-time" water consumption information. This technology could be used as a conservation tool by helping increase customer awareness of their water use patterns as well as allow for earlier leak detection for increased savings.

CALIFORNIA URBAN WATER CONSERVATION COUNCIL (CUWCC)

EBMUD supports research conducted by the CUWCC through its membership, and it participated in the CUWCC Research and Evaluation (R&E) Committee. The R&E Committee oversees assessments of technology as Potential Best Management Practices (PBMPs). PBMPs are studied to identify possible implementation of economically reasonable Best Management Practices.

SELF-ADJUSTING WEATHER-BASED IRRIGATION CONTROLLERS

The California Department of Water Resources (DWR) awarded EBMUD, in cooperation with five other agencies, a $1.6 million Prop. 13 grant for a Weather-Based Irrigation Controller Program to install state-of-the-art controllers within six counties in Northern California. Through this grant, EBMUD's portion of the program was $625,000 for 800 controllers. Program implementation began in January 2007. Outdoor water savings to date for customers who participated in the pilot program total nearly 175 million gallons.

MULTI-FAMILY SUBMETERING

In April 2006, the EBMUD Board of Directors authorized acceptance of a Prop. 50 matching grant in the amount of $150,000 from DWR to investigate the business case for individually metering multi-family dwelling units. The grant contains three phases, each receiving matching funds of $50,000. The first phase, a study of the costs, benefits, and administrative issues of metering new multi-family dwelling units, was completed in September 2006. As a result of the first phase, the EBMUD Board adopted a new regulation effective January 1, 2009, requiring individual metering for multi-family and multi-occupancy structures three stories and under. In September 2008, Phase Two of the metering study was initiated and included a voluntary pilot incentive program for customers to sub-meter existing multi-family residential properties. The final phase, slated for implementation in 2011-12, involves studying the accuracy, and applicability of point-of-use metering technology.

COMMERCIAL, INSTITUTIONAL, AND INDUSTRIAL (CII) PLAN REVIEW

EBMUD was awarded a Prop. 50 grant from the DWR to develop a resource guidebook for reviewing plans of new CII developments for water use efficiency and to pilot a CII plan review program. The guidebook was published in 2008 and presents the technology associated with water-efficient hardware and processes applicable to the CII sector. In addition, EBMUD together with the CUWCC has held training classes in both Northern and Southern California on the guidebook. A final report on the plan review water savings is expected in 2012.

AMERICAN WATER WORKS ASSOCIATION RESEARCH FOUNDATION (AWWARF)

EBMUD has partnered with the AWWARF in the following cooperative studies: (1) "Water Efficiency Programs for Integrated Water Management" (#2935) investigating avoided costs associated with water conservation programs and comparing those costs to other supply-side options, (2) "Water Budgets and Rate Structures" (#3094) investigating the role of water budgets in rate setting, and (3) "Environmental Leadership" (#2854) investigating how management perceives their environmental leadership role.

RESIDENTIAL END-USE OF WATER

EBMUD is participating in a DWR Prop. 50 grant to determine single-family indoor and outdoor end uses of water and water use efficiency at 1,200 homes in California. Indoor and outdoor water use will be determined using dataloggers. Indoor water use efficiency will be evaluated by comparing use by fixture/ appliance, and outdoor water use efficiency will be determined by comparing the irrigated landscape area to the use.

PIPELINE LEAK DETECTION PROJECT

With partial funding from a USBR grant, EBMUD is investigating the cost-effectiveness of permanent installation of water leak detection logger equipment versus the lift and shift method. EBMUD has installed approximately 850 acoustic leak detection loggers covering approximately 250 miles of pipe within the city of Berkeley and has continually collected leak detection data for 18 months. EBMUD investigated and repaired over 100 leaks identified. An additional 150 loggers are used in a lift and shift manner. Other goals of the study are to accelerate leak identification and repair, learn the nature and cause of leaks, measure how long leaks take to surface, and learn how much water can be saved by aggressive leak detection methods.

Table 6-6 Water Conservation Research Activities Continued

Aqueduct Leak Detection Project

With partial funding from a USBR grant, EBMUD is demonstrating the use of specialized water leak detection equipment on large pipelines and aqueducts where traditional equipment does not work. EBMUD tested three different acoustic technologies on the same and similar pipelines and compared the benefits and weaknesses of each method. One technology deemed to be more cost-effective was selected for a second phase inspection on a larger number of pipelines. During the study, approximately 86 miles were surveyed, and numerous leaks were identified. The technology was also used as a method to help inform pipeline condition assessment and prioritize pipe replacements and repair strategies.

Fixed Network Leak Detection Project

With partial funding from a USBR grant, EBMUD is demonstrating the use of leak detection technology utilizing remote sensors that can detect leaks in pipelines and can then report the information to EBMUD without requiring a field visit. This project is expected to monitor approximately 20 miles of pipeline in the same area as an Advanced Metering Infrastructure Pilot and may use the same telemetry equipment.

WaterSmart Advanced Metering Infrastructure (AMI) Pilot

With partial funding from the USBR and DWR grants, EBMUD is investigating the conservation potential of using AMI technology in conjunction with a web interface. The WaterSmart Toolbox web interface allows customer to monitor their yearly, monthly, daily, and even hourly water usage on a user-friendly web interface. The toolbox also provides corresponding weather information, can send users emails when they have leaks or exceed user-defined water budgets, and also offers friendly tips on ways to save water. Aside from saving water directly, the goal of the study is to better define the conservation of this technology for future use and to optimize savings and customer services.

Combined AMI and ET Controller Project

With partial funding from the USBR, EBMUD is investigating the use of Evaporation (ET) Controller technology with customers that have the WaterSmart Toolbox and AMI technology. These users will be better able to ascertain the performance of their ET technology and hopefully improve the savings potential of both technologies.

System Operations Review and AMI Implementation Plan

With partial funding from the USBR, EBMUD is conducting a review of its system performance and water losses, identifying ways to optimize this performance, and reducing overall leakage. The potential benefits of using an AMI system to optimize the system will be studied. The project will then identify the best way to implement this AMI technology to maximize system performance as well as meter reading processes.

American Water Works Association Research Foundation on the efficacy of water budget-based rate structures as a tool to provide a meaningful price signal to increase water use efficiency and manage drought response.

Table 6-6 lists research projects that EBMUD is currently pursuing. A comprehensive list of EBMUD Research Projects is included in Appendix I-2.

Regulatory Programs

EBMUD's Water Service Regulations include a number of water-efficiency requirements to enhance supply reliability. A number of these regulations govern all water use.

Water-Efficiency Requirements

In 2007, EBMUD adopted a new water service regulation, Section 31 (Appendix F), that identifies water-efficiency requirements for water service and a procedure for notifying applicants that water-efficiency measures are required. Water service shall not be furnished to any applicant for new or expanded service unless all the applicable water-efficiency measures described in this regulation are installed at the applicant's expense. Applicants for expanded service may be required to retrofit existing water service facilities or uses to comply with these requirements. Applicants are required to maintain design documents and construction and installation records and furnish a copy of said documents and records to EBMUD upon request. EBMUD may inspect the installation of water-efficiency measures to verify that the items are installed and performing to the required water use levels.

EBMUD has also adopted a new water service regulation on applying for service, Section 2 (Appendix F), affecting multi-family and multi-space commercial/ industrial developments of three stories or less in height. Effective January 1, 2009, the new regulation requires a developer to

plumb every unit or space so that it can be individually metered by EBMUD at an approved metering site. EBMUD will require individual metering of each separate unit in a structure of three stories or less in height, whenever it is feasible in the opinion of EBMUD to do so. Individual metering of each unit or space would be required regardless of their number in the structure or how the hot water is supplied. For example, if the hot water to each apartment or commercial space is supplied by a common boiler, then the cold water supply for each unit must be metered by EBMUD at the approved metering site and the hot water will be metered separately as a "house" or landlord meter.

Landscape Plan Review

EBMUD's services complement the DWR's 2009 Updated Model Water Efficient Landscape Ordinance, which is codified in Title 23 of the California Code of Regulations (Sections 490-495) and required by the Water Conservation in Landscaping Act. From 1995-2000, EBMUD has offered voluntary plan review for non-residential new construction projects at the time new service connections are requested. All projects with new service connections of three inches or larger were encouraged to submit plans to the Water Conservation Division for review and comment. Since 2007, as part of its review and approval of proposed new water service to landscape projects, EBMUD determines compliance with water-efficiency requirements, such as minimized overspray and run-off, appropriate use and groupings of plants, and required automatic irrigation systems and schedules.

EBMUD works with cities and counties within its water service area to support local and state landscape ordinances through landscape plan review requirements and services for all new water service accounts. EBMUD also provides voluntary plan review for existing customers upon request. All plans are reviewed for irrigation system efficiency and scheduling, if provided, and for plant selection and planting design. Comments are returned to the jurisdiction that submitted the plan for EBMUD's review.

SUPPLY-SIDE CONSERVATION

DISTRIBUTION AND RAW WATER SYSTEM LOSS ACCOUNTING

EBMUD's water distribution system includes approximately 4,100 miles of pipe. EBMUD implements best practices to manage water losses for the supply-side of the distribution

TABLE 6-7 DISTRIBUTION WATER LOSSES AND RAW WATER LOSSES ACCOUNTING

DISTRIBUTION WATER LOSSES	APPARENT LOSSES	UNAUTHORIZED CONSUMPTION E.G. THEFT – ILLEGAL TAPS, UNAUTHORIZED FIRE HYDRANT USE (UNMETERED CONSTRUCTION CREWS, ILLEGAL HYDRANT OPENINGS)
		CUSTOMER METERING INACCURACIES E.G. METER ERROR ADJUSTMENTS
		SYSTEMATIC DATA HANDLING ERRORS E.G. ERRORS THAT OCCUR ANYWHERE FROM THE TIME THE METER READING IS REGISTERED TO THE FINAL REPORTING AND USE OF THE CONSUMPTION DATA
	REAL LOSSES	LEAKAGE ON MAINS E.G. TRANSMISSION AND DISTRIBUTION PIPELINE LEAKAGE AND BREAKS
		LEAKAGE AND OVERFLOWS AT STORAGES E.G. LOSSES FROM OPEN-CUT RESERVOIRS, STORAGE TANKS, AND TERMINAL STORAGE RESERVOIRS
		LEAKAGE ON SERVICE CONNECTIONS UP TO CUSTOMER METERING E.G. LOSSES ON LATERALS FROM DISTRICT MAIN TO CUSTOMER METER
RAW WATER LOSSES	APPARENT LOSSES	UNAUTHORIZED USE
		METERING INACCURACIES E.G. METER ERROR ADJUSTMENTS
	REAL LOSSES	LEAKAGE ON AQUEDUCTS AND RAW WATER PIPELINES E.G. AQUEDUCT LEAKAGE AND BREAKS, REAL LOSSES IN THE WATER TREATMENT PLANTS
		LEAKAGE AT WATER TREATMENT PLANTS E.G. REAL LOSSES AT THE WATER TREATMENT PLANTS

NOTE:
Components adopted from American Water Works Association (AWWA) and International Water Association Audit Components.

and raw water systems. Modeled after the American Water Works Association (AWWA) Water Audits standards, EBMUD has a protocol for identifying and assessing water losses. The supply-side management program is integral to operating and maintaining the water system and is critical to ensuring efficient management of EBMUD's limited water supply. A standardized procedure to account for all losses in the distribution and raw water systems helps EBMUD understand the nature of those water losses such that it can take appropriate action to reduce them. EBMUD has also identified and made staff accountable for measuring, collecting, assessing, retrieving, validating, and reporting data on District water supply losses.

The difference between the volume of water produced at the treatment plants (also called Distribution System Input) and the sum of all billed and unbilled authorized consumption (also called Authorized Consumption) is termed Distribution Water Losses. Distribution Water Losses consist of all apparent losses and all real losses in the distribution system. Apparent losses are the total losses of treated water from unauthorized consumption (theft), inaccuracies associated with customer metering, and systematic data handling errors. All real losses are the total physical losses of treated water from storage system overflows or draining, main and service line breaks, and background leakages. EBMUD's Distribution Water Losses from 2001-2010 are around 11 percent.

Raw water losses consist of apparent losses and real losses in the raw water system. Raw water apparent losses are the total losses of raw water due to raw water meter errors, unauthorized use from theft, and transmission line blow-offs and flushings. Raw water real losses are the total physical losses of raw water that include overflows and leakage up to and at the water treatment plants, such as leaks and breaks from aqueducts, transmission lines, or other parts of the raw water distribution system, and water treatment plant losses. Table 6-7 summarizes several examples of both distribution water losses and raw water losses.

Distribution water losses and raw water losses are part of non-revenue water. The benefits of managing and minimizing non-revenue water include:

- reducing demand on scarce water supplies and minimizing the need to develop an additional supply;
- reducing water and revenue losses;
- reducing pumping and treatment costs;
- increasing knowledge of the distribution system; and
- reducing property damage through improved maintenance.

Leak Detection

EBMUD controls water loss using a variety of efforts. The first is to identify the magnitude and source of that loss. The second is to review accuracy of meters used to measure system inflow and outflow. The third is to develop an appropriate leak detection program. The fourth is to have a reasonable program to respond to identified leaks. The final step is a pipe replacement program that helps to ensure a tight distribution system. Techniques used to locate leaks include visual inspections, sonic leak detection (in both the pipe and externally connected devices), and customer reports. EBMUD crews are equipped with electronic sound detection equipment to routinely detect leaks in the field.

EBMUD is conducting two pilot projects looking at new and developing technology in distribution pipeline leak detection. These projects will find leaks in pipelines and allow EBMUD to fix them before water is seen on the street. Both of these projects identify leaks using acoustic technology that recognizes the sound made by a small leak in a pipeline. One project tests the performance with sonic probes placed on the inside of large pipelines or hydrophones connected to available taps (such as hydrants and air valves) on the pipelines while water is flowing through them. The second project tests the performance with sonic probes placed at fixed locations on the outside of smaller pipelines instead. The pilot studies are partially funded with grants from the USBR. Field work was completed in 2010, and the final reports are anticipated to be completed in 2011.

Pipe Replacement

Many conditions affect the rate of deterioration of pipelines in the distribution system, including pipe type and size, soil conditions, and ground movement. As a result of systematic replacement of the most troublesome pipes in the system, use of cathodic protection, and improved leak detection methods, the system has a relatively stable leak rate where the rate of overall system deterioration has been stabilized to minimize impacts over time. The Pipeline Replacement Program identifies potential main failures and renews those pipelines in need of replacement based on maintenance histories and leak records.

Table 6-8

Foundational and Programmatic BMPs

Foundational BMPs - BMPs considered to be essential water conservation activities.

New BMP Category	Old BMP Name
A. Utility Operations Programs	
1.1 Operations Practices	Wholesale Agency Assistance Program (N/A)
	Conservation Coordinator (EBMUD staffs and maintains the position of water conservation coordinator.)
	Water Waste Prohibition
1.2 Water Loss Control	System Water Audits, Leak Detection and Repair
1.3 Metering with Commodity Rates for All New Connections and Retrofit of Existing Connections	Metering with Commodity Rates for all New Connections and Retrofit of Existing Connections (All service connections within EBMUD service area are metered.)
1.4 Retail Conservation Pricing	Conservation Pricing (EBMUD maintains rate structure consistent with BMP's definition of conservation)
B. Education Programs	
2.1 Public Information Programs	Public Information Programs
2.2 School Education Programs	School Education Programs

Programmatic BMPs - BMPs that promote new initiatives in water conservation.

New BMP Category	Old BMP Name
A. Residential	Water Survey Programs for Single-Family and Multi-Family Residential Customers
	Residential Plumbing Retrofit
	High-Efficiency Clothes Washing Machine Financial Incentive Programs
B. Commercial, Industrial, and Institutional	Residential ULFT Replacement Programs
	Conservation Programs for Commercial, Industrial, and Institutional (CII) Accounts School Education Programs
C. Landscape	Large Landscape Conservation Programs and Incentives

Corrosion Control

EBMUD's corrosion control program has been active since its inception in 1923. The corrosion control program extends the useful life of EBMUD pipelines by installing and upgrading cathodic protection systems. The program, covering the Mokelumne Aqueducts and distribution piping and facilities, effectively reduces corrosion and related deterioration of EBMUD's infrastructure, resulting in substantial leak reduction and reduced loss of water. The Mokelumne Aqueduct pipelines have an extensive corrosion control system with 44 individual impressed current cathodic protection systems and approximately 650 test locations to monitor the levels of corrosion control. The distribution system pipelines are protected from corrosion by 155 impressed current cathodic protection stations and over 1,300 galvanic anode stations. These systems are continually monitored to ensure proper operation. This program has resulted in a continual reduction in leaks on both cast iron and steel pipes. Internal corrosion in these pipelines is controlled with lime additions to the water system to raise pH levels. Designs for all structures are carefully reviewed to select proper coatings, materials, and other corrosion control measures to maximize the life of EBMUD facilities and pipelines.

Best Management Practices

EBMUD is a founding author of the "Memorandum of Understanding Regarding Urban Water Conservation in California" (MOU), administered by the California Urban Water Conservation Council (CUWCC) and first adopted September 1991 and last amended June 2010. As a long-standing member of the CUWCC, EBMUD has remained in compliance with the MOU in the implementation of water conservation Best Management Practices (BMPs). A BMP is a policy, program, practice, rule, regulation or ordinance, or the use of devices, equipment, or facilities that results in the efficient use or conservation of water as an established and generally accepted practice among water suppliers.

The Council's 14 BMPs instituted before the 2010 MOU amendment are now organized into five new categories. Two categories, Utility Operations and Education, are "Foundational BMPs". The remaining three categories, 1) Residential, 2) Commercial, Industrial, and Institutional (CII), and 3) Landscape, are "Programmatic BMPs". Foundational BMPs are further divided into sub-categories. Conservation practices which currently meet the definition of a BMP, as per the MOU are listed in Table 6-8, are discussed in this Plan.

EBMUD currently implements all of the identified BMPs as well as a number of additional conservation measures that go beyond the BMPs. EBMUD's compliance with the 2009 and 2010 Urban Water Conservation MOU coverage requirements for programmatic BMP implementation is presented in a tabular format in Appendix I-1. On-going upgrades to the CUWCC reporting database preclude the use of the CUWCC reporting format. Overall, EBMUD has self-certified that its water conservation achievements to date are on-track, ahead of schedule or have reached 100% completion for all established BMP, Flex Trak or GPCD coverage requirements.

Conservation In The Future

Water conservation is a central component of EBMUD's long-term water supply planning efforts which seek to address issues that impact the reliability of EBMUD's water supply now and in the future. EBMUD is committed to continue investing in water conservation programs to meet EBMUD's water conservation goals, to provide a reliable water supply, and to help meet the statewide per capita water use reduction goals of SBx7-7. Developed as part of the implementation plan with water recycling efforts for compliance with SBx7-7, the WCMP outlines the various conservation programs that will assure EBMUD achieves its water use targets.

Looking at water demand and supply projections, the contribution of conservation to water supply is evident. Conservation and water recycling are expected to account for 26 percent of projected demand not met by Mokelumne River, Freeport Regional Water Project, and Bayside supplies. In normal rainfall years, conservation will play an important role in the future reliability of supply and will reduce the frequency of shortages. A further discussion on projected water supply is presented in Chapter 4 and Figure 4-10.

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Appendix A. Urban Water Management Planning Act

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CALIFORNIA WATER CODE DIVISION 6
PART 2.6. URBAN WATER MANAGEMENT PLANNING

All California Codes have been updated to include the 2010 Statutes.

CHAPTER 1.	GENERAL DECLARATION AND POLICY	10610-10610.4
CHAPTER 2.	DEFINITIONS	10611-10617
CHAPTER 3.	URBAN WATER MANAGEMENT PLANS	
Article 1.	General Provisions	10620-10621
Article 2.	Contents of Plans	10630-10634
Article 2.5.	Water Service Reliability	10635
Article 3.	Adoption and Implementation of Plans	10640-10645
CHAPTER 4.	MISCELLANEOUS PROVISIONS	10650-10656

WATER CODE
SECTION 10610-10610.4

10610. This part shall be known and may be cited as the "Urban Water Management Planning Act."

10610.2. (a) The Legislature finds and declares all of the following:

(1) The waters of the state are a limited and renewable resource subject to ever-increasing demands.

(2) The conservation and efficient use of urban water supplies are of statewide concern; however, the planning for that use and the implementation of those plans can best be accomplished at the local level.

(3) A long-term, reliable supply of water is essential to protect the productivity of California's businesses and economic climate.

(4) As part of its long-range planning activities, every urban water supplier should make every effort to ensure the appropriate level of reliability in its water service sufficient to meet the needs of its various categories of customers during normal, dry, and multiple dry water years.

(5) Public health issues have been raised over a number of contaminants that have been identified in certain local and imported water supplies.

(6) Implementing effective water management strategies, including groundwater storage projects and recycled water projects, may require specific water quality and salinity targets for meeting groundwater basins water quality objectives and promoting beneficial use of recycled water.

(7) Water quality regulations are becoming an increasingly important factor in water agencies' selection of raw water sources, treatment alternatives, and modifications to existing treatment facilities.

(8) Changes in drinking water quality standards may also impact the usefulness of water supplies and may ultimately impact supply reliability.

(9) The quality of source supplies can have a significant impact

on water management strategies and supply reliability.
(b) This part is intended to provide assistance to water agencies in carrying out their long-term resource planning responsibilities to ensure adequate water supplies to meet existing and future demands for water.

10610.4. The Legislature finds and declares that it is the policy of the state as follows:
(a) The management of urban water demands and efficient use of water shall be actively pursued to protect both the people of the state and their water resources.
(b) The management of urban water demands and efficient use of urban water supplies shall be a guiding criterion in public decisions.
(c) Urban water suppliers shall be required to develop water management plans to actively pursue the efficient use of available supplies.

WATER CODE
SECTION 10611-10617

10611. Unless the context otherwise requires, the definitions of this chapter govern the construction of this part.

10611.5. "Demand management" means those water conservation measures, programs, and incentives that prevent the waste of water and promote the reasonable and efficient use and reuse of available supplies.

10612. "Customer" means a purchaser of water from a water supplier who uses the water for municipal purposes, including residential, commercial, governmental, and industrial uses.

10613. "Efficient use" means those management measures that result in the most effective use of water so as to prevent its waste or unreasonable use or unreasonable method of use.

10614. "Person" means any individual, firm, association, organization, partnership, business, trust, corporation, company, public agency, or any agency of such an entity.

10615. "Plan" means an urban water management plan prepared pursuant to this part. A plan shall describe and evaluate sources of supply, reasonable and practical efficient uses, reclamation and demand management activities. The components of the plan may vary according to an individual community or area's characteristics and its capabilities to efficiently use and conserve water. The plan shall address measures for residential, commercial, governmental, and industrial water demand management as set forth in Article 2 (commencing with Section 10630) of Chapter 3. In addition, a strategy and time schedule for implementation shall be included in the plan.

10616. "Public agency" means any board, commission, county, city

and county, city, regional agency, district, or other public entity.

10616.5. "Recycled water" means the reclamation and reuse of wastewater for beneficial use.

10617. "Urban water supplier" means a supplier, either publicly or privately owned, providing water for municipal purposes either directly or indirectly to more than 3,000 customers or supplying more than 3,000 acre-feet of water annually. An urban water supplier includes a supplier or contractor for water, regardless of the basis of right, which distributes or sells for ultimate resale to customers. This part applies only to water supplied from public water systems subject to Chapter 4 (commencing with Section 116275) of Part 12 of Division 104 of the Health and Safety Code.

WATER CODE
SECTION 10620-10621

10620. (a) Every urban water supplier shall prepare and adopt an urban water management plan in the manner set forth in Article 3 (commencing with Section 10640).

(b) Every person that becomes an urban water supplier shall adopt an urban water management plan within one year after it has become an urban water supplier.

(c) An urban water supplier indirectly providing water shall not include planning elements in its water management plan as provided in Article 2 (commencing with Section 10630) that would be applicable to urban water suppliers or public agencies directly providing water, or to their customers, without the consent of those suppliers or public agencies.

(d) (1) An urban water supplier may satisfy the requirements of this part by participation in areawide, regional, watershed, or basinwide urban water management planning where those plans will reduce preparation costs and contribute to the achievement of conservation and efficient water use.

(2) Each urban water supplier shall coordinate the preparation of its plan with other appropriate agencies in the area, including other water suppliers that share a common source, water management agencies, and relevant public agencies, to the extent practicable.

(e) The urban water supplier may prepare the plan with its own staff, by contract, or in cooperation with other governmental agencies.

(f) An urban water supplier shall describe in the plan water management tools and options used by that entity that will maximize resources and minimize the need to import water from other regions.

10621. (a) Each urban water supplier shall update its plan at least once every five years on or before December 31, in years ending in five and zero.

(b) Every urban water supplier required to prepare a plan pursuant to this part shall, at least 60 days prior to the public hearing on the plan required by Section 10642, notify any city or county within which the supplier provides water supplies that the urban water

supplier will be reviewing the plan and considering amendments or changes to the plan. The urban water supplier may consult with, and obtain comments from, any city or county that receives notice pursuant to this subdivision.

(c) The amendments to, or changes in, the plan shall be adopted and filed in the manner set forth in Article 3 (commencing with Section 10640).

WATER CODE
SECTION 10630-10634

10630. It is the intention of the Legislature, in enacting this part, to permit levels of water management planning commensurate with the numbers of customers served and the volume of water supplied.

10631. A plan shall be adopted in accordance with this chapter that shall do all of the following:

(a) Describe the service area of the supplier, including current and projected population, climate, and other demographic factors affecting the supplier's water management planning. The projected population estimates shall be based upon data from the state, regional, or local service agency population projections within the service area of the urban water supplier and shall be in five-year increments to 20 years or as far as data is available.

(b) Identify and quantify, to the extent practicable, the existing and planned sources of water available to the supplier over the same five-year increments described in subdivision (a). If groundwater is identified as an existing or planned source of water available to the supplier, all of the following information shall be included in the plan:

(1) A copy of any groundwater management plan adopted by the urban water supplier, including plans adopted pursuant to Part 2.75 (commencing with Section 10750), or any other specific authorization for groundwater management.

(2) A description of any groundwater basin or basins from which the urban water supplier pumps groundwater. For those basins for which a court or the board has adjudicated the rights to pump groundwater, a copy of the order or decree adopted by the court or the board and a description of the amount of groundwater the urban water supplier has the legal right to pump under the order or decree. For basins that have not been adjudicated, information as to whether the department has identified the basin or basins as overdrafted or has projected that the basin will become overdrafted if present management conditions continue, in the most current official departmental bulletin that characterizes the condition of the groundwater basin, and a detailed description of the efforts being undertaken by the urban water supplier to eliminate the long-term overdraft condition.

(3) A detailed description and analysis of the location, amount, and sufficiency of groundwater pumped by the urban water supplier for the past five years. The description and analysis shall be based on information that is reasonably available, including, but not limited to, historic use records.

(4) A detailed description and analysis of the amount and location of groundwater that is projected to be pumped by the urban water supplier. The description and analysis shall be based on information that is reasonably available, including, but not limited to, historic use records.

(c) (1) Describe the reliability of the water supply and vulnerability to seasonal or climatic shortage, to the extent practicable, and provide data for each of the following:

(A) An average water year.

(B) A single dry water year.

(C) Multiple dry water years.

(2) For any water source that may not be available at a consistent level of use, given specific legal, environmental, water quality, or climatic factors, describe plans to supplement or replace that source with alternative sources or water demand management measures, to the extent practicable.

(d) Describe the opportunities for exchanges or transfers of water on a short-term or long-term basis.

(e) (1) Quantify, to the extent records are available, past and current water use, over the same five-year increments described in subdivision (a), and projected water use, identifying the uses among water use sectors, including, but not necessarily limited to, all of the following uses:

(A) Single-family residential.

(B) Multifamily.

(C) Commercial.

(D) Industrial.

(E) Institutional and governmental.

(F) Landscape.

(G) Sales to other agencies.

(H) Saline water intrusion barriers, groundwater recharge, or conjunctive use, or any combination thereof.

(I) Agricultural.

(2) The water use projections shall be in the same five-year increments described in subdivision (a).

(f) Provide a description of the supplier's water demand management measures. This description shall include all of the following:

(1) A description of each water demand management measure that is currently being implemented, or scheduled for implementation, including the steps necessary to implement any proposed measures, including, but not limited to, all of the following:

(A) Water survey programs for single-family residential and multifamily residential customers.

(B) Residential plumbing retrofit.

(C) System water audits, leak detection, and repair.

(D) Metering with commodity rates for all new connections and retrofit of existing connections.

(E) Large landscape conservation programs and incentives.

(F) High-efficiency washing machine rebate programs.

(G) Public information programs.

(H) School education programs.

(I) Conservation programs for commercial, industrial, and institutional accounts.

(J) Wholesale agency programs.
(K) Conservation pricing.
(L) Water conservation coordinator.
(M) Water waste prohibition.
(N) Residential ultra-low-flush toilet replacement programs.
(2) A schedule of implementation for all water demand management measures proposed or described in the plan.
(3) A description of the methods, if any, that the supplier will use to evaluate the effectiveness of water demand management measures implemented or described under the plan.
(4) An estimate, if available, of existing conservation savings on water use within the supplier's service area, and the effect of the savings on the supplier's ability to further reduce demand.
(g) An evaluation of each water demand management measure listed in paragraph (1) of subdivision (f) that is not currently being implemented or scheduled for implementation. In the course of the evaluation, first consideration shall be given to water demand management measures, or combination of measures, that offer lower incremental costs than expanded or additional water supplies. This evaluation shall do all of the following:
(1) Take into account economic and noneconomic factors, including environmental, social, health, customer impact, and technological factors.
(2) Include a cost-benefit analysis, identifying total benefits and total costs.
(3) Include a description of funding available to implement any planned water supply project that would provide water at a higher unit cost.
(4) Include a description of the water supplier's legal authority to implement the measure and efforts to work with other relevant agencies to ensure the implementation of the measure and to share the cost of implementation.
(h) Include a description of all water supply projects and water supply programs that may be undertaken by the urban water supplier to meet the total projected water use as established pursuant to subdivision (a) of Section 10635. The urban water supplier shall include a detailed description of expected future projects and programs, other than the demand management programs identified pursuant to paragraph (1) of subdivision (f), that the urban water supplier may implement to increase the amount of the water supply available to the urban water supplier in average, single-dry, and multiple-dry water years. The description shall identify specific projects and include a description of the increase in water supply that is expected to be available from each project. The description shall include an estimate with regard to the implementation timeline for each project or program.
(i) Describe the opportunities for development of desalinated water, including, but not limited to, ocean water, brackish water, and groundwater, as a long-term supply.
(j) For purposes of this part, urban water suppliers that are members of the California Urban Water Conservation Council shall be deemed in compliance with the requirements of subdivisions (f) and (g) by complying with all the provisions of the "Memorandum of Understanding Regarding Urban Water Conservation in California,"

dated December 10, 2008, as it may be amended, and by submitting the annual reports required by Section 6.2 of that memorandum.

(k) Urban water suppliers that rely upon a wholesale agency for a source of water shall provide the wholesale agency with water use projections from that agency for that source of water in five-year increments to 20 years or as far as data is available. The wholesale agency shall provide information to the urban water supplier for inclusion in the urban water supplier's plan that identifies and quantifies, to the extent practicable, the existing and planned sources of water as required by subdivision (b), available from the wholesale agency to the urban water supplier over the same five-year increments, and during various water-year types in accordance with subdivision (c). An urban water supplier may rely upon water supply information provided by the wholesale agency in fulfilling the plan informational requirements of subdivisions (b) and (c).

10631.1. (a) The water use projections required by Section 10631 shall include projected water use for single-family and multifamily residential housing needed for lower income households, as defined in Section 50079.5 of the Health and Safety Code, as identified in the housing element of any city, county, or city and county in the service area of the supplier.

(b) It is the intent of the Legislature that the identification of projected water use for single-family and multifamily residential housing for lower income households will assist a supplier in complying with the requirement under Section 65589.7 of the Government Code to grant a priority for the provision of service to housing units affordable to lower income households.

10631.5. (a) (1) Beginning January 1, 2009, the terms of, and eligibility for, a water management grant or loan made to an urban water supplier and awarded or administered by the department, state board, or California Bay-Delta Authority or its successor agency shall be conditioned on the implementation of the water demand management measures described in Section 10631, as determined by the department pursuant to subdivision (b).

(2) For the purposes of this section, water management grants and loans include funding for programs and projects for surface water or groundwater storage, recycling, desalination, water conservation, water supply reliability, and water supply augmentation. This section does not apply to water management projects funded by the federal American Recovery and Reinvestment Act of 2009 (Public Law 111-5).

(3) Notwithstanding paragraph (1), the department shall determine that an urban water supplier is eligible for a water management grant or loan even though the supplier is not implementing all of the water demand management measures described in Section 10631, if the urban water supplier has submitted to the department for approval a schedule, financing plan, and budget, to be included in the grant or loan agreement, for implementation of the water demand management measures. The supplier may request grant or loan funds to implement the water demand management measures to the extent the request is consistent with the eligibility requirements applicable to the water management funds.

(4) (A) Notwithstanding paragraph (1), the department shall

determine that an urban water supplier is eligible for a water management grant or loan even though the supplier is not implementing all of the water demand management measures described in Section 10631, if an urban water supplier submits to the department for approval documentation demonstrating that a water demand management measure is not locally cost effective. If the department determines that the documentation submitted by the urban water supplier fails to demonstrate that a water demand management measure is not locally cost effective, the department shall notify the urban water supplier and the agency administering the grant or loan program within 120 days that the documentation does not satisfy the requirements for an exemption, and include in that notification a detailed statement to support the determination.

(B) For purposes of this paragraph, "not locally cost effective" means that the present value of the local benefits of implementing a water demand management measure is less than the present value of the local costs of implementing that measure.

(b) (1) The department, in consultation with the state board and the California Bay-Delta Authority or its successor agency, and after soliciting public comment regarding eligibility requirements, shall develop eligibility requirements to implement the requirement of paragraph (1) of subdivision (a). In establishing these eligibility requirements, the department shall do both of the following:

(A) Consider the conservation measures described in the Memorandum of Understanding Regarding Urban Water Conservation in California, and alternative conservation approaches that provide equal or greater water savings.

(B) Recognize the different legal, technical, fiscal, and practical roles and responsibilities of wholesale water suppliers and retail water suppliers.

(2) (A) For the purposes of this section, the department shall determine whether an urban water supplier is implementing all of the water demand management measures described in Section 10631 based on either, or a combination, of the following:

(i) Compliance on an individual basis.

(ii) Compliance on a regional basis. Regional compliance shall require participation in a regional conservation program consisting of two or more urban water suppliers that achieves the level of conservation or water efficiency savings equivalent to the amount of conservation or savings achieved if each of the participating urban water suppliers implemented the water demand management measures. The urban water supplier administering the regional program shall provide participating urban water suppliers and the department with data to demonstrate that the regional program is consistent with this clause. The department shall review the data to determine whether the urban water suppliers in the regional program are meeting the eligibility requirements.

(B) The department may require additional information for any determination pursuant to this section.

(3) The department shall not deny eligibility to an urban water supplier in compliance with the requirements of this section that is participating in a multiagency water project, or an integrated regional water management plan, developed pursuant to Section 75026 of the Public Resources Code, solely on the basis that one or more of

the agencies participating in the project or plan is not implementing all of the water demand management measures described in Section 10631.

(c) In establishing guidelines pursuant to the specific funding authorization for any water management grant or loan program subject to this section, the agency administering the grant or loan program shall include in the guidelines the eligibility requirements developed by the department pursuant to subdivision (b).

(d) Upon receipt of a water management grant or loan application by an agency administering a grant and loan program subject to this section, the agency shall request an eligibility determination from the department with respect to the requirements of this section. The department shall respond to the request within 60 days of the request.

(e) The urban water supplier may submit to the department copies of its annual reports and other relevant documents to assist the department in determining whether the urban water supplier is implementing or scheduling the implementation of water demand management activities. In addition, for urban water suppliers that are signatories to the Memorandum of Understanding Regarding Urban Water Conservation in California and submit biennial reports to the California Urban Water Conservation Council in accordance with the memorandum, the department may use these reports to assist in tracking the implementation of water demand management measures.

(f) This section shall remain in effect only until July 1, 2016, and as of that date is repealed, unless a later enacted statute, that is enacted before July 1, 2016, deletes or extends that date.

10631.7. The department, in consultation with the California Urban Water Conservation Council, shall convene an independent technical panel to provide information and recommendations to the department and the Legislature on new demand management measures, technologies, and approaches. The panel shall consist of no more than seven members, who shall be selected by the department to reflect a balanced representation of experts. The panel shall have at least one, but no more than two, representatives from each of the following: retail water suppliers, environmental organizations, the business community, wholesale water suppliers, and academia. The panel shall be convened by January 1, 2009, and shall report to the Legislature no later than January 1, 2010, and every five years thereafter. The department shall review the panel report and include in the final report to the Legislature the department's recommendations and comments regarding the panel process and the panel's recommendations.

10632. (a) The plan shall provide an urban water shortage contingency analysis that includes each of the following elements that are within the authority of the urban water supplier:

(1) Stages of action to be undertaken by the urban water supplier in response to water supply shortages, including up to a 50 percent reduction in water supply, and an outline of specific water supply conditions that are applicable to each stage.

(2) An estimate of the minimum water supply available during each of the next three water years based on the driest three-year historic

sequence for the agency's water supply.

(3) Actions to be undertaken by the urban water supplier to prepare for, and implement during, a catastrophic interruption of water supplies including, but not limited to, a regional power outage, an earthquake, or other disaster.

(4) Additional, mandatory prohibitions against specific water use practices during water shortages, including, but not limited to, prohibiting the use of potable water for street cleaning.

(5) Consumption reduction methods in the most restrictive stages. Each urban water supplier may use any type of consumption reduction methods in its water shortage contingency analysis that would reduce water use, are appropriate for its area, and have the ability to achieve a water use reduction consistent with up to a 50 percent reduction in water supply.

(6) Penalties or charges for excessive use, where applicable.

(7) An analysis of the impacts of each of the actions and conditions described in paragraphs (1) to (6), inclusive, on the revenues and expenditures of the urban water supplier, and proposed measures to overcome those impacts, such as the development of reserves and rate adjustments.

(8) A draft water shortage contingency resolution or ordinance.

(9) A mechanism for determining actual reductions in water use pursuant to the urban water shortage contingency analysis.

(b) Commencing with the urban water management plan update due December 31, 2015, for purposes of developing the water shortage contingency analysis pursuant to subdivision (a), the urban water supplier shall analyze and define water features that are artificially supplied with water, including ponds, lakes, waterfalls, and fountains, separately from swimming pools and spas, as defined in subdivision (a) of Section 115921 of the Health and Safety Code.

10633. The plan shall provide, to the extent available, information on recycled water and its potential for use as a water source in the service area of the urban water supplier. The preparation of the plan shall be coordinated with local water, wastewater, groundwater, and planning agencies that operate within the supplier's service area, and shall include all of the following:

(a) A description of the wastewater collection and treatment systems in the supplier's service area, including a quantification of the amount of wastewater collected and treated and the methods of wastewater disposal.

(b) A description of the quantity of treated wastewater that meets recycled water standards, is being discharged, and is otherwise available for use in a recycled water project.

(c) A description of the recycled water currently being used in the supplier's service area, including, but not limited to, the type, place, and quantity of use.

(d) A description and quantification of the potential uses of recycled water, including, but not limited to, agricultural irrigation, landscape irrigation, wildlife habitat enhancement, wetlands, industrial reuse, groundwater recharge, indirect potable reuse, and other appropriate uses, and a determination with regard to the technical and economic feasibility of serving those uses.

(e) The projected use of recycled water within the supplier's

service area at the end of 5, 10, 15, and 20 years, and a description of the actual use of recycled water in comparison to uses previously projected pursuant to this subdivision.

(f) A description of actions, including financial incentives, which may be taken to encourage the use of recycled water, and the projected results of these actions in terms of acre-feet of recycled water used per year.

(g) A plan for optimizing the use of recycled water in the supplier's service area, including actions to facilitate the installation of dual distribution systems, to promote recirculating uses, to facilitate the increased use of treated wastewater that meets recycled water standards, and to overcome any obstacles to achieving that increased use.

10634. The plan shall include information, to the extent practicable, relating to the quality of existing sources of water available to the supplier over the same five-year increments as described in subdivision (a) of Section 10631, and the manner in which water quality affects water management strategies and supply reliability.

WATER CODE SECTION 10635

10635. (a) Every urban water supplier shall include, as part of its urban water management plan, an assessment of the reliability of its water service to its customers during normal, dry, and multiple dry water years. This water supply and demand assessment shall compare the total water supply sources available to the water supplier with the total projected water use over the next 20 years, in five-year increments, for a normal water year, a single dry water year, and multiple dry water years. The water service reliability assessment shall be based upon the information compiled pursuant to Section 10631, including available data from state, regional, or local agency population projections within the service area of the urban water supplier.

(b) The urban water supplier shall provide that portion of its urban water management plan prepared pursuant to this article to any city or county within which it provides water supplies no later than 60 days after the submission of its urban water management plan.

(c) Nothing in this article is intended to create a right or entitlement to water service or any specific level of water service.

(d) Nothing in this article is intended to change existing law concerning an urban water supplier's obligation to provide water service to its existing customers or to any potential future customers.

WATER CODE
SECTION 10640-10645

10640. Every urban water supplier required to prepare a plan pursuant to this part shall prepare its plan pursuant to Article 2 (commencing with Section 10630).

The supplier shall likewise periodically review the plan as required by Section 10621, and any amendments or changes required as a result of that review shall be adopted pursuant to this article.

10641. An urban water supplier required to prepare a plan may consult with, and obtain comments from, any public agency or state agency or any person who has special expertise with respect to water demand management methods and techniques.

10642. Each urban water supplier shall encourage the active involvement of diverse social, cultural, and economic elements of the population within the service area prior to and during the preparation of the plan. Prior to adopting a plan, the urban water supplier shall make the plan available for public inspection and shall hold a public hearing thereon. Prior to the hearing, notice of the time and place of hearing shall be published within the jurisdiction of the publicly owned water supplier pursuant to Section 6066 of the Government Code. The urban water supplier shall provide notice of the time and place of hearing to any city or county within which the supplier provides water supplies. A privately owned water supplier shall provide an equivalent notice within its service area. After the hearing, the plan shall be adopted as prepared or as modified after the hearing.

10643. An urban water supplier shall implement its plan adopted pursuant to this chapter in accordance with the schedule set forth in its plan.

10644. (a) An urban water supplier shall submit to the department, the California State Library, and any city or county within which the supplier provides water supplies a copy of its plan no later than 30 days after adoption. Copies of amendments or changes to the plans shall be submitted to the department, the California State Library, and any city or county within which the supplier provides water supplies within 30 days after adoption.

(b) The department shall prepare and submit to the Legislature, on or before December 31, in the years ending in six and one, a report summarizing the status of the plans adopted pursuant to this part. The report prepared by the department shall identify the exemplary elements of the individual plans. The department shall provide a copy of the report to each urban water supplier that has submitted its plan to the department. The department shall also prepare reports and provide data for any legislative hearings designed to consider the effectiveness of plans submitted pursuant to this part.

(c) (1) For the purpose of identifying the exemplary elements of the individual plans, the department shall identify in the report those water demand management measures adopted and implemented by specific urban water suppliers, and identified pursuant to Section

10631, that achieve water savings significantly above the levels established by the department to meet the requirements of Section 10631.5.

(2) The department shall distribute to the panel convened pursuant to Section 10631.7 the results achieved by the implementation of those water demand management measures described in paragraph (1).

(3) The department shall make available to the public the standard the department will use to identify exemplary water demand management measures.

10645. Not later than 30 days after filing a copy of its plan with the department, the urban water supplier and the department shall make the plan available for public review during normal business hours.

WATER CODE
SECTION 10650-10656

10650. Any actions or proceedings to attack, review, set aside, void, or annul the acts or decisions of an urban water supplier on the grounds of noncompliance with this part shall be commenced as follows:

(a) An action or proceeding alleging failure to adopt a plan shall be commenced within 18 months after that adoption is required by this part.

(b) Any action or proceeding alleging that a plan, or action taken pursuant to the plan, does not comply with this part shall be commenced within 90 days after filing of the plan or amendment thereto pursuant to Section 10644 or the taking of that action.

10651. In any action or proceeding to attack, review, set aside, void, or annul a plan, or an action taken pursuant to the plan by an urban water supplier on the grounds of noncompliance with this part, the inquiry shall extend only to whether there was a prejudicial abuse of discretion. Abuse of discretion is established if the supplier has not proceeded in a manner required by law or if the action by the water supplier is not supported by substantial evidence.

10652. The California Environmental Quality Act (Division 13 (commencing with Section 21000) of the Public Resources Code) does not apply to the preparation and adoption of plans pursuant to this part or to the implementation of actions taken pursuant to Section 10632. Nothing in this part shall be interpreted as exempting from the California Environmental Quality Act any project that would significantly affect water supplies for fish and wildlife, or any project for implementation of the plan, other than projects implementing Section 10632, or any project for expanded or additional water supplies.

10653. The adoption of a plan shall satisfy any requirements of state law, regulation, or order, including those of the State Water Resources Control Board and the Public Utilities Commission, for the preparation of water management plans or conservation plans; provided, that if the State Water Resources Control Board or the Public Utilities Commission requires additional information concerning water conservation to implement its existing authority, nothing in this part shall be deemed to limit the board or the commission in obtaining that information. The requirements of this part shall be satisfied by any urban water demand management plan prepared to meet federal laws or regulations after the effective date of this part, and which substantially meets the requirements of this part, or by any existing urban water management plan which includes the contents of a plan required under this part.

10654. An urban water supplier may recover in its rates the costs incurred in preparing its plan and implementing the reasonable water conservation measures included in the plan. Any best water management practice that is included in the plan that is identified in the

"Memorandum of Understanding Regarding Urban Water Conservation in California" is deemed to be reasonable for the purposes of this section.

10655. If any provision of this part or the application thereof to any person or circumstances is held invalid, that invalidity shall not affect other provisions or applications of this part which can be given effect without the invalid provision or application thereof, and to this end the provisions of this part are severable.

10656. An urban water supplier that does not prepare, adopt, and submit its urban water management plan to the department in accordance with this part, is ineligible to receive funding pursuant to Division 24 (commencing with Section 78500) or Division 26 (commencing with Section 79000), or receive drought assistance from the state until the urban water management plan is submitted pursuant to this article.

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Appendix B. Public Notice

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Appendix B. Public Notice

EBMUD published public notices in the following newspapers on the dates indicated below. A sample declaration of the published notices is provided in subsequent pages of this appendix.

Table B-1 Legal Notice Advising of the Second Comment Period Extension

Date (2011)	Alameda Newspaper Group	Contra Costa Newspaper Group	Sacramento Bee	Calaveras Enterprise	Amador Ledger	Lodi News Sentinal	Stockton Record
Monday, May 9						■	
Tuesday May 10				■	■		
Thursday, May 12							
Friday, May 13	■	■	■	■	■	■	■
Saturday, May 14	■	■	■			■	■
Sunday, May 15	■	■	■				■
Monday, May 16						■	
Tuesday, May 17				■	■		
Thursday, May 19							
Friday, May 20	■	■	■	■	■	■	■
Saturday, May 21	■	■	■			■	■
Sunday, May 22	■	■	■				■

Legal Notice Advising of the Hearing Postponement and Comment Period Extension

Date (2011)	Alameda Newspaper Group	Contra Costa Newspaper Group	Sacramento Bee	Calaveras Enterprise	Amador Ledger	Lodi News Sentinal	Stockton Record
Thursday, April 21							
Friday, April 22	■	■	■	■		■	■
Saturday, April 23	■	■	■			■	■
Sunday, April 24	■	■	■				■
Monday, April 25						■	
Tuesday, April 26				■			
Thursday, April 28							
Friday, April 29	■	■	■	■	■	■	■
Saturday, April 30	■	■	■			■	■
Sunday, May 1	■	■	■				■
Monday, May 2						■	
Tuesday, May 3				■	■		
Thursday, May 5							
Friday, May 6					■		

Legal Notice Announcing the Publication of the Draft UWMP

Date (2011)	Alameda Newspaper Group	Contra Costa Newspaper Group	Sacramento Bee	Calaveras Enterprise	Amador Ledger	Lodi News Sentinal	Stockton Record
Tuesday, April 12				■	■		
Thursday, April 14							
Friday, April 15	■	■	■	■	■	■	■
Saturday, April 16	■	■	■			■	■
Sunday, April 17	■	■	■				■
Monday, April 18						■	

The Sacramento Bee

P.O. Box 15779 • 2100 Q Street • Sacramento, CA 95852

EAST BAY MUNICIPAL UTILITY DIST
375 11TH ST ms806
OAKLAND, CA 97607

DECLARATION OF PUBLICATION
(C.C.P. 2015.5)

COUNTY OF SACRAMENTO
STATE OF CALIFORNIA

I am a citizen of the United States and a resident of the County aforesaid; I am over the age of eighteen years, and not a party to or interest ed in the above entitled matter. I am the printer and principal clerk of the publisher of The Sacramento Bee, printed and published in the City of Sacramento, County of Sacramento, State of California, daily, for which said newspaper has been adjudged a newspaper of general circulation by the Superior Court of the County of Sacramento, State of California, under the date of September 26, 1994, Action No. 379071; that the notice of which the annexed is a printed copy, has been published in each issue thereof and not in any supplement thereof on the following dates, to wit:

May 13, 14, 15, 20, 21, 22, 2011

I certify (or declare) under penalty of perjury that the foregoing is true and correct and that this declaration was executed at Sacramento, California, on **May 22, 2011.**

(Signature)

NO 482 PUBLIC NOTICE

NOTICE OF SECOND COMMENT PERIOD EXTENSION

East Bay Municipal Utility District
Draft Urban Water Management Plan 2010,
2010 Water Shortage Contingency Plan, and
SBx7-7 Implementation Plan.

THIS IS TO ADVISE YOU THAT, IN RESPONSE TO A REQUEST FROM THE PUBLIC, THE COMMENT PERIOD FOR THE DRAFT UWMP 2010 HAS BEEN EXTENDED FOR A SECOND TIME. AN UPDATED DRAFT UWMP 2010 WAS RELEASED ON MAY 6, 2011 AND THE PUBLIC REVIEW AND COMMENT PERIOD WILL NOW END ON MAY 31, 2011.

The Urban Water Management Plan (UWMP) brings together important information on water supply and usage, recycled water and conservation programs at East Bay Municipal Utility District (EBMUD). In accordance with the statutory requirements, EBMUD is updating its 2005 UWMP to reflect current conditions and legislation including requirements established in SBx7-7, Water Conservation Act of 2009. The UWMP presents EBMUD's efforts to promote efficient water use consistent with the California Urban Water Management Planning Act as part of the California Water Code.

EBMUD will review and consider all comments received (or postmarked) by May 31, 2011, 4:30pm. All written comments should be submitted to Suzie Corralejo by email to scorrale@ebmud.com, or by mail to: Attn: Ms. S. Corralejo, Water Resources Planning Division, EBMUD, PO BOX 24055, MS 901, Oakland, California, 94623-1055.

Copies of the Updated Draft UWMP 2010 are available at the public libraries located within the EBMUD service area, the California State Library, and the plan is posted onwww.ebmud.com. Additionally copies may be requested by contacting Suzie Corralejo by telephone at 510-287-0109, by email to scorrale@ebmud.com, or by mail to: Attn: Ms. S. Corralejo, Water Resources Planning Division, EBMUD, PO BOX 24055, MS 901, Oakland, California, 94623-1055.

The UWMP will be considered for adoption by the EBMUD Board of Directors during the regularly scheduled EBMUD Board meeting, beginning at 1:30 pm on June 28, 2011, in the Board Room, EBMUD Administration Building, 375 Eleventh Street, Oakland, California. The next revision to the UWMP will occur no earlier than 2015.

5/13, 5/14, 5/15, 5/20, 5/21, 5/22
Lynelle M. Lewis
Secretary of the District

The Sacramento Bee

P.O. Box 15779 • 2100 Q Street • Sacramento, CA 95852

EAST BAY MUNICIPAL UTILITY DIST
375 11TH ST MS806
OAKLAND, CA 97607

DECLARATION OF PUBLICATION
(C.C.P. 2015.5)

COUNTY OF SACRAMENTO
STATE OF CALIFORNIA

I am a citizen of the United States and a resident of the County aforesaid; I am over the age of eighteen years, and not a party to or interest ed in the above entitled matter. I am the printer and principal clerk of the publisher of The Sacramento Bee, printed and published in the City of Sacramento, County of Sacramento, State of California, daily, for which said newspaper has been adjudged a newspaper of general circulation by the Superior Court of the County of Sacramento, State of California, under the date of September 26, 1994, Action No. 379071; that the notice of which the annexed is a printed copy, has been published in each issue thereof and not in any supplement thereof on the following dates, to wit:

April 29, 30, 2011 & May 1, 2011

I certify (or declare) under penalty of perjury that the foregoing is true and correct and that this declaration was executed at Sacramento, California, on **May 1, 2011**

(Signature)

NO 453 PUBLIC NOTICE

NOTICE OF HEARING AND COMMENT PERIOD EXTENSION

East Bay Municipal Utility District Draft Urban Water Management Plan 2010, 2010 Water Shortage Contingency Plan, and SBx7-7 Implementation Plan.

THE UPDATED DRAFT UWMP 2010 WILL BE RELEASED ON MAY 6, 2011 AND THE PUBLIC REVIEW AND COMMENT PERIOD IS EXTENDED THROUGH MAY 20, 2011. A PUBLIC HEARING ON THE DRAFT UWMP 2010 WILL NOW BE HELD DURING THE REGULARLY SCHEDULED EBMUD BOARD MEETING, BEGINNING AT 1:30 PM ON MAY 10, 2011 IN THE BOARD ROOM, EBMUD ADMINISTRATION BUILDING, 375 ELEVENTH STREET, OAKLAND, CALIFORNIA.

The Urban Water Management Plan (UWMP) brings together important information on water supply and usage, recycled water and conservation programs at East Bay Municipal Utility District (EBMUD). EBMUD is updating its 2005 UWMP to reflect current conditions and legislation including requirements established in SBx7-7, Water Conservation Act of 2009. The UWMP presents EBMUD's efforts to promote efficient water use consistent with the California Urban Water Management Planning Act as part of the California Water Code.

The May 10 hearing will provide the public an opportunity to comment on EBMUD's UWMP, Water Shortage Contingency Plan, and SBx7-7 Implementation Plan. EBMUD will review and consider all comments received (or postmarked) by May 20, 2011, 4:30pm. All written comments should be submitted to Suzie Corralejo by email to scorrale@ebmud.com, or by mail to: Attn: Ms. S. Corralejo, Water Resources Planning Division, EBMUD, PO BOX 24055, MS 901, Oakland, California, 94623-1055.

Copies of the Updated Draft UWMP 2010 will be available at the public libraries located within the EBMUD service area, and at the California State Library, and will also be posted on www.ebmud.com on May 6, 2011. Additionally copies may be requested by contacting Suzie Corralejo by telephone at 510-287-0109, by email to scorrale@ebmud.com, or by mail to: Attn: Ms. S. Corralejo, Water Resources Planning Division, EBMUD, PO BOX 24055, MS 901, Oakland, California, 94623-1055.

The UWMP will be considered for adoption by the EBMUD Board of Directors during the regularly scheduled EBMUD Board meeting, beginning at 1:30 pm on June 28, 2011, in the Board Room, EBMUD Administration Building, 375 Eleventh Street, Oakland, California. The next revision to the UWMP will occur no earlier than 2015.

Lynelle M. Lewis
Secretary of the District

The Sacramento Bee

P.O. Box 15779 • 2100 Q Street • Sacramento, CA 95852

EAST BAY MUNICIPAL UTILITY DIST
375 11TH ST
OAKLAND, CA 97607

DECLARATION OF PUBLICATION
(C.C.P. 2015.5)

COUNTY OF SACRAMENTO
STATE OF CALIFORNIA

I am a citizen of the United States and a resident of the County aforesaid; I am over the age of eighteen years, and not a party to or interest ed in the above entitled matter. I am the printer and principal clerk of the publisher of The Sacramento Bee, printed and published in the City of Sacramento, County of Sacramento, State of California, daily, for which said newspaper has been adjudged a newspaper of general circulation by the Superior Court of the County of Sacramento, State of California, under the date of September 26, 1994, Action No. 379071; that the notice of which the annexed is a printed copy, has been published in each issue thereof and not in any supplement thereof on the following dates, to wit:

April 22, 23, 24, 2011

I certify (or declare) under penalty of perjury that the foregoing is true and correct and that this declaration was executed at Sacramento, California, on **April 24, 2011**

(Signature)

NO 480 PUBLIC NOTICE

NOTICE OF HEARING POSTPONEMENT AND COMMENT PERIOD EXTENSION

East Bay Municipal Utility District Draft Urban Water Management Plan 2010, 2010 Water Shortage Contingency Plan, and SBx7-7 Implementation Plan.

THIS IS TO ADVISE YOU THAT THE PUBLIC HEARING SCHEDULED TO BEGIN AT 1:45 PM ON APRIL 26, 2011 IN THE BOARD ROOM, EBMUD ADMINISTRATION BUILDING, 375 ELEVENTH STREET, OAKLAND, CALIFORNIA HAS BEEN CANCELLED. EBMUD IS REVISING THE DRAFT UWMP 2010, WITH A NEW SCHEDULE AS FOLLOWS.

THE UPDATED DRAFT UWMP 2010 WILL BE RELEASED ON MAY 6, 2011 AND THE PUBLIC REVIEW AND COMMENT PERIOD IS EXTENDED THROUGH MAY 20, 2011. A PUBLIC HEARING ON THE DRAFT UWMP 2010 WILL NOW BE HELD DURING THE REGULARLY SCHEDULED EBMUD BOARD MEETING, BEGINNING AT 1:30 PM ON MAY 10, 2011 IN THE BOARD ROOM, EBMUD ADMINISTRATION BUILDING, 375 ELEVENTH STREET, OAKLAND, CALIFORNIA.

The Urban Water Management Plan (UWMP) brings together important information on water supply and usage, recycled water and conservation programs at East Bay Municipal Utility District (EBMUD). EBMUD is updating its 2005 UWMP to reflect current conditions and legislation including requirements established in SBx7-7, Water Conservation Act of 2009. The UWMP presents EBMUD's efforts to promote efficient water use consistent with the California Urban Water Management Planning Act as part of the California Water Code.

The May 10 hearing will provide the public an opportunity to comment on EBMUD's UWMP, Water Shortage Contingency Plan, and SBx7-7 Implementation Plan. EBMUD will review and consider all comments received (or postmarked) by May 20, 2011, 4:30pm. All written comments should be submitted to Suzie Corralejo by email to scorrale@ebmud.com, or by mail to: Attn: Ms. S. Corralejo, Water Resources Planning Division, EBMUD, PO BOX 24055, MS 901, Oakland, California, 94623-1055.

Copies of the updated Draft UWMP 2010 will be available at the public libraries located within the EBMUD service area, and at the California State Library, and will also be posted on www.ebmud.com on May 6, 2011. Additionally copies may be requested by contacting Suzie Corralejo by telephone at 510-287-0109, by email to scorrale@ebmud.com, or by mail to: Attn: Ms. S. Corralejo, Water Resources Planning Division, EBMUD, PO BOX 24055, MS 901, Oakland, California, 94623-1055.

The UWMP will be considered for adoption by the EBMUD Board of Directors during the regularly scheduled EBMUD Board meeting, beginning at 1:30 pm on June 28, 2011, in the Board Room, EBMUD Administration Building, 375 Eleventh Street, Oakland, California. The next revision to the UWMP will occur no earlier than 2015.

Lynelle M. Lewis
Secretary of the District

The Sacramento Bee

P.O. Box 15779 • 2100 Q Street • Sacramento, CA 95852

EAST BAY MUNICIPAL UTILITY DIST
375 11TH ST
OAKLAND, CA 97607

DECLARATION OF PUBLICATION
(C.C.P. 2015.5)

COUNTY OF SACRAMENTO
STATE OF CALIFORNIA

I am a citizen of the United States and a resident of the County aforesaid; I am over the age of eighteen years, and not a party to or interest ed in the above entitled matter. I am the printer and principal clerk of the publisher of The Sacramento Bee, printed and published in the City of Sacramento, County of Sacramento, State of California, daily, for which said newspaper has been adjudged a newspaper of general circulation by the Superior Court of the County of Sacramento, State of California, under the date of September 26, 1994, Action No. 379071; that the notice of which the annexed is a printed copy, has been published in each issue thereof and not in any supplement thereof on the following dates, to wit:

April 15, 16, 17, 2011

I certify (or declare) under penalty of perjury that the foregoing is true and correct and that this declaration was executed at Sacramento, California, on **April 17, 2011**

(Signature)

NO 479 PUBLIC NOTICE

East Bay Municipal Utility District
Draft Urban Water Management Plan 2010,
2010 Water Shortage Contingency Plan, and
SBx7-7 Implementation Plan.

To be released for public review and comment beginning on April 15, 2011 AND ENDING on May 6, 2011. A public Comment meeting on the uwmp will be held on april 21, 2011 at 6:00 pm. In addition, A public hearing will be held during the regularly scheduled EBMUD Board meeting beginning at 1:45 pm on April 26, 2011. The Hearing and the comment meeting will be held in the Board Room, EBMUD Administration Building, 375 Eleventh Street, Oakland, California.

The Urban Water Management Plan (UWMP) brings together important information on water supply and usage, recycled water and conservation programs at East Bay Municipal Utility District (EBMUD). EBMUD is updating its 2005 UWMP to reflect current conditions and legislation including requirements established in SBx7-7, Water Conservation Act of 2009. The UWMP presents EBMUD's efforts to promote efficient water use consistent with the California Urban Water Management Planning Act as part of the California Water Code.

The April 21 comment meeting and the April 26 hearing will provide the public an opportunity to comment on EBMUD's UWMP, Water Shortage Contingency Plan, and SBx7-7 Implementation Plan. EBMUD will review and consider all comments received at the hearing, comment meeting and written comments received (or postmarked) by May 6, 2011, 4:30pm. All written comments should be submitted to Suzie Corralejo by email to scorrale@ebmud.com, or by mail to: Attn: Ms. S. Corralejo, Water Resources Planning Division, EBMUD, PO BOX 24055, MS 901, Oakland, California, 94623-1055.

Copies of the draft UWMP are available at the public libraries located within the EBMUD service area, and at the California State Library. The draft UWMP may also be downloaded from www.ebmud.com, or copies may be requested by contacting Suzie Corralejo by telephone at 510-287-0109, by email to scorrale@ebmud.com, or by mail to: Attn: Ms. S. Corralejo, Water Resources Planning Division, EBMUD, PO BOX 24055, MS 901, Oakland, California, 94623-1055.

The UWMP will be considered for adoption by the EBMUD Board of Directors during the regularly scheduled EBMUD Board meeting, beginning at 1:45 pm on June 28, 2011, in the Board Room, EBMUD Administration Building, 375 Eleventh Street, Oakland, California. The next revision to the UWMP will occur no earlier than 2015.

Dated: April 15, 16, 17, 2011
Lynelle M. Lewis
Secretary of the District

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Appendix C. Comments and Responses

Appendix C–Table of Contents

Name	Date Comment Received	Page Number
Tom Infusino	05/31/2011	Appendix C-1
SAIC	05/31/2011	Appendix C-19
Amador Water Agency	05/31/2011	Appendix C-22
Edith Luis	05/23/2011 and 06/03/2011	Appendix C-23
Randy Berg	05/17/2011	Appendix C-25
Lary Heath	05/14/2011	Appendix C-26
Michael J. Spadoni	05/12/2011	Appendix C-27
Lee R. Peterson	05/12/2011	Appendix C-28
Wayne and Valerie Brunmeier	05/11/2011	Appendix C-29
John Knox White	04/21/2011	Appendix C-30

In addition to changes identified in the responses to comments above, editorial and clarification changes were made throughout the document.

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Appendix C. Comments and Responses

Tom Infusino, et. al.

Date Comment Received: 05/31/2011
Name of Organization/ Agency/ Individual: Tom Infusino on behalf of the Foothill Conservancy, California Sportfishing Protection Alliance, and Friends of the River

Comment:

From: Tom Infusino [mailto:tomi@volcano.net]
Sent: Tuesday, May 31, 2011 3:35 PM
To: Corralejo, Suzanne
Subject: Comments on the 2010 DUWMP

Dear Ms. Corralejo:

Attached are comments on the Draft Urban Water Management Plan. Please contact me if you have any trouble opening the attachment.

Sincerely,

Tom Infusino

Thomas P. Infusino
P.O. Box 792
Pine Grove, CA 95665
tomi@volcano.net
(209) 295-8866

5/31/11

East Bay Municipal Utility District
Water Resources Planning
Attn: S. Corralejo
P.O. BOX 24055, MS #901
Oakland, CA 94623-1055

Re: Comments on Draft Urban Water Management Plan 2010.

Dear Ms. Corralejo:

My name is Tom Infusino and I am writing on behalf of the Foothill Conservancy, California Sportfishing Protection Alliance, and Friends of the River. They encourage you to drop Pardee Expansion as a potential future water supply enhancement, and to revise the 2010 Draft Urban Water Management Plan (2010 DUWMP) to conform to the requirements of the Water Code.

As you know, the future water supply projects relied upon in the Draft 2010 Urban Water Management Plan (DUWMP) include expanding the size of Pardee and Lower Bear reservoirs by building a new dam (Pardee) and raising the heights of the existing dam (Lower Bear). The reservoirs are located in Amador and Calaveras counties. Also, the 2010 DUWMP relies on additional water supplies from the Interregional Conjunctive Use Plan + (IRCUP+). In addition to the Bear and Pardee expansions, IRCUP+ includes the construction of a reservoir at Duck Creek, which requires the condemnation of an existing California Department of Fish and Game wildlife conservation easement. Participating in the expansion of Los Vaqueros Reservoir is not listed among the supply options available to EBMUD, despite the invitation to do so by Contra Costa Water District, and a recent court ruling requiring the consideration of that alternative in EBMUD's Water Supply Management Plan 2040 (WSMP 2040) PEIR.

I. Members of the Foothill Conservancy will be harmed by your dam plans.

The Foothill Conservancy is a nonprofit organization with members who live and work in the Mokelumne River watershed. The Foothill Conservancy seeks to restore, protect, and sustain the natural and human environment in and around Amador and Calaveras Counties. The Foothill Conservancy's vision for this area includes protected scenic quality, conserved forest lands, restored natural diversity of native plants and animals, free-flowing

Tom Infusino, et. al.

rivers, coordinated land use planning, and balanced economic development that is ecologically and socially sustainable.

Our Infrastructure Planning and Development Principles ask agencies to employ demand-side management techniques, including conservation and efficiency, before taking on expensive expansion projects, and to develop infrastructure with minimal harm to the natural and built environment. Our River and Watershed Principles

- Recognize that the ecological health of our rivers and watersheds is of primary importance,
- Support National Wild and Scenic River designation for the Mokelumne River,
- Oppose new on-stream dams, and
- Encourage safe public access and recreational use of rivers.

These principles are more than currently popular platitudes. They are the culmination of wisdom learned through two decades of conservation work by the Foothill Conservancy in the Mokelumne River watershed. Over those years we played a key role in negotiating a settlement agreement for the relicensing of PG&E's hydroelectric project on the Mokelumne River, which set a national precedent; led to the breaching, dismantling or removal of three dams on North Fork Mokelumne tributary streams; and began improvements to river health and recreation. We sponsor annual Mokelumne River Cleanups. We helped secured public access to the Middle Bar reach of the Mokelumne River (below Highway 49 to Pardee Reservoir), which had been closed to public access for more than 30 years. We helped protect more than nine miles of the North Fork of the Mokelumne River by stopping the proposed Devil's Nose Dam project. We recently won a court ruling requiring EBMUD to set aside approval of its 2040 WSMP and EIR certification for failure to consider impacts from Pardee Expansion and failure to consider a broad range of alternatives.

The Foothill Conservancy has its headquarters in Amador County. Members of the Foothill Conservancy and their families have taken their place in the Sierra Nevada foothills. Like the many shoots that form a willow basket, their diverse lives and cherished memories are interwoven with the multifaceted landscape of this unique region. It is the place they work and struggle, where they stick out the hot summers and the muddy winters. They endure lower incomes, limited career opportunities and inadequate levels of public service because they love our landscape and quality of life.

The Mokelumne River is one of the special places that bind our members to the land. Members of the Foothill Conservancy rely on the Mokelumne River and its watershed not only as a source of water, but as a place of residence, business, recreation and spiritual renewal. It is where young couples meet and fall in love. It is where they take long walks to discuss their future. It is where they run the rapids. It is where their children will catch their first trout, and learn about rivers and nature. It is where they live today, and where they will be laid to eternal rest tomorrow.

The uses made of the Mokelumne River watershed by members of the Foothill Conservancy, and by the public at large, will be impaired by the proposed foothill dams.

Expanding Pardee as proposed would inundate the Middle Bar Reach recreation area, valued for whitewater rafting and kayaking, fishing, gold panning, wildflower viewing, family picnics, bird watching, and historic and cultural resources and Native American cultural activities. Expanding Pardee would remove the Middle Bar Bridge, eliminating a first responder access and a resident evacuation route in the event of a wildland fire, putting lives and property at grave risk, and increasing the likelihood of catastrophic wildland fire on EBMUD’s watershed lands with resulting harm to EBMUD’s water quality.

Furthermore, members of the Foothill Conservancy suffer from local political arenas too often focused on divisive debate over controversial projects thrust upon us by outside interests, and too infrequently focused on making progress in our broad fields of agreement for the good of the local citizenry. EBMUD’s proposed foothill projects drag our communities’ energies away from making progress on water supplies we agree on and force us to focus time and money on fighting another colonial raid on our resources.

We urge EBMUD to withdraw the Pardee Expansion from further consideration as a component of its 2010 UWMP. The project is included in the plan to meet water needs that are not adequately demonstrated, using water that will likely not be available for diversion above the Sacramento-San Joaquin Delta. The project will harm the communities,

Tom Infusino, et. al.

economy, and natural environment of our foothill counties. And it plainly conflicts with the stated objectives of the Urban Water Management Planning Act.

II. Drop Pardee Expansion (PE) from the 2010 Urban Water Management Plan. TI-1

A) Drop PE because it is not consistent with the intent of the UWMP Act.

The amendments to the UWMP Act over the last decade reflect two key beliefs of the California State Legislature. The first is that, "[T]he people of California will best be served by meeting municipal, agricultural and environmental water needs of each hydrologic region to the maximum extent practicable without diminishing the resources of other regions that are necessary to meet the present and future needs of those regions." The second is that, "The health, safety, and well-being of the people of the State of California will best be served by employing current and developing water treatment and conservation technologies." (Stats of 2001, c. 320 (S.B. 672).) "Improvements in technology and management practices offer the potential for increasing water efficiency in California over time, providing an essential water management tool to meet the need for water for urban, agricultural, and environmental uses." (Water Code, sec. 10608.)

Given the State's focus on regional self-sufficiency, the use of new technologies and management practices, and the desire to avoid harm to other regions, it seems inconceivable that EBMUD's response in the 2010 DUWMP is to rebuild its 20th century dam and to further harm the foothill region. Right in EBMUD's own backyard, Contra Costa Water District is expanding a state-of-the-art low-impact water storage facility, with room to grow to accommodate EBMUD's needs. If EBMUD feels the need for a new storage facility, Los Vaqueros Expansion (LVE) is the modern local alternative that EBMUD should pursue. Please include LVE as a possible future supply in the final 2010 UWMP.

B) Drop PE from the 2010 DUWMP because it does not provide the water supply security that your constituents want.

One of the important topics discussed in an UWMP is water supply reliability. (Water Code, secs. 10631, subd. (c) and 10635.) During the 2040 WSMP process, EBMUD hand picked a Community Liaison Committee to review future policies and water supply options. The water supply portfolio concept that got the most support from the CLC was the proposal to develop a new source of water storage closer to EBMUD's customers, not on the other side of the geologically unstable Central Valley. Pardee Expansion does not provide this key element of water supply security to EBMUD customers (a need, incidentally, recognized by EBMUD since the 1950s). Please drop Pardee Expansion from the 2010 DUWMP. Los Vaqueros Expansion would give your customers the security to know that a major component of their water storage is close at hand. Please include LVE as a possible future supply enhancement in the final 2010 UWMP.

C. Drop PE from the 2010 DUWMP because your Board already knows PE is neither needed nor desirable.

An important focus of an UWMP is the comparison of future supply and future demand. (Water Code, sec. 10631, subds. (a - h).) During the 2040 WSMP hearing, members of the EBMUD Board correctly assessed that Pardee Expansion was an unnecessary water supply source, that its construction and operation would be unnecessarily harmful to people and the environment, and that its inclusion in EBMUD plans would lead to litigation and strained relations with foothill interests. These Board members were right on all three counts. If EBMUD simply uses its 2002 growth projections and its 25 percent rationing policy, there is no need to include Pardee Expansion in future water plans. EBMUD's inclusion of Pardee Expansion in the 2040 WSMP did lead to strained relations and litigation. As noted by the court in *Foothill Conservancy, et al. v. EBMUD*, the Pardee Expansion has the potential to significantly impact public safety, Miwok cultural practices, and river recreation. Please do not make the same mistake again. Please leave Pardee Expansion out of the 2010 UWMP.

III. EBMUD must comply with the many provisions of the UWMP before it can qualify for state grants and loans. TI-2

The Urban Water Management Plan Act compels water suppliers to evaluate current and future water demand, evaluate current and future water supply, describe opportunities for water transfers, implement feasible water conservation measures, plan for responding to droughts, and reduce the water rate hardships of low-income customers.

Tom Infusino, et. al.

Unfortunately, even after 20 years of implementation, water suppliers have done a poor job of completing and implementing urban water management plans. In its report to the Legislature in 2006, the Department of Water Resources indicated that, of the 460 water suppliers required to file an UWMP in 2005, 166 didn't even manage to file a plan. Of the 139 plans reviewed by DWR, only 39 plans (28 percent) were complete. Over half the plans reviewed lacked a water shortage contingency plan, a recycled water plan, or a plan to implement 10 of the 14 proposed demand management measures. (DWR, Summary of the Status of 2005 Urban Water Management Plans, pp. A-12 and B-1.) Considering that the completion and implementation of these plans is critical to California's future water supply for people, for the environment, and for economic growth; these dismal compliance numbers are appalling.

To create a disincentive for non-compliance, the Legislature has now determined that failure to complete an UWMPA and implement its demand management plan may result in a water supplier being ineligible for state grants and loans. (Water Code, secs. 10631.5 and 10656.)

IV. We have the following comments regarding specific provisions of the 2010 DUWMP.

A) Chapter 1: General Information.

Page 1-4: The plan states that population growth in the EBMUD service area will increase from 1,474,000 in 2015 to 1,751,000 in 2035. That is an increase of 18.8 percent. However, during this same period (by 2020), the State of California is trying to reduce per capita customer demand by 20 percent. EBMUD seeks to take advantage of compliance options to limit its per capita reduction to only 12.7 percent (from 165 to 144 GPCD). However, if EBMUD instead continued to do its part, and reduced per capita demand by the full 20 percent (from 165 to 132 GPCD), it could absorb the projected population increase without the need for costly water supply enhancements. Right now, EBMUD's current use averages 130 GPCD. Why not strive to keep the GPCD low? **TI-3**

Page 1-4: The plan provides run-off statistics for the Mokelumne watershed, but not for the watersheds in the EBMUD service area. The report should identify the amount of stormwater runoff that is captured in the Bay Area. Rather than running this water through stormdrains and disposing of it as untreated discharge to the Bay, this water could be treated and used for landscape irrigation, industrial purposes and other beneficial uses. It is the intent of the California Legislature that each hydrologic region seek to meet its own needs first, before taking or despoiling the resources of other regions. Please add the run-off information in the final 2010 UWMP, and identify a program for stormwater collection, treatment, and use. **TI-4**

B) Chapter 2: Water Supply and Water Supply Planning.

Page 2-1: The plan states:

> "In the long-term, during drought periods, the Mokelumne River cannot meet EBMUD's projected customer demands, even with an 'up to 15%' rationing imposed under EBMUD's Board Policy 9.03 (see Appendix F) and use of existing dry-year supplemental supplies."

The change from 25 percent dry-year rationing to 15 percent dry-year rationing was made by the EBMUD Board in the 2040 WSMP. EBMUD has been directed by the California Superior Court to set aside certification of the 2040 WSMP Program EIR, and "and all related project approvals." (Judge Timothy M. Frawley, Peremptory Writ of Mandate, *Foothill Conservancy et al. v. EBMUD*, 5/25/11, p. 1.) Thus, pending completion of the 2040 WSMP PEIR, EBMUD's 2010 UWMP and the analyses therein must not presume a reduction to a 15 percent rationing level during droughts. The presumption of the 15 percent rationing level would effectively reinstate the 2040 WSMP prior to completion of the PEIR, in violation of CEQA and the court's writ. **TI-5**

Page 2-1: The plan states that storing local run-off is limited by reservoir capacity, yet no mention is made of increasing local reservoir capacity to capture additional local runoff. It is the intent of the California Legislature that each hydrologic region seek to meet its own needs first, before taking or despoiling the resources of other regions. In the final UWMP, please identify the potential for storing, treating, and using local runoff. **TI-6**

Tom Infusino, et. al.

Page 2-1: The plan states:

> "Pardee Reservoir also is operated to provide recreational facilities to the public and to protect and enhance the fishery resources and ecosystem of the lower Mokelumne River."

While this is a true statement, it is far from the whole truth. The whole truth is that the operation of Pardee Reservoir has severely limited public access to the Mokelumne River for traditional public trust uses. In addition, the existence of Pardee Reservoir (and the later-constructed Camanche Reservoir downstream) prevents the migration of salmon and steelhead to their native spawning beds upstream. Please add this information to the final 2010 UWMP. Without this information, the description of Pardee Reservoir is not entirely accurate. The UMWMP should be a factual document, and as such, must include all of the pertinent facts.

TI-7

Figure 2-2: What exactly is this figure intended to show? Does it show that in an average year there is insufficient flow in the Mokelumne River to meet the maximum water allocations for all appropriators and fish releases? In the final 2010 UWMP, please provide a better discussion of the water rights held by the Mokelumne appropriators, and the impact that the future use of these rights will have on both EBMUD's supply and the amount of water remaining in the river. The environmental information is needed for the evaluation of demand management measures pursuant to Water Code, sec. 10631, subd. (g)(1).

TI-8

Page 2-5 and 2-6: The plan lists a series of supply vulnerabilities. With the exception of drought, the plan provides no indication of the historic frequency of any of the other supply interruptions over the years. Such information is essential if EBMUD is to prioritize the most pressing supply vulnerabilities and to cost-effectively improve water supply reliability.

TI-9

Page 2-7: The plan states:

> "EBMUD consistently provides the highest quality water possible. EBMUD's primary water supply from the Mokelumne River requires only limited treatment to meet or surpass health standards, because it comes from a remote, mostly undeveloped watershed and is transported within two days to the EBMUD's service area in large steel pipes."

This method of protecting water quality precludes water from flowing farther downstream to restore fisheries and riparian ecosystems. When Pardee Reservoir began operations in the late 1920s, water purification technologies were rudimentary by modern standards, and urban water diversions from the Mokelumne River were smaller. At that time, it probably made sense to grab the purest water as high in the Sierra as feasible and deliver it to Bay Area customers. However, today the water diversion demands on the Mokelumne River are much greater, and water suppliers have a host of modern technologies available to purify water diverted much farther downstream. Urban Water Management Planning is supposed to result in the use of improvements in technology and water management practices to help meet the need for water for environmental uses. (Water Code, sec. 10608, subd. (f).) Nevertheless, in the 2010 DUWMP, EBMUD does not look at taking its Mokelumne River water farther downstream from Pardee Reservoir. Nor does it explore exchange opportunities with other water suppliers to allow them to take Mokelumne River water further downstream. (Water Code, sec. 10631, subd. (d).) Please evaluate these options in the final 2010 UWMP.

TI-10

Page 2-7: The plan states:

> "As a result, the Mokelumne River supply is not exposed to common sources of contaminants such as pesticides, agricultural or urban runoff, municipal sewage, or industrial toxics."

This is not an entirely accurate statement. Urban runoff is affecting Mokelumne River water supplies even farther upstream than Pardee Reservoir. For example, the Amador Water Agency's is planning to move the water intake for its CAWP system upstream to the Tiger Creek Regulator Reservoir specifically to avoid water quality degradation from development runoff. In addition, recent studies on the Mokelumne River have identified bacterial contamination hot spots upstream of Pardee Reservoir. Also, the Pardee water supply is not immune from contamination by toxins. Right now, EBMUD is developing health warnings due to the elevated levels of mercury in the fish in Pardee Reservoir, most likely

TI-11

Tom Infusino, et. al.

from historic mining activity in the watershed. Please disclose these facts in the final 2010 UWMP.

TI-11

Page 2-17: The plan states:

> "In recognition of the extensive conservation savings that EBMUD has achieved to date and issues associated with demand hardening, EBMUD has set the rationing goal up to 15% during multi-year droughts."

The change from 25 percent dry-year rationing to 15 percent dry-year rationing was made by the EBMUD Board in the 2040 WSMP. EBMUD has been directed by the California Superior Court to set aside certification of the 2040 WSMP Program EIR, and "and all related project approvals." (Judge Timothy M. Frawley, Peremptory Writ of Mandate, *Foothill Conservancy et al. v. EBMUD*, 5/25/11, p. 1.) Thus, pending completion of the 2040 WSMP PEIR, EBMUD's 2010 UWMP and the analyses therein must not presume a reduction to a 15 percent rationing level during droughts. The presumption of the 15 percent rationing level would effectively reinstate the 2040 WSMP prior to completion of the PEIR, in violation of CEQA and the court's writ.

Page 2-20: Just like the 2040 WSMP, the 2010 DUWMP discusses the IRCUP+ as a potential supplemental water supply. The plan describes IRCUP+ as including Pardee Expansion and/or Duck Creek Reservoir as components. (See also, EBMUD, *IRCUP Terms & Conditions Agreement*, 2009.) Just like the 2040 WSMP, the 2010 DUWMP discusses enlarging EBMUD's existing facilities on the Mokelumne River. Just like the 2040 WSMP, the 2010 DUWMP makes no mention of the possibility that a Los Vaqueros Expansion could be an option for EBMUD's future water supply.

TI-12

EBMUD has been directed by the California Superior Court to set aside certification of the 2040 WSMP Program EIR, and "and all related project approvals." (Judge Timothy M. Frawley, Peremptory Writ of Mandate, *Foothill Conservancy et al. v. EBMUD*, 5/25/11, p. 1.) Thus, pending completion of the 2040 WSMP PEIR, EBMUD's 2010 UWMP and the analyses therein must *not* presume the upcountry reservoir expansions are the only ones available to supplement EBMUD's future water dry-year water supply. If EBMUD approves a legally required UWMP with a supply analysis that lists the upcountry reservoir expansions to the exclusion of LVE, it effectively reinstate the 2040 WSMP prior to completion of the PEIR, in violation of CEQA and the court's writ. It also impermissibly prejudices the selection of alternatives when the 2040 WSMP EIR is revised.

C) Chapter 3: Water Shortage Contingency Plan.

Pages 3-2 to 3-4, and 3-10: The text refers to EBMUD's 2010 change from the 25 percent dry-year rationing limit to the 15 percent dry-year rationing limit.

The change from 25 percent dry-year rationing to 15 percent dry-year rationing was made by the EBMUD Board in the 2040 WSMP. EBMUD has been directed by the California Superior Court to set aside certification of the 2040 WSMP Program EIR, and "and all related project approvals." (Judge Timothy M. Frawley, Peremptory Writ of Mandate, *Foothill Conservancy et al. v. EBMUD*, 5/25/11, p. 1.) Thus, pending completion of the 2040 WSMP PEIR, EBMUD's 2010 UWMP and the analyses therein must not presume a reduction to a 15 percent rationing level during droughts. The presumption of the 15 percent rationing level would effectively reinstate the 2040 WSMP prior to completion of the PEIR, in violation of CEQA and the court's writ.

TI-13

D) Chapter 4: Water Usage.

Page 4-2 to 4-3: The plan states that the demand figures are from the 2040 Demand Study using the land-based method, and that these figures still reflect a reasonable expectation for growth over the long to 2040.

However, there is a great risk in basing expensive future infrastructure plans on one set of demand projections. As a result, prudent planners generally look at a range of possible future demand, and then make contingency plans accordingly. This is especially prudent when EBMUD's demand estimates have *increased* greatly, but actual demand has not.

In the past EBMUD has used the projected growth model rather than the land use based model. EBMUD shifted to the land use model in 2002, and then modified that land use model again for the 2040 plan. The 1992 data analysis based on projected growth

TI-14

Tom Infusino, et. al.

estimated EBMUD gross demand in 2020 at 277 million gallons per day. (*Foothill Conservancy et al. v. EBMUD,* 66 Administrative Record (AR) 25685; 93 AR 35626) Using a land use method, the 2005 Urban Water Management Plan estimated EBMUD's gross demand in 2030 to be 281 mgd. (*Foothill Conservancy et al. v. EBMUD,* 106 AR 40299 – 40301.) That is not a major difference. However, just five years later, the Land Use Model was altered and all of a sudden the 2030 demand shot up from 281 mgd to 304 mgd, with the 2040 gross demand estimated at 312 mgd. (*Foothill Conservancy et al. v. EBMUD,* 10 AR 4312) Thus, by choosing to tweak the model, EBMUD created a 23 mgd increase in gross demand in 2030. By way of comparison, that 23 mgd is more water than any single component of the 2040 WSMP other than Conservation (39 mgd) and Pardee Expansion (51.2 mgd.) (*Foothill Conservancy et al. v. EBMUD,* 4 AR 771)

We agree that community-centered growth and infill development are likely to play an important role in future growth in the EBMUD service area. The biggest problem with these new demand figures is that they are based upon the questionable assumption that population and economic growth in the service area will *accelerate* to fill the increased available development capacity of the local-government-generated land use planning maps for the region. (Of course, another possibility is that the same rate of growth will take place and merely use up less land in the process.) The "if you map it they will come faster" theory has obvious limitations, not the least of which are the ability of such dense infill development opportunities to attract investors to build the units and consumers to purchase the units in the numbers estimated by EBMUD. Unfortunately, the huge caveat on page 3-15 of the 2040 Demand Study is rarely fully appreciated when its results are considered: "Although the total demands still reflect development per the general plans, *the timing of development and therefore demands may be slower than that projected in this study."* (Emphasis added.) However, the demand inflation did not stop there.

TI-14

The 2040 WSMP EIR shows that the reduction in dry-year rationing from 25% down to 15%created the need for an additional 20 mgd of water. (*Foothill Conservancy et al. v. EBMUD,* 4 AR 774) Thus, by choosing a modified demand methodology (plus 23 mgd), and a new rationing policy (plus 20 mgd), EBMUD increased its 2040 gross water demand by 43 mgd. By way of comparison, according to the 2040 WSMP DEIR, that 43 mgd is more water than is produced by any single 2040 WSMP component other than Pardee Expansion (51.2 mgd.). (*Foothill Conservancy et al. v. EBMUD,* 4 AR 771)

In the final 2010 UWMP, please also look at the multiple dry-year demand given the prior demand model and the 25 percent dry-year rationing. Given this information, and the true extent of the impacts of Pardee Expansion, we hope that the EBMUD Board will chose to stick with the 25 percent dry-year rationing, and/or choose to stick with the 2002 demand model. These two things, in combination with the desalination component (up to 20 mgd yield), would avoid any need for Pardee Expansion. (*Foothill Conservancy et al. v. EBMUD,* 4 AR 771)

Pages 4-6 to 4-10: An UWMP is supposed to, "Identify and quantify, to the extent practicable, the existing and planned sources of **water** available to the supplier" in five-year increments. If one of the supplies is groundwater, the UWMP must provide a copy of any applicable groundwater management plan, a description of the basin, information as to whether the basin is overdrafted, efforts being undertaken to eliminate long-term overdraft, and the amount of groundwater expected to be pumped. (Water code, sec. 10631, subd. (b).) The 2010 DUWMP does not do this.

TI-15

Furthermore, an Urban Water Management Plan is required to:

> "Describe the reliability of the water supply and vulnerability to seasonal or climatic shortage, to the extent practicable, and provide data for each of the following:
>
> (A) An average water year.
> (B) A single dry water year.
> (C) Multiple dry water years.
>
> For any water source that may not be available at a consistent level of use, given specific legal, environmental, water quality, or climatic factors, describe plans to supplement or replace that source with alternative sources or water demand management measures, to the extent practicable." (Water code, sec. 10631, subd. (c).)

The 2010 DUWMP does not do this.

TI-16

Tom Infusino, et. al.

Finally, and Urban Water Management Plan must:

> "Include a description of all water supply projects and water supply programs that may be undertaken by the urban water supplier to meet the total projected water use as established pursuant to subdivision (a) of Section 10635. The urban water supplier shall include a detailed description of expected future projects and programs, other than the demand management programs identified pursuant to paragraph (1) of subdivision (f), that the urban water supplier may implement to increase the amount of the water supply available to the urban water supplier in average, single-dry, and multiple-dry water years. The description shall identify specific projects and include a description of the increase in water supply that is expected to be available from each project. The description shall include an estimate with regard to the implementation timeline for each project or program." (Water code, sec. 10631, subd. (h).)

The 2010 DUWMP does not do this.

TI-17

Chapter four of DWR's *Guidebook to Assist Urban Water Suppliers to Prepare a 2010 Urban Water Management Plan,* provides an explanation of the information needed to conform to the requirements of the aforementioned code sections. (See, DWR Guidebook, pp. 4-1 to 4-4; Section I, pp. I-4 to I-6. items 13-23.) :

*The failure to provide this information is perhaps the most glaring inadequacy in the 2010 DUWMP***.** In recent amendments to the UWMPA, the Legislature declared that, "As part of its long-range planning activities, every urban water supplier should make every effort to ensure the appropriate level of reliability in its water service sufficient to meet the needs of its various categories of customers during normal, dry, and multiple dry water years." The Legislature acknowledged that," The quality of source supplies can have a significant impact on water management strategies and supply reliability." The intent of UWMPA is "to provide assistance to water agencies in carrying out their long-term resource planning responsibilities to ensure adequate water supplies to meet existing and future demands for water." (Water Code, sec. 10610.2, subds. (a)(4), (a) (9), and (b).)

TI-18

In short, an Urban Water Management Plan is supposed to compare future water *demand* and future water *supply*. By failing to identify the yield of each potential supplemental supply source, the timing of its implementation, and its reliability in average, dry, and multiple dry years, EBMUD has failed to complete the challenging half the of its 2010 DUWMP. This failure is magnified by EBMUD omitting details about the groundwater basins that it seeks to use for future supply. Instead of dealing with these issues head on, EBMUD hid important supply distinctions by aggregating future supply and reliability information, and not filling supply gaps. (See 2010 DUWMP, pp. 4-10.) That is a far cry from the source-by-source disclosure envisioned in the UWMPA.

E) Chapter 5: Wastewater and Recycled Water.

Table 5-5: This table indicates that recycled water use will increase from 9.3 mgd to 19.9 mgd from 2010 to 2040. However, the 19.9 mgd figure is still only 10.6 percent of the total 188.6 mgd of waterwater to be collected and treated in 2040. Why is the recycling percentage so low? In rural Calaveras County, where the low average income of the customers and the geographic challenges are much greater than in the East Bay, the water district currently recycles over 85 percent of the wastewater it collects, and expects to continue to do so through 2040. (Calaveras County Water District, 2010 *Draft Urban Water Management Plan*, Chapter 5.) If Calaveras County can do this to keep water in the Mokelumne River for fish, wildlife and recreation; why can't EBMUD? If EBMUD were to recycle 85 percent of the wastewater it expects to collect in 2040, that would result in a water supply enhancement of over 160 mgd, or *three times the yield of the Pardee Expansion.* Put another way, EBMUD would only have to recycling 27.2 percent of the effluent it expects to collect in 2040 to equal the yield of the Pardee Expansion. This 51.2 mgd of recycled water could be used to supply residential outdoor demand (about 54 mgd in 2040) and irrigation demand (7 mgd in 2040).

TI-19

The amendments to the UWMP Act over the last decade reflect two key beliefs of the California State Legislature. The first is that, "[T]he people of California will best be served by meeting municipal, agricultural, and environmental water needs of each hydrologic region to the maximum extent practicable without diminishing the resources of other

Tom Infusino, et. al.

regions that are necessary to meet the present and future needs of those regions." The second is that, "The health, safety, and well-being of the people of the State of California will best be served by employing current and developing water treatment and conservation technologies." (Stats of 2001, c. 320 (S.B. 672).) Given the State's focus on regional self-sufficiency, the use of new technologies and management practices, and the desire to avoid harm to other regions, please consider a higher level of water recycling in the final 2040 UWMP.

F) Chapter 6: Water Conservation.

Table 6-4: This table shows that EBMUD will take advantage of Senate Bill 7 compliance options to limit its per capita reduction to only 12.7 percent (from 165 to 144 GPCD). We recommend that EBMUD instead reduced per capita demand by the full 20 percent (from 165 to 132 GPCD). Please make the commitment to do this in the final 2010 UWMP. In addition, EBMUD could further reduce its water demand and set an example for the rest of the state. According to the U.S. Geological Survey, cited in the Sierra Club *Yodeler* (May-June 2010), New Mexico has reduced residential water consumption to 107 GPCD.

TI-20

V. Conclusions

A) EBMUD's 2010 DUWMP is deficient in many respects.

TI-21

Most notably, Chapter 1 fails to describe a potential local source of water (local stormwater runoff) that could offset the need to construct damaging foothill dams. Chapter 2 fails to consider a downstream diversion point to reduce impacts of water taken from the Mokelumne River. Chapter 4 relies on a single inflated demand calculation based upon an admittedly weak assumption, relies on a drought rationing policy set aside by the Superior Court, and does not provide basic required information about each future source of water supply. Finally, in Chapter 5 EBMUD commits to only a very low level of water recycling. Please bring the final 2010 UWMP into compliance with the Water Code.

B) EBMUD's 2010 DUWMP violates CEQA and the Court's Writ.

TI-22

The Public Resources Code, section 21168.9(a) (2) allows a court administering a writ to suspend agency activities that "will prejudice the consideration or implementation of particular mitigation measures or alternatives to the project." In *San Joaquin Raptor/Wildlife Rescue Center v. County of Stanislaus* (1994) 27 Cal.App.4th 713, the court chose not to allow any portion of the project to proceed, including non-impacting aspects like surveying, to avoid just this sort of bureaucratic momentum from building up prior to completion of a CEQA-compliant revised EIR.

The writ in *Foothlill Conservancy, et al. v. EBMUD* directed EBMUD to set aside the 2040 WSMP PEIR and related project approvals, pending completion of a valid PEIR that better evaluates impacts of Pardee Expansion, and considers a broad range of alternatives, including Los Vaqueros Expansion.

Nevertheless, the 2010 DUWMP repeatedly relies upon components adopted as part of the 2040 WSMP. It also relies upon water supply alternatives selected in the 2040 WSMP, to the exclusion of other alternatives such as LVE. For example:

> Chapter 2 regarding "Water Supply System & Water Resources Planning" still refers to the reduction in drought rationing to 15%. ("In recognition of the extensive conservation savings that EBMUD has achieved to date and issues associated with demand hardening, EBMUD has set the rationing goal up to 15% during multi-year droughts." [P. 2-17].) This change occurred after the proposal was adopted in the 2040 WSMP, in April 2010. Also, Chapter 2 makes no mention of the possibility Los Vaqueros Expansion as an option for future EBMUD water supply.
>
> Chapter 3 regarding "2010 Water Shortage Contingency Plan" refers to the change from 25% to the 15% rationing limit, and specifies that its success is contingent on development of additional water supply components. (pp. 3-2 to 3-3, 3-10.).
>
> Chapter 4 on "Water Demand" is still using the inflated demand model from the 2040 WSMP (p. 4-2), and the 15% rationing assumption (p. 4-9.)

Tom Infusino, et. al.

Appendix F listing EBMUD Policies and Rates still includes Policy 9.03, approved in April 2010 following the 2040 WSMP approval that changed the drought rationing limit to 15% from 25%. (pp. F-6 & F-7)

Appendix G on the "2010 Water Shortage Contingency Plan Supplement" plan is based on the change to a 15% rationing limit (p. G-3).

While the 2010 UWMP is not subject to CEQA review, the 2040 WSMP ruling sets aside the 2040 WSMP and EIR, and directs EBMUD to comply with CEQA in evaluating alternatives including Pardee Expansion and Los Vaqueros Expansion. If EBMUD approves a legally required UWMP with 20-year demand that presumes the same components as the 2040 WSMP (the reduction to a 15 percent rationing level, the 2040 WSMP demand numbers, the 2040 WSMP levels of conservation and recycling) then that UWMP prejudices the selection of alternatives when the 2040 WSMP EIR is revised. Similarly, if the 2010 UWMP's supply analysis lists the upcountry reservoir expansions to the exclusion of LVE, it also prejudices the selection of alternatives when the 2040 WSMP EIR is revised. As the court put it, "By adopting the Water Supply Plan, the District committed itself to particular rationing, conservation, and recycling levels. This, in turn, committed the District to a specific programmatic direction that will require the District to pursue various supplemental water supply projects to bridge the gap between supply and demand." (Ruling, pp. 9-10.)

Furthermore, EBMUD's completion of the 2010 UWMP opens the door to state funding for its water supply components. By including PE as a potential supply source, but excluding LVE as a potential supply source, EBMUD is prejudicing the LVE alternative to the 2040 WSMP by unnecessarily burdening it with funding barriers and additional administrative costs (e.g. for a subsequent 2010 UWMP amendment).

Thus, pending completion of the 2040 WSMP PEIR, EBMUD's 2010 UWMP and the analyses therein must not presume a reduction to a 15 percent rationing level during droughts. It must not presume that the upcountry reservoir expansions are the lone reservoir expansion options. Instead, EBMUD must leave open the opportunity that LVE is an option. EBMUD must not presume that the 2040 WSMP's inflated demand figures alone are valid, and must consider other valid options. To do otherwise would essentially reinstate the 2040 WSMP prior to completion of the PEIR, in violation of CEQA and the court's writ.

C) EBMUD's 2010 DUWMP repeats the mistakes of the 2040 WSMP **TI-23**

The 2040 Water Supply Management Plan made many mistakes. It relied on a single inflated demand calculation based upon an admittedly weak assumption. It failed to consider and adopt alternatives that would reduce the impacts of EBMUD's water supply including the collection of local stormwater runoff, an increase in the rate of water recycling, the use of a downstream diversion point for water taken from the Mokelumne River, and the Los Vaqueros Expansion. It did not provide basic information about each future source of water supply that was necessary to empower the Board to make a rational decision. As noted above, the 2010 DUWMP makes these same mistakes.

We strongly encourage EBMUD to learn from the mistakes made in the 2040 WSMP, and not repeat them in the final 2010 UWMP. This is your first, best chance to correct those mistakes and move on. Please embrace this opportunity.

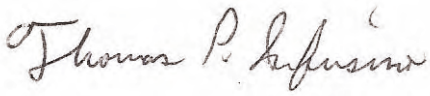
D) Drop PE and embrace a better future. **TI-24**

For years the leadership at EBMUD has periodically lurched forward, against EBMUD's own history and internal bureaucratic inertia, toward a more enlightened approach to water supply, demand management, and conflict resolution. As a result of that leadership, EBMUD staff and customers have implemented conservation programs that have repeatedly yielded greater results than the naysayers and statisticians anticipated. However, in the face of these great accomplishments, periodically EBMUD leadership returns out of fear to its old security blanket: bigger dams in the Mokelumne River watershed. The hard-working Mokelumne River does not deserve your bigger dam. It deserves your tender, loving care. Your successful conservation employees do not deserve your fear. They deserve your confidence and support. Your customers' desire for the security of a local reservoir does not deserve to be ignored. They deserve your attention. Drop PE from the 2010 UWMP. If you set your sights on a better future today, the future will thank you for it tomorrow.

Tom Infusino, et. al.

We hope that your final UWMP will properly address the concerns detailed in this letter, and those of expressed by other commenters. Please notify us a when the final UWMP is available, and when EBMUD intends to make its decision.

Sincerely,



Thomas P. Infusino,

for the Foothill Conservancy, California Sportfishing Protection Alliance, and Friends of the River

cc: Mr. John Beuttler, California Sportfishing Protection Alliance
Mr. Chuck Bonham, Trout Unlimited
Mr. Jim Eicher, Bureau of Land Management
Mr. Terry Davis, Sierra Club Mother Lode Chapter
Ms. Sonia Diermayer, Sierra Club Bay Chapter
Mr. Stuart M. Flashman
Mr. Mike Jackson, California Sportfishing Protection Alliance
Mr. Bill Jennings, California Sportfishing Protection Alliance
Mr. Curtis Knight, CalTrout
Mr. David Moller, PG&E
Mr. Matt Morrison, Sierra Club Bay Chapter
Mr. David Nesmith, Environmental Water Caucus
Ms. Beth Paulson, US Forest Service
Mr. Chris Shutes, California Sportfishing Protection Alliance
Mr. Dave Steindorf, American Whitewater
Mr. Ron Stork, Friends of the River
Mr. Steve Evans, Friends of the River
Supervisor Steve Wilensky, Calaveras County
Ms. Ann Hayden, Environmental Defense Fund
Mr. Spreck Rosekrans, Environmental Defense Fund

EBMUD Response:

TI-1 Response

EBMUD reorganized the text in the UWMP to clarify the discussion in the UWMP regarding potential future supplemental water supply sources. The “Potential Supplemental Water Supply Sources” section (pages 2-17 through 2-21) has been divided into “Short-Term Potential Supplemental Water Supply Projects” and “Long-Term Conceptual Supplemental Water Supply Projects” with the intent to recognize that some of the longer term supplemental supply sources are not likely to be developed in the 20-year time frame that is the primary focus of the UWMP. Projects listed under the Short-Term Potential Supplemental Water Supply Projects are anticipated to be implemented by 2030, which is within the 20-year planning horizon as mandated by the UWMP Act (Water code, Secs. 10631 (h) and 10635.) Projects, including those for expansion of surface supply, that are listed under the Long-Term Conceptual Supplemental Water Supply Projects section are in the conceptual stage and are anticipated to take place beyond the UWMP’s 20-year planning horizon. The project scope and availability of these long-term supplemental supplies will be refined in subsequent UWMPs, which are updated every 5 years.

In the “Long-Term Conceptual Supplemental Water Supply Projects” section, EBMUD updated the text of the UWMP to acknowledge its commitment to examine its participation in the Los Vaqueros Expansion as a means of satisfying its future long-term need for supplemental supply as part of the effort to supplement the analysis of impacts and alternatives in the Program Environmental Impact Report for the WSMP 2040. As noted on page 2-21 of the UWMP, if pursued in the future, any expansion of surface water storage on the Mokelumne River, as well as

Tom Infusino, et. al.

any participation in the expansion of local reservoir projects, will be subject to "additional negotiations, as well as planning, design and environmental review."

TI-2 Response

EBMUD's UWMP acknowledges the legal requirements in the provisions of the UWMP Act. (see Water Code, secs. 10631.5 and 10656 in Appendix A-7 and A-15)

TI-3 Response

Since the 1970s, demand management has been an important part of EBMUD's water practices and policies to promote reasonable and efficient use of supplies. Figure 6-3 of the UWMP shows that EBMUD has made significant strides in decreasing historical daily per capita water demand as a result of EBMUD's aggressive water conservation and recycling efforts and other factors. This continuous effort in reducing daily per capita water use goes beyond the short-term focus on consumption reduction as required through SBx7-7.

SB x7-7 was drafted with the intent to allow agencies including EBMUD to capture previously realized conservation and recycled water savings, and the law thus provides flexibility to allow suppliers to select one of four methods for establishing its SBx7-7 targets. EBMUD selected a target method that would allow EBMUD to be credited for its aggressive water conservation and recycling programs, implement demand management program budgets that are appropriately tailored to customer usage, and account for anticipated demand hardening in consumption behavior that is the result, in part, of EBMUD's existing aggressive conservation efforts.

EBMUD is also committed to achieving an estimated projected use at 144 gallons per capita per day (gpcd) in year 2020, which exceeds the requirement of its SBx7-7 target of 150 gpcd.

TI-4 Response

The comment is unclear on the exact action requested. Runoff – includes both the runoff from precipitation that falls on watershed lands within the basin of a reservoir or runoff from precipitation that falls on urbanized areas and is captured in storm drains. Both types of runoff are addressed in the UWMP to the extent that they are relevant to EBMUD's supplies and means of reducing demand and serving its customers.

As noted in Chapter 2 of the UWMP, East Bay reservoir runoff from EBMUD's local watersheds to the reservoirs constitutes a portion of EBMUD's secondary supply source. About 15-25 MGD of EBMUD's supply comes from local runoff in normal hydrologic years. In dry years, evaporation can exceed local runoff and result in no net local supply.

Secondly, as noted in Table 6-2, EBMUD's long-term water conservation planning efforts includes future measures for capturing graywater. Specifically the identified measures include drain line plumbing for future installation of graywater systems in new and retrofitted single-family homes. EBMUD has promoted the study of graywater as an alternative local water source for decades, including its 1996 study with the California Department of Water Resources. EBMUD also works with local jurisdictions and interested parties on advancing the knowledge and science of rainwater catchment systems.

It is important to note that only cities/ counties have the authority to implement programs that allow for storm water collection, treatment and use, and that management of graywater systems is outside of EBMUD's jurisdiction. The measures included within EBMUD's long-term water conservation program are designed to encourage the use of graywater. Since measures for capturing graywater are currently identified as potentially appropriate and included as

Tom Infusino, et. al.

part of the long-term water conservation program, any further developments in graywater use in the community served by EBMUD will be discussed in future UWMPs.

TI-5 Response

The actions taken in lowering the targeted level of customer rationing to 15%, as adopted by EBMUD's BOD through Policy 9.03 is independent of the ongoing WSMP 2040 process and is the result of the recognition that EBMUD has instituted an aggressive conservation program that has limited the ability to achieve further water use reductions during dry and critical dry years without severe economic hardship. The discussion in the UWMP is consistent with the legislative goal of ensuring that the District explores the reliability of its supplies and the specific factors that affect that reliability.

As noted in Figure 4-10, rationing is a critical component of EBMUD's water supply portfolio, and EBMUD expects that its customers will curtail their use during droughts. To ease the burden on its customers, while recognizing possible economic hardships to specific customer class categories; and as EBMUD customers are approaching demand hardening, which limits their ability to ration further, and heightens the impact of additional water use reductions in dry and critical dry years as a result of extensive conservation practices already put in place, EBMUD's BOD lowered its targeted customer rationing level to 15 percent. However, as noted, to obtain the 15 percent rationing level, EBMUD will need to pursue and implement the short term potential supplemental water supply projects as identified in Chapter 2.

TI-6 Response

East Bay Municipal Utility District operates five local reservoirs – Briones Dam, Chabot Dam, Lafayette Dam, San Pablo Dam and Upper San Leandro Dam as described in Chapter 2 of the UWMP. Due to urban development in the area and limitations in topography, none of the five reservoirs is a candidate for significant future expansion and an expansion of these reservoirs would not feasibly yield significant supplemental supplies.

Other local storage options that EBMUD had evaluated included potential surface storage construction within Bollinger Canyon, Cull Canyon, Curry Canyon, and Kellogg Canyon., all within the East Bay. But these new projects all involve significant issues and environmental effects.

TI-7 Response

The referenced statement appears on page 2-2. The UWMP Act requires the supplier to describe its service area, projected water needs, and to identify and quantify existing and planned sources available to serve demand over a 20 year planning period. (Water Code, sec. 10631). The requested information is not required to be included in an urban water management plan and is not relevant to an assessment of EBMUD's water supply and demand.

TI-8 Response

The amounts available for Mokelumne River use vary in a given year depending on a number of factors, including hydrology, which itself is highly variable as depicted in Figure 2-3. The purpose of Figure 2-2 is to illustrate how Mokelumne River flows are generally allocated to various uses.

Please note that because the identified needs must be met (particularly fish requirements) they are not affected by EBMUD's actions to institute demand management measures discussed in Water Code section 10631, subd. (g)(1). EBMUD is in compliance with the California Urban Water Conservation Council's Memorandum of Understanding

Tom Infusino, et. al.

through the implementation of urban water conservation best management practices (BMPs) as well as a number of additional conservation measures that go beyond the BMPs. (pages 6-22 to 6-23 of the UWMP)

TI-9 Response

EBMUD has updated the text of the UWMP to include the historic frequency of supply vulnerabilities listed in Chapter 2 (pages 2-6 to 2-10).

EBMUD has updated the text of the UWMP to include a table of earthquakes of significance that have occurred in the Bay Area since 1836.

EBMUD has updated the text of the UWMP to clarify water quality impacts to water supply.
The 1997 shutdown of the Mokelumne Aqueducts caused Briones Reservoir to be drafted down to its lowest level since it was first filled. Briones holds more than half of the District's standby storage, and it was crucial to replace the water by pumping at the Walnut Creek Pumping Plant once the aqueducts were back online. The cause of the high turbidity in Pardee was due to a landslide that occurred on January 9, 1997 on a slope by the Mokelumne River in the wilderness are of the Upper Mokelumne River watershed. The slide created very high turbidity in Pardee Reservoir and the water entered the Mokelumne Aqueduct reached a peak turbidity of about 60 NTUs. As the District's in-line water treatment plants are not designed to adequately treat water of this range of turbidity, EBMUD switched the source of supply from Pardee Reservoir to Briones Reservoir.

TI-10 Response

Consistent with the UWMP Act, EBMUD's UWMP describes the service area of the supplier and the projected water needs, and identifies and quantifies existing and planned sources available to serve demand over a 20 year planning period and the infrastructure that makes these sources available. (Water Code, sec. 10631). As noted in Water Code, sec 10631 (d) referenced on page A-5 of the UWMP, EBMUD has acknowledged the requirement to discuss opportunities for supplemental water supplies through exchanges/ transfers of water supplies with other suppliers. Long term exchange/ transfer opportunities are discussed on pages 2-19, 2-20 and 2-21 of the UWMP; short-term exchange/ transfer opportunities are discussed on pages 3-6 through 3-8. As this text recognizes, while EBMUD may obtain supplemental supplies through transfers or exchanges, there are few exchange opportunities that would allow for EBMUD to meet its demands through diversions of Mokelumne River water further downstream.

TI-11 Response

EBMUD has updated the text of the UWMP to clarify that the Mokelumne River supply is "minimally" exposed to common sources of contaminants and to acknowledge that despite precautionary warnings of mercury found in the fish, mercury has never been detected in the water supply in Pardee Reservoir at levels above the California Public Health Goal (PHG) of 1.2 ug/L on page 2-8.

TI-12 Response

The statement has been modified in the text of the UWMP on page 2-19. Please see EBMUD Response TI-1 found on page Appendix C-11 to C-12 and TI-5 found on page Appendix C-13 of EBMUD's UWMP (as related to LVE).

Tom Infusino, et. al.

TI-13 Response

Please see EBMUD Response TI-5 found on page Appendix C-13 of EBMUD's UWMP.

TI-14 Response

The demand study is based on a land use model, which is viewed within the field of water demand estimating as the most rigorous analysis methodology, as compared to using population projections or growth rate projections and population based demand category correlation. The demand study was developed with direct input from city and county land-use planning agencies reflecting the agencies' best estimate of both land use and timing of both new development and redevelopment through 2040. This approach also supports the intent of the UWMP Act, which requires that "[e]ach urban water supplier shall coordinate the preparation of its plan with other appropriate agencies in the area, including other water suppliers that share a common source, water management agencies, and relevant public agencies...." (Water Code, sec. 10620, subd. (d)(2).). In planning and developing any long-term supplemental supply projects, EBMUD would confirm the demand estimates and assess the necessity of the project.

TI-15 Response

EBMUD has updated the text of the UWMP to clarify that native groundwater is used only to a limited extent as part of the implementation of the injection/extraction system associated with the Bayside Groundwater Facility. As noted on page 2-17, the project supplies supplemental water to EBMUD customers only when supplemental water is needed, and overall, the quantity of water injected into the aquifer of the South East Bay Plain Groundwater Basin will exceed the quantity of water extracted.

TI-16 Response

Consistent with Water Code, Sec. 10631, subd. (c), Table 4-3 of the UWMP provides water supply data for average, single and multiple dry water years. Although the supply sources included in Table 4-3 are currently expected to be available on a consistent level, factors, other than droughts, that may temporarily affect these sources or factors whose impacts have not been quantified at the present (such as global climate change) are described on page 2-6 and 2-7 of the UWMP.

TI-17 Response

Please see EBMUD Response TI-1 found on page Appendix C-11 to C-12 of EBMUD's UWMP. The UWMP identifies possible yields from the short-term supplemental supply projects.

TI-18 Response

Please see response TI-16 for consistency with Water Code, Sec. 10631, Subd. (c), and response TI-15 for SEBPB discussion.

Tom Infusino, et. al.

EBMUD has updated the text of the UWMP to clarify how the projected supplemental supply need anticipated in dry years (and presented in Table 4-3 of the UWMP) will be met by EBMUD. Information regarding the individual project capacities that will be used to met the need during dry years (provided on pages 2-17 through 2-19 of the UWMP), has also been restated in Chapter 4.

TI-19 Response

In accordance with the California Water Code, EBMUD's policy requires the use of recycled water for appropriate uses when it is of adequate quality and quantity, available at reasonable cost, not detrimental to public health and not injurious to plant life, fish and wildlife. EBMUD has an appropriate recycled water program in an urban environment where recycled water projects are developed based on supply and demand locations.

Recycled water projects are developed if there is adequate wastewater supply and sufficient demands near the supply source to implement cost-effective projects. EBMUD's service area spans 332 square miles and includes 20 incorporated cities and 15 unincorporated communities in two counties. Building recycled water projects and extensive distribution systems in an urban environment is difficult and more costly than compared to a rural environment.

In some cases where wastewater supply is available, there isn't sufficient demand close to the supply source to develop a project that utilizes all of the supply. Therefore, a cost-effective project is developed where a portion of the wastewater supply is used. An example is the East Bayshore Recycled Water Project (see discussion on page 5-9 of the UWMP). In other cases, there is sufficient demand close to the wastewater supply to develop a project that utilizes all of the supply. Therefore, a cost-effective project is developed where all of the wastewater supply is used. An example is the Richmond Advanced Recycled Expansion Water Project (see discussion on pages 5-6 and 5-9 of the UWMP).

Almost all of EBMUD's recycled water customers are existing urban users where each customer site has to be retrofitted to use recycled water, an added complexity and expense. Also, a higher level of treatment, primarily tertiary, is required which is more costly. There are no agricultural recycled water customers in EBMUD's service area.

It is not appropriate to compare EBMUD's recycled water program to other programs in rural areas where a minimum level of treatment and less infrastructure are needed to meet a large agricultural irrigation demand. Complete detail of EBMUD's recycle water program is in Chapter 5 of the UWMP.

TI-20 Response

Please see EBMUD Response TI-3 found on page Appendix C-12 of EBMUD's UWMP.

EBMUD's baseline per capita water use and SBx7-7 target is well below the statewide average of 192 gpcd. Per capita water use represents an approximation tool or metric for water utilities to measure consumption patterns and trends within their own agency over time. Per capita water use is not a good measure for comparing use between agencies or geographic areas due to the inherent differences in land use, climate, service area demographics, business and industrial markets, and more. These factors affecting per capita use is evident in the wide variation of reported baseline per capita water use within California's hydrologic regions of 154 to 346 gpcd.[1]
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[1] 20x2020 Water Conservation Plan, California Department of Water Resources, State Water Resources Control Board, California Bay-Delta Authority, California Energy Commission, California Department of Public Health, California Public Utilities Commission, California Air Resources Board, February 2010.

Tom Infusino, et. al.

TI-21 Response

EBMUD has prepared the 2010 Urban Water Management Plan in order to comply with the Urban Water Management Planning Act and the Water Conservation Act of 2009. The final 2010 UWMP meets the requirements of California law.

For questions on Chapter 1, please see EBMUD Response TI-4 found on page Appendix C-12 to C-13.
For questions on Chapter 2, please see EBMUD Response TI-10 found on page Appendix C-14.
For questions on Chapter 4, please see response EBMUD Response TI-14 found on page Appendix C-15 and TI-18 found on page Appendix C-15 to C-16.
For questions on Chapter 5, please see EBMUD Response TI-19 found on page Appendix C-16.

TI-22 Response

EBMUD's legally mandated adoption of the 2010 UWMP is not an action that will prejudice the consideration or implementation of particular mitigation measures or alternatives to the Water Supply Management Program 2040, which is presently under review. The Urban Water Management Planning Act requires EBMUD to prepare and adopt an urban water management plan that provides a description of EBMUD's water demand management measures and includes an evaluation of economic and noneconomic factors, including environmental, social, health, customer impact, and technological factors affecting the implementation of new water demand management measures.

EBMUD's Drought Management Program includes a policy to implement rationing at a maximum of 15% of total annual demand based on the recognition that on-going water conservation and recycling have decreased the flexibility to further reduce demand during droughts. It is this recognition that EBMUD's increasingly aggressive conservation efforts have reduced the ability to achieve further conservation during a drought that resulted in the lowering of the planned rationing level. It may be necessary for EBMUD to include greater levels of demand reduction during a multiple year drought to the extent that additional supplemental supplies cannot be obtained to meet demand but this may result in significant customer hardship, particularly as demand increases, and costs and burdens will not be distributed equally among customer categories. For the short-term, as explained in Appendix G, demand has been suppressed by the response to earlier drought conditions and the economic recession in the Bay Area. As demand and population within the service area increases, however, the aggressive conservation levels set forth in the UWMP are expected to further limit the feasibility of achieving rationing levels beyond 15% during multiple dry years without severe hardship to EBMUD's customers.

The adoption of the UWMP plan, including the mandated SBx7-7 targets, water shortage contingency actions, and the plan to continue the development of recycled water projects, will not prejudice the analysis and selection of alternatives for satisfying long-term demand projections as part of the current review and further development of the WSMP 2040. In adopting the 2010 UWMP, EBMUD is complying wit the Urban Water Management Planning Act, as well as the Water Conservation Act of 2009, and EBMUD is continuing its long-standing policy, consistent with the Water Code, to provide recycled water in lieu of potable water for landscape irrigation and certain industrial uses where feasible.

It should be noted that the 2010 UWMP is not intended to facilitate funding or development of the enlargement of EBMUD's existing facilities on the Mokelumne River or any of EBMUD's other longer term supplemental supply options, particularly because these supplemental sources are intended to be examined if necessary in the long term, as part of an interrelated set of projects. As noted in Appendix A, the Urban Water Management Plan is required to identify and quantify, to the extent practicable, the expected demand for twenty years and to identify and quantify existing and planned sources to serve that demand. The Act requires that the analysis be reviewed every five years, and these regular reviews will allow EBMUD to revisit the identified supply sources, as well as demands and

Tom Infusino, et. al.

demand reduction options. In the meantime, EBMUD does not intend to use the UWMP as the basis for funding for the identified supplemental supply sources and has instead identified potential supplemental supplies in the UWMP in order to comply with the Urban Water Management Planning Act.

TI-23 Response

Please see EBMUD Response:

- TI-1 found on page Appendix C-11 to C-12
- TI-4 found on page Appendix C-12 to C-13
- TI-10 found on page Appendix C-14
- TI-14 found on page Appendix C-15
- TI-19 found on page Appendix C-16

TI-24 Response

Please see EBMUD Response TI-1 found on page Appendix C-11 to C-12 of EBMUD's UWMP for a discussion of the identified supplemental supply projects.

SAIC

Date Comment Received: 05/31/2011
Name of Organization/ Agency/ Individual: SAIC on behalf of Chevron Environmental Management Company

Comment:

From: Burns, Thomas A. [mailto:THOMAS.A.BURNS@saic.com]
Sent: Tuesday, May 31, 2011 1:29 PM
To: Jain, Priyanka
Cc: Anzelon, Daniel B.; Hoang, Tan T.
Subject: EBMUD Draft Urban Water Management Plan

Ms. Jain-

Attached is a letter of introduction that was sent to EBMUD in September 2009 regarding inactive former historic petroleum pipelines that were located within EBMUD's service area boundary. On behalf of Chevron Environmental Management Company (CEMC), SAIC is sending this letter and associated pipeline information to you to be used when EBMUD plans urban water management construction projects.

SAIC -1

Please contact me with any questions.

Regards-

Thomas A. Burns, PG | Benham, An SAIC Company
Principal Geologist/Program Manager
Energy, Engineering & Infrastructure Business Unit
Office: 916.979.3748

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SAIC

Attachment

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Environmental Project Manager

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September 3, 2009

Stakeholder Correspondence–East Bay Municipal Utility District

Ms. Lesa R. McIntosh
Director – Ward 1
East Bay Municipal Utility District
375 11th Street
Oakland, CA 94607

Subject: **East Bay Municipal Utility District**
Chevron Environmental Management Company
Historic Pipeline Alignment–Bakersfield to Richmond

Dear Ms. McIntosh:

Chevron Environmental Management Company (CEMC) recently assessed the locations of water transmission pipelines operated by the East Bay Municipal Utility District (EBMUD) in Contra Costa County. The purpose of this letter is to notify stakeholders of EBMUD as to the location of formerly active crude-oil transportation pipelines with respect to the EBMUD Service Area. The intent is that the pipeline location information will be incorporated into future engineering and environmental documents for EBMUD infrastructure/utility projects.

In the early 1900s, Tidewater Associated Oil Company (TAOC) and Standard Oil (Standard) built pipeline systems to transport heavy crude oil from oilfields in the southern San Joaquin Valley to refineries in the San Francisco Bay Area. These pipelines were operated until the early 1970s when they were decommissioned. Currently, CEMC manages work associated with these historic pipelines.

Evidence of historic releases associated with the formerly active pipelines is sometimes identified during the course of underground utility work and other subsurface construction activities near the pipeline right-of-ways. Generally, residual weathered crude oil associated with TAOC's and Standard's historical pipeline operations can be observed visually; however, analytical testing is necessary to confirm that the likely source of the affected material is associated with these former pipelines. Analytical results from human health risk assessments performed by CEMC at several known historical pipeline release sites confirm that soil affected by the historic release of product from the pipelines is non-hazardous, and does not pose significant health risks.

CEMC's experience indicates that the potential exists for subsurface soil along and near the former TAOC and Standard alignments to be affected by undocumented residual weathered crude oil; however, encountering affected soil from these former pipelines should not delay the progress of EBMUD projects. CEMC requests to be informed of planned projects in the vicinity of the former TAOC and Standard alignments.

For more information regarding the Historical Pipeline Portfolio–Bakersfield to Richmond alignment, please visit http://www.hppinfo.com/. If you have any questions, require additional information or would like to request more detailed maps, please call SAIC consultants Tom Burns at (916) 979-3748 or Mohamed Ibrahim (916) 979-3828.

Sincerely,

Lee Higgins, PG

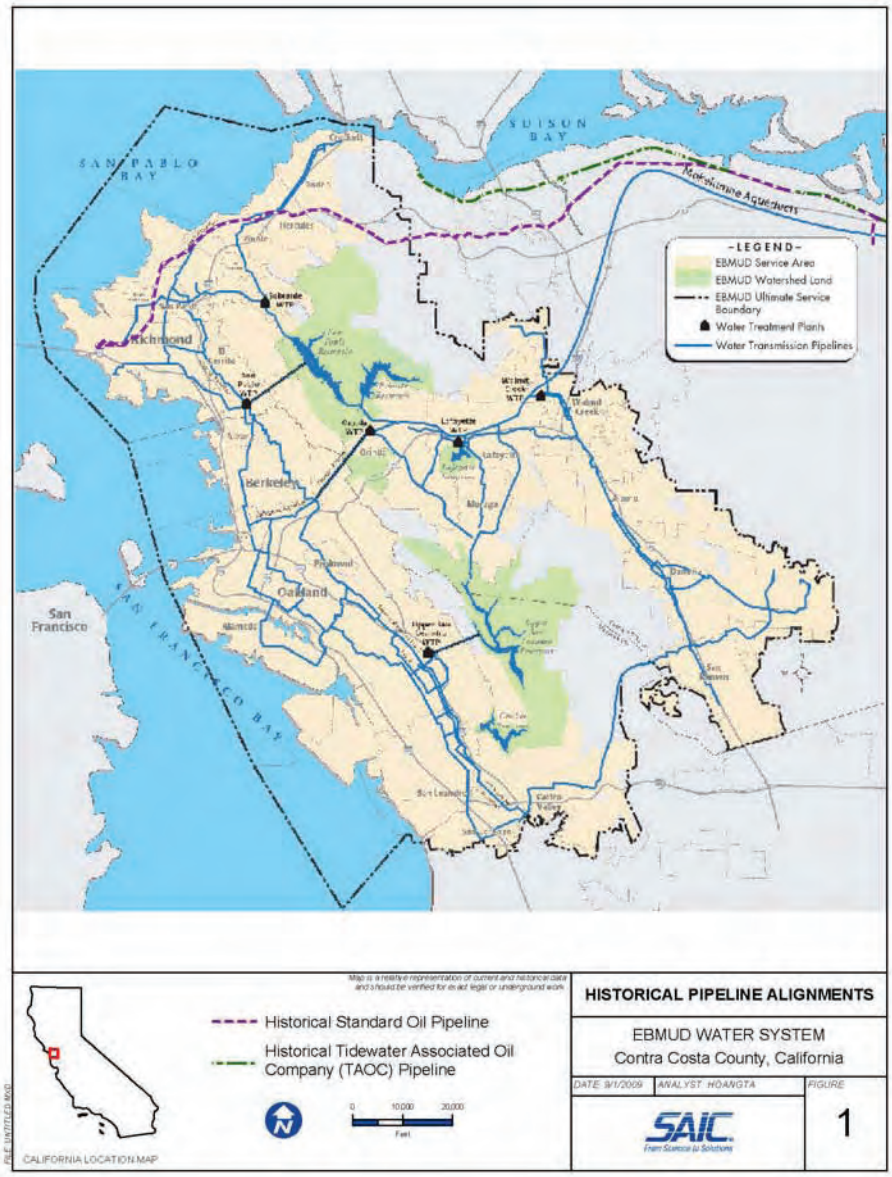
LPH/klg

Enclosures:
Figure 1. Historic Pipeline Alignments

cc: Mr. Tom Burns – SAIC
3800 Watt Avenue, Suite 210, Sacramento, California 95821
Mr. Mike Jenkins – SAIC (letter only)
3800 Watt Avenue, Suite 210, Sacramento, California 95821
Mr. Mohamed Ibrahim – SAIC
3800 Watt Avenue, Suite 210, Sacramento, California 95821

SAIC

Attachment



EBMUD Response:

SAIC -1 Response

EBMUD's Urban Water Management Plan 2010 provides an assessment of water supply availability and water demand for a 20 year horizon as well as a water shortage contingency plan. Your comment is intended for use during construction projects and would not be applicable to this water management plan. Your comment has been noted.

Amador Water Agency

Date Comment Received: 05/31/2011
Name of Organization/ Agency/ Individual: Amador Water Agency

Comment:

A Public Agency

12800 Ridge Road, Sutter Creek, CA 95685-9630 • www.amadorwater.org • OFFICE: (209) 223-3018
FAX: (209) 257-5281

May 26, 2011

Mr. Alexander Coate
General Manager
EBMUD
375 11th Street
Oakland, CA 94607

Re: EBMUD Urban Water Management Plan Update

Dear Mr. Coate,

The Amador Water Agency values its partnership with EBMUD in the Mokelumne Water Forum and Upper Mokelumne River Watershed Authority. We encourage EBMUD to continue to seek regional solutions for future water supply. Like you, we are working to ensure that the future water needs of our ratepayers can be met in the most cost-effective manner with the least controversy and minimal social, economic and environmental harm.

We look forward to continue working with EBMUD to develop regional water solutions that will provide the future water supply security that all parties in the Mokelumne Forum desire and to protect the Mokelumne River and its important environmental resources.

AWA-1

Sincerely,

Gary Thomas

Gary Thomas
Amador Water Agency
Vice President, Board of Directors

EBMUD Response:

AWA-1 Response

EBMUD's Urban Water Management Plan 2010 contains a discussion of regional conjunctive use projects on page 2-21 which can provide benefits to a broad range of Mokelumne River basin stakeholders. Your comment has been noted.

Edith Luis

Date Comment Received: 05/23/2011 and 06/03/2011
Name of Organization/ Agency/ Individual: Edith Luis

Comment:

EAST BAY MUNICIPAL UTILITY DISTRICT

May 24, 2011

Edith Luis
14946 Raven Rd.
Pioneer, CA 95666

RE: Correspondence

Dear Ms. Luis,

We received your letter dated May 19, 2011. Thank you for your comments on the Draft Urban Water Management Plan 2010 (UWMP 2010). Comments received by May 31, 2011 will be addressed in the final UWMP 2010.

In order to respond to your letter (enclosed), please clarify the following statement:

"Could we revise a bit less a bit more often? 2011-2013 \ 2013-2015"

Thank you for participating in the public review process.

Sincerely,

Priyanka K. Jain
Project Manager – UWMP 2010

RECEIVED
JUN 03 2011
WATER RESOURCES PLANNING DIV.

PKJ:smc

Enclosure

example: Change rates at lower cost every 2 yrs instead of "like" every 4 yrs — to long term customers like me...

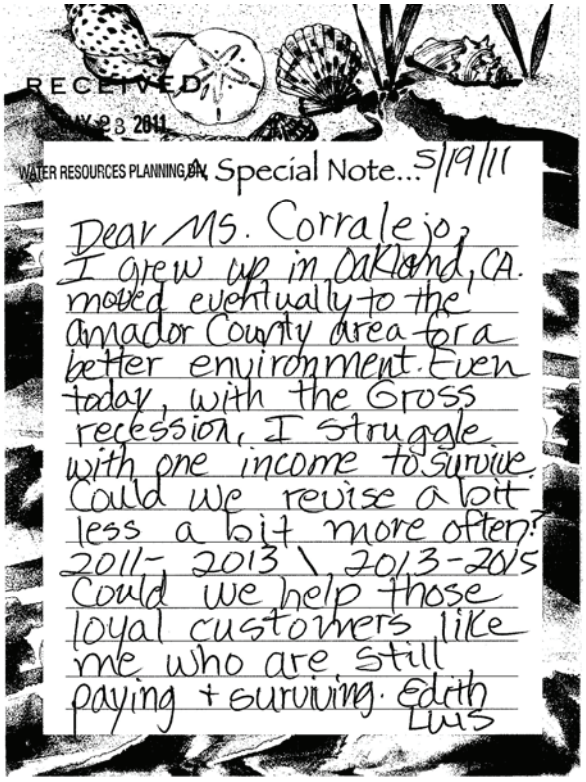
Thank you
Edith Luis

375 ELEVENTH STREET . OAKLAND . CA 94607-4240 . TOLL FREE 1-866-40-EBMUD

Recycled Paper

EL-1

Edith Luis


RECEIVED
MAY 23 2011
WATER RESOURCES PLANNING DIV.

Special Note... 5/19/11

Dear Ms. Corralejo,
I grew up in Oakland, CA. moved eventually to the Amador County area for a better environment. Even today, with the Gross recession, I struggle with one income to survive. Could we revise a bit less a bit more often? 2011-2013 \ 2013-2015 Could we help those loyal customers like me who are still paying + surviving. Edith Luis

EBMUD Response:

EL-1 Response

EBMUD water rates and rate structure are established biennially by the EBMUD Board of Directors. Any changes are subjected to a procedure of public notice and hearing to allow for input from the public and rate payers. Page 3-13 of the UWMP provides more information on this public notification process.

Randy Berg

Date Comment Received: 05/17/2011
Name of Organization/ Agency/ Individual: Randy Berg

Comment:

RECEIVED
MAY 17 2011
WATER RESOURCES PLANNING DIV.

May 12, 2011

To the board of EBMUD,

I happened to attend the February 4th hearing in Judge Frawleys' court room. One of the first things that your attorney stated was that EBMUD **DID NOT NEED TO ENLARGE THE PARDEE RESERVOIR**. Was he lying to the judge? Why is the enlargement of the Pardee Reservoir still listed as a possible surface water supply option in your draft UWMP? You lost that lawsuit. The Judge ordered, among other things, that you evaluate and consider the option of joining in the Los Vaqueros expansion. Why is that NOT in your draft UWMP? The environmental groups are not going to go away. They will fight you to the bitter end on this and cost you plenty of your ratepayer's dollars. Doug Linney stated back in October 2009 that the Pardee Reservoir expansion would be an albatross around your necks and he is right. The Los Vaqueros expansion has no opposition by environmental groups. Storing your water closer to your customers so any catastrophe in the delta won't cut off your supply seems like a no brainer. Perhaps that's your problem. no brains! Stop listening to your attorneys who only want to line their pockets by fighting this issue. Step into the 21st century and leave the technology of the 20th century behind! Remove the option to enlarge the Pardee Reservoir from your plans!!!

RB-1

Sincerely,

Randy Berg

Randy Berg
PO Box 266
Jackson, CA 95642

EBMUD Response:

RB-1 Response

Please see EBMUD Response TI-1 found on page Appendix C-11 to C-12 of EBMUD's UWMP for a discussion of the identified supplemental supply projects.

Lary Heath

Date Comment Received: 05/14/2011
Name of Organization/ Agency/ Individual: Lary Heath

Comment:

From: Lary Heath [laryheath@sbcglobal.net]
Sent: Saturday, May 14, 2011 12:00 PM
To: Corralejo, Suzanne
Subject: Conservation first

Ms. Corrale,

Before the Pardee, do more for conservation and grey water. If we did, probably would not need the dam.
Thank you.

Lary Heath

LH-1

EBMUD Response:

LH-1 Response

Please see EBMUD Response TI-1 found on page Appendix C-11 to C-12 of EBMUD's UWMP for a discussion of the identified supplemental supply projects.

Please see EBMUD Response TI-3 found on page Appendix C-12 of EBMUD's UWMP for further details on EBMUD's conservation efforts.

Please see EBMUD Response TI-4 found on page Appendix C-12 to C-13 of EBMUD's UWMP for a discussion of graywater.

Michael J. Spadoni

Date Comment Received: 05/12/2011
Name of Organization/ Agency/ Individual: Michael J. Spadoni

Comment:

From: Michael J. Spadoni [mailto:michaeljack@volcano.net]
Sent: Thursday, May 12, 2011 6:27 AM
To: Corralejo, Suzanne
Subject: NO Pardee Expansion up the Mokelumne River

Expand Los Vaqueros instead!

Better Yet: Teach EBMUD and its customers (better called "consumers"?) to conserve and reuse water, and leave all natural flows NATURAL...

MJS-1

Michael J. Spadoni
PO Box 430 / 1902 Garner Road
Rail Road Flat, CA 95248

EBMUD Response:

MJS-1 Response

Please see EBMUD Response TI-1 found on page Appendix C-11 to C-12 of EBMUD's UWMP for a discussion of the identified supplemental supply projects.

Please see EBMUD Response TI-3 found on page Appendix C-12 of EBMUD's UWMP for further details on EBMUD's conservation efforts.

Please see EBMUD Response TI-18 found on page Appendix C-15 to C-16 of EBMUD's UWMP for further details on EBMUD's recycled water program.

Lee R. Peterson

Date Comment Received: 05/12/2011
Name of Organization/ Agency/ Individual: Lee R. Peterson

Comment:

From: solarnwind@gmail.com [mailto:solarnwind@gmail.com]
Sent: Thursday, May 12, 2011 9:13 AM
To: Corralejo, Suzanne
Cc: Linda & John Judd; Phyllis Murdoch; Jane P. Hodgson; Nadine Peterson; Mike Tuciarone; Lindsey Peterson
Subject: It's Time for EBMUD to Drop its Plans to Expand the Pardee and Destroy the Mokelumne Wild River !

Dear EBMUD Board Members,

As a former resident of the East Bay and someone that still has most of my extended family living in the East Bay; I understand how important it is for EBMUD to work toward securing water for its residents and customers in the future.

As someone that is concerned about protecting our environment, I am deeply concerned about EBMUD's apparent obsession with moving ahead with plans to raise Pardee Reservoir and thereby destroy this wonderful whitewater section of the Mokelumne River. This is in spite of overwhelming public and local opposition from environmentalists and residents in and around Jackson, including conservation groups, fishermen, rafting and kayaking enthusiasts.

The court ruling that EBMUD lost on April 11th of this year was overwhelming. EBMUD failed to properly and honestly analyze or mitigate impacts to the river's cultural and recreational resources. EBMUD violated the California Environmental Quality Act by failing to consider the expansion of Los Vaqueros Reservoir as one of its water supply alternatives. Los Vaqueros is right in EBMUD's back yard, EBMUD refused to look at Los Vaqueros Reservoir as an alternative and viable source.

LRP-1

EBMUD's reputation as a responsible utility district has suffered. This reflects negatively on all residents in the East Bay.

EBMUD's Board of Directors have a stated "Public Responsibility to Preserve the region's resources and set industry standards for how the water utilities conduct themselves"
http://www.ebmud.com/about-ebmud/board-directors/your-board-members

I believe if EBMUD Directors continue to conduct themselves in this fashion, by pursuing this course of action, then you are in violation of your public trust. Your responsibilities should extend beyond the perimeter that makes up EBMUD's customers. It should also reflect that of local communities that your actions have a direct impact on.

It's time to drop the Pardee expansion from EBMUD's long-term water plans.
It's time to stop EBMUD plans that would destroy the wild & Scenic Section of the Moke
It's time to consider the expansion of Los Vaqueros Reservoir, which the court ordered EBMUD to consider.

Thank you for listening, if you're listening,

Sincerely,
Lee R. Peterson

EBMUD Response:

LRP-1 Response

Please see EBMUD Response TI-1 found on page Appendix C-11 to C-12 of EBMUD's UWMP for a discussion of the identified supplemental supply projects.

Wayne and Valerie Brunmeier

Date Comment Received: 05/11/2011
Name of Organization/ Agency/ Individual: Wayne and Valerie Brunmeier

Comment:

From: Wayne Brunmeier [mailto:wbrunmeier@hotmail.com]
Sent: Wednesday, May 11, 2011 11:26 AM
To: Corralejo, Suzanne
Subject: Pardee Expansion

Dear Ms. CORRALEJO,

As a long time resident of Calaveras County we encourage EBMUD to drop the Pardee expansion from their long-term water plans and fully support National Wild and Scenic River designation for the Mokelumne from Salt Springs Dam to the backwaters of Pardee Reservoir.

WB-1

Thank you,

Wayne Brunmeier
Valerie Brunmeier

Valley Springs, Ca.

EBMUD Response:

WB-1 Response

Please see EBMUD Response TI-1 found on page Appendix C-11 to C-12 of EBMUD's UWMP for a discussion of the identified supplemental supply projects.

John Knox White

Date Comment Received: 04/21/2011
Name of Organization/ Agency/ Individual: John Knox White

Comment:

Note: Comment below is typed verbatim as heard on the recorded tape during the April 21, 2011 UWMP 2010 Public Meeting.

Comment by John Knox White:

Thank you for the presentation and clearly this is the result of a lot of work. I have a couple of comments that I [am] probably less comfortable making being the only person speaking here. Quickly, I'm pretty new to a lot of this water management, water management plans, and whatnot; by which I mean I didn't know they existed until about two weeks ago.

Reading through the Water Management Planning Act, one of the three policy goals of the Act is for Urban Water Suppliers should be required to develop water management plans to actively pursue the efficient use of available supplies. And yet, I found that this Plan['s] directly stated goal is designed to satisfy the requirements of this Planning Act, but to provide the public with a report on EBMUD's progress implementing conservation. I think that in reading the Plan it seems to have missed the goal of actually actively pursuing policies and planning to…it's the actual pursuit part that seems to be missing in the Plan. The Plan is more of a static document that kind of faithfully provides the required elements that are in the Planning Act, but it doesn't actually plan for the next thirty years. It represents Plans that have already been put together, and says here what we are doing and here's what we have done. I think that it's a missed opportunity; I'm unclear on whether or not it meets the letter of what the goal was, and I'm uncomfortable given that you guys are one of the implementing agencies for getting the Planning Act started, and together; I won't tell you what it's suppose to be for. But, I think that it's a great snapshot and it shows that you guys are doing a lot of work and whatever else, but it's a missed opportunity to come to the Board with a document, that is only put together every five years, and say, OK Board we want to set a course for the future. It's more of a, if somebody wants to say hey, what we were doing in 2010 and what were we thinking could possibly happen in the future. You'd pull it off the shelf and read it and say, oh, OK that's what was going on and here's were some of the conversations that were happening.

JKW-1

An example, I think is the drought planning section, which is probably the only issue with EBMUD that I've been involved in; I was...I spoke once before the Board and it was during the drought pricing. Which was a... it wasn't contentious, but there were a variety of ideas on how the District should move forward with encouraging the voluntary reduction of water use. To me, hum, here I'm going to read what I wrote, because I'm stumbling here. The document identifies the drought committee, it lists out the committee's rules and responsibilities, it identifies what was done from 2010 during the last dry spell, and it outlines possible approaches for the future in Appendix G. But all that it presented is a process for dealing with another drought, but there is no Board…you're not asking your Board to actually say, but this is how you are going to deal with it. These, when we have to make the difficult decisions, these are the policies by which we are going to make the decisions when the staff drought committee gathers, because a drought has been declared. What are the guiding policies that the Board would expect staff to be trying to meet and coming up with a proposal for how to do it? I'm not saying that none of us know what that drought is going to look like at this time. I can be a policy and process person, I think that well design policies and processes lead us to really good results and that documents like this, which are put together every five years, are the appropriate place to really have these large conversations, and holistic discussions about how do we want to make decisions about how we are going to deal with the drought and encourage behavior and what not. It felt to me like that was missing from this document. This morning I was told that it was the Water Supply Management Plan that actually had a lot of the policies in it, but when I went to that it too just explained what has been done in terms of conservation. There were no, where are we going and how we are going to drive the decisions that lay before us. Again, that's not to say that we have to change everything that's being done, but the document does do a pretty good job of laying out issues that are coming forward. I would expect that… it would seem to me that a plan would also lay out the path for how we are going to get there, and ask the Board for direction on how we should be shaping that path. Because you know there are so many options, like I said, Appendix G lists out five or six different ways we can deal with the drought next time. That is to me the opposite of planning, that's

JKW-2

John Knox White

a menu, and maybe we should be looking at not necessarily choosing, possibly choosing, how we want to deal with the drought. But if we don't want to make that decision right now, because every drought is different and every time is different, there maybe some issues about equity, current water use etc. that the Board should be looking at and saying, OK, but when you come back with a plan we want to encourage conservation and reduction of water this way, etc. Knowing that you are trying to have this adopted into the state by July it's probably unlikely you are going to be able do that, but one might be able to adopt into this a set of policies that say we are going to start having those conversations by the next time. That the future Water Management Plans will have that kind of…laying out the path forward.

JKW-2

I have a couple of questions based on what I heard and I really appreciate it being able to hear this presented as well, but quickly, there were a couple of, just, these are just small things. There are a couple of places in which accumulative data is presented as opposed to household data, and I thought it was actually…I hadn't been aware of the Steinberg amendment from 2009 that actually set the state goals for what you guys are trying to achieve. And I was interested that those are per capita goals, and yet almost everything that is presented through here is cumulative information that shows water usage constantly going up, and I know that it is a… right…. The agency has to be aware of total water needs so that you can plan for how much more water your going to need in the future. On the other hand, I think that if you are also at the same time trying to be, to minimize that by looking at reducing household, or reducing per capita use, or per household use, a lot of the information would be well served by presenting the per capita or per household usage data as well. But I had two kind of specific examples that, I think, figure 4.5 shows the west-of-the-hills and east-of-the-hills in aggregate and it ignores, or it doesn't present at all that west-of-the-hills households in people far out number the east-of-the-hills households. And a reasonable reader reading this would assume that the west-of-the-hills households are using twice as much water, and really are, the water usage is rampant over here on the west, when in fact we know there are about three times as many people living over here and that the per household usage is about the reverse. I think that is a… where some of the graphs and whatever else, I think it would be good to show the per household…this is one where I think; actually the graph itself is showing the exact opposite of what is happening, and actually leads to misunderstanding of the District and water use within the District. I would assume that the EBMUD's databases could easily kick this out on a zip code or by city basis that would provide a more accurate and more useful presentation that would show up a picture of where is water getting used and in what ways so… and I would imagine that would be useful in terms of conservation etc. those programs that are going on.

JKW-3

And the other one, was just I found it kind of jarring to read the accumulative amounts that are being spent on the conservation programs since 1976 that was just a… it certainly sounds big when you say, since 1970's EBMUD has invested 65 million dollars in implementation of customer targeted water conservation programs. When you look at the per annual it's…you aren't spending that much and you are doing great work. I think in terms of budgeting and whatever else, it would be actually better to show what you are spending every year. If I was in charge of the department I would want to show that too; just to make sure that it doesn't dip down, you know, you can cut that budget in half and it would still show the accumulative going up. If you are trying to make the case that we need to conserve more at budget time, having a report that shows how much we are spending right now, and that we haven't really increased our spending on conservation, from what I could calculate trying to look at the differences in the accumulative, I think having that spelled out annually, what we are spending would be a little more useful. Plus 65 million dollars since the 1970's is a…I don't want to say it's a meaningless number; it's great that the money's been spent, but I'm not sure what anybody reading that can really assume, is that a big number, or a good number, or it doesn't really tell us how that relates to the works' being done and does that seem like…even…does that seem like a good number or not?

JKW-4

So those are my, I'll say criticisms, and I'm sorry, unfortunately that tends to sum up public comment [inaudible]. But in terms of planning I want to say that I think EBMUD's use of local planning documents, as a baseline for how the East Bay's going to grow is a good thing. Rather than trying to ascertain something from, let's say, the census data and whatever else, I think looking at how local communities are planning to grow and use their land use and whatever else is probably a better measure of moving forward. A comment that was…this was something I learned about during the drought that the idea of going into drought…the drought… this will give you an example of a policy that I think should be in this document. The idea that drought pricing leads to a budget gap, leads, I think that…this

JKW-5

John Knox White

is bigger than this document, but there is probably a big conversation to be had about how EBMUD is doing its pricing if encouraging people to conserve their water becomes a budget issue. And that perhaps there is a different way to price the water based on usage that might allow that to become less of a problem. Water and water availabilities only going to become probably more of a problem as we move forward, and looking at that, so that… looking at that again at a time when we don't have to implement it. Because there isn't a drought now, would maybe be the time of looking at how we might want to structure drought pricing so that it doesn't lead to cut backs. At a time according to this report EBMUD's actually going out and spending more money, because in order to get people to reduce their uh,… five million dollars for the…to do communications, whatever, for the drought plan that was a eye opening, not in a bad way, but eye opening in a wow I was surprised that you guys have brought that many more people on. I know it's not a huge number especially when you're dealing with three hundred thousand households etc. but again I…EBMUD's got to find a way to do; be able to do drought pricing and not drive itself into a hole. And again I think Plans like this are a time to do that and then you know I'm not sure if anybody, if Mr. Harris wants to answer this question or not, but I was interested that the gallons per day includes commercial and whatnot. And I'm curious how does a district like EBMUD deal with the idea that you have all these cities within the District working really hard to bring new commercial and whatever else businesses here, but the population may not grow accordingly you could end up increasing your commercial water use significantly with a small change in, probably unlikely, the small change in population and end up having to conserve more to hit that 20%. Is there a way for which…I'm just curious… does the state take that into account? And the other question I have is I know that EBMUD has been very, very successful in the conservation you guys have done compared to other water districts a really great job when we're looking at the 2020. Do you guys get credit for that or do you still have to bring down your water usage 20 whereas other districts that have kind of, let's say, allowed water use to be more rampant they're not making the same…you know, there's a certain point in time everybody cuts and cuts and cuts the next cut is harder to make the next cut is even harder to make. I don't think we are anywhere near where it's really difficult for any of us to make those cuts. My wife is from west Australia their water use there, in a place that lives as nice a lifestyle as we do here in the Bay Area, is less than half. I even want to say it's about a third we do per household, so I think there's lots of places to go. But I'm curious how the state's…how your guys past success, does that come back and bite us as a District in the behind? I'm all done, thank you.

JKW-5

JKW-6

JKW-7

EBMUD Response:

JKW-1 Response

Consistent with the UWMP Act, EBMUD's UWMP describes the service area and the projected water needs of the supplier, and identifies and quantifies existing and planned water sources available to serve demand over a 20 year planning period. (Water Code, sec. 10631).

EBMUD has in place adopted organizational principles and numerous existing policies that support planning activities to pursue the efficient use of available water supplies. These principles and policies, in conjunction with the UWMP and other water management plans, all provide guidance on demand management and water use efficiency.

For instance, the guiding principles in EBMUD's mission statement (see page 1-2 of the UWMP) clearly directs EBMUD to pursue water resource planning activities that ensure environmental responsibility and sustainability. Policies include Policy 9.05 Non-Potable Water, Section 29 Prohibiting Wasteful Use of Water, and Section 31 Water Efficiency Requirements (see Appendix F of the UWMP), which all promote recycled water use, the efficient use of available supplies, and conservation that are key components of EBMUD's long-term water supply planning objectives.

John Knox White

is bigger than this document, but there is probably a big conversation to be had about how EBMUD is doing its pricing if encouraging people to conserve their water becomes a budget issue. And that perhaps there is a different way to price the water based on usage that might allow that to become less of a problem. Water and water availabilities only going to become probably more of a problem as we move forward, and looking at that, so that… looking at that again at a time when we don't have to implement it. Because there isn't a drought now, would maybe be the time of looking at how we might want to structure drought pricing so that it doesn't lead to cut backs. At a time according to this report EBMUD's actually going out and spending more money, because in order to get people to reduce their uh,… five million dollars for the…to do communications, whatever, for the drought plan that was a eye opening, not in a bad way, but eye opening in a wow I was surprised that you guys have brought that many more people on. I know it's not a huge number especially when you're dealing with three hundred thousand households etc. but again I…EBMUD's got to find a way to do; be able to do drought pricing and not drive itself into a hole. And again I think Plans like this are a time to do that and then you know I'm not sure if anybody, if Mr. Harris wants to answer this question or not, but I was interested that the gallons per day includes commercial and whatnot. And I'm curious how does a district like EBMUD deal with the idea that you have all these cities within the District working really hard to bring new commercial and whatever else businesses here, but the population may not grow accordingly you could end up increasing your commercial water use significantly with a small change in, probably unlikely, the small change in population and end up having to conserve more to hit that 20%. Is there a way for which…I'm just curious… does the state take that into account? And the other question I have is I know that EBMUD has been very, very successful in the conservation you guys have done compared to other water districts a really great job when we're looking at the 2020. Do you guys get credit for that or do you still have to bring down your water usage 20 whereas other districts that have kind of, let's say, allowed water use to be more rampant they're not making the same…you know, there's a certain point in time everybody cuts and cuts and cuts the next cut is harder to make the next cut is even harder to make. I don't think we are anywhere near where it's really difficult for any of us to make those cuts. My wife is from west Australia their water use there, in a place that lives as nice a lifestyle as we do here in the Bay Area, is less than half. I even want to say it's about a third we do per household, so I think there's lots of places to go. But I'm curious how the state's…how your guys past success, does that come back and bite us as a District in the behind? I'm all done, thank you.

JKW-5

JKW-6

JKW-7

EBMUD Response:

JKW-1 Response

Consistent with the UWMP Act, EBMUD's UWMP describes the service area and the projected water needs of the supplier, and identifies and quantifies existing and planned water sources available to serve demand over a 20 year planning period. (Water Code, sec. 10631).

EBMUD has in place adopted organizational principles and numerous existing policies that support planning activities to pursue the efficient use of available water supplies. These principles and policies, in conjunction with the UWMP and other water management plans, all provide guidance on demand management and water use efficiency.

For instance, the guiding principles in EBMUD's mission statement (see page 1-2 of the UWMP) clearly directs EBMUD to pursue water resource planning activities that ensure environmental responsibility and sustainability. Policies include Policy 9.05 Non-Potable Water, Section 29 Prohibiting Wasteful Use of Water, and Section 31 Water Efficiency Requirements (see Appendix F of the UWMP), which all promote recycled water use, the efficient use of available supplies, and conservation that are key components of EBMUD's long-term water supply planning objectives.

John Knox White

JKW-2 Response

EBMUD's water supply shortage response is presented in detail in Chapter 3 of the UWMP. Drought Management Program Elements, presented in Table 3-3 of the UWMP, outline the various actions that EBMUD may take based on the severity of a drought to encourage conservation and reduction of water use. As referenced in Appendix F of the UWMP, water service regulations Sections 28 (adopted with a water shortage emergency declaration), 29, and 31, and Policy 9.03 already provide guidance on responding to a water supply shortage. The combination of the actions outlined in Table 3-3, and the underlying regulations, and policies create the basis for developing a drought management program customized to flexibly meet the unique needs of each drought.

JKW-3 Response

Figure 6-3 of the UWMP charts historic daily per capita water demand.

EBMUD acknowledges that the east-of-hills and west-of-hills aggregate water use for single-families can lead to a misunderstanding of regional water use characteristics within the EBMUD service area. Consequently EBMUD has included a new figure (Figure 4-6) in the final UWMP that illustrates the variation in single-family water use per account within the EBMUD service area.

JKW-4 Response

Figure 6-2 of the UWMP illustrates EBMUD's cumulative annual Water Conservation Program (WCP) expenditures. Annual expenditures can be estimated from the same graph by comparing each year's cumulative expenditure with that from the previous year. As noted on pages 6-4 through 6-5 of the UWMP, EBMUD's historical expenditures for the WCP was $65 million since the 1970s, and the five-year budgetary plan through FY15 includes an additional $18.3 million. This information provides a comparison of historic and future annual expenditures.

JKW-5 Response

EBMUD's BOD considers drought rate pricing when it declares a water shortage emergency. Drought rate pricing development involves analyses of numerous complex variables including water availability, consumption behavior, and anticipated consumption reductions, which provide inherent uncertainties. As noted on page 3-12 of the UWMP, EBMUD adopts a revenue schedule to allow increasing the volume rate, adding a drought surcharge, and using the contingency and rate stabilization reserve fund to fully recover costs of providing ongoing water service, mitigate the expense of implementing the Drought Management Program, and recover lost revenues from lower water consumption. A well-designed drought rate pricing is desired. Gradual improvements in calibrating forecasts will be gained through insight from experience of past droughts.

JKW-6 Response

Since the 1970s, demand management has been an important part of EBMUD's water practices and policies to promote reasonable and efficient use of supplies. Figure 6-3 of the UWMP shows that EBMUD has made significant strides in decreasing historical daily per capital water demand as a result of EBMUD's aggressive water conservation and recycling efforts and other factors. This continuous effort in reducing daily per capita water use goes beyond the short-term focus on consumption reduction as required through SBx7-7.

John Knox White

Current statewide per capita water use has been dramatically reduced in some communities due to a combined 3-year drought and the significant economic recession. The law developed by the legislature and the methodology adopted by the Department of Water Resources, as mandated by SBx7-7, were designed to not limit the economic growth of the state, while recognizing and ensuring efficiency in past and future water use respectively.

To allow agencies including EBMUD to capture previously realized conservation and recycled water savings, SBx7-7 was designed with flexibility to allow suppliers to select one of four methods for establishing its SBx7-7 targets. EBMUD selected a target method that would allow EBMUD to be credited for its aggressive water conservation and recycling programs, implement demand management program budgets that are appropriately tailored to customer usage, anticipate the post-drought and economic rebound, and account for anticipated demand hardening in consumption behavior.

Furthermore, EBMUD is committed to an estimated projected use at 144 gallons per capita per day (gpcd) in year 2020, which exceeds the requirement of its SBx7-7 target of 150 gpcd.

JKW-7 Response

Please see EBMUD Response TI-3 found on page Appendix C-12 of EBMUD's UWMP for further details on EBMUD's conservation efforts.

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Appendix D. Board Resolutions

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APPENDIX D. BOARD RESOLUTIONS

RESOLUTION NO. 33832-11

ADOPTING THE URBAN WATER MANAGEMENT PLAN 2010

Introduced by Director Foulkes ; Seconded by Director Mellon

WHEREAS, the California Urban Water Management Planning Act ("Act") requires urban water suppliers to adopt an urban water management plan every five years; and

WHEREAS, the East Bay Municipal Utility District ("District") last updated its Urban Water Management Plan in accordance with the provisions of the Act in 2005; and

WHEREAS, in accordance with the requirements of the Act, the District commenced a review of the Urban Water Management Plan and an update to its provisions in 2010, and based upon the review, the District has prepared a revised and updated Urban Water Management Plan (Plan); and

WHEREAS, a draft of the updated Plan was made available for public inspection beginning in April 2011, and a noticed public hearing was conducted by the District Board of Directors on May 10, 2011, and all comments received from the public and from public agencies have been reviewed and considered and the District has modified the Plan.

NOW, THEREFORE, BE IT RESOLVED that the Board of Directors of the East Bay Municipal Utility District does hereby adopt the Plan dated June 2011, and directs the Secretary to file a copy of the Plan with the California Department of Water Resources, to distribute a copy of the Plan to the California State Library, and copies to cities and two counties within the District's

service area, within thirty (30) days of this action. The Secretary is further directed to make the Plan available for public review during normal District business hours.

ADOPTED this 28th day of June, 2011 by the following vote:

AYES: Directors Foulkes, Katz, McIntosh, Mellon, Patterson and President Coleman.

NOES: None.

ABSENT: Director Linney.

ABSTAIN: None.

President

ATTEST:

Secretary

APPROVED AS TO FORM AND PROCEDURE:

General Counsel

RESOLUTION NO. 33833-11

ADOPTING UPDATED URBAN WATER SHORTAGE CONTNGENCY PLAN FOR INCLUSION WITHIN THE EBMUD UPDATED URBAN WATER MANAGEMENT PLAN 2010

Introduced by Director Foulkes ; Seconded by Director Mellon

WHEREAS, in 1992, the Board of Directors of East Bay Municipal Utility District adopted an Urban Water Shortage Contingency Plan in accordance with the requirements of the California Urban Water Management Planning Act; and

WHEREAS, recent water resource planning changes, including an updated rationing policy, recent drought events, and the availability of an additional dry year supply from the Freeport Regional Water Facility, make it necessary to update the Contingency Plan to plan and respond to periods of water shortage; and

WHEREAS, a draft of the Contingency Plan, and the draft Urban Water Management Plan in which it is included, were made available for public inspection beginning with a first draft in April 2011; and

WHEREAS, a noticed public hearing was conducted by this Board of Directors on May 10, 2011, and all comments received from the public and from public agencies have been reviewed and considered.

NOW, THEREFORE, BE IT RESOLVED that the Board of Directors does hereby adopt the Urban Water Shortage Contingency Plan and directs the Secretary to file a copy of the Contingency Plan, as included in the 2010 Urban Water Management Plan with the California Department of Water Resources within 30 days of adoption of the 2010 Urban Water

Management Plan. The Secretary is further directed to make the plan available for public review during normal District business hours.

ADOPTED this 28th day of June, 2011 by the following vote:

AYES: Directors Foulkes, Katz, McIntosh, Mellon, Patterson and President Coleman.

NOES: None.

ABSENT: Director Linney.

ABSTAIN: None.

President

ATTEST:

Secretary

APPROVED AS TO FORM AND PROCEDURE:

General Counsel

Appendix E. South East Bay Plain Groundwater Basin Overview

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Appendix E. South East Bay Plain Groundwater Basin Overview

In accordance with the Urban Water Management Planning Act under California Water Codes section 10631(b), this appendix of the Plan provides a comprehensive description of the South East Bay Plain Basin where the Bayside Groundwater Project (Phase 1 and the potential Phase 2) is located.

Description

The East Bay Plain Basin extends along the East Bay foothills to the Bay approximately from Richmond to Hayward as shown in Figure E-1. Consisting of a portion of the East Bay Plain Basin, the South East Bay Plain Groundwater Basin (SEBPB) is bounded to the east by the Hayward Fault and extends beneath San Francisco Bay to the west. The exact location of the western boundary under the Bay is not precisely known/ defined; therefore, the boundary is assumed to coincide with the edge of the Bay, consistent with the California Department of Water Resources' (DWR) depiction of the basin in their Bulletin 118. The SEBPB thins out to the north and becomes an insignificant source of groundwater near Berkeley. The southern boundary is in the City of Hayward near the San Mateo Bridge. The Niles Cone Groundwater Basin (NCGWB) begins immediately south of the SEBPB, and extends from about Hayward to Milpitas.

Hydrostratigraphic Units

The SEBPB is comprised of three main aquifer systems. The SEBPB aquifer systems include:

- The shallow aquifer is at approximately 30 to 130 feet below ground surface (bgs). Aquifers of limited extent, comprising of a water table aquifer system with relatively low vertical permeability, occur at depths of less than 50 feet in this unit. This unit is separated from the underlying aquifers by an Old Bay Mud (also known as Yerba Buena Mud) aquitard that is about 50 feet thick and pinches out to the east towards the Hayward Fault.
- The middle aquifer is comprised of deposits at depths of about 130 to 375 feet bgs. Groundwater in this aquifer occurs under confined conditions.
- The Deep Aquifer includes the upper 100 feet of the continental portion of the Alameda Formation and consists of alluvial fan deposits interfingered with water body deposits. This confined aquifer is to be used for injection and extraction of water during operation of the project. The Deep Aquifer is located over 400 feet bgs. It is thickest in the south, and thins and feathers out to the north; the unit is not substantially productive north of San Leandro. The aquifer is believed to extend toward the middle of the Bay. Fine-grained clays and silts exist below the Deep Aquifer.

Groundwater Basin Management

EBMUD collaborates with local stakeholders such as the Alameda County Public Works Department, Alameda County Water District (ACWD), City of Hayward, and the DWR to share groundwater monitoring data and project operational data. In addition, EBMUD has conducted geohydrological studies and continues conducting subsidence investigations of the SEBPB in partnership with local and federal partners. During the Bayside Groundwater Project's EIR process, EBMUD in partnership with ACWD developed a numeric groundwater flow model for the SEBPB and NCGWB, called the Niles Cone and South East Bay Plain Integrated Groundwater and Surface Water Model (NEBIGSM) to evaluate potential project impacts on groundwater levels in this area. Currently, EBMUD is exploring feasibility to collaboratively develop a groundwater management plan for the SEBPB in partnership with local stakeholders.

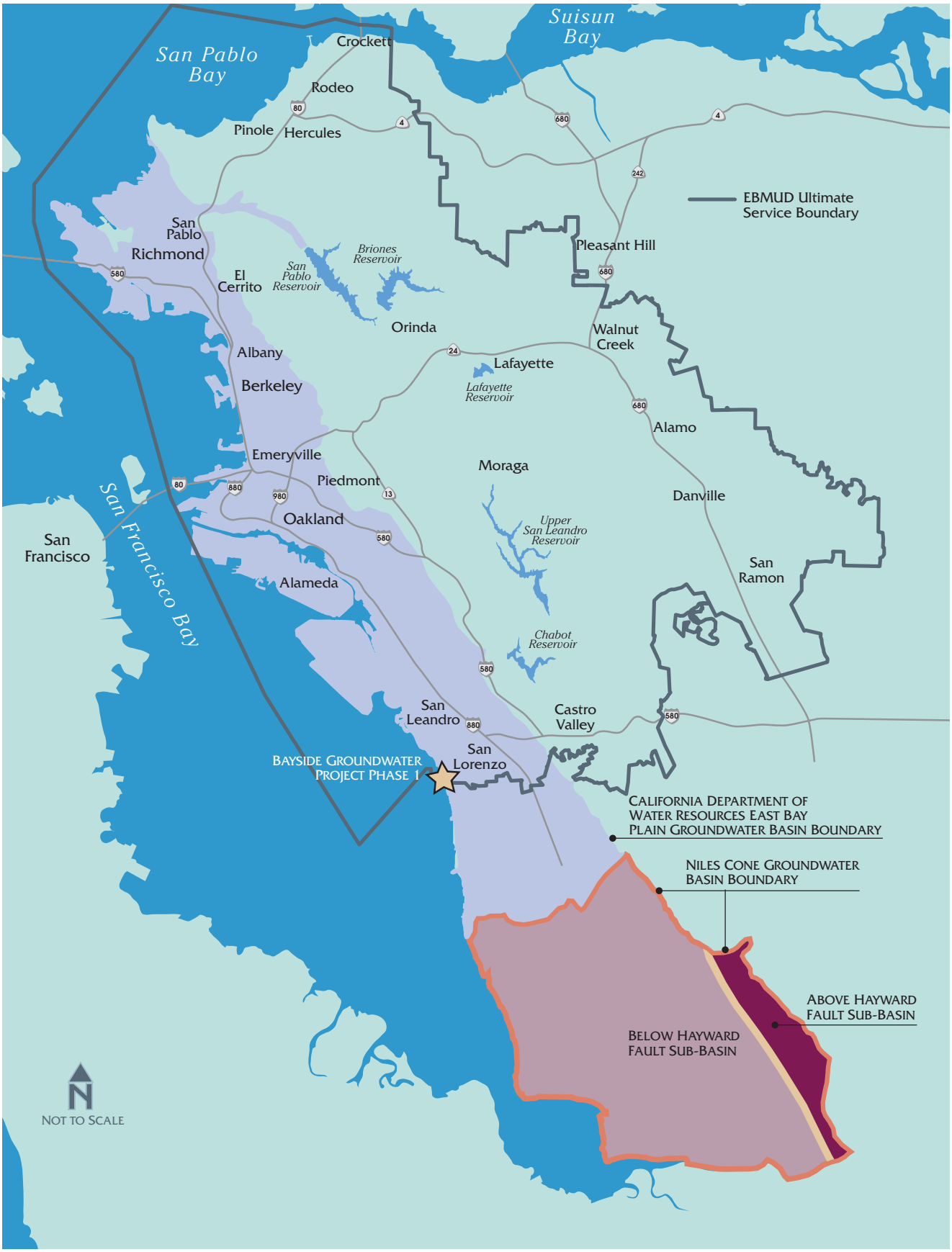
Water Budget

The historic low basin water level and associated low storage volume were observed in early 1960s. Currently the basin is fully recovered from historic pumping and basin water level is steady/ stable. The basin is not in an overdraft condition. Water balance results indicate the basin is experiencing, on average, a net recharge of 1,300 acre-feet (discharge is estimated to have averaged about 7,100 acre-feet per year. Recharge to the basin is estimated to have averaged about 8,400 acre-feet per year in the mid-1990s). This result is reflected in the field, where rising water levels in the Deep Aquifer have been observed for some time.

SEBPB Groundwater Movement

Currently, groundwater in the shallow units of the SEBPB generally flows from east to west, from the Hayward Fault

FIGURE E-1 SOUTH EAST BAY PLAIN BASIN



towards San Francisco Bay, with an average horizontal flow gradient of about 0.002. Average horizontal gradients in the middle aquifer are also about 0.002. The horizontal flow gradient in the Deep Aquifer is about 0.001 with a northerly flow component.

Vertical downward gradients (i.e., the head in the upper unit is higher than that of the adjacent lower unit) are present throughout the SEBPB where the Old Bay Mud is present. Vertical gradients are approximately 0.02 near the Bay margin (from both Newark Aquifer equivalent to Centerville and Fremont Aquifer equivalents, and from these units to the Deep Aquifer), and are insignificant near the foothills where the Old Bay Mud pinches out.

Historic Water Levels

Maximum drawdown in the SEBPB occurred in the early 1960s. Water levels were at about -90 to -110 feet below Mean Sea Level (MSL) at that time, with gradual recovery to the present. Currently, the basin water levels range approximately between -5 to -10 feet below MSL, under normal water year and basin usage conditions.

Groundwater Quality In The SEBPB

Groundwater of the shallow aquifer, based on total depths less than about 200 feet bgs, contains relatively high concentrations of total dissolved solids (TDS), chloride, nitrate, and sulfate, especially compared to deeper units, and is more vulnerable to contamination from surface sources. Groundwater from some wells completed in this aquifer exceeds the maximum contaminant level (MCL) for nitrate and the secondary MCL for TDS, chloride, sulfate, iron, and manganese. Nitrate levels in groundwater are elevated in portions of the shallow aquifer that underlies the San Leandro/ San Lorenzo area. Iron concentrations in the shallow aquifer are typically less than 0.05 parts per million. Based on available data, groundwater from wells completed within the intermediate aquifer locally exceeded the secondary MCLs for TDS, chloride, iron, and manganese. High TDS values in at least some of these wells are probably related to shallow screen intervals. Iron and manganese data for this zone are sparse.

Wells completed within the Deep Aquifer (wells with depths greater than 500 feet bgs), are primarily found in the southern-most portion of the SEBPB. Groundwater from these wells is generally of high quality with elevated concentrations of iron and manganese. Chloride, nitrate, and sulfate concentrations are relatively low in this unit. Native groundwater extracted from wells screened in the Deep Aquifer near the project area meets all current primary (health-based) drinking water standards and, with the exception of manganese, all secondary (aesthetic) drinking water standards. Note that high manganese content is common in native groundwater (not just in the SEBPB). Standard treatment methods for manganese are filtration and dilution. For the Bayside project, the treatment facility includes filter platforms and pipe assembly, which can be used to install manganese filtration system as needed. Radon, which commonly occurs in the air and soil, can also be found in groundwater and is currently not regulated. The native groundwater from the Deep Aquifer of the project area contains radon with the concentration of 800 picocuries per liter. The water quality samples from the Deep Aquifer are also analyzed for hexavalent chromium by using EPA 218.6 method. The analysis did not detect hexavalent chromium at or above the method detection limit.

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Appendix F. EBMUD Policies and Rates

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EBMUD

Policy 3.07

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RESPONSIBILITY TO SERVE WATER CUSTOMERS

IT IS THE POLICY OF EAST BAY MUNICIPAL UTILITY DISTRICT TO:

Ensure that during times of water shortage, available water supplies are appropriately allocated to water customers.

Discussion

Water supplies that were available to EBMUD's customers were limited due to rationing necessitated by past drought conditions.

It is expected that the water available for supplying EBMUD's customers will vary over time depending on the following factors: diversions by Mokelumne River users with senior water rights, requirements for instream flows to protect fish and wildlife in the Mokelumne River, the Sacramento- San Joaquin River Delta, and the San Francisco Bay, as well as development of future supplemental supplies.

Water agencies are responsible for planning to meet the needs of their customers through periods of drought with minimal disruption to residential, commercial, and industrial activities within their service area.

Water Service Responsibility

EBMUD recognizes that when there is a water shortage or projected water shortage, EBMUD's responsibility to serve its customers and service area is prioritized as follows:

- First, to serve its existing customers within its existing service area.
- Second, to serve expected new customers within its existing service area, but only if this does not unacceptably impair EBMUD's ability to serve its existing customers.
- Third, to consider serving new customers outside of its existing service area, but only if this does not impair EBMUD's ability to serve existing and expected new customers within its service area.

In accordance with California Government Code, Section 65589.7, when new service connections are restricted by EBMUD's Board of Directors, priority shall be given to applicants for water service to proposed developments within EBMUD's existing service area that include housing units affordable to lower income households, pursuant to administrative procedures adopted and implemented by the General Manager. Applicants granted such priority shall comply with all of EBMUD's Water Service regulations and pay all requisite fees.

Restrictions on provision of new water service connections may be due to the following:

- A declaration of a water shortage emergency condition under California Water Code, Section 350, et seq.
- A determination by the Board of Directors, based on EBMUD's Urban Water Management Plan, that sufficient water supply is not available to support the granting of all requests for new service, as provided in California Government Code, Section 66473.7.

- A determination by the Board of Directors, based on a written engineering report, that EBMUD does not have sufficient water treatment or distribution capacity to serve the needs of proposed development.

- The imposition of a compliance order by the Department of Health Services limiting new connections.

Authority

Resolution No. 32867-94, June 28, 1994
As amended by Resolution No. 33443-04, September 28, 2004
As amended by Resolution No. 33543-06, June 27, 2006
As amended by Resolution No. 33687-08, October 14, 2008
As amended by Resolution No. 33763-10, April 27, 2010.

California Government Code, Section 65589.7

EBMUD

Policy 7.03

EFFECTIVE 23 NOV 10

SUPERSEDES 24 FEB 09

EMERGENCY PREPAREDNESS/BUSINESS CONTINUITY

IT IS THE POLICY OF EAST BAY MUNICIPAL UTILITY DISTRICT TO:

Create and maintain an active Emergency Preparedness Program that includes an Emergency Operations Plan (EOP) written and administered to help manage the District's critical functions during any emergency and protect people, property, and the environment. The District will coordinate the EOP function and response with Federal, State, and local agencies and private entities charged with emergency duties. The District will also create and maintain a Business Continuity Program Plan to minimize impacts to critical business functions and enhance its capability to recover operations expediently and successfully following a disruptive incident.

Emergency

An emergency includes actual or threatened existence of conditions of disaster or extreme peril to critical District functions and/or the health and safety of staff or the public. These conditions may be caused by an earthquake, power outage, dam failure, freeze, water supply contamination, national security incident, and other conditions that may be beyond the capability of District forces and may require support from other political subdivisions, other agencies, volunteer and non-profit organizations, or the private sector.

Emergency Preparedness Program

The District's Emergency Preparedness Program shall include an EOP written and administered in accordance with the guidelines of the National Response Framework (NRF), the National Incident Management System (NIMS), and the California Standardized Emergency Management System (SEMS). In accordance with NIMS and SEMS, the Emergency Preparedness Program will consist of four phases of emergency management: mitigation, preparedness/planning, response, and recovery. The EOP will include guidelines for identifying and training District staff in the NIMS, designate District staff to critical positions identified in the EOP, and designate staff to represent the District in negotiations or consultations with public and private agencies on matters pertaining to response to the emergency and recovery of damaged systems and financial costs. The Regulatory Compliance Office will facilitate progress on this program.

National Response Framework

The NRF is a guide to how the nation conducts all-hazards emergency response. It is built upon scalable, flexible, and adaptable coordinating structures to align key roles and responsibilities across the nation. It describes specific authorities and best practices for managing incidents that range from the serious but purely local, to large-scale terrorist attacks or catastrophic natural disasters. It builds upon the NIMS and focuses particularly on how the Federal Government is organized to support local entities and States in catastrophic incidents.

National Incident Management System

NIMS is a system mandated by Homeland Security Presidential Directive 5 that provides a consistent nationwide approach for Federal, State, local and tribal governments, the private sector, and nongovernmental organizations to work effectively and efficiently together to prepare for, respond to, and recover from domestic incidents, regardless of cause, size, or complexity. To provide for interoperability and compatibility among Federal, State, local and tribal capabilities, the NIMS includes a core set of concepts, principles, and terminology.

Emergency Preparedness/Business Continuity

NUMBER	7.03
PAGE NO.:	2
EFFECTIVE DATE	23 NOV 10

Standardized Emergency Management System

The State Office of Emergency Services regulates the SEMS which was created by Government Code Section 8607 following the 1991 East Bay Hills Firestorm. SEMS is used to establish consistent response operations, coordinate emergency response, provide a method through which jurisdictions can request assistance, and provide a means for communication among levels of government. To ensure eligibility for state funding of response-related costs, all District emergency plans, procedures, and training will follow the SEMS regulations, and coordinate with the District-wide EOP.

Authorization During District Emergencies

When an emergency condition arises that necessitates immediate action to minimize damage and inconvenience resulting from such condition, the General Manager or successor, in consultation with the President of the Board of Directors, or successor, is authorized to enter into emergency contracts not to exceed $350,000, per contract, without bids or notice.

At the next regular or special meeting of the Board of Directors following such emergency, a report shall be made to the Board of Directors summarizing all expenditures made and contracts executed in response to said emergency. Periodic reports shall be generated at the direction of the Board until the emergency is concluded.

Following a Presidential Declaration of an emergency, the Federal Government historically deploys personnel, equipment and financial resources to support the recovery effort. Following a Governor's State of Emergency Proclamation, State assistance for emergency response costs and permanent restoration assistance for mutual aid/assistance may be available. The Governor may direct execution of the State's emergency plan, or commit other State resources as the situation demands. The Emergency Operations Director (EOD) or designee is authorized to take all necessary action to complete the application procedures to access the incoming resources and to represent the District in requesting/negotiating for the needed resources.

Emergency Operations Director

The District's EOP will identify a District manager to serve as the EOD who will have the authority for developing plans, training staff and activating the EOP. In consultation with the General Manager, the EOD will identify staff to fulfill the planning and response duties listed in the EOP. As the need arises, the EOD may direct all staff or material resources of the District to combat the effects of a threatened, declared or actual emergency.

Mutual Aid/ Assistance

The California Master Mutual Aid Agreement (Government Code Sections 8561, 8615 and 8617) allows for the implementation of mutual aid during threatened, actual, or declared emergencies. The General Manager, EOD, and their successors, in accordance with the EOP, may request mutual aid/assistance from other local government and public agencies, or commit District resources to other agencies requesting aid. The General Manager may sign appropriate documents to implement mutual aid/assistance, emergency interties, and other emergency response agreements.

Emergency Preparedness/Business Continuity	NUMBER	7.03
	PAGE NO.:	3
	EFFECTIVE DATE	23 NOV 10

Business Continuity Program

The District provides products and services that support the economic, human, and environmental health of the East Bay. Therefore, the District must have a program that facilitates the performance of essential functions during an emergency situation that disrupts normal operations and/or the timely resumption of normal operations once the emergency has ended. The Business Continuity Program Plan (BCPP) provides the overall framework for the program and outlines the basic priorities for recovery of business functions in individual departmental Business Continuity Plans (BCPs). The Regulatory Compliance Office will manage the program and maintain the BCPP. Departments will create BCPs that outline: the critical functions, which must be performed before, during and after an event; the personnel responsible for completing the necessary actions; and the vital records, equipment, and systems required to accomplish the identified tasks. The departments are responsible to ensure that their BCPs are maintained, employees trained, plans tested, and their vital records necessary to maintain operations are available. Vital records include all information and records, which if lost, would place significant financial, operational, or legal restrictions on the continuation of District services.

Continuity of Management

The District's BCPs will list at least three successors to critical staff identified in each plan, including the General Manager. In the event the primary person is unable to respond to an emergency, each successor, in order, may assume all the duties and powers of the primary staff.

Status Reports

The General Manager will provide periodic Emergency Preparedness Program progress reports to the Board of Directors, as necessary, and the District's response to a declared District emergency, when applicable.

Authority

Resolution No. 33014-96, November 12, 1996
As amended by Resolution No. 33027-02, September 24, 2002
As amended by Resolution No. 33460-05, February 8, 2005
As amended by Resolution No. 33564-06, November 14, 2006
As amended by Resolution No. 33703-09, February 24, 2009
As amended by Resolution No. 33793-10, November 23, 2010

References

District Emergency Operations Plan
Procedure 122 - Emergency Purchases
Policy 7.13 – Security
Municipal Utility District Act – Section 12753
California Master Mutual Aid Agreement
Standardized Emergency Management System
National Response Framework
National Incident Management System

EBMUD

Policy 9.03

EFFECTIVE 14 JUN 11

SUPERSEDES 13 APR 10

WATER SUPPLY AVAILABILITY AND DEFICIENCY

IT IS THE POLICY OF THE EAST BAY MUNICIPAL UTILITY DISTRICT TO:

Evaluate the availability of the District's water supplies and determine the acceptable maximum level of annual customer demand for the District's service area based on limiting rationing up to a maximum of 15 percent of District-wide annual demand and implementation of current and proposed District conservation programs, recycled water programs and supplemental supply projects.

Annual Water Supplies Report

A review and report to the Board of Directors shall be made on the current and long-term adequacy of the District's water supplies before May 1st of each year. The report shall include an evaluation of the adequacy of the District's water supplies to satisfy customer demand for the current water year and a projection through the year 2040, based on the determination of the Allowable Maximum Level of Demand.

Long-Term Water Supply Reliability

An assessment of long-term water supply reliability through the year 2040 shall be made assuming:

- Water service will be provided in accordance with the District's Regulations Governing Water Service to Customers.
- Water conservation and water recycling programs will be implemented as provided in the District's current Urban Water Management Plan (UWMP).

Supplemental Supplies

The District shall pursue supplemental supplies if existing supplies are found to be inadequate either for the current year or through the year 2040 as provided in the District's current UWMP.

Rationing

The District shall have a goal of limiting customer rationing to a maximum of 15% of District-wide annual demand and will implement this policy consistent with the District's Drought Management Program Guidelines, as outlined in the current UWMP.

Notification Surplus Water

In accordance with the 1998 Joint Settlement Agreement when a determination of the availability of Mokelumne River water is made, the District will notify the Resources Agencies, specifically the United States Fish and Wildlife Services and the California Department of Fish and Game, of the availability of the additional water.

Definitions

Drought Planning Sequence (DPS) – Three year hydrology sequence presenting a worst case drought scenario derived from historical record.

Allowable Maximum Level of Demand (AMLD) – The allowable maximum level of customer demand, in MGD as an annual average, that the system can sustain under the DPS.

Water Supply Availability and Deficiency

NUMBER	9.03
PAGE NO.:	2
EFFECTIVE DATE	14 JUN 11

Definitions

Drought Planning Sequence (DPS) – Three year hydrology sequence presenting a worst case drought scenario derived from historical record

Allowable Maximum Level of Demand (AMLD) – The allowable maximum level of customer demand, in MGD as an annual average, that the system can sustain under the DPS.

Authority

Amended by Resolution 31,246, May 14, 1985
Amended by Resolution No. 32,204, May 9, 1989
Amended by Resolution No. 33175-99, November 9, 1999
Amended by Resolution No. 33759-10, April 13, 2010
Amended by Resolution No. 33821-11, June 14, 2011

References

Policy 3.01 - Annexations
Policy 3.05 - Effects of Extension of Water Beyond the Ultimate Service Boundary
Policy 3.07 - Responsibility to Serve Water Customers
Procedure 900 – Water Supply Accounting and Reporting
Procedure 901 – Recycled Water Accounting and Reporting
Procedure 902 – Water Conservation Accounting and Reporting

EBMUD's Urban Water Management Plan

EBMUD

Policy 9.05

EFFECTIVE 14 NOV 06

SUPERSEDES 28 SEP 04

NON-POTABLE WATER

IT IS THE POLICY OF EAST BAY MUNICIPAL UTILITY DISTRICT TO:

Require that customers of the East Bay Municipal Utility District ("EBMUD") use non-potable water, including recycled water, for non-domestic purposes when it is of adequate quality and quantity, available at reasonable cost, not detrimental to public health and not injurious to plant life, fish and wildlife. When nonpotable water satisfying these conditions is made available to the customer, the use of potable water for nondomestic purposes may constitute a waste and unreasonable use of water within the meaning of Section 2 of Article X of the California Constitution and is prohibited.

Findings Related To Use Of Non-potable Water

The Board of Directors of EBMUD has determined that existing water supplies will not adequately accommodate existing and future demand within the EBMUD's Ultimate Service Boundary. Non-potable water resources, including treated wastewater discharged to the San Francisco Bay from EBMUD and other Bay Area treatment plants, could provide a safe and effective alternative water supply for certain non-potable purposes, increase the availability of the limited water supplies of EBMUD , assure non-potable water customers of a more reliable water supply during periods of drought, reduce wastewater discharges to the Bay, and provide EBMUD with greater flexibility to meet instream needs in the Mokelumne River. The State Legislature has also determined that the use of potable domestic water for certain non-potable uses may constitute a waste or unreasonable use of water if recycled water is available which meets specified conditions. (Water Code Section 13550 et seq.)

Definitions

Non-potable Water - All reclaimed, recycled, reused, or untreated water supplies that meet the conditions set forth in the California Water Code, Section 13550 and are determined by EBMUD to be suitable for non-domestic purposes and feasible for the particular intended use.

Non-domestic Uses - For purposes of this policy, "non-domestic uses" shall mean all applications except drinking, culinary purposes and the processing of products intended for direct human consumption.

Mandated Uses Of Non-potable Water

Customers may be required to use non-potable water for their non-domestic uses which may include, but are not limited to, the following:

- irrigation of cemeteries, golf courses, playing fields, parks, and residential and nonresidential landscaped areas;
- commercial and industrial process uses; and
- toilet and urinal flushing in nonresidential buildings.

Non-potable Water

NUMBER	9.05
PAGE NO.:	2
EFFECTIVE DATE	14 NOV 06

Determination Of Feasibility Of Non-potable Water

In determining whether non-potable water is feasible for a particular non-domestic use, EBMUD shall consider the following factors:

- Whether the non-potable water may be furnished for the intended use at a reasonable cost to the customer and EBMUD.
- Whether the non-potable water is of adequate quality for the intended use and does not require significant additional on-site treatment beyond that required for potable water.
- Whether the use of non-potable water is consistent with all applicable federal, state, and local laws and regulations.
- Whether the use of non-potable water will not be detrimental to the public health and will not adversely affect plant life, fish and wildlife.

Regulations Governing Non-potable Service

The regulations governing non-potable water service and the rates therefore shall be determined by the Board of Directors and published in the Regulations Governing Water Service and Schedule of Rates and Charges for Customers of East Bay Municipal Utility District.

Water Reuse Zones

EBMUD designates Water Reuse Zones within EBMUD's service area where non-potable water service has been determined to be reasonably available.

Non-potable Water Service Agreements

Where implementation of this Policy requires agreements, such agreements shall, wherever possible, have a term of 20 or more years and shall include provisions governing facilities operation and maintenance responsibilities. Upon termination or expiration of an agreement, customers receiving non-potable water service pursuant to that agreement shall be governed by the non-potable water service regulations and rate schedule, unless a new agreement is entered into.

Authority

Resolution No. 32981-96, April 9, 1996
As amended by Resolution No. 33443-04, September 28, 2004
As amended by Resolution No. 33564-06, November 14, 2006

References

Regulations Governing Water Service and Schedule of Rates and Charges for Customers of East Bay Municipal Utility District

SECTION 2

APPLYING FOR SERVICE

If a service connection is already serving the premises, applications for service are taken at the business offices of the District. If a new service connection is required, applications for service are taken at the New Business Office of the District. The District's requirements for the type of service desired must be met before an application will be approved (see Section 31 – Water Efficiency Requirements).

If standard service (see Section 3) is not reasonably available, or if the premises are outside the District's boundaries, or if unusual conditions exist, the applicant will be advised of the terms and conditions which must be met before an application for service may be accepted. In determining whether the portion of an applicant's premises lying directly along a main constitutes principal frontage, the District's decision shall be final.

Effective January 1, 2009, each new multi-family residential or multi-occupancy commercial/industrial unit in a structure of three stories in height or less shall be individually metered when the District has determined it is feasible to do so. The determination of feasibility is made by the District to meter each unit individually when reasonably possible to do so and this determination by the District is final.

Continuance of service is dependent on compliance with the District's regulations governing service, and on conditions at the location of the service remaining unchanged to the extent that they do not conflict with the District's requirements for obtaining service. Where a change in conditions at the location of the service makes a customer ineligible for continued service, the customer concerned shall be responsible for promptly notifying the District in writing of the change.

Applicants for service shall pay all the applicable charges as provided in the Schedule of Rates and Charges, including the following:

- Account Establishment Charge
- Service Installation Charges
- Water Service Estimate Fee (if applicable)
- Water Main Extension Charges (if required)
- System Capacity Charge
- Charges for Annexation (if applicable)
- Wastewater Capacity Fee (if applicable)

Applicants shall provide all information determined by the District necessary to establish conditions at the location of service. This information can include, but not be limited to:

- Property descriptions
- Improvement plans, including certification of subgrade elevation
- Information regarding soils and known contaminated soil conditions
- Environmental documentation
- Fire flow form signed by responsible fire agency

SECTION 2

APPLYING FOR SERVICE
(continued)

- Topographical map(s)
- Development and site plans with hydrant locations identified and signed by the responsible fire department (if applicable)
- Hydraulic calculations for proposed fire sprinkler system (if applicable)

AMORTIZATION OF CONNECTION AND INSTALLATION FEES

Applicants for service that satisfy the criteria set forth below may make written application to the District to amortize the payment of water service installation charges (Schedules D and E), water main extension charges (Schedule G), system capacity charges (Schedule J) and wastewater capacity fees, pursuant to the following terms and conditions:

- The amount amortized shall be at least $5,000 but not more than $150,000.
- Applicant shall pay in advance a minimum of 25% of the estimated cost to provide the new service connection.
- Applicant shall enter into an agreement with the District which provides that:

  a. amortized charges that shall be paid in equal installments over a maximum period of 24 months;
  b. interest shall be applied to the balance due at a rate set by the Director of Finance;
  c. water service may be terminated for failure to pay any installment when due;
  d. repayment of the amortized charges shall be secured by real property owned by applicant and District shall have the right of foreclosure by a power of sale;
  e. applicant shall pay all escrow and title search costs incurred.

- Applicant shall execute deeds of trust which shall constitute a lien upon real property interests described therein, which property shall be situated in California and shall be sufficient to secure repayment of the amortized charges.

<u>Applicant Criteria</u>

I. Applicants providing job training in District job skills.

In order to make application to amortize charges pursuant to this section, the applicant must:

a. make written application to the District for water service;
b. have tax-exempt status under Internal Revenue Code section 501(c)3;
c. provide job training, including job skills utilized in District job classifications, to unemployed individuals; and
d. own and occupy the property for which water service application is made.

SECTION 2

APPLYING FOR SERVICE
(continued)

II. Applicants providing low income housing incorporating water conserving devices and landscaping.

In order to make application to amortize charges pursuant to this section, the applicant must:

- be organized solely for the purpose of constructing low income housing;
- provide evidence of eligibility for Community Development Block Grant (CDBG) assistance;
- own the property for which water service is requested;
- seek to amortize charges related to providing water service to a low-income housing project that:

  i) is restricted to such use for at least 15 years or such other time specified or required by law; and

  ii) will provide rental units for low-income residents or, if intended for ownership, will be owner-occupied units for low-income residents.

- incorporate water conservation features, beyond those required by law, into the design of the project and install and maintain water conserving landscaping approved by the District; and
- specify the cost benefit that will inure to residents of the project.

For purposes of this section, “housing” and “low-income housing” shall have the following meaning:

- Housing is defined to include rental housing, condominiums, cooperative housing, ownership housing, housing for families, senior housing, housing for physically and/or mentally disabled people, emergency shelters and shared housing.

- Low-income housing is defined as housing which is subsidized in whole or in part by one or more governmental agencies or foundations and which is rented or owned by individuals or families whose incomes are within ranges specified as low-income by the U.S. Department of Housing and Urban Development for Alameda and Contra Costa Counties.

III. In addition to the above criteria, applicants must make written application to the District for water service and provide evidence of tax-exempt status under Internal Revenue Code section 501(c)(3).

SECTION 3

STANDARD SERVICE

SERVICE CONNECTION EXISTS AT TIME APPLICATION RECEIVED

A standard service may be granted where a complete service connection for the premises exists, there is no change in the use of the premises, the service has been active within the previous five years, there is no change in service size, and the District's requirements are met as stated in these regulations (see Section 2, Applying for Service and Section 31 – Water Efficiency Requirements). In such cases, if sufficient advance notice is furnished to the District, the service will be turned on at the meter on the date requested by the customer, except Saturdays, Sundays, and holidays.

All requirements established for the existing service connection shall remain in effect, including the requirement for a pressure regulator or backflow prevention device.

SERVICE CONNECTION DOES NOT EXIST AT TIME APPLICATION RECEIVED

When an application is received for a standard service to premises where a service connection does not exist, or the existing service connection is inadequate, as determined by the District, a standard service may be granted and installed provided the applicant meets the District's general requirements as stated elsewhere in these regulations, and:

1. Service is reasonably available at the premises to be served.

2. The size of the service connection is approved by the District.

3. The applicable District charges have been paid.

4. The applicant agrees to install a pressure regulator or backflow prevention device when required by the District.

5. There is an immediate need for water service to the premises.

6. The applicant agrees to meter the development as specifically approved by the District.

If service is not reasonably available or if unusual conditions exist, the applicant will be advised of the terms and conditions which must be met before an application for service will be accepted.

Additional requirements for nonpotable water service are included in Sections 30 and 31 of these regulations.

SECTION 3

STANDARD SERVICE
(continued)

In circumstances under which the District anticipates unusual conditions, the applicant shall pay installation charges based on the District's estimate of the total cost of all materials, labor and other costs incidental to the installation. Unusual conditions shall exist when, in the opinion of the District, the installation is to be made under conditions which would result in unusual or significant departure from the basic installation charges set forth in the Schedule of Rates and Charges to Customers. Such circumstances shall include, but not be limited to, the length of the lateral, the type of pavement, anticipated soil or other underground conditions, and the width or travel conditions of the roadway or right-of-way.

Water service will generally be made available by extending a main if the premises to be served does not have principal frontage on an existing water main of adequate flow and pressure (See Section 4). However, water service will not be provided by the extension of a water main where the meter(s) for the premises concerned will be located at an elevation of less than 100 feet below the overflow level of the reservoir supplying such main.

EXCEPTIONS

TEMPORARY CONSTRUCTION SERVICE

The District may grant a temporary construction service where it is expected that the service will be in use for a short period to serve a temporary operation not related to any particular premises. In such cases, the appropriate installation and system capacity charges set forth in the Schedule of Rates and Charges shall be paid in advance and billing at the current rate for a standard service shall apply.

INSTALLATION OF SERVICES CONNECTIONS IN NEW SUBDIVISIONS

Under special conditions the District may install a service connection without the meter in advance of actual need to avoid later cutting of pavement or for other reasons. In such cases, the appropriate installation charges set forth in the Schedule of Rates and Charges shall be paid in advance, but billing procedure shall not apply as the service will not be turned on until a standard service is required and approved by the District. The System Capacity Charge shall be paid in accordance with the provisions of Section 3B. If the service connection is not completed by a request for meter installation and turned on within one year of installation of the connection, the District may determine there is no immediate need for water service and may remove the service connection. Regardless of whether the service connection was removed, to establish service a new service application will be required under the Regulations and Schedule of Rates and Charges then in effect.

SECTION 3

STANDARD SERVICE
(continued)

STREET LANDSCAPING SERVICE

The District may grant a street landscaping service for planting strips or areas which lie within public streets and are devoted to and maintained for landscaping and related purposes by the public agency having jurisdiction over the streets. In such cases, the planting strip or area may be considered a single unit for the purposes of receiving, using and paying for service regardless of its division or intersection by other public streets. The District shall approve the size and location of the service and the distance or area which may constitute a single unit. The appropriate installation and system capacity charge set forth in the Schedule of Rates and Charges shall be paid, and billing at the current rate for a standard service shall apply. Additional requirements for nonpotable and potable water service are contained in Sections 30 and 31 of these regulations.

COMBINATION STANDARD AND FIRE SERVICE

The District may grant a service to provide both standard service and a supply to a private fire protection system for a single-family premises or a multi-family premises of two units. A separate fire service connection is required for service to a private fire protection system at all other premises except the following:

1. New service or the enlargement of existing connections required for large area premises with public or private educational facilities and publicly-owned facilities served with combined standard and fire service.

2. Service to multi-family residential premises when it is determined by the District that a combined service connection is acceptable for metering normal water use and is approved by the responsible fire protection agency.

3. Service to group homes or residential facilities when it is determined by the District that a combined service connection is acceptable for metering normal water use and is approved by the responsible fire protection agency.

Except for the System Capacity Charge as provided in Schedule J, the rates and charges pertaining to the service shall be based on actual meter size.

IRRIGATION METERING

A separate irrigation meter shall be required for all new (residential and nonresidential) irrigated landscaping covering an area of 5,000 square feet or more, except as provided in Section 31 of these regulations.

SECTION 3

STANDARD SERVICE
(continued)

BRANCH METERING

The District may grant two or more standard services from a single service connection for a premises other than a single-family premises. The appropriate installation charge set forth in the Schedule of Rates and Charges shall be paid.

MASTER METERING

Each separate structure of a premises shall be separately metered.

The District may grant a single service to a premises with two or more dwelling units and or commercial/industrial units such as a residential or commercial condominium project, provided all the following conditions are met:

1. The property to be served must be in single ownership, including streets containing the owner's water service pipelines. Where dwelling units are individually owned, the property surrounding the structures must be in single common ownership under a residents or homeowners association.

2. There must be a resident manager for the property who will be responsible for maintaining the private water system beyond the master meter and for payment of all water service charges.

3. The applicant must furnish a written statement from the fire district or other public agency with jurisdiction, indicating its acceptance of the proposed arrangement for providing fire flow, and that the liability for supplying water for fire protection rests solely with the property owner responsible for the private water system.

4. It has been determined by the District that individual metering of each unit is not feasible in accordance with Section 2 of these regulations

SERVICE CONNECTION NOT AT THE PRINCIPAL FRONTAGE

In certain unusual circumstances, the District may locate a conditional service connection for a premises at other than the principal frontage provided:

- service is reasonably available at that location,
- the principal frontage must be on a private road or driveway and set back no more than 150 feet from the service connection,

SECTION 3

STANDARD SERVICE
(continued)

- there is only one premises which would be so served,
- there is no apparent possibility of further extension to serve other premises,
- there is no requirement for a fire hydrant,
- a main extension for adjacent premises would not be required.

The owner(s) of the premises shall agree in writing to the conditions of service and to relocate the service and pay any applicable costs in the future, should standard service become available at the principal frontage. This agreement shall be a covenant against the premises to be served and shall run with the land, and will be recorded by the District.

SERVICE CONNECTION AT ALTERNATE MAJOR FRONTAGE

The District may locate the service connection for a premises at that part of the perimeter immediately adjacent to a street or road of general public access, where a water main exists or may be installed, even though it is not the normal vehicle access to the property and provided that the fire hydrant location in relation to the premises is acceptable to the responsible fire protection agency.

The District may locate the service connection(s) for a multi-family residential unit(s) or multi-occupancy commercial/industrial unit(s) at that part of the perimeter immediately adjacent to a street or road of general public access in a development where individual metering of all multi-family residential or multi-occupancy commercial/industrial unit(s) has been determined to be feasible in the sole discretion of the District in accordance with Section 2 of these Regulations.

SECTION 29

PROHIBITING WASTEFUL USE OF WATER

A. REGULATIONS AND RESTRICTIONS ON WATER USE

It is hereby declared by the Board of Directors that in order to conserve the District's water supply for the greatest public benefit, and to reduce the quantity of water used by the District's customers, that wasteful use of water should be eliminated. Customers of the District shall observe the following regulations and restrictions on water use:

1. Residential Customers shall:

   a. Use water for lawn or gardening watering, or any other irrigation, in a manner which does not result in excessive flooding or runoff in gutters or other waterways, patios, driveways, walks or streets;

   b. Use water for washing sidewalks, walkways, driveways, patios, parking lots, tennis courts or other hard-surfaced areas in a manner which does not result in excessive runoff or waste;

   c. Use water for washing cars, boats, trailers or other vehicles and machinery, preferably from a hose equipped with a shutoff nozzle, in a manner which does not result in excessive runoff or waste;

   d. Reduce other interior or exterior uses of water to minimize or eliminate excessive runoff or waste; and

   e. Repair leaks wherever feasible.

2. Nonresidential Customers shall:

   a. Use systems which recycle water where feasible; Single pass cooling systems in new connections, non-recirculating systems in all new conveyer car wash and commercial laundry systems, and non-recycling decorative water fountains shall be prohibited;

   b. Use water for lawn or garden watering, or any other irrigation, in a manner which does not result in excessive flooding or runoff in gutters or other waterways, patios, driveways, walks or streets;

   c. Use water for washing sidewalks, walkways, driveways, patios, parking lots, tennis courts or other hard-surfaced areas in a manner which does not result in excessive runoff or waste;

   d. Limit sewer flushing or street washing with District water as much as possible, consistent with public health and safety needs; and

PROHIBITING WASTEFUL USE OF WATER
(Continued)

2. Nonresidential Customers shall (Continued):

   e. Reduce other interior or exterior water uses to minimize or eliminate excessive runoffs or waste; and

   f. Repair leaks wherever feasible.

B. EXCEPTIONS

Consideration of written applications for exceptions regarding regulations and restrictions on water use set forth in this Section shall be as follows:

1. Written applications for exceptions shall be accepted, and may be granted, by the Manager of the Customer Service Division.

2. Denials of applications may be appealed in writing to the General Manager;

3. Grounds for granting such applications are:

   a. Failure to do so would cause an unnecessary and undue hardship to the Applicant, including, but not limited to, adverse economic impacts, such as loss of production or jobs; or

   b. Failure to do so would cause a condition affecting the health, sanitation, fire protection or safety of the Applicant or the public.

C. ENFORCEMENT

1. The District may, after one written warning, order that a special meter reading or readings be made in order to ascertain whether wasteful use of water is occurring. Charges for such a meter reading or readings or for follow-up visits by District staff shall be fixed by the Board from time to time and shall be paid by the customer.

2. In the event that the District observes that apparently excessive water use is occurring at a customer's premises, the General Manager or the Manager of Administration may, after a written warning to the customer, authorize installation of a flow-restricting device on the service line for any customer observed by District personnel to be willfully violating any of the regulations and restrictions on water use set forth in this section.

3. In the event that a further willful violation is observed by District personnel, the District may discontinue service. Charges for installation of flow-restricting devices or for restoring service may be fixed by the Board from time to time.

SECTION 31

WATER EFFICIENCY REQUIREMENTS

These regulations identify the types of water efficiency requirements for water service and the procedure for notification to Applicants that water efficiency measures are required.

A. DETERMINATION OF FEASIBILITY OF WATER EFFICIENCY MEASURES

The District will review applications for new standard services and determine the applicability of, and compliance with, water-efficiency requirements. Applicants for expanded service may be required to retrofit existing water service facilities or uses to comply with these requirements. Applicant shall maintain design documents and construction and installation records and furnish a copy of said documents and records to the District upon request. The District may inspect the installation of water efficiency measures to verify that the items are installed and performing to the required water use levels. The Applicant or their representative may be present during any District inspection.

B. WATER EFFICIENCY REQUIREMENTS FOR NEW DEVELOPMENT OR EXPANDED SERVICE

Water service shall not be furnished to any Applicant for new or expanded service unless all the applicable water-efficiency measures hereinafter described in this Section 31 have been reviewed and approved by the District. All the applicable and required water-efficiency measures shall be installed at Applicant expense.

C. RESIDENTIAL SERVICE

1. Indoor Water Use (All Applicants)

a. Toilets shall be high-efficiency or dual flush models rated and (third party) tested at a maximum average flush volume of 1.28 gallons per flush (gpf), and be certified as passing a 350 gram or higher flush test as established by the U.S. Environmental Protection Agency WaterSense Specification or other District-accepted third party testing entity. No flush or conversion devices of any other kind shall be accepted.

b. Showerheads shall be individually plumbed and have a maximum rated flow of 2.5 gallons per minute or less and be limited to one showerhead per shower stall of 2,500 sq. inches in area or less. Installation of flow restrictors in existing showerheads does not satisfy this requirement.

c. Lavatory faucets shall have aerators or laminar flow control devices (i.e. orifices) with a maximum rated flow of 1.5 gallons per minute or less.

d. Kitchen faucets shall have aerators or laminar flow control devices (i.e. orifices) with a maximum rated flow of 2.2 gallons per minute or less.

SECTION 31

WATER EFFICIENCY REQUIREMENTS
(continued)

e. Clothes washing machines shall be front loading horizontal axis or top loading models with both: (1) a water factor rating of 6.0 or less. A water factor rating of 6.0 means a maximum average water use of 6.0 gallons per cubic foot of laundry.

f. Dishwashers rated as standard size (i.e. 324 kWh/year) shall use less than or equal to 5.8 gallons/cycle. Dishwashers rated as compact size (i.e. 234 kWh/year) shall use less than or equal to 4.0 gallons/cycle.

2. Outdoor Water Use (All applicants except as noted below)

a. Landscaping.

i. Plans with design details including plants, irrigation, grading and hydrozones shall be submitted to the District for review and approval by District for compliance with these Regulations prior to planting. Landscaping shall be designed to be less than or equal to the maximum allowable landscape irrigation requirement to maintain a functional, healthy landscape and shall not exceed 70% of the reference evapotranspiration (the amount of water required to maintain a healthy landscape accounting for the evaporation of water from the soil surface and the transpiration of water through the plant foliage) for the irrigated area. Recreational turf landscaping shall be designed to be irrigated at no more than 100% of the reference evapotranspiration. Applicants with less than three residential units shall be required to complete a check list provided by the District in lieu of a detailed landscaping plan.

ii. Ornamental Turf areas shall be limited to no more than 25% of the total irrigated area. Exceptions may be granted, in the sole discretion of the District, when using drought tolerant grasses and for approved recreational areas. Turf is not permitted in areas or medians less than eight feet in width. These provisions do not apply to applicants with less than three residential units.

iii. Non-turf areas. At least 80% of the plant area shall be native or climate-appropriate low water use species and require minimal water once established. Up to 20% of the plant area may be of a non-drought tolerant variety as long as they are appropriately grouped together and irrigated separately and efficiently.

iv. Mulch: A minimum 2 inch layer of mulch shall be specified for non-turf planting areas unless there is a horticultural reason not to mulch.

SECTION 31

WATER EFFICIENCY REQUIREMENTS
(continued)

b. Irrigation.

i. Irrigation Efficiency. Irrigation systems shall be designed, installed and operated to avoid overspray and runoff and to meet the maximum allowable landscape irrigation requirement to maintain a functional, healthy landscape and shall not exceed 70% of the reference evapotranspiration (the amount of water required to maintain a healthy landscape accounting for the evaporation of water from the soil surface and the transpiration of water through the plant foliage) for the irrigated area. These provisions do not apply to applicants with less than three residential units.

ii. Automatic, self-adjusting irrigation controllers shall be required on all irrigation systems and shall automatically activate and deactivate the irrigation system based on changes in the climate or soil moisture. All automatic irrigation systems shall be equipped with a rain sensor shutoff. Applicants with less than three residential units are not required to install weather-based controllers.

iii. Overhead sprinklers and spray heads shall not be permitted in areas less than eight feet wide. All sprinklers shall have matched precipitation rates within each control valve and circuit. Landscape design best practices shall include distribution uniformity, head-to-head spacing and setbacks from walkways and pavement.

iv. Valves and circuits shall be separated (individual hydrozones) based on plant material and water need.

v. Dedicated Irrigation Meter shall be required for irrigated landscaping of 5,000 square feet or more.

c. Swimming Pools and Spas.

i. Covers shall be required for all pool and spa water features.

D. NONRESIDENTIAL SERVICE (including Residential Common Area)

1. Indoor Plumbing

a. Toilets shall be high-efficiency or dual flush models rated and (third-party) tested at a maximum average flush volume of 1.28 gallons per flush (gpf), and be certified as passing a 350 gram or higher flush test as established by the U.S. Environmental Protection Agency WaterSense Specification or other District-accepted third party testing entity. Pressure-assisted type toilets shall be high-efficiency rated at a maximum 1.0 gpf. No flush or conversion devices of any other kind shall be accepted.

SECTION 31

WATER EFFICIENCY REQUIREMENTS
(continued)

b. Urinals shall have a maximum rated flow of 0.5 gpf or less, or be zero water consumption urinals.

c. Showerheads shall be individually plumbed and have a maximum rated flow of 2.5 gallons per minute or less, and be limited to one showerhead per shower stall of 2,500 sq. inches in area or less. Installation of flow restrictors in existing showerheads does not satisfy this requirement.

d. Lavatory faucets shall have aerators or laminar flow control devices (i.e. orifices) with a maximum rated flow of 1.5 gallons per minute or less.

e. Kitchen faucets shall have aerators or laminar flow control devices (i.e. orifices) with a maximum rated flow of 2.2 gallons per minute or less.

f. Laundry washing machines shall be front loading horizontal axis or top loading models with both: (1) a maximum water factor rating of 6.0 or less. A water factor of 6.0 means a maximum average water use of 6.0 gallons per cubic foot of laundry or less.

g. Cooling towers not utilizing recycled water shall be equipped with recirculating systems and operate at a minimum of five (5) cycles of concentration. Newly constructed cooling towers shall be operated with conductivity controllers, as well as make up and blowdown meters.

h. Food steamers in all food service facilities shall be boiler less or self-contained models where applicable.

i. Ice machines shall be air-cooled or use no more than 25 gallons of water per 100 pounds of ice and shall be equipped with a recirculating cooling unit.

j. Commercial refrigeration shall be air-cooled or if water-cooled, must have a closed looped system. No once through, single pass systems are permitted.

k. Pre-Rinse Dishwashing Spray Valves shall have a maximum rated flow of 1.6 gpm or less.

l. Vehicle wash facilities shall reuse a minimum of 50% of water from previous vehicle rinses in subsequent washes.

SECTION 31

WATER EFFICIENCY REQUIREMENTS
(continued)

2. Outdoor Water Use

a. Landscaping.

i. Plans with design details including plants, irrigation, grading and hydrozones shall be submitted to the District for review and approval by District for compliance with these Regulations prior to planting. Landscaping shall be designed to be less than or equal to the maximum allowable landscape irrigation requirement to maintain a functional, healthy landscape and shall not exceed 70% of the reference evapotranspiration (the amount of water required to maintain a healthy landscape accounting for the evaporation of water from the soil surface and the transpiration of water through the plant foliage) for the irrigated area. Recreational turf landscaping shall be designed to be irrigated at no more than 100% of the reference evapotranspiration.

ii. Ornamental Turf areas shall be limited to no more than 25% of the total irrigated area. Exceptions may be granted, in the sole discretion of the District, when using drought tolerant grasses and for approved recreational areas such as sports fields, parks and picnic grounds. Turf is not permitted in areas or medians less than eight feet in width.

iii. Non turf areas. At least 80% of the plant area shall be native or climate-appropriate low water use species and require minimal water once established. Up to 20% of the plant area may be of a non-drought tolerant variety as long as they are appropriately grouped together and irrigated separately and efficiently.

b. Irrigation.

i. Irrigation Efficiency. Irrigation systems shall be designed, installed and operated to avoid overspray and runoff and to meet the maximum allowable landscape irrigation requirement to maintain a functional, healthy landscape and shall not exceed 70% of the reference evapotranspiration (the amount of water required to maintain a healthy landscape accounting for the evaporation of water from the soil surface and the transpiration of water through the plant foliage) for the irrigated area.

ii. Automatic, self-adjusting irrigation controllers shall be required on all irrigation systems and shall automatically activate and deactivate the irrigation system based on changes in climate or soil moisture. All automatic irrigation systems shall be equipped with a rain sensor shutoff.

SECTION 31

WATER EFFICIENCY REQUIREMENTS
(continued)

iii. Overhead sprinklers and spray heads shall not be permitted in areas less than eight feet wide. All sprinklers shall have matched precipitation rates within each control valve and circuit. Landscape design best practices shall include distribution uniformity, head-to-head spacing, and setbacks from walkways and pavement.

iv. Valves and circuits shall be separated (individual hydrozones) based on plant material and water need.

v. Dedicated Irrigation Meter shall be required for irrigated landscaping of 5,000 square feet or more.

vi. Mulch: A minimum 2 inch layer of mulch shall be specified for non-turf planting areas unless there is a horticultural reason not to mulch.

E. PENALTIES/CONSEQUENCES

Failure of Applicant to conform to this Regulation and these water-efficiency requirements stated herein may result in:

1. A requirement to resubmit water service application and water-efficiency plan at Applicant's expense until District approves water service.

2. District's inability to release water meter(s) for installation and inability to activate account until water-efficiency plan is approved by District.

SCHEDULE OF RATES AND CHARGES TO CUSTOMERS OF THE EAST BAY MUNICIPAL UTILITY DISTRICT

PAGE NUMBER 1-A

EFFECTIVE 07/01/11

SCHEDULE A

RATE SCHEDULE FOR WATER SERVICE

The following rates apply to water service received inside and outside District boundaries unless otherwise indicated.

A. ONE MONTH BILLING

Bills for all metered services shall consist of:

FIRST - A SERVICE CHARGE and A SEISMIC IMPROVEMENT PROGRAM SURCHARGE based on the size of a standard meter:

SIZE	SERVICE CHARGE AMOUNT	SEISMIC IMPROVEMENT SURCHARGE
5/8 and 3/4 inch meters.....	$11.54	$1.08
1 inch meter	18.55	2.71
1-1/2 inch meter	29.91	5.41
2 inch meter	43.69	8.65
3 inch meter	75.84	16.21
4 inch meter	121.76	27.01
6 inch meter	236.58	54.03
8 inch meter	374.36	86.43
10 inch meter	535.10	124.25
12 inch meter	741.77	172.86
14 inch meter	948.44	221.49
16 inch meter	1,201.03	280.91
18 inch meter	1,453.63	340.33

The service charge and seismic improvement program surcharge for a special type of meter or for a battery of meters installed on one service in lieu of one meter will be based on the size of a single standard meter of equivalent capacity as determined by the District.

The seismic improvement program surcharge is effective on each potable water bill through February 28, 2025. The seismic improvement program surcharge shall not be applied to nonpotable water service.

Effective July 1, 1997, when a meter larger than 4 inches is required for a single-family residential customer in order to maintain adequate water pressure, the maximum service charge amount and seismic improvement surcharge shall be set at the 4-inch meter level.

AUTHORITY-RESOLUTION NUMBER 33822-11

SCHEDULE OF RATES AND CHARGES TO CUSTOMERS OF THE EAST BAY MUNICIPAL UTILITY DISTRICT

PAGE NUMBER 1-B

EFFECTIVE 07/01/11

SCHEDULE A

RATE SCHEDULE FOR WATER SERVICE

A. ONE MONTH BILLING (Continued)

SECOND - A SEISMIC IMPROVEMENT SURCHARGE for each Single Family Residential or Multiple Family Residential account.

	SEISMIC IMPROVEMENT SURCHARGE PER ACCOUNT
Single Family Residential Accounts	$1.08
Multiple Family Residential Accounts	5.08

THIRD - A CHARGE FOR WATER DELIVERED and A SEISMIC IMPROVEMENT PROGRAM SURCHARGE based on one month meter readings for all water delivered per 100 cu. ft.:

	WATER DELIVERED CHARGE PER 100 CU. FT.	SEISMIC IMPROVEMENT SURCHARGE PER 100 CU. FT.
INSIDE DISTRICT BOUNDARIES		
Potable Water Service		
Single Family Residential Accounts:		
For the first 172 gpd	$2.28	$--
For all water used in excess of 172 gpd, up to 393 gpd	2.83	--
For all water used in excess of 393 gpd	3.47	--
Multiple Family Residential Accounts:		
For all water used	2.89	--
All Other Water Use:		
For all water used	2.99	.12

All individually metered multi-family dwelling units or individually metered mobile home residential units that receive District service shall be billed at the single family residential rate.

The seismic improvement program surcharge is effective on each potable water bill through February 28, 2025. The seismic improvement program surcharge shall not be applied to nonpotable water service.

AUTHORITY-RESOLUTION NUMBER 33822-11

SCHEDULE OF RATES AND CHARGES TO CUSTOMERS OF THE EAST BAY MUNICIPAL UTILITY DISTRICT

PAGE NUMBER 1-C

EFFECTIVE 07/01/11

SCHEDULE A

RATE SCHEDULE FOR WATER SERVICE

A. ONE MONTH BILLING (Continued)

	WATER DELIVERED CHARGE PER 100 CU. FT.
Nonpotable Water Service	
For all water used	$2.49

Nonpotable Water Use Incentive Rate

A customer for whom the District has determined, pursuant to Section 30 of the Water Service Regulations, that the provision of nonpotable water service is feasible and to whom the District has issued written notification that specifies a date by which the customer site must be ready to accept nonpotable water service, shall ready the site by the date specified or pay the Nonpotable Water Use Incentive Rate for all potable water used during the period of noncompliance. The Nonpotable Water Use Incentive Rate shall be charged at a rate 20 percent higher than the applicable potable water rate.

OUTSIDE DISTRICT BOUNDARIES

Charge per 100 cu. ft. will be twice the charge applicable for inside District Boundaries.

AUTHORITY-RESOLUTION NUMBER 33822-11

SCHEDULE OF RATES AND CHARGES TO CUSTOMERS OF THE EAST BAY MUNICIPAL UTILITY DISTRICT

PAGE NUMBER 1-D

EFFECTIVE 07/01/11

SCHEDULE A

RATE SCHEDULE FOR WATER SERVICE

B. TWO MONTH BILLING

Bills for all metered services shall consist of:

FIRST - A SERVICE CHARGE and A SEISMIC IMPROVEMENT PROGRAM SURCHARGE based on the size of a standard meter:

SIZE	SERVICE CHARGE AMOUNT	SEISMIC IMPROVEMENT SURCHARGE
5/8 and 3/4 inch meters	$23.08	$2.16
1 inch meter	37.10	5.42
1-1/2 inch meter	59.82	10.82
2 inch meter	87.38	17.30
3 inch meter	151.68	32.42
4 inch meter	243.52	54.02
6 inch meter	473.16	108.06
8 inch meter	748.72	172.86
10 inch meter	1,070.20	248.50
12 inch meter	1,483.54	345.72
14 inch meter	1,896.88	442.96
16 inch meter	2,402.06	561.82
18 inch meter	2,907.26	680.66

The service charge and seismic improvement program surcharge for a special type of meter or for a battery of meters installed on one service in lieu of one meter will be based on the size of a single standard meter of equivalent capacity as determined by the District.

The seismic improvement program surcharge is effective on each potable water bill through February 28, 2025. The seismic improvement program surcharge shall not be applied to nonpotable water service.

Effective July 1, 1997, when a meter larger than 4 inches is required for a single-family residential customer in order to maintain adequate water pressure, the maximum service charge amount and seismic improvement surcharge shall be set at the 4-inch meter level.

SECOND - A SEISMIC IMPROVEMENT SURCHARGE for each Single Family Residential or Multiple Family Residential account.

AUTHORITY-RESOLUTION NUMBER 33822-11

SCHEDULE OF RATES AND CHARGES TO CUSTOMERS OF THE EAST BAY MUNICIPAL UTILITY DISTRICT

PAGE NUMBER 1-E

EFFECTIVE 07/01/11

SCHEDULE A

RATE SCHEDULE FOR WATER SERVICE

B. TWO MONTH BILLING (Continued)

	SEISMIC IMPROVEMENT CHARGE PER ACCOUNT
Single Family Residential Accounts	$2.16
Multiple Family Residential Accounts	10.16

THIRD - A CHARGE FOR WATER DELIVERED and A SEISMIC IMPROVEMENT PROGRAM SURCHARGE based on two month meter readings for all water delivered per 100 cu. ft.

	WATER DELIVERED CHARGE PER 100 CU. FT.	SEISMIC IMPROVEMENT SURCHARGE PER 100 CU. FT.
INSIDE DISTRICT BOUNDARIES		
Potable Water Service		
Single Family Residential Accounts:		
For the first 172 gpd	$2.28	$--
For all water used in excess of 172 gpd, up to 393 gpd	2.83	--
For all water used in excess of 393 gpd	3.47	--
Multiple Family Residential Accounts:		
For all water used	2.89	--
All Other Water Use:		
For all water used	2.99	.12

All individually metered multi-family dwelling units or individually metered mobile home residential units that receive District service shall be billed at the single family residential rate.

The seismic improvement program surcharge is effective on each potable water bill through February 28, 2025. The seismic improvement program surcharge shall not be applied to nonpotable water service.

AUTHORITY-RESOLUTION NUMBER 33822-11

SCHEDULE OF RATES AND CHARGES TO CUSTOMERS OF THE EAST BAY MUNICIPAL UTILITY DISTRICT

PAGE NUMBER 1-F

EFFECTIVE 07/01/11

SCHEDULE A

RATE SCHEDULE FOR WATER SERVICE

B. TWO MONTH BILLING (Continued)

	WATER DELIVERED CHARGE PER 100 CU. FT.
Nonpotable Water Service	
For all water used	$2.49

Nonpotable Water Use Incentive Rate

A customer for whom the District has determined, pursuant to Section 30 of the Water Service Regulations, that the provision of nonpotable water service is feasible and to whom the District has issued written notification that specifies a date by which the customer site must be ready to accept nonpotable water service, shall ready the site by the date specified or pay the Nonpotable Water Use Incentive Rate for all potable water used during the period of noncompliance. The Nonpotable Water Use Incentive Rate shall be charged at a rate 20 percent higher than the applicable potable water rate.

OUTSIDE DISTRICT BOUNDARIES

Charge per 100 cu. ft. will be twice the charge applicable for inside District Boundaries.

AUTHORITY-RESOLUTION NUMBER 33822-11

SCHEDULE OF RATES AND CHARGES TO CUSTOMERS OF THE EAST BAY MUNICIPAL UTILITY DISTRICT

PAGE NUMBER 1-G

EFFECTIVE 07/01/11

SCHEDULE A

RATE SCHEDULE FOR WATER SERVICE

C. EXCEPTION TO TWO MONTH BILLING

Except as provided below, customer accounts will be subject to bi-monthly meter reading and customer billing schedules.

- Accounts for which the average monthly bill is estimated to exceed $1500; such account will be billed monthly.
- Accounts for which there are reasonable and justifiable customer requests for monthly billing.
- Accounts for which the average monthly bill is estimated to be between $100 and $1500, and the customer service manager recommends monthly billing based on an evaluation of credit and/or collection problems.

D. PRIVATE FIRE SERVICES

Effective July 1, 2005, the rates for Private Fire Services shall consist of:

FIRST - A MONTHLY SERVICE CHARGE and A SEISMIC IMPROVEMENT PROGRAM SURCHARGE based on the size of a standard meter:

SIZE	SERVICE CHARGE AMOUNT	SEISMIC IMPROVEMENT SURCHARGE
5/8 and 3/4 inch meters.....	$9.75	$1.08
1 inch meter	14.00	2.71
1-1/2 inch meter	20.92	5.41
2 inch meter	29.31	8.65
3 inch meter	48.88	16.21
4 inch meter	76.82	27.01
6 inch meter	146.67	54.03
8 inch meter	230.52	86.43
10 inch meter	328.34	124.25
12 inch meter	454.09	172.86
14 inch meter	579.84	221.49
16 inch meter	733.55	280.91
18 inch meter	887.26	340.33

AUTHORITY-RESOLUTION NUMBER 33822-11

SCHEDULE OF RATES AND CHARGES TO CUSTOMERS OF THE EAST BAY MUNICIPAL UTILITY DISTRICT

PAGE NUMBER 1-H

EFFECTIVE 07/01/11

SCHEDULE A

RATE SCHEDULE FOR WATER SERVICE

D. PRIVATE FIRE SERVICES (Continued)

The seismic improvement program surcharge is effective on each potable water bill through February 28, 2025. The seismic improvement program surcharge shall not be applied to nonpotable water service.

Effective July 1, 1997, when a meter larger than 4 inches is required for a single-family residential customer in order to maintain adequate water pressure, the maximum service charge amount and seismic improvement surcharge shall be set at the 4-inch meter level.

SECOND - A CHARGE FOR WATER DELIVERED based on two-month meter readings for all water delivered per 100 cu. ft.:

There shall be no charge for water used through such services extinguishing accidental fires, but any water lost through leakage or used in violation of the District's Regulations shall be paid for at double the rate for general use.

E. ELEVATION SURCHARGE

Elevation Designator	AMOUNT PER 100 CU. FT.
0 and 1	$0.00
2 through 5	0.43
6 and greater	0.88

Elevation surcharge is determined by the pressure zone in which the service connection is located. Pressure zones are identified by designations which include an elevation designator.

F. SUPPLEMENTAL SUPPLY SURCHARGE

Potable Water Service	Surcharge Amount
All potable water customer accounts	14% of the total Charge for Water Delivered for the Billing Period

The supplemental supply surcharge is effective on each potable water bill after the District Board declares a need to use the Freeport Project to deliver supplemental supplies from outside of the District's normal watershed. The supplemental supply surcharge shall not be applied to nonpotable water service.

AUTHORITY-RESOLUTION NUMBER 33822-11

SCHEDULE OF RATES AND CHARGES TO CUSTOMERS OF THE EAST BAY MUNICIPAL UTILITY DISTRICT

PAGE NUMBER 1-A

EFFECTIVE 07/01/12

SCHEDULE A

RATE SCHEDULE FOR WATER SERVICE

The following rates apply to water service received inside and outside District boundaries unless otherwise indicated.

A. ONE MONTH BILLING

Bills for all metered services shall consist of:

FIRST - A SERVICE CHARGE and A SEISMIC IMPROVEMENT PROGRAM SURCHARGE based on the size of a standard meter:

SIZE	SERVICE CHARGE AMOUNT	SEISMIC IMPROVEMENT SURCHARGE
5/8 and 3/4 inch meters.....	$12.23	$1.14
1 inch meter	19.66	2.87
1-1/2 inch meter	31.70	5.73
2 inch meter	46.31	9.17
3 inch meter	80.39	17.18
4 inch meter	129.07	28.63
6 inch meter	250.77	57.27
8 inch meter	396.82	91.62
10 inch meter	567.21	131.71
12 inch meter	786.28	183.23
14 inch meter	1,005.35	234.78
16 inch meter	1,273.09	297.76
18 inch meter	1,540.85	360.75

The service charge and seismic improvement program surcharge for a special type of meter or for a battery of meters installed on one service in lieu of one meter will be based on the size of a single standard meter of equivalent capacity as determined by the District.

The seismic improvement program surcharge is effective on each potable water bill through February 28, 2025. The seismic improvement program surcharge shall not be applied to nonpotable water service.

Effective July 1, 1997, when a meter larger than 4 inches is required for a single-family residential customer in order to maintain adequate water pressure, the maximum service charge amount and seismic improvement surcharge shall be set at the 4-inch meter level.

AUTHORITY-RESOLUTION NUMBER 33822-11

SCHEDULE OF RATES AND CHARGES TO CUSTOMERS OF THE EAST BAY MUNICIPAL UTILITY DISTRICT

PAGE NUMBER 1-B

EFFECTIVE 07/01/12

SCHEDULE A

RATE SCHEDULE FOR WATER SERVICE

A. ONE MONTH BILLING (Continued)

SECOND - A SEISMIC IMPROVEMENT SURCHARGE for each Single Family Residential or Multiple Family Residential account.

	SEISMIC IMPROVEMENT SURCHARGE PER ACCOUNT
Single Family Residential Accounts	$1.14
Multiple Family Residential Accounts	5.38

THIRD - A CHARGE FOR WATER DELIVERED and A SEISMIC IMPROVEMENT PROGRAM SURCHARGE based on one month meter readings for all water delivered per 100 cu. ft.:

	WATER DELIVERED CHARGE PER 100 CU. FT.	SEISMIC IMPROVEMENT SURCHARGE PER 100 CU. FT.
INSIDE DISTRICT BOUNDARIES		
Potable Water Service		
Single Family Residential Accounts:		
For the first 172 gpd	$2.42	$--
For all water used in excess of 172 gpd, up to 393 gpd	3.00	--
For all water used in excess of 393 gpd	3.68	--
Multiple Family Residential Accounts:		
For all water used	3.06	--
All Other Water Use:		
For all water used	3.17	.13

All individually metered multi-family dwelling units or individually metered mobile home residential units that receive District service shall be billed at the single family residential rate.

The seismic improvement program surcharge is effective on each potable water bill through February 28, 2025. The seismic improvement program surcharge shall not be applied to nonpotable water service.

AUTHORITY-RESOLUTION NUMBER 33822-11

SCHEDULE OF RATES AND CHARGES TO CUSTOMERS OF THE EAST BAY MUNICIPAL UTILITY DISTRICT

PAGE NUMBER 1-C

EFFECTIVE 07/01/12

SCHEDULE A

RATE SCHEDULE FOR WATER SERVICE

A. ONE MONTH BILLING (Continued)

	WATER DELIVERED CHARGE PER 100 CU. FT.
Nonpotable Water Service	
For all water used	$2.64

Nonpotable Water Use Incentive Rate

A customer for whom the District has determined, pursuant to Section 30 of the Water Service Regulations, that the provision of nonpotable water service is feasible and to whom the District has issued written notification that specifies a date by which the customer site must be ready to accept nonpotable water service, shall ready the site by the date specified or pay the Nonpotable Water Use Incentive Rate for all potable water used during the period of noncompliance. The Nonpotable Water Use Incentive Rate shall be charged at a rate 20 percent higher than the applicable potable water rate.

OUTSIDE DISTRICT BOUNDARIES

Charge per 100 cu. ft. will be twice the charge applicable for inside District Boundaries.

AUTHORITY-RESOLUTION NUMBER 33822-11

SCHEDULE OF RATES AND CHARGES TO CUSTOMERS OF THE EAST BAY MUNICIPAL UTILITY DISTRICT

PAGE NUMBER 1-D

EFFECTIVE 07/01/12

SCHEDULE A

RATE SCHEDULE FOR WATER SERVICE

B. TWO MONTH BILLING

Bills for all metered services shall consist of:

FIRST - A SERVICE CHARGE and A SEISMIC IMPROVEMENT PROGRAM SURCHARGE based on the size of a standard meter:

SIZE	SERVICE CHARGE AMOUNT	SEISMIC IMPROVEMENT SURCHARGE
5/8 and 3/4 inch meters	$24.46	$2.28
1 inch meter	39.32	5.74
1-1/2 inch meter	63.40	11.46
2 inch meter	92.62	18.34
3 inch meter	160.78	34.36
4 inch meter	258.14	57.26
6 inch meter	501.54	114.54
8 inch meter	793.64	183.24
10 inch meter	1,134.42	263.42
12 inch meter	1,572.56	366.46
14 inch meter	2,010.70	469.56
16 inch meter	2,546.18	595.52
18 inch meter	3,081.70	721.50

The service charge and seismic improvement program surcharge for a special type of meter or for a battery of meters installed on one service in lieu of one meter will be based on the size of a single standard meter of equivalent capacity as determined by the District.

The seismic improvement program surcharge is effective on each potable water bill through February 28, 2025. The seismic improvement program surcharge shall not be applied to nonpotable water service.

Effective July 1, 1997, when a meter larger than 4 inches is required for a single-family residential customer in order to maintain adequate water pressure, the maximum service charge amount and seismic improvement surcharge shall be set at the 4-inch meter level.

SECOND - A SEISMIC IMPROVEMENT SURCHARGE for each Single Family Residential or Multiple Family Residential account.

AUTHORITY-RESOLUTION NUMBER 33822-11

SCHEDULE OF RATES AND CHARGES TO CUSTOMERS OF THE EAST BAY MUNICIPAL UTILITY DISTRICT

PAGE NUMBER 1-E

EFFECTIVE 07/01/12

SCHEDULE A

RATE SCHEDULE FOR WATER SERVICE

B. TWO MONTH BILLING (Continued)

	SEISMIC IMPROVEMENT CHARGE PER ACCOUNT
Single Family Residential Accounts	$2.28
Multiple Family Residential Accounts	10.76

THIRD - A CHARGE FOR WATER DELIVERED and A SEISMIC IMPROVEMENT PROGRAM SURCHARGE based on two month meter readings for all water delivered per 100 cu. ft.

	WATER DELIVERED CHARGE PER 100 CU. FT.	SEISMIC IMPROVEMENT SURCHARGE PER 100 CU. FT.
INSIDE DISTRICT BOUNDARIES		
Potable Water Service		
Single Family Residential Accounts:		
For the first 172 gpd	$2.42	$--
For all water used in excess of 172 gpd, up to 393 gpd	3.00	--
For all water used in excess of 393 gpd	3.68	--
Multiple Family Residential Accounts:		
For all water used	3.06	--
All Other Water Use:		
For all water used	3.17	.13

All individually metered multi-family dwelling units or individually metered mobile home residential units that receive District service shall be billed at the single family residential rate.

The seismic improvement program surcharge is effective on each potable water bill through February 28, 2025. The seismic improvement program surcharge shall not be applied to nonpotable water service.

AUTHORITY-RESOLUTION NUMBER 33822-11

SCHEDULE OF RATES AND CHARGES TO CUSTOMERS OF THE EAST BAY MUNICIPAL UTILITY DISTRICT

PAGE NUMBER 1-F

EFFECTIVE 07/01/12

SCHEDULE A

RATE SCHEDULE FOR WATER SERVICE

B. TWO MONTH BILLING (Continued)

	WATER DELIVERED CHARGE PER 100 CU. FT.
Nonpotable Water Service	
For all water used	$2.64

Nonpotable Water Use Incentive Rate

A customer for whom the District has determined, pursuant to Section 30 of the Water Service Regulations, that the provision of nonpotable water service is feasible and to whom the District has issued written notification that specifies a date by which the customer site must be ready to accept nonpotable water service, shall ready the site by the date specified or pay the Nonpotable Water Use Incentive Rate for all potable water used during the period of noncompliance. The Nonpotable Water Use Incentive Rate shall be charged at a rate 20 percent higher than the applicable potable water rate.

OUTSIDE DISTRICT BOUNDARIES

Charge per 100 cu. ft. will be twice the charge applicable for inside District Boundaries.

AUTHORITY-RESOLUTION NUMBER 33822-11

SCHEDULE OF RATES AND CHARGES TO CUSTOMERS OF THE EAST BAY MUNICIPAL UTILITY DISTRICT

PAGE NUMBER 1-G

EFFECTIVE 07/01/12

SCHEDULE A

RATE SCHEDULE FOR WATER SERVICE

C. EXCEPTION TO TWO MONTH BILLING

Except as provided below, customer accounts will be subject to bi-monthly meter reading and customer billing schedules.

- Accounts for which the average monthly bill is estimated to exceed $1500; such account will be billed monthly.
- Accounts for which there are reasonable and justifiable customer requests for monthly billing.
- Accounts for which the average monthly bill is estimated to be between $100 and $1500, and the customer service manager recommends monthly billing based on an evaluation of credit and/or collection problems.

D. PRIVATE FIRE SERVICES

Effective July 1, 2005, the rates for Private Fire Services shall consist of:

FIRST - A MONTHLY SERVICE CHARGE and A SEISMIC IMPROVEMENT PROGRAM SURCHARGE based on the size of a standard meter:

SIZE	SERVICE CHARGE AMOUNT	SEISMIC IMPROVEMENT SURCHARGE
5/8 and 3/4 inch meters.....	$10.34	$1.14
1 inch meter	14.84	2.87
1-1/2 inch meter	22.18	5.73
2 inch meter	31.07	9.17
3 inch meter	51.81	17.18
4 inch meter	81.43	28.63
6 inch meter	155.47	57.27
8 inch meter	244.35	91.62
10 inch meter	348.04	131.71
12 inch meter	481.34	183.23
14 inch meter	614.63	234.78
16 inch meter	777.56	297.76
18 inch meter	940.50	360.75

AUTHORITY-RESOLUTION NUMBER 33822-11

SCHEDULE OF RATES AND CHARGES TO CUSTOMERS OF THE EAST BAY MUNICIPAL UTILITY DISTRICT

PAGE NUMBER 1-H

EFFECTIVE 07/01/12

SCHEDULE A

RATE SCHEDULE FOR WATER SERVICE

D. PRIVATE FIRE SERVICES (Continued)

The seismic improvement program surcharge is effective on each potable water bill through February 28, 2025. The seismic improvement program surcharge shall not be applied to nonpotable water service.

Effective July 1, 1997, when a meter larger than 4 inches is required for a single-family residential customer in order to maintain adequate water pressure, the maximum service charge amount and seismic improvement surcharge shall be set at the 4-inch meter level.

SECOND - A CHARGE FOR WATER DELIVERED based on two-month meter readings for all water delivered per 100 cu. ft.:

There shall be no charge for water used through such services extinguishing accidental fires, but any water lost through leakage or used in violation of the District's Regulations shall be paid for at double the rate for general use.

E. ELEVATION SURCHARGE

Elevation Designator	AMOUNT PER 100 CU. FT.
0 and 1	$0.00
2 through 5	0.46
6 and greater	0.93

Elevation surcharge is determined by the pressure zone in which the service connection is located. Pressure zones are identified by designations which include an elevation designator.

F. SUPPLEMENTAL SUPPLY SURCHARGE

Potable Water Service	Surcharge Amount
All potable water customer accounts	14% of the total Charge for Water Delivered for the Billing Period

The supplemental supply surcharge is effective on each potable water bill after the District Board declares a need to use the Freeport Project to deliver supplemental supplies from outside of the District's normal watershed. The supplemental supply surcharge shall not be applied to nonpotable water service.

AUTHORITY-RESOLUTION NUMBER 33822-11

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Appendix G. 2010 Water Shortage Contingency Plan Supplement

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Appendix G. 2010 Water Shortage Contingency Plan Supplement

G-1. Central Valley Project Supply

As detailed in Chapter 2, EBMUD has a long-term renewal contract with the United States for the Central Valley Project (CVP) supplemental water supply. The contract term ends in 2046 and can be renewed for additional terms of 40 years. During specified drought conditions, EBMUD may request delivery of the CVP water and convey it by using the Freeport Regional Water Facility. The key contractual limitation on this supply is that EBMUD's maximum cumulative delivery over three sequential dry years is 165,000 acre-feet (AF). The contractual maximum delivery in any single dry year is 133,000 AF. EBMUD anticipates that it would generally utilize its full contractual amount of 165,000 AF of CVP water over any three year drought period. The year-by-year decisions on how much CVP water to request involve the following considerations:

- current projections of customer demand;
- current-year projection of total system storage (with reference to Table 3-2);
- supply conditions in the two key CVP reservoirs (Shasta and Folsom), which indicate whether EBMUD may receive the full amount of CVP water it requests, or whether CVP shortages may lead to reduced deliveries (see below for a fuller discussion); and
- the remaining amount of the 165,000 AF three year contractual quantity available to EBMUD in the current CVP contract year based on deliveries taken in the preceding two CVP contract years.

Allocation by the United States Bureau of Reclamation (USBR) of CVP water among all contractors during shortage conditions is subject to the draft CVP Municipal and Industrial (M&I) Shortage Policy; this policy was under review in 2010, and may be revised and issued as a revised draft or final policy in 2011 or later. The policy reflects the fact that in some dry years there will not be sufficient CVP water available to meet the aggregate amount requested by contractors. Furthermore, the policy recognizes that under severe drought conditions, cutbacks in allocations to M&I contractors, such as EBMUD, may have to be limited so that a "Public Health and Safety" (PH&S) level of supply can be sustained.

CVP Supply to Meet Public Health and Safety

EBMUD's understanding is that the USBR will follow its then-existing M&I Shortage Policy in determining the quantity of CVP water needed to bring EBMUD's supply up to a PH&S level during a critical drought. Whereas the policy is currently under review and, in any event, cannot be assumed to be static over the long-term, it appears likely that the policy will always contain at least the following basic elements applicable to PH&S levels of supply:

- determination of an M&I contractor's PH&S need that is based on population served (for residential need) as well as historical deliveries to commercial, institutional, and industrial customers; and
- estimation of an M&I contractor's available supply from non-CVP sources in a critical drought.

In estimating EBMUD's available supply from non-CVP sources in a critical drought in the context of its PH&S needs, the following operating principles should be recognized:

1. EBMUD currently defines the threshold between Severe and Critical Conditions as an end-of-water-year total system storage level of 300,000 AF, as depicted in Table 3-2 (and also, for the near term, in Table G-2.1). When projected total system storage levels indicate Severe or Critical conditions, EBMUD prepares for the possibility that the following water year will also be critically dry.
2. EBMUD's ability to divert from the Mokelumne River or from its storage is restricted, especially during a critical drought, because the following reservations and releases must be achieved:
   a. Required releases from Camanche Reservoir per the 1998 Joint Settlement Agreement (JSA) with state and federal resource agencies for fishery protection are at a minimum of 22,500 AF in a critically dry water year and increase when more water is available.
   b. The JSA also requires EBMUD to reserve up to 20,000 AF (beyond the above mentioned prescribed fish releases) once in a drought period to enhance flows for fish species in the lower Mokelumne River.

c. Releases for senior appropriations and riparian water rights along the lower Mokelumne River are at least 58,000 AF.

d. A minimum of 38,000 AF must be released from Camanche Reservoir in critically dry water years to make up for channel losses.

e. A minimum of 88,000 AF of storage in EBMUD's East Bay local surface reservoirs (part of total system storage) is reserved for up to six months of emergency supply to cope with potential infrastructure damage to its Mokelumne Aqueducts as a result of disruptive events such as earthquakes or Delta flooding.

f. Approximately 16,000 AF of the total system storage is dead pool storage in Pardee and Camanche Reservoirs.

Considering the sum of the quantities in items (a) through (f) above, a minimum of 242,500 AF of water supply must be reserved or released and cannot be used as non-emergency supply for EBMUD's customers.

EBMUD's understanding is that when the USBR's initial allocation in a CVP contract year[1] is less than the amount requested by EBMUD based on its contractual limits, EBMUD may submit to the USBR a determination of how much CVP water is required to meet EBMUD's PH&S needs. Table G-1.1 illustrates, using two examples of Critical Conditions, how EBMUD intends to make such a determination. The calculations illustrated in Table G-1.1 incorporate a projection of non-CVP supply in the *following* water year based on the assumption of Critical conditions in that year also.

Further to the calculation illustrated in Table G-1.1, assume that the USBR and EBMUD determine that EBMUD's PH&S need is 150,000 AF:

- Using example number 1 for the Critical Condition, the quantity needed from the CVP to meet PH&S needs in the current CVP contract year is *zero*, since EBMUD projects it will have sufficient supply through the remainder of the current water year and at least 150,500 AF available for supply in the following water year. The 150,500 AF available for the following water year exceeds the PH&S annual need of 150,000 AF.
- Using example number 2 for the Critical Condition, the quantity needed from the CVP to meet PH&S needs is *59,500 AF*, since EBMUD projects that although it will have sufficient supply for the remainder of the current water year, it may have as little as 90,500 AF available for supply in the following water year excluding any CVP supply. The 90,500 AF (without CVP supply) available for the following water year, assuming it is also Critical, is insufficient to meet the PH&S annual need of 150,000 AF.

G-2. Interim Drought Management Plan Guidelines

EBMUD temporarily revised its Drought Management Program Guidelines. The resulting Interim Drought Management Program Guidelines (Table G-2.1) were implemented in January 2010. They will remain in effect until the economy recovers and post-drought consumption rebounds to 2040 Demand Study (February 2009) planning levels. Based on past consumption trends for previous droughts in the 1970s and 1980s, the suppressed demand is expected to rebound and return to anticipated planning levels as projected in the 2040 Demand Study by 2020.

Table G-1.1 Illustration: Determining Minimum CVP Supply to Meet Public Health and Safety Needs

	Example Number 1 of Critical Condition in Current Water Year[1]	Example Number 2 of Critical Condition in Current Water Year[1]
A. Projected total system storage at end of current water year	260,000 AF	200,000 AF
B. Critical-year runoff assumed for the following water year[2]	133,000 AF	133,000 AF
C. Minimum required releases from Camanche Reservoir and minimum storage reservations	242,500 AF	242,500 AF
D. Net quantity available for supply in a following critical water year without addition of CVP supply[3] [= row A + row B - row C]	150,500 AF	90,500 AF

[1] EBMUD's water year extends from October 1 through September 30 of the following calendar year. The determination as to whether a Severe or Critical condition exists in the current water year is typically made in April under policy 9.03 (Appendix F) using total system storage projected forward to September 30, the end of the current water year.

[2] Runoff into Pardee Reservoir (i.e. net of upstream diversions) is 133,000 AF for a 1977 hydrological year when modeled using estimated 2010 upstream diversions. This is the most critical water year on record.

[3] Adjustments must be made for supplies available to EBMUD from other sources including the Bayside Groundwater Project.

[1] The CVP contract year runs from March 1 through February 28/29 of the following calendar year.

Table G-2.1 Interim Drought Management Program Guidelines[1]

Stage	April Projection of Total System Storage on September 30 (Thousand Acre-Feet)	Percent of Maximum System Storage[2]	CVP Import Quantity (Thousand Acre-Feet)	Rationing Reduction Goal[3]
Normal	500 or more	65% and greater	0	None
Moderate	500-450	65 to 59%	0	0-15% - voluntary
	450-425	59 to 55%	up to 35	0-15% - voluntary
Severe	425- 300	55 to 39%	35 - 65	15% - mandatory
Critical[4]	<300	39% and below	65	15% - mandatory

[1] Source: Revised Drought Management Program Guidelines Memorandum, issued January 21, 2010 to the Board of Directors. It is based on numerical modeling that accounts for 2010 projected demand of 189 million gallons per day (MGD) with CVP supplies via Freeport. This level of demand was reduced from the 2040 Demand Study (February 2009) assumption of 216 MGD for year 2010 from recent rationing and adverse economic conditions. Demand is expected to return to long term planning levels when the post-drought consumption rebound ends and the economy recovers.

[2] Maximum system storage represents the maximum reservoir capacity of approximately 767 TAF.

[3] Policy 9.03 limits rationing up to 15 percent in planning for drought management.

[4] With the availability of CVP supplies and up to 15 percent rationing, critical conditions would only occur in the third year of the design drought.

The interim guidelines account for the following recent developments affecting drought planning:

- completion of the Freeport Regional Water Facility in 2010;
- change of a maximum rationing level of up to 15 percent of overall demand; and
- current suppressed customer demand resulting from the aftereffects of the recent drought and adverse economic conditions.

These guidelines factor in operating conditions for initiating customer rationing and for importing water under the Freeport Regional Water Project (EBMUD's Central Valley Project (CVP) contract). Constraints were considered, such as the water delivery schedule under the CVP contract and the risk of reduced allocations from the USBR due to supply shortages. When the projected end-of-September total system storage falls below 500 thousand acre-feet (TAF), voluntary rationing up to 15 percent will be considered. Early rationing minimizes the need for CVP supplies and mandatory rationing if dry conditions persist and ensures that a sufficient water supply is available in following years. In accordance with the interim guidelines, when total system storage falls between 450 and 425 TAF, EBMUD will access CVP supplies to minimize the risk of exhausting remaining water supplies at the end of a severe three year drought. When projected total system storage, including CVP supplies, falls below 425 TAF, mandatory rationing to achieve 15 percent demand reduction will be implemented.

G-3. 2008-2009 Drought Management Program

The following sections highlight the process used during the 2008-2009 Drought Management Program (DMP) to determine reduction goals, water use allocations, and drought rate structure pricing. This recent drought, as well as the 1976-77 and 1987-92 droughts, provided guidelines and experiences that EBMUD could consider for future drought management programs. For each drought period in the future, EBMUD will develop and implement a specific drought management program.

Recent Reduction Goals

Table G-3.1 illustrates the reduction goals for each customer group and their anticipated reductions in indoor and outdoor use from the implementation of the 2008-2009 DMP. The expected reductions were based on experience and discretionary use.

Customers were expected to achieve an overall 10 percent reduction for indoor use and an overall 27 percent reduction for outdoor use. Water use reduction goals for each customer class were determined by taking the weighted average of the expected reductions for indoor and outdoor water use and the proportion of indoor and outdoor water use to the total. For example, Single-Family Residential customers are expected to reduce indoor water use by 13 percent and outdoor use by 28 percent. The weighted average of these reductions and the indoor/ outdoor use (62 percent indoor/ 38 percent outdoor) is calculated to be 19 percent for the customer class reduction goal.

Water Use Allocation

During the 2008-2009 DMP, each customer's water use allocation was based on a percentage of their baseline use. The baseline use and individual water use allocation for each customer were determined using the following principles:

1. Each customer's baseline water use was the customer's three year average consumption from FY 2005 to FY 2007. Each billing cycle had its own baseline water use.

Table G-3.1 2008-2009 Drought Management Program Goals by Customer Class

Customer Class	% Use[1]			% Reduction[2]			Proportion (%) of EBMUD's Goal
	Total	Indoor	Outdoor	Indoor	Outdoor	Goal	
Single-Family Residential	46	62	38	13	28	19	58
Multi-Family Residential	17	86	14	10	21	11	13
Irrigation	6	0	100	0	30	30	12
Institutional	3	85	15	7	24	9	2
Commercial	11	90	10	11	25	12	9
Industrial	17	98	2	5	30	5	6
Total	100						
Service Area-Wide Average		**72**	**28**	**10**	**27**	**15**	**100**

[1] Actual use based on 1970-2004 long-term average.
[2] Customer class rationing goals estimated to achieve district-wide rationing target.

2. Accounts with less than one year's billing history or no billing history had baselines estimated for missing billing cycles using the procedures for SFR and non-SFR customers listed below.
3. Water use allocation estimates were rounded up to whole numbers.
4. Private fire service, hydrant meter, recycled and raw water customers were not assigned water use allocations.

Special Procedures for SFR Customers:

- If baseline use was unavailable for a billing period because of missing data or no consumption, EBMUD used the average SFR customer consumption in the SFR customer's zip code for the baseline use for each corresponding billing period.

Special Procedures for non-SFR Customers:

- For the FY 2005 to FY 2007 period, billed consumption from the service address was used to calculate the current customer's baseline use if the Business Classification Code (BCC) for the service address had not changed.
- If the baseline use for a billing period could not be calculated because of missing data, EBMUD estimated the missing baseline using either the average ratio of the customer's available consumption with the average consumption for the same BCC or the consumption from similar facility and customer characteristics.

Drought Rate Structure

The drought rate structure adopted in FY 2009 consisted of:

1. Increasing the FY 2009 volume charges by ten percent for all customers with some exceptions.
2. Setting individual water use allocations for customers, based on using half of the water use reduction goal for the customer category as a percentage of the baseline water use.
3. Instituting a drought surcharge of $2.00 per ccf (1 ccf = 100 cubic feet = 748 gallons) for consumption exceeding the allocated water use with some exceptions.
4. Using up to $31 million of the $43 million rate stabilization reserve fund in FY 2009 to partially offset reduced water sales revenue.

All customers (except industrial) who conserved and met their water use reduction goals paid less for total water use under the drought rate structure than under the pre-drought adopted FY 2009 rates. However, industrial customers who achieved their reduction goals of only five percent saw their bills increase by four percent, and those who reduced their consumption by ten percent paid the same as under the pre-drought adopted FY 2009 rates. Certain customer groups were recognized for significantly reducing their potable water consumption. For instance, SFR customers with low use (using an average of 100 gallons per day (GPD) or less per billing period during the drought emergency) and recycled water customers were exempt from incentive pricing tied to allocations and surcharges.

Future Considerations

The experience from the 2008-2009 DMP provided insight into future program improvements, such as processes to develop more effective allocations, consumption analyses, and consumption feedback. Despite being the only mandatory program in the San Francisco Bay Area, the DMP successfully increased customer awareness of water conservation and achieved substantial water savings. It was also EBMUD customers' first experience with mandatory

rationing in nearly two decades. Although the following considerations were not part of the DMP, there are other available tools that could be considered in the future.

Exploration of Rate Alternatives

Water use varies over EBMUD's geographically diverse service area characterized by regional land use and weather patterns. A drought rate structure based on water allocations or an absence of it (i.e. severe use restrictions with heavy enforcement or steep tier pricing) may not necessarily be an appropriate fit for such diverse water use patterns. Experience from the 2008-2009 DMP suggests that sufficient time should be allocated to exploring rate alternatives and soliciting public input in developing an equitable drought rate structure.

Allocation Adjustment Process

Experience during the recent 2008-2009 DMP validated that a clear and transparent process for customers to seek allocation adjustments helped ensured equity and would also be vital in future programs for accommodating special circumstances for some customers. Audits for approved allocation adjustments ensure that accurate information was submitted and assure the integrity of the process.

Water Consumption Data Analysis

Effective demand reduction measures are designed based on analyses of historical consumption data, which models customer consumption behavior. Statistical analyses on average, monthly, seasonal, annual, and indoor and outdoor water use data provide insight into potential impacts on customers from implementing planned demand restrictions, allocation structures, and rationing goals. These analyses can also help assess the effect of drought water rates and surcharges on revenues. Data on average consumption grouped by zip code for each customer category, by the BCC, and by per capita daily water use are examples of water use characteristics that could be considered as the basis for adjusting water use allocations.

Monthly vs. Bimonthly Billing

A DMP that increases the frequency of billing cycles from bimonthly to monthly would send more timely price signals to encourage customers to conserve. When conservation measures are quickly implemented, a drought response program realizes conservation benefits sooner and effectively preserves more water and emergency storage for the remaining and following years. Rationing earlier at uncomfortable yet manageable levels and at graduated intensity is preferred over waiting and rationing later at extreme levels.

The current staggered bimonthly billing cycles requires more time for customers to adjust their water consumption behavior in response to adopted drought rates and water allocations. A monthly billing format may enable EBMUD to better gauge customers' current consumption response relative to allocation targets and to assess the need to adjust conservation earlier. Due to resource constraints with current meter reading technology, monthly billings for all accounts is not practical unless meters were upgraded to accommodate automated meter readings. EBMUD has begun a pilot study of automated meter reading.

Other Industry Methods

Other allocation methods used by the water retail industry include percentage reduction; financial rationing; per connection allotment; per capita allotment, and hybrid per capita/ percentage.

- *A percentage reduction* assigns each customer a consumption reduction goal that is a percentage of the historical consumption level. Required percent reductions can be constant, stepped, or variable. Excess use charges are applied to water consumption above a baseline allotment level. EBMUD used this method during the 2008-2009 DMP.
- *Financial rationing* sets tiers based on past use for non-residential customers and the average number of occupants for each account for residential customers.
- *Per Connection allotment* (for residential customers only) establishes a customer's water consumption goal on a unit basis (based on, for example, the number of bedrooms per single family home or multi-family unit) calculated from an estimate of essential uses.
- *Per Capita allotment* (for residential customers only) provides a fixed amount of water per person.
- *Hybrid per capita/percentage allotment* programs allow limited outside irrigation and distinguish between single-family and multi-family dwellings with different water use requirements. The hybrid provides water for inside use and a percentage of the five year average for outside use. A geographic information system (GIS) could be used to estimate the outside use portion of the hybrid system based on the landscaped area served by each meter. A maximum per customer allocation is necessary because it limits the amount of water allocated to large parcels.

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Appendix H.
SBx7-7 20x2020 Baseline and Target Methodology

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Appendix H.
SBx7-7 20x2020 Baseline and Target Methodology

In late 2009 the legislature adopted Senate Bill x7-7 (SBx7-7), the Water Conservation Act of 2009, which calls for a 20 percent statewide reduction in per capita water use by the year 2020 and directs urban retail water suppliers to set 2020 urban water use targets. Under the bill and the 2020 Water Conservation Plan adopted by the California Department of Water Resources, all urban water agencies are required to report their per capita water use and reduction targets in their Urban Water Management Plan (UWMP). This appendix presents the background data, methodology, and calculations for the baseline and target using one of the target methods established by law.

EBMUD will achieve its target water use by implementing water conservation and recycling programs identified in its long-term integrated resources planning. Phased implementation of water savings programs are incorporated into EBMUD's Water Conservation Master Plan, as summarized in Chapter 6 of this UWMP and recycled water programs as discussed in Chapter 5 of this UWMP 2010. The target water use will be finalized in the next UWMP submittal in 2015.

Baseline Calculation

Water suppliers must define a ten year base period for water use that will be used to develop their target levels of per capita water use. Water suppliers must also calculate water use for a five year baseline period, and use that value to determine minimum required reduction in water use by 2020.

Gross Water Use

Section 10608.12(g) of the California Water Code defines "Gross Water Use" as:

the total volume of water, whether treated or untreated, entering the distribution system of an urban retail water supplier, excluding all of the following:

(1) Recycled water that is delivered within the service area of an urban retail water supplier or its urban wholesale water supplier.

(2) The net volume of water that the urban retail water supplier places into long-term storage.

(3) The volume of water the urban retail water supplier conveys for use by another urban water supplier.

(4) The volume of water delivered for agricultural use, except as otherwise provided in subdivision (f) of Section 10608.24.

EBMUD gross water use is a measure of water supplied to the entire distribution system including raw water within the Service Area Boundary over a continuous 12-month calendar year, adjusted for changes in distribution system storage and recycled water deliveries. The methodology for calculating gross water use broadly follows American Water Works Association (AWWA) Manual M36 guidance for calculating Distribution System Input. Table H-1 presents tallied gross water use data for the calendar years 1995 thru 2004 and includes both treated and untreated water for residential and non-residential uses, and fire safety.

Table H-1 EBMUD Gross Water Use (1995-2004)

Calendar Year	Annual Water Production (MG)	Annual Water Production (MGD)
1995	69,663	191
1996	71,533	196
1997	77,188	211
1998	74,258	203
1999	77,058	211
2000	78,719	216
2001	78,871	216
2002	78,637	215
2003	78,360	215
2004	80,180	220

Sample Gross Water Use calculation: Raw water source volume (+/-) meter accuracy adjustment (+/-) change in distribution storage.

Service Area Population

As a Category 1 water supplier, EBMUD service area population data was compiled from the Association of Bay Area Governments and from EBMUD's UWMPs since 1990. Where individual yearly data was not available, it was interpolated using published projections. The data is checked against other state and federal sources such as the California Department of Finance and U.S. Census.

Base Daily Per Capita Water Use

Base Daily Per Capita Water Use is defined as average gross water use, expressed in gallons per capita daily (GPCD) for a continuous, multi-year base period. The Water Code specifies two different base periods for

Table H-2 EBMUD Baseline Daily Per Capita Water Use Calculation (1995-2004)

Calendar Year	Population	Annual Water Production (MG)	Annual Water Consumption (GPCD)
1995	1,225,000	69,663	156
1996	1,234,000	71,533	159
1997	1,243,000	77,188	170
1998	1,252,000	74,258	162
1999	1,261,000	77,058	167
2000	1,270,000	78,719	170
2001	1,283,600	78,871	168
2002	1,297,200	78,637	166
2003	1,310,800	78,360	164
2004	1,324,400	8,0180	166
10-Year Average Baseline			**165**

calculating Base Daily Per Capita Water Use. EBMUD's ten year base daily per capita water use was calculated over a continuous 1995-2004 baseline period (Water Code Section 10608.20). Figure H-1 illustrates a map of the service area boundary changes that occured during the 1995-2004 base period.

The following calculation is required only if the five year baseline per capita water use per Section 10608.12 (b) (3) is greater than 100 GPCD. The calculation is used to determine whether the water supplier's 2015 and 2020 per capita water use targets meet the legislation's minimum water use reduction requirement per Section 10608.22.

EBMUD's second continuous baseline period covers the years 2003-07 and was used to calculate the minimum water use reduction target requirement per Section 10608.22 of the Water Code. The tabulated data is presented in Tables H- 2 and H-3. Figure H-2 illustrates a map of the service area boundary changes that occurred during the 2003-2007 base period

Target Daily Per Capita Water Use

An urban retail water supplier must set a 2020 water use target and a 2015 interim target using one of the methods outlined in the legislation and by the Department of Water Resources.

The Water Code directs that water suppliers must compare their actual water use in 2020 with their calculated targets to assess compliance. Water suppliers must also report interim compliance in 2015 as compared to an interim target (generally halfway between the baseline water use and the 2020 target level). A water supplier is allowed to revise its water use target in its 2015 UWMP or in an amended plan.

Table H-3 EBMUD Minimum Daily Per Capita Water Use Calculation (2003-2007)

Calendar Year	Population	Annual Water Production (MG)	Annual Water Consumption (GPCD)
2003	1,310,800	78,360	164
2004	1,324,400	80,180	165
2005	1,338,000	76,065	156
2006	1,352,800	76,218	154
2007	1,367,600	75,021	150
5-Year Average Baseline			**158**
5% Minimum Water Use Reduction Requirement			**150**

EBMUD's target is based on Target Method #2 (TM2) using the following components to calculate the water use target for 2020:

- Indoor Residential Water Use = 55 gallons per capita daily water use (GPCD) (provisional standard subject to adjustment by Legislative statute);
- Commercial, Industrial, and Institutional (CII) Uses = 10% reduction in water use from the baseline CII water use; and
- Landscaped Area Water Use = water efficiency equivalent to the standards of the Model Water Efficient Landscape Ordinance set forth in Chapter 2.7 of Division 2 of Title 23 of the California Code of Regulations.

Under TM2, the target year per capita water use is determined as the sum of residential indoor use, the landscaped area water use and commercial, industrial, and institutional (CII) water use. As shown in Table H-4, EBMUD's calculated 2020 Target Daily Per Capita Use is 175 GPCD. This exceeds the required minimum reduction shown in Table H-3, therefore the lower minimum water use reduction target of 150 GPCD will be used. The midpoint between this 2020 target level and the baseline

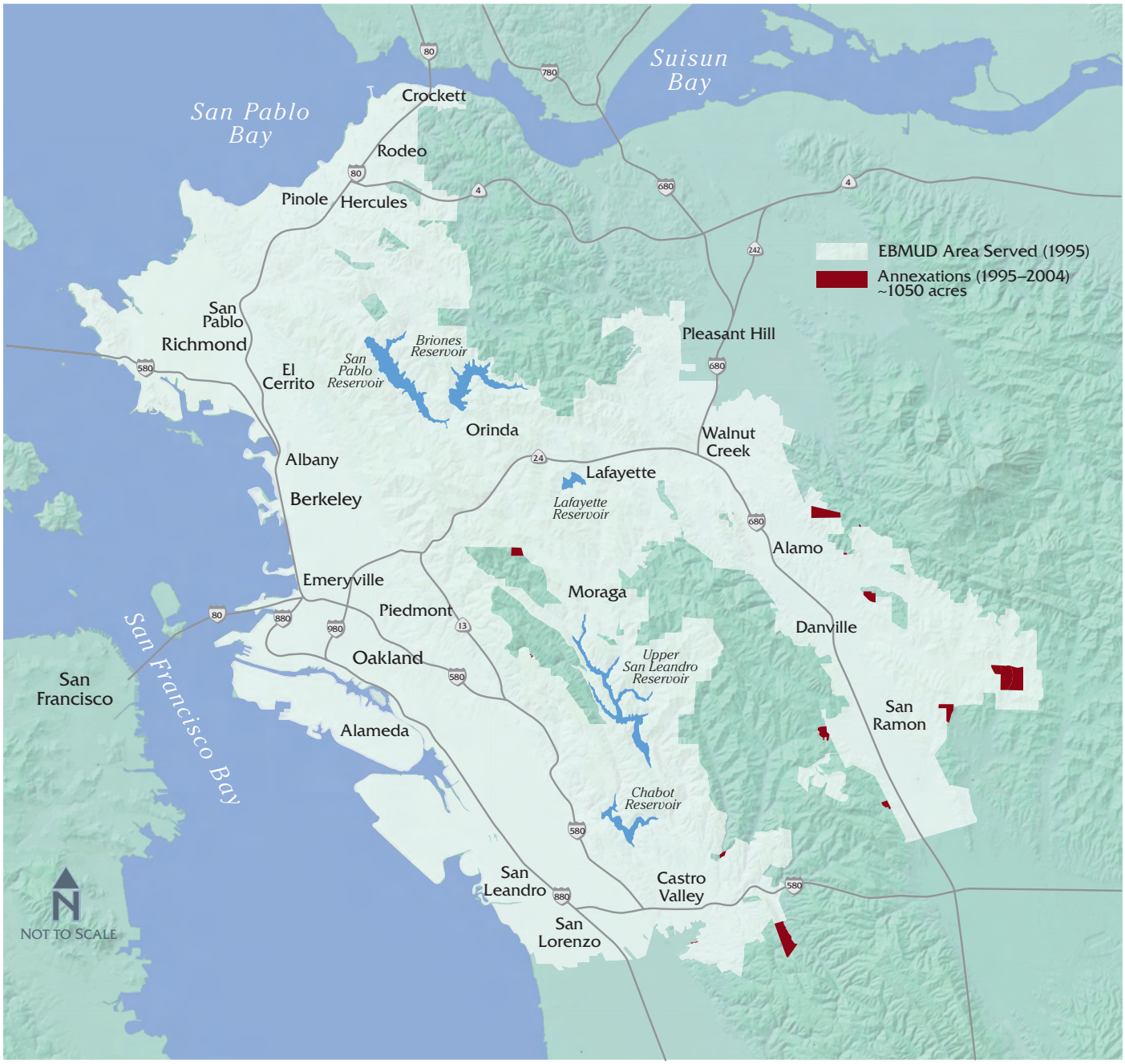
Table H-4 EBMUD TM2 Target Daily Per Capita Water Use

Projected Use	2020 MGD	2020 GPCD[1]
Residential Indoor	85	55
Landscape (Irrigation & Residential Indoor)	105	68
Commercial, Industrial and Institutional[2]	80	52
Total	**269**	**175**

[1] Based on projected 2020 population of 1,538,000 sourced from ABAG Projections 2009. The 2020 target may be updated in UWMP 2015 as revised ABAG projections based on the 2010 census data become available.

[2] Institutional use includes District uses and other non-revenue water uses.

FIGURE H-1 1995 AREA SERVED WITH ANNEXATIONS FROM 1995–2004



water use is the interim 2015 target of 158 GPCD. EBMUD anticipates it will meet this interim 2015 target through its planning level programs, which project an even more aggressive and lower demand level of 151 GPCD for year 2015.

Though Section 10608.20(b)(2)(A) sets a provisional standard for efficient indoor use (55 GPCD) that urban retail water suppliers using TM2 must use to set their 2020 target, suppliers can use a combination of the indoor residential use, landscaped area water use and commercial, industrial, and institutional (CII) water use to collectively meet the overall 2020 target.

CII WATER USE

As shown in Table H-5, the base CII water use is 58 GPCD. Applying the required ten percent reduction results in a target of 52 GPCD for 2020.

FIGURE H-2 2003 AREA SERVED WITH ANNEXATIONS FROM 2003–2007

LANDSCAPE WATER USE

As outlined by DWR, landscaped area for the purposes of calculating the TM2 target shall mean the water supplier's estimate or measurement of 2020 landscaped areas that are irrigated and served by residential or dedicated landscape meters or connections. Water suppliers shall develop a preliminary estimate (forecast) of 2020 landscaped areas for purposes of setting urban water use targets and interim urban water use targets under Subdivision 10608.20 (a) (1). For final compliance-year calculations, water suppliers shall update the estimate of 2020 landscaped areas using one of the techniques allowed.

Water suppliers shall follow five steps to calculate Landscaped Area Water Use:

- Identify applicable State Model Water-Efficient Landscape Ordinance (MWELO) (1992 or 2010) by parcel.

Table H-5 Calculation of Baseline Commercial, Industrial and Institutional (CII) Water Use Component

Calendar Year	Population	Annual Water Production (MG)	Annual Water Consumption (GPCD)
1995	1,225,000	24,885	56
1996	1,234,000	24,639	55
1997	1,243,000	27,511	61
1998	1,252,000	28,665	63
1999	1,261,000	27,798	60
2000	1,270,000	28,132	61
2001	1,283,600	27,042	58
2002	1,297,200	26,596	56
2003	1,310,800	27,438	57
2004	1,324,400	27,842	58
10-Year Average Baseline			**58**
10% Reduction Target			**52**

Table H-6 Estimated Number of 2020 EBMUD Customer Landscape Water Use Accounts

Parcel Area/ Strata (sq.ft.)	WOH	CENT	EOH
0-4,000	44,163	11,653	3,051
4,001-8,000	111,730	46,855	11,310
8,001-12,000	16,307	15,477	12,518
12,001-16,000	5,377	6,580	6,538
16,001-20,000	2,346	4,061	3,942
20,001-24,000	1,392	3,746	3,654
>24,001	7,417	11,351	7,871
Total	**188,732**	**99,723**	**48,884**

- Estimate irrigated landscaped area for each parcel.
- Determine reference evapotranspiration for each parcel.
- Use the Maximum Applied Water Allowance (MAWA) equation from the applicable MWELO to calculate annual volume of landscaped area water use.
- Convert annual volume to GPCD.

The estimated landscape water use component under TM2 is 68 GPCD. This value factors total estimated landscape areas and associated water budgets utilizing historical landscape water use over the 10-year baseline period of 1995-2004, water efficiency requirements for new accounts under EBMUD's Water Service Regulations and the MWELO, and estimated account growth between 2010-2020.

Before computing landscaped area, water suppliers must determine how MWELO ordinances apply to specific parcels in their service areas. Two versions of MWELO apply according to the date when landscaping was installed in a given parcel:

- For landscaped areas installed on or after January 1, 2010, the MAWA equation and all applicable criteria from the 2009 version of the ordinance or its equivalent shall be used.
- For landscaped areas installed before January 1, 2010, the MAWA equation and all applicable criteria from the 1992 version of the ordinance or its equivalent shall be used.

For the current 2020 landscape water use estimate, approximately 99% of the landscapes were installed prior to January 1, 2010 and all applicable criteria from the 1992 version of the MWELO were applied.

- The landscaped area must be measured or estimated for all parcels served by a residential or dedicated landscape water meter or connection in the water supplier's service area.
- Only irrigated landscaped area served by residential or dedicated landscape water meter or connection is included in the calculation of Landscaped Area Water Use.
- Landscape served by CII connections and non-irrigated landscape is excluded.

The purpose of this landscape measurement is to estimate the irrigation efficiency of EBMUD customers. It requires a measurement (or estimate) of landscaped area and of the landscape water use per unit area based on a reference evapotranspiration (ET). All landscape irrigated by dedicated or residential meters must be included, including multi-family residential parcels irrigated through dedicated or residential meters or connections. The selected methodology relies on the collection of a statistical random, stratified sample of customer parcels, irrigated area, outdoor water use group by parcel size which is statistically field verified and extrapolated for the rest of the District. Estimates are based on (Geographical Information System) GIS images, photographs provided by Google, and from a representative number of sites and field visits.

Division of Service Area

For the purposes of this analysis, the EBMUD service area was divided into six distinct areas with similar weather patterns/characteristics as follows:

- **West of Hills (WOH):** Cities of Alameda, Albany, Berkeley, Castro Valley, Crockett, El Sobrante,

Richmond, El Cerrito, Emeryville, Hayward, Hercules, Oakland, San Leandro, San Lorenzo.

- **Central (CENT)**: Cities of Lafayette, Moraga, Orinda.
- **East of Hills (EOH)**: Cities of Alamo, Danville, Pleasant Hill, San Ramon, Walnut Creek.

Parcels within each area were then segmented into seven subcategories by parcel size.

Measuring with Remote Sensing

The landscaped area was determined through a combination of measurements using remote sensing (aerial or satellite imaging) and field site visits to identify the landscaped areas in conjunction with a GIS representation of the parcels in service area.

- The remote-sensing information must be overlaid onto a GIS representation of each parcel boundaries to estimate the irrigated landscaped area in each parcel.
- The remote-sensing imagery must have a resolution of 1 meter or fewer per pixel.
- The remote-sensing technique must be verified for accuracy by comparing its results to the results of field-based measurement for a subset of parcels selected using random sampling.

Using Sampling to Estimate Landscaped Area on Small Parcels

The landscaped area for smaller-sized parcels was calculated by measuring the percentage of total parcel area that is landscaped in a sample of similar parcels and applying that percentage to the remaining parcels. This technique was used for parcels with a total land area of 24,000 square feet or less. The parcels for which this technique was used was divided into groups, or strata, based on parcel size increments of 4,000 square feet or less. (For example, parcels up to 4,000 square feet would form one group, parcels between 4,001 and 8,000 square feet would form another group, and so forth.)

Field-based measurement and remote sensing was used to calculate the landscaped area for a subset of parcels sampled at random in each parcel size group. The percentage of landscaped area to total land area for the sampled parcels in each group was then be used to calculate the landscaped area for all other parcels in the group. Parcels greater than 24,000 square feet are to be measured separately.

The methodology/technique was tested for accuracy by comparing the results of satellite and field-based measurement for a subset of parcels. Satellite and field-based measurement were performed for a subset of parcels selected at random. The percent error between the calculations of landscaped area produced by the selected satellite technique and those produced by field-based measurements were used to create coefficient values for extrapolating parcel data across a total of 168 customer account categories, micro-climate regions, and parcel size tier. Summary findings from this analysis in included in Table H-6.

Data Collection

The goal of this analysis is to collect data about a representative number of parcels to determine irrigation efficiency. A combination of field visits, GIS, Google Earth and Google Street maps was used to determine the nature of each property. For each property the following information was used obtained and/or measured:

- Parcel size (county records and polygon of parcel).
- Square footage of property on County Records.
- Footprint of home and structures on property.
- Hardscape not including footprint. This may include items such as driveway, patio, sidewalks, or other paved areas.
- Irrigable area which is ground where plants could be grown but not necessarily where there are plants now or where intentional irrigation is taking place. This is calculated as the difference between recorded or measured lot size and footprint plus hardscape.
- Total Turf Area.
- Other Irrigated area. This is calculated as the area defined by polygons where plants are known or believe to be irrigated.
- Total Irrigated Area. This is the sum of turf and non-turf areas that appear to be irrigated.
- Non-irrigated irrigable area. This is the remainder of irrigable area minus Total Irrigated Area.
- Outdoor water use based on monthly consumption.

Number of Statistical Samples

From each subgroup a statistical number of sample services were collected. Additional samples were taken and landscape estimates were measured with the use of GIS until the results are repeatable and a smaller standard deviation is achieved. The confidence coefficient should be 95%.

Extrapolation of Results

Once the confidence coefficient has been achieved for each subgroup a number of relationships were defined that

Image 1

Image 2

were extrapolated for the rest of the group and a calculation of current landscape efficiency was measured. Examples of relationships are shown below.

Sample calculation

For homes in WOH between 4,000 and 8,000 SF:

- Average square footage = 6,000 SF
- Average footprint =1802 SF
- Average hardscape = 1000 SF
- Ratio of hardscape to average square footage = 1000/6000
- Average irrigable area = 6000-1802-1000 = 3198
- Ratio of irrigable area to average square footage = 3198/6000
- Average area of irrigated turf = 1200 SF
- Average area of irrigated non-turf = 825 SF
- Total area of irrigated area = 2025
- Ratio of irrigable area which is irrigated = 2025/3198
- Ratio of irrigated area to lot size = 2025/6000

ArcGIS

EBMUD maintains a sophisticated GIS database. Images for the analysis were at a resolution of between 4 and 6 inches per pixel. Alameda and Contra Costa County records including parcel and building footprint statistics were used and overlayed on the aerial photos. Described below are the steps taken to measure water service characteristics consistent with the adopted state methodology. Results of the landscape water use analysis for single-family, multi-family, and irrigation accounts are presented in Tables H-7 through H-9.

Calculating Footprint

Polygons were drawn around the footprint of obvious structures. (Images 1 and 2) Obvious structures include any structure which a person can enter:

- Building
- Garage or Carport
- Shed
- Covered gazebo

Properties and structures were also viewed in Google Earth or Google Street View when available to improve viewpoints (see Images 3 to 5 of a second sample site).

Measuring Polygons-HardScape

Hardscape is defined as any grade level area which can not support landscape such as driveways, sidewalks or compacted dirt. It also includes grade level structures such as decks, patios, or stone pathways. It may also include artificial turf or sheet mulched areas (see Image 6).

IMAGE 3

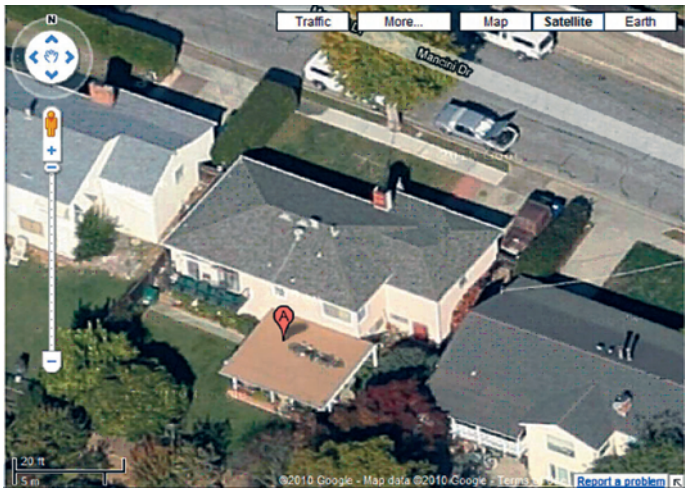
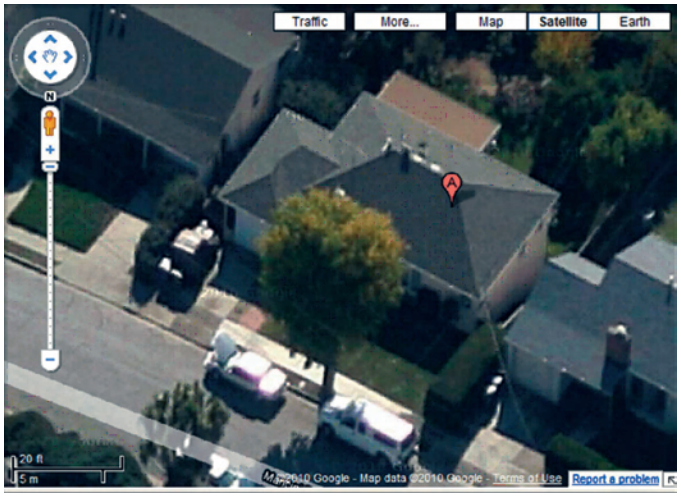


IMAGE 4



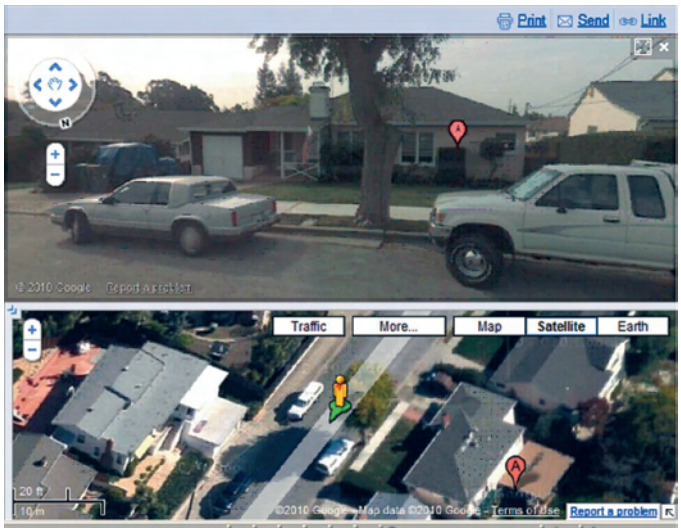
Measuring – Landscape Area-Irrigable

Irrigable area is defined as any property which is neither under the footprint of a building or hardscape. Therefore, it can be calculated as the difference between the parcel size and (hardscape plus footprint). It would include any vegetated area or non-vegetated area that is not otherwise covered.

Measuring – Irrigated Areas-Turf and Non-Turf

Determining whether landscape is being actively irrigated from photographs is an inexact science. However certain clues help make the work more accurate. The first is by looking at different imagery to see if the landscape is brown during different seasons. That would indicate that it may not be irrigated. Another clue is to look at the water use for a property to see if the usage is reasonably higher

IMAGE 5



in summer vs. winter for the size of the estimated landscape.

In Image 7 the property appears to have both a front and rear lawn. It also appears to have manicured shrubs in the front and larger trees in the back. The shrubs on either side of the property appear to be shared with neighbors with approximately half of the watering of these shared areas taken by each adjacent neighbor. In this case, the trees are not likely to be separately watered but probably obtain some water from the irrigated turf, so the assumption is that the area of lawn hidden by the tree canopy is lawn or equivalent root zone of the trees.

In Image 7 the green polygon represents the irrigated turf areas. The irrigated non-turf areas are in the gaps northwest and southeast of the house to the parcel line.

Field Verification

EBMUD landscape water budgets and GIS calculations were performed on statistically sampled sites, which were visited to verify the accuracy of the GIS method, establish uniform correction factors, or determine if more field visits were necessary. A field visit consists of the following:

- Random selection of the sites to be visited.
- Contacting the customer of record and asking the following:
  a. Area of their property.
  b. What is the type of landscape they have?
  c. Would it be okay to visit their backyard?
  d. Would they be interested in receiving a free water audit?

Image 6

Image 7

- Bring a 11x17 copy of the aerial photograph marked up with polygons indicating landscape of presumed irrigated area. Green for grass, blue for shrubs.
- Mark up the aerial photograph with any corrections. Data collected for each analyzed parcel includes:
  a. Service #
  b. City
  c. Square footage of home from county records
  d. Square footage of parcel size
  e. Footprint of home measured
  f. Hardscape measured
  g. Irrigable area calculated
  h. Irrigated Turf measured
  i. Irrigated non-turf measured
  j. Total irrigated area calculated
  k. Non-irrigated irrigable area calculated
  l. Outdoor water use
  m. GIS Operator
  n. Field corrected turf irrigated area
  o. Field corrected non-turf irrigated area.
  p. Field Inspector

TABLE H-7

ESTIMATED 2020 EBMUD SINGLE FAMILY RESIDENTIAL LANDSCAPE WATER USE

LOCATION	TIER (SQ.FT.)	NUMBER OF SERVICES	AVE. PARCEL AREA (SQ.FT.)	SUM PARCEL AREA (SQ.FT.)	AVE. BLDG. AREA (SQ.FT.)	SUM BLDG. AREA (SQ.FT.)	AVE. YEAR BUILT	NUMBER OF POOLS	% OF MULTI-STORY BLDG.	AVE. BLDG. HARD-SCAPE-ADDED PER SERVICE[1] (SQ.FT.)	AVE.LOT OTHER FEATURES ADDED PER SERVICE[2] (SQ.FT.)	TOTAL AVE. BUILDING FOOTPRINT[3] (SQ.FT.)	SUM OF TOTAL BUILDING FOOTPRINT (SQ.FT.)	IRRIGATABLE AREA (SQ.FT.)	IRRIGATED AREA FACTOR (%)	IRRIGATED AREA (SQ.FT.)	REF.ET (IN.)	TOTAL MAWA (GPD)
EOH	0-4,000	3,001	2,955	8,867,373	1,735	5,120,419	1987	4	71%	2,251	330	2,581	7,744,686	1,122,687	53%	599,430	50	40,972
EOH	4,001-8,000	11,167	6,489	72,467,098	2,144	23,709,502	1982	895	54%	2,868	431	3,298	36,832,129	35,634,969	46%	16,406,694	50	1,121,422
EOH	8,001-12,000	12,284	9,983	122,6341,24	2,243	27,394,085	1973	2,700	43%	3,786	1,119	4,905	60,258,450	62,375,674	76%	47,251,511	50	3,229,711
EOH	12,001-16,000	6,404	14,113	90,379,179	2,498	15,824,349	1973	2,287	38%	4,489	1,474	5,963	38,183,945	52,195,234	61%	31,729,890	50	2,168,785
EOH	16,001-20,000	3,827	17,912	68,550,843	2,761	10,377,124	1973	1,670	36%	5,123	1,639	6,762	25,877,354	42,673,489	48%	20,398,450	50	1,394,264
EOH	20,001-24,000	3,552	21,807	77,458,727	2,901	10,095,366	1971	1,805	33%	5,039	1,899	6,938	24,645,537	52,813,190	28%	14,927,352	50	1,020,307
EOH	24,000+	6,300	95,702	602,923,964	10,091	49,981,824	1975	2,498	33%	16,981	8,743	25,724	162,059,293	440,864,671	22%	97,140,499	50	6,639,698
SUBTOTAL		**46,535**		**1,043,281,308**		**142,502,669**		**11,859**					**355,601,395**	**687,679,913**		**228,453,826**		**15,615,159**
AVERAGE			**24,137**		**3,482**		**1976**		**44%**	**5,791**	**2,233**	**8,024**			**48%**		**50**	
WOH	0-4,000	40,036	3,268	130,825,254	1,452	57,305,609	1931	45	19%	2,039	386	2,426	97,110,418	33,714,836	35%	11,711,365	38	604,487
WOH	4,001-8,000	98,929	5,501	544,214,748	1,871	183,285,529	1939	793	21%	2,621	672	3,293	325,723,903	218,490,845	53%	116,502,000	38	6,013,299
WOH	8,001-12,000	13,764	9,612	132,293,789	2,718	36,118,761	1949	476	26%	3,878	759	4,637	63,828,816	68,464,973	21%	14,300,693	38	738,136
WOH	12,001-16,000	4,285	13,733	58,845,582	3,129	12,125,808	1952	218	26%	4,048	1,669	5,718	24,500,740	34,344,842	17%	5,873,989	38	303,188
WOH	16,001-20,000	1,810	17,923	32,440,551	4,048	6,160,305	1956	112	28%	5,876	1,463	7,339	13,284,108	19,156,443	45%	8,710,526	38	449,597
WOH	20,001-24,000	1,035	21,839	22,603,343	4,937	3,816,399	1958	54	23%	6,391	1,799	8,190	8,476,453	14,126,890	54%	7,586,835	38	391,598
WOH	24,000+	4,428	128,085	567,161,621	10,051	18,212,786	1959	239	12%	8,508	7,625	16,134	71,439,332	495,722,289	12%	57,851,820	38	2,986,046
SUBTOTAL		**164,287**		**1,488,384,888**		**317,025,197**		**1,937**					**604,363,770**	**884,021,118**		**222,537,229**		**11,486,352**
AVERAGE			**28,566**		**4,030**		**1949**		**22%**	**4,766**	**2,053**	**6,819**			**34%**		**38**	
CENT	0-4,000	11,246	3,038	34,161,251	1,379	15,080,592	1965	15	40%	1,546	309	1,855	20,865,313	13,295,938	81%	10,782,789	45	66,1447
CENT	4,001-8,000	44,972	5,806	261,090,536	1,599	71,523,149	1959	942	18%	2,748	607	3,354	150,850,846	110,239,690	57%	62,614,541	45	3,840,953
CENT	8,001-12,000	14,816	9,803	145,239,251	1,950	28,551,754	1965	1,490	22%	3,645	626	4,271	63,281,852	81,957,399	35%	29,076,735	45	1,783,649
CENT	12,001-16,000	6,201	13,842	85,835,560	2,225	13,563,896	1964	1,020	22%	4,190	1,589	5,779	35,833,313	50,002,247	38%	19,059,955	45	1,169,192
CENT	16,001-20,000	3,788	17,933	67,928,753	2,417	8,911,112	1962	804	21%	4,886	1,800	6,686	25,326,634	42,602,119	38%	16,066,722	45	985,578
CENT	20,001-24,000	3,531	21,975	77,594,465	2,745	9,202,163	1964	925	24%	5,082	2,152	7,234	25,544,292	52,050,173	22%	11,339,717	45	695,610
CENT	24,000+	9,111	90,010	820,083,869	5,448	39,842,102	1966	2,344	23%	9,185	5,542	14,727	134,177,731	685,906,138	20%	135,196,927	45	8,293,362
SUBTOTAL		**93,665**		**1,491,933,685**		**186,674,768**		**7,540**					**455,879,981**	**1,036,053,704**		**284,137,387**		**17,429,792**
AVERAGE			**23,201**		**2,538**		**1964**		**24%**	**4,469**	**1,804**	**6,272**			**42%**		**45**	
TOTAL		**304,487**		**4,023,599,881**		**646,202,634**		**21,336**					**1,415,845,145**	**2,607,754,736**		**735,128,441**		**44,531,302**
AVERAGE			**25,301**		**3,350**		**1963**		**30%**	**5,009**	**2,030**	**7,039**			**41%**		**44**	

2020 POPULATION: 1,538,000

2020 GPCD: 29

[1] Sidewalks, patios, decks, roofline
[2] Driveways, detached garage, pool, sheds
[3] Including hardscape and features

Table H-8 Estimated 2020 EBMUD Multi-Family Residential Landscape Water Use

Location	Tier (sq.ft.)	Number of Services	Ave. Parcel Area (sq.ft.)	Sum Parcel Area (sq.ft.)	Ave. Bldg. Area (sq.ft.)	Sum Bldg. Area (sq.ft.)	Ave. Year Built	Number of Pools	Ave. Bldg. Hard-scape-Added per Service[1] (sq.ft.)	Ave. Lot Other Features Added per Service[2] (sq.ft.)	Total Ave. Building Footprint[3] (sq.ft.)	Sum of Total Building Footprint (sq.ft.)	Irrigatable Area (sq.ft.)	Irrigated Area Factor (%)	Irrigated Area (sq.ft.)	Ref.ET (in.)	Total MAWA (gpd)
EOH	0-4,000	23	2,556	58,787	1,530	29,061	1979		1,324	-	1,324	30,444	28,343	43%	12,234	50	836
EOH	4,001-8,000	92	6,713	617,620	2,528	227,498	1961	2	3,767	874	4,641	426,967	190,653	32%	60,692	50	4,148
EOH	8,001-12,000	158	9,795	1,547,543	3,732	574,743	1965	10	5,110	1,592	6,702	1,058,944	488,599	26%	125,946	50	8,609
EOH	12,001-16,000	92	14,063	1,293,829	5,058	419,829	1969	11	9,877	1,535	11,412	1,049,929	243,900	49%	120,726	50	8,252
EOH	16,001-20,000	81	18,006	1,458,492	5,662	356,692	1970	9	3,728	5,928	9,656	782,129	676,363	95%	643,857	50	44,009
EOH	20,001-24,000	75	21,995	1,649,638	5,407	346,076	1969	22	5,965	4,616	10,581	793,582	856,056	36%	308,079	50	21,058
EOH	24,000+	854	224,974	192,127,819	44,364	18,544,274	1977	83	22,919	29,652	52,571	44,895,613	147,232,206	16%	23,985,986	50	1,639,478
Subtotal		**1,375**		**198,753,728**		**20,498,173**		**137**				**49,037,608**	**149,716,120**		**25,257,519**		**1,726,389**
Average			**42,586**		**9,754**		**1970**		**7,527**	**6,314**	**13,841**			**43%**		**50**	
WOH	0-4,000	3,947	3,236	12,771,340	2,311	8,793,636	1918	2	2,030	369	2,399	9,468,079	3,303,261	27%	889,073	38	45,890
WOH	4,001-8,000	12,331	5,715	70,470,898	3,506	41,516,050	1928	20	3,140	829	3,969	48,945,199	21,525,699	28%	6,039,928	38	311,753
WOH	8,001-12,000	2,357	9,688	22,833,743	7,430	15,900,518	1939	13	4,336	1,380	5,716	13,472,040	9,361,703	76%	7,100,771	38	366,509
WOH	12,001-16,000	956	13,769	13,163,152	12,086	9,934,282	1948	18	7,544	3,633	11,177	10,685,011	2,478,141	43%	1,053,633	38	54,384
WOH	16,001-20,000	434	18,069	7,841,902	16,896	6,352,924	1954	14	6,525	3,549	10,075	4,372,489	3,469,413	44%	1,541,735	38	79,577
WOH	20,001-24,000	261	21,911	5,718,731	20,344	3,967,050	1964	9	9,989	2,634	12,622	3,294,452	2,424,279	37%	891,006	38	45,990
WOH	24,000+	1,664	182,648	303,927,076	74,366	81,058,764	1974	142	33,704	28,798	62,502	104,004,045	199,923,031	80%	159,397,050	38	8,227,345
Subtotal		**21,950**		**436,726,842**		**167,523,224**		**218**				**194,241,317**	**242,485,525**		**176,913,198**		**9,131,448**
Average			**36,434**		**19,563**		**1946**		**9,610**	**5,885**	**15,494**			**48%**		**38**	
CENT	0-4,000	357	3,063	1,093,501	2,017	625,388	1942		1,536	301	1,837	655,850	437,651	21%	93,400	45	5,729
CENT	4,001-8,000	1,681	5,753	9,670,347	2,639	4,337,997	1950	4	2,770	1,036	3,806	6,397,432	3,272,915	21%	692,925	45	42,506
CENT	8,001-12,000	585	9,747	5,701,991	3,318	1,837,971	1955	8	3,285	2,700	5,985	3,501,208	2,200,783	18%	402,208	45	24,673
CENT	12,001-16,000	343	13,881	4,761,265	4,201	1,293,937	1953	9	3,693	5,690	9,383	3,218,264	1,543,001	19%	288,950	45	17,725
CENT	16,001-20,000	227	18,000	4,085,959	4,965	1,042,611	1954	12	3,144	9,347	12,491	2,835,464	1,250,495	16%	204,427	45	12,540
CENT	20,001-24,000	167	21,823	3,644,519	5,957	941,213	1959	10	9,115	4,491	13,606	2,272,283	1,372,236	9%	122,669	45	7,525
CENT	24,000+	1,410	251,100	354,050,526	100,502	102,712,641	1979	103	78,498	39,767	118,265	166,753,923	187,296,603	14%	26,718,258	45	1,638,974
Subtotal		**4,770**		**383,008,108**		**112,791,758**		**146**				**185,634,424**	**197,373,684**		**28,522,838**		**1,749,672**
Average			**46,195**		**17,657**		**1956**		**14,577**	**9,047**	**23,625**			**17%**		**45**	
Total		**28,095**		**1,018,488,678**		**300,813,155**		**501**				**428,913,349**	**589,575,329**		**230,693,555**		**12,607,509**
Average			**41,738**		**15,658**		**1958**		**10,571**	**7,082**	**17,653**			**36%**		**44**	

2020 Population: 1,538,000

2020 GPCD: 8

[1] Sidewalks, patios, decks, roofline
[2] Driveways, detached garage, pool, sheds
[3] Including hardscape and features

Table H-9 Estimated 2020 EBMUD Irrigation Only Landscape Water Use

Location	Tier (sq.ft.)	Number of Services	Average Parcel Area (sq.ft.)	Sum Parcel Area (sq.ft.)	Average Building Area (sq.ft.)	Sum Building Area (sq.ft.)	Average Year Built	Number of Pools	Irrigated Area Factor (%)	Irrigated Area (sq.ft.)	Ref.ET (in.)	Total MAWA (gpd)
EOH	0-4,000	27	2,524	68,145	1,811	23,542	1984	0	37%	25,148	50	1,718
EOH	4,001-8,000	51	6,175	314,906	2,274	97,788	1988	3	43%	135,097	50	9,229
EOH	8,001-12,000	76	9,990	759,231	2,696	161,745	1979	14	36%	275,399	50	18,813
EOH	12,001-16,000	42	13,752	577,591	3,084	101,776	1985	9	38%	219,782	50	15,013
EOH	16,001-20,000	34	17,893	608,355	6,319	132,696	1991	3	46%	277,354	50	18,946
EOH	20,001-24,000	27	22,017	594,464	4,615	59,995	1980	5	38%	223,306	50	15,254
EOH	24,000+	717	439,444	315,081,265	57,807	13,758,127	1984	29	48%	150,861,416	50	10,305,419
Subtotal		**974**		**318,003,957**		**14,335,669**		**63**		**152,017,503**		**10,384,392**
Average			**73,113**		**11,229**		**1984**		**35%**		**50**	
WOH	0-4,000	180	2,881	518,658	2,385	224,169	1969	0	31%	158,504	38	8,181
WOH	4,001-8,000	470	5,892	2,769,306	3,584	1,222,164	1955	4	36%	1,005,495	38	51,899
WOH	8,001-12,000	186	9,858	1,833,519	6,158	677,375	1952	3	38%	699,082	38	36,083
WOH	12,001-16,000	136	13,873	1,886,767	10,229	675,086	1962	0	35%	665,064	38	34,328
WOH	16,001-20,000	102	17,930	1,828,849	9,947	467,511	1963	3	44%	805,509	38	41,577
WOH	20,001-24,000	96	22,020	2,113,882	20,699	890,052	1973	1	30%	638,393	38	32,951
WOH	24,000+	1,325	567,809	752,347,315	68,183	31,296,088	1980	22	41%	308,804,232	38	15,939,059
Subtotal		**2,495**		**763,298,296**		**35,452,445**		**33**		**312,776,281**		**16,144,078**
Average			**91,466**		**17,312**		**1965**		**32%**		**38**	
CENT	0-4,000	50	2,727	136,337	1,767	53,014	1990	0	31%	41,988	45	2,576
CENT	4,001-8,000	202	6,051	1,222,377	2,152	335,665	1977	2	42%	513,391	45	31,493
CENT	8,001-12,000	76	9,988	759,120	3,088	142,030	1974	1	43%	323,346	45	19,835
CENT	12,001-16,000	36	14,172	510,186	3,015	57,294	1980	0	31%	156,267	45	9 ,586
CENT	16,001-20,000	46	18,015	828,686	5,579	150,638	1981	2	26%	214,193	45	13,139
CENT	20,001-24,000	48	21,747	1,043,879	8,286	248,565	1986	0	26%	271,302	45	16,642
CENT	24,000+	830	1,163,543	965,740,594	104,021	36,823,497	1984	29	34%	332,407,223	45	20,390,800
Subtotal		**1,288**		**970,241,179**		**37,810,703**		**34**		**333,927,708**		
Average			**176,606**		**18,273**		**1982**		**29%**		**45**	**20,484,071**
Total		**4,757**		**2,051,543,432**		**87,598,817**		**130**		**798,721,491**		**47,012,541**
Average			**113,729**		**15,605**		**1977**		**32%**		**44**	

2020 Population: 1,538,000

2020 GPCD: 31

Appendix I. 2009-2010 CUWCC MOU Activity Reports and EBMUD Conservation Research Projects

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Appendix I. 2009-2010 CUWCC MOU Activity Reports and EBMUD Conservation Research Projects

I-1. 2009-2010 CUWCC MOU Activity Reports

Water Usage - 2009					Water Sources - 2009		
Property Type	Metered Accounts	Metered Water Delivered (AF/Year)	Un-Metered Accounts	Un-Metered Water Delivered (AF/Year)	Supply Source Name	Quantity Supplied AF/Year	Water Supply Type
Potable							
Single-Family	321,727	86,625	0	0	**Own Sources**		
Multi-Family	28,355	32,521	0	0	Mokelumne River	191,290	Potable
Commercial	15,433	15,551	0	0	Local reservoirs	9,770	Potable
Industrial	1,968	22,258	0	0	Subtotal	201,060	
Institutional	3,695	9,198	0	1,831	**Imported Water**	NA	NA
Irrigation	5,123	12,789	0	0	**Exported Water**	NA	NA
SubTotal	376,301	178,942	0	1,831	Total	201,060	
Non-Potable							
Single-Family	0	0	0	0	**Own Sources**		
Multi-Family	0	0	0	0	Wastewater Treatment	8,504	Recycled
Commercial	2	2	0	0	Local reservoirs	254	Raw
Industrial	1	4,418	0	0	Subtotal	8,758	
Institutional	0	0	0	0	**Imported Water**	NA	NA
Irrigation	57	1264	0	0	**Exported Water**	NA	NA
SubTotal	60	5,684	0	0	Total	8,758	
Total	**376,361**	**184,626**	**0**	**1,831**	**Total**	**209,818**	

Water Usage - 2010					Water Sources - 2010		
Property Type	Metered Accounts	Metered Water Delivered (AF/Year)	Un-Metered # Account	Un-Metered Water Deliveries (AF/Year)	Supply Source Name	Quantity Supplied AF/Year	Water Supply Type
Potable							
Single-Family	322,306	84,526	0	0	**Own Sources**		
Multi-Family	28,412	32,019	0	0	Mokelumne River	187,166	Potable
Commercial	15,386	15,037	0	0	Local reservoirs	13,192	Potable
Industrial	1,943	20,638	0	0	Subtotal	200,358	
Institutional	3,688	8,695	0	1,825	**Imported Water**	NA	NA
Irrigation	5,116	11,928	0	0	**Exported Water**	NA	NA
SubTotal	376,851	172,844	0	1,825	Total	200,358	
Non-Potable							
Single-Family	0	0	0	0	**Own Sources**		
Multi-Family	0	0	0	0	Wastewater Treatment	11,746	Recycled
Commercial	2	0	0	0	Local reservoirs	NA	Raw
Industrial	2	5,695	0	0	Subtotal	11,746	
Institutional	0	0	0	0	**Imported Water**	NA	NA
Irrigation	61	1152	0	0	**Exported Water**	NA	NA
SubTotal	65	6,847	0	0	Total	11,746	
Total	**376,916**	**179,691**	**0**	**1,825**	**Total**	**212,104**	

Operation Practices - 2009				
Conservation Coordinator				
Name	Richard Harris		Street Address 1	375 11th Street
Title	Manager of Water Conservation		Street Address 2	
Phone	510-287-1675		City	Oakland
Mobile	510-384-8499		State	CA
Email	rharris@ebmud.com		Zip	94607
Water Waste Prevention				
Option A	EBMUD Water Service Regulation Section 28 - "Water Use During Water Shortage" and Section 29 - "Prohibiting Wasteful Use of Water" establish dry-year and normal year conditions/restrictions to limit the waste of indoor and outdoor water use among residential and non-residential customers; the regulations can be found at www.ebmud.com			
Option B	EBMUD Procedure 900 - Water Supply Accounting and Reporting; Procedure 901 - Recycled Water Accounting and Reporting; and Procedure 902 - Water Conservation Accounting and Reporting establish utility operations best management practices, definitions, procedures and reporting frequencies to account for all water supply and demand to maximize efficiency.			
Option C	EBMUD 2009 Drought Management Program included a Water Savings Team canvassing the service area; mandatory water rationing allocations and enforcement measures.			
Enforcement Reporting	**Water Waste Prevention Type**	**Importance Ranking**	**Description**	**Actions**
Water Savings Team, Field Services	Excessive runoff and overspray	NA	Correspondence, followed by field visit and ultimately flow restriction and or account interruptions.	
Financial Investments & Bulking Partnerships	**BMP Name**	**Expense**	**Equivalent Resources Provided**	**Actions**
NA	NA	NA	NA	NA
Technical Support	**Tech Support Type**	**Tech Support Expense**	**Description**	**Actions**
NA	NA	NA	NA	NA
Program Management	**BMP Name**	**Program Description**	**Organization Name**	**Actions**
NA	NA	NA	NA	NA
Water Shortage Allocation				
Agency has a water shortage allocation plan or policy				**Yes**
Date of Adoption: Water Supply Availability and Deficiency Rule				
Encourage CUWCC Membership				
List efforts to recruit retail agencies			Board and committee member participation; present CUWCC activities, encourage participation at Bay Area Water Agencies Coalition and other water industry events.	
Amount of dues paid on behalf of retail agencies				NA

Operation Practices - 2010

Conservation Coordinator

Name	Richard Harris	Street Address 1	375 11th Street
Title	Manager of Water Conservation	Street Address 2	
Phone	510-287-1675	City	Oakland
Mobile	510-384-8499	State	CA
Email	rharris@ebmud.com	Zip	94607

Water Waste Prevention

Option A	EBMUD Water Service Regulation Section 29 - "Prohibiting Wasteful Use of Water" establish dry-year and normal year conditions/restrictions to limit the waste of indoor and outdoor water use among residential and non-residential customers; the regulations can be found at www.ebmud.com
Option B	EBMUD Procedure 900 - Water Supply Accounting and Reporting; Procedure 901 - Recycled Water Accounting and Reporting; and Procedure 902 - Water Conservation Accounting and Reporting establish utility operations best management practices, definitions, procedures and reporting frequencies to account for all water supply and demand to maximize efficiency.

Enforcement Reporting	Water Waste Prevention Type	Importance Ranking	Description	Actions
Water Savings Team, Field Services	Excessive runoff and overspray	NA	Correspondence, followed by field visit and ultimately flow restriction and or account interruptions.	

Financial Investments & Bulking Partnerships	BMP Name	Expense	Equivalent Resources Provided	Actions
NA	NA	NA	NA	NA

Technical Support	Tech Support Type	Tech Support Expense	Description	Actions
NA	NA	NA	NA	NA

Program Management	BMP Name	Program Description	Organization Name	Actions
NA	NA	NA	NA	NA

Water Shortage Allocation

Agency has a water shortage allocation plan or policy	**Yes**
Date of Adoption: Water Supply Availability and Deficiency Rule	

Encourage CUWCC Membership

List efforts to recruit retail agencies	Board and committee member participation; present CUWCC activities, encourage participation at Bay Area Water Agencies Coalition and other water industry events.
Amount of dues paid on behalf of retail agencies	NA

Encourage CUWCC Membership

List efforts to recruit retail agencies	Board and committee member
Amount of dues paid on behalf of retail agencies	NA

Water Loss Control - 2009	
AWWA Water Audit	
Agency to complete a water audit & balance using the AWWA software upload worksheets (AWWA Water Audit)	Yes
Agency test source, import & production meters this reporting year	Yes
Water Audit Validity Score	84
Agency completed training in the AWWA Water Audit Method	Yes
Agency completed training in the Component Analysis Process	In Progress
Completed/Updated the Component Analysis (at least every 4 years)?	In Progress
Component Analysis completed/updated Date	In Progress
Water Loss Performance	
Agency Demonstrated Progress in Water Loss Control Performance	Yes
Agency repaired all reported leaks & breaks to the extent cost effective	Yes
Agency established and maintained a record keeping system for the repair of reported leaks for the following	Yes
Leak Location	Yes
Leak running time from report to repair	Yes
Cost of Repair	Yes
Date/Time Reported	Yes
Type of leaking pipe segment or fitting	Yes
Leak volume estimate	Yes
Agency located and repaired unreported leaks to the extent cost effective	Yes
Type of Program activities used to detect unreported leaks	
EBMUD conducts routine field leak surveys of pipe. EBMUD conducted research projects involving (a) semi-permanent installation of acoustic leak detection loggers on 250 miles of pipe and (b) a large pipe leak detection technologies on approximately 100 miles of pipe.	
Procedure 900 - Water Supply Accounting and Reporting and On-line Water Loss Control Manual stipulate EBMUD procedures, actions to account and report on apparent and real water loss.	

Water Loss Control - 2010	
AWWA Water Audit	
Agency to complete a water audit & balance using the AWWA software upload worksheets (AWWA Water Audit)	Yes
Agency test source, import & production meters this reporting year	Yes
Water Audit Validity Score	84
Agency completed training in the AWWA Water Audit Method	Yes
Agency completed training in the Component Analysis Process	In Progress
Completed/Updated the Component Analysis (at least every 4 years)?	In Progress
Component Analysis completed/updated Date	In Progress
Water Loss Performance	
Agency Demonstrated Progress in Water Loss Control Performance	Yes
Agency repaired all reported leaks & breaks to the extent cost effective	Yes
Agency established and maintained a record keeping system for the repair of reported leaks for the following	Yes
Leak Location	Yes
Leak running time from report to repair	Yes
Cost of Repair	Yes
Date/Time Reported	Yes
Type of leaking pipe segment or fitting	Yes
Leak volume estimate	Yes
Agency located and repaired unreported leaks to the extent cost effective	Yes
Type of Program activities used to detect unreported leaks	
EBMUD conducts routine field leak surveys of pipe. EBMUD conducted research projects involving (a) semi-permanent installation of acoustic leak detection loggers on 250 miles of pipe and (b) a large pipe leak detection technologies on approximately 100 miles of pipe.	
Procedure 900 - Water Supply Accounting and Reporting and On-line Water Loss Control Manual stipulate EBMUD procedures, actions to account and report on apparent and real water loss.	

AWWA WLCC Free Water Audit Software: Reporting Worksheet

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WAS v4.1

Back to Instructions

? Click to access definition

Water Audit Report for: East Bay Municipal Utility District
Reporting Year: CY2009 1/2009 - 12/2009

Please enter data in the white cells below. Where available, metered values should be used; if metered values are unavailable please estimate a value. Indicate your confidence in the accuracy of the input data by grading each component (1-10) using the drop-down list to the left of the input cell. Hover the mouse over the cell to obtain a description of the grades

All volumes to be entered as: MILLION GALLONS (US) PER YEAR

WATER SUPPLIED << Enter grading in column 'E'

Volume from own sources:	9	66,431.900	Million gallons (US)/yr (MG/Yr)	
Master meter error adjustment (enter positive value):	9	1,391.200	over-registered	MG/Yr
Water imported:	n/a	0.000	MG/Yr	
Water exported:	n/a	0.000	MG/Yr	
WATER SUPPLIED:		65,040.700	MG/Yr	

AUTHORIZED CONSUMPTION

Click here: ? for help using option buttons below

				Pcnt:	Value:
Billed metered:	9	58,312.300	MG/Yr		
Billed unmetered:	n/a	0.000	MG/Yr		
Unbilled metered:	8	8.800	MG/Yr		
Unbilled unmetered:	6	108.400	MG/Yr		108.400
AUTHORIZED CONSUMPTION:		58,429.500	MG/Yr		

Use buttons to select percentage of water supplied **OR** value

WATER LOSSES (Water Supplied - Authorized Consumption) 6,611.200 MG/Yr

Apparent Losses

				Pcnt:	Value:
Unauthorized consumption:	4	74.000	MG/Yr		74.000
Customer metering inaccuracies:	6	466.000	MG/Yr		466.000
Systematic data handling errors:	6	0.700	MG/Yr		
Apparent Losses:		540.700			

Choose this option to enter a percentage of billed metered consumption. This is NOT a default value

Real Losses (Current Annual Real Losses or CARL)

Real Losses = Water Losses - Apparent Losses:		6,070.500	MG/Yr
WATER LOSSES:		6,611.200	MG/Yr

NON-REVENUE WATER

NON-REVENUE WATER:		6,728.400	MG/Yr

= Total Water Loss + Unbilled Metered + Unbilled Unmetered

SYSTEM DATA

Length of mains:	9	4,108.0	miles	
Number of active AND inactive service connections:	9	381,728		
Connection density:		93	conn./mile main	
Average length of customer service line:	10	0.0	ft	(pipe length between curbstop and customer meter or property boundary)
Average operating pressure:	3	83.0	psi	

COST DATA

Total annual cost of operating water system:	10	$230,490,000	$/Year
Customer retail unit cost (applied to Apparent Losses):	10	$4.86	$/1000 gallons (US)
Variable production cost (applied to Real Losses):	5	$220.00	$/Million gallons

PERFORMANCE INDICATORS

Financial Indicators

Non-revenue water as percent by volume of Water Supplied:	10.3%
Non-revenue water as percent by cost of operating system:	1.7%
Annual cost of Apparent Losses:	$2,627,802
Annual cost of Real Losses:	$1,335,510

Operational Efficiency Indicators

Apparent Losses per service connection per day:	3.88	gallons/connection/day
Real Losses per service connection per day*:	43.57	gallons/connection/day
Real Losses per length of main per day*:	N/A	
Real Losses per service connection per day per psi pressure:	0.52	gallons/connection/day/psi
Unavoidable Annual Real Losses (UARL):	2,407.95	million gallons/year
From Above, Real Losses = Current Annual Real Losses (CARL):	6,070.50	million gallons/year
Infrastructure Leakage Index (ILI) [CARL/UARL]:	2.52	

* only the most applicable of these two indicators will be calculated

WATER AUDIT DATA VALIDITY SCORE:

***** YOUR SCORE IS: 80 out of 100 *****

A weighted scale for the components of consumption and water loss is included in the calculation of the Water Audit Data Validity Score

PRIORITY AREAS FOR ATTENTION:

Based on the information provided, audit accuracy can be improved by addressing the following components:

1: Variable production cost (applied to Real Losses)
2: Unauthorized consumption
3: Customer metering inaccuracies

For more information, click here to see the Grading Matrix worksheet

Metering with Commodity - 2009					
Implementation					
Does agency have any unmetered service connections?					No
If yes, has your agency completed a meter retrofit plan?					NA
If yes, number of previously unmetered accounts fitted with meters during reporting year:					NA
Are all new service connections being metered?					Yes
Are all new service connections being billed volumetrically?					Yes
Has your agency completed and submitted electronically to the Council a written plan, policy, or program to test, repair, and replace meters?					Yes
Matrix					
Account Type	**# Metered Accounts**	**# Metered Accts. Read**	**# Metered Accts. Billed by Volume**	**Billing Frequency by Year**	**# Volume Estimates**
Single Family	321,727	321,727	321,727	Bi-monthly	NA
Multi-Family	28,355	28,355	28,355	Bi-monthly	NA
Commercial	15,433	15,433	15,433	Bi-monthly	NA
Industrial	1,968	1,968	1,968	Monthly	NA
Institutional	3,695	3,695	3,695	Bi-monthly	NA
Landscape Irrigation	5,123	5,123	5,123	Bi-monthly	NA
Subtotal	376,301	376,301	376,301		
Feasibility Study					
Has your agency conducted a feasibility study to assess the merits of a program to provide incentives to switch mixed-use accounts to dedicated landscape meters?					No
If yes, please fill in the following information:					NA
When was the feasibility study conducted?					NA
Description, upload, link:					NA
Number of CII accounts with mixed use meters					2,745
Number of CII accounts with mixed use meters retrofitted with dedicated irrigation meters.					13
At Least as Effective As					
Is your agency implementing an "at least as effective as" variant of this BMP?					No
If yes, please explain in detail how your implementation of this BMP differs from Exhibit 1 and why you consider it to be "at least as effective"					NA

Metering with Commodity - 2010					
Implementation					
Does agency have any unmetered service connections?					No
If yes, has your agency completed a meter retrofit plan?					NA
If yes, number of previously unmetered accounts fitted with meters during reporting year:					NA
Are all new service connections being metered?					Yes
Are all new service connections being billed volumetrically?					Yes
Has your agency completed and submitted electronically to the Council a written plan, policy, or program to test, repair, and replace meters?					Yes
Matrix					
Account Type	**# Metered Accounts**	**# Metered Accts. Read**	**# Metered Accts. Billed by Volume**	**Billing Frequency by Year**	**# Volume Estimates**
Single Family	322,306	322,306	322,306	Bi-monthly	NA
Multi-Family	28,412	28,412	28,412	Bi-monthly	NA
Commercial	15,386	15,386	15,386	Bi-monthly	NA
Industrial	1,943	1,943	1,943	Monthly	NA
Institutional	3,688	3,688	3,688	Bi-monthly	NA
Landscape Irrigation	5,116	5,116	5,116	Bi-monthly	NA
Subtotal	376,851	376,851	376,851		
Feasibility Study					
Has your agency conducted a feasibility study to assess the merits of a program to provide incentives to switch mixed-use accounts to dedicated landscape meters?					No
If yes, please fill in the following information:					NA
When was the feasibility study conducted?					NA
Description, upload, link:					NA
Number of CII accounts with mixed use meters					2,745
Number of CII accounts with mixed use meters retrofitted with dedicated irrigation meters.					10
At Least as Effective As					
Is your agency implementing an "at least as effective as" variant of this BMP?					No
If yes, please explain in detail how your implementation of this BMP differs from Exhibit 1 and why you consider it to be "at least as effective"					NA

Retail Conservation Pricing - 2009				
Implementation (Water Rate Structure)				
Compliant?				Yes
Water Rate Structures that are assigned to the majority of your customers, by customer class				
Rate Structure Option	**Customer Class Name**	**Total Revenue Commodity Charges ($Millions)**	**Total Revenue Customer Meter/Service (Fixed) Charges ($Millions)**	**Commodity vs. Fixed Ratio (%)**
Volumetric 3-Tier	Single-Family Residential	103.6	44.7	70%
Volumetric Single-Tier	Multi-Family Residential	41.2	7.1	85%
Volumetric Single-Tier	Commercial	21.8	3.4	87%
Volumetric Single-Tier	Industrial	28.7	0.8	97%
Volumetric Single-Tier	Institutional / Government	13.4	1.2	92%
Volumetric Single-Tier	Dedicated Irrigation	18.5	1.6	92%
Volumetric Single-Tier	Recycled	5.7	0.1	98%
Volumetric Single-Tier	Raw	0.2	0.02	91%
	Total	**233.1**	**58.9**	**80%**
Implementation Option				
Retail Waste Water (Sewer) Rate Structure by Customer Class				
Compliant?				Yes
Select the Retail Waste Water (Sewer) Rate Structure assigned to the majority of your				
Rate Structure Option	**Customer Class Name**	**Total Revenue Commodity Charges ($Millions)**	**Total Revenue Customer Meter/Service (Fixed) Charges ($Millions)**	**Commodity vs. Fixed Ratio (%)**
Volumetric 3-Tier	Single-Family Residential	5.7	17	**25%**
Volumetric Single-Tier	Multi-Family Residential	7.8	3.5	**69%**
Volumetric Single-Tier	Commercial	7.7	0.7	**92%**
Volumetric Single-Tier	Industrial	0.1	2.7	**4%**
Volumetric Single-Tier	Institutional / Government	NA	NA	NA
Volumetric Single-Tier	Dedicated Irrigation	NA	NA	NA
Volumetric Single-Tier	Recycled	NA	NA	NA
Volumetric Single-Tier	Raw	15.6	6.9	**69%**
	Total	**36.9**	**30.8**	**55%**
At Least as Effective As				
Is your agency implementing an "at least as effective as" variant of this BMP?				No
If yes, please explain in detail how your implementation of this BMP differs				NA
Exemption Request				
Agency has requested an exemption from implementing this BMP				No
Exemption Type				NA

Retail Conservation Pricing - 2010				
Implementation (Water Rate Structure)				
Compliant?				Yes
Water Rate Structures that are assigned to the majority of your customers, by customer class				
Rate Structure Option	**Customer Class Name**	**Total Revenue Commodity Charges ($Millions)**	**Total Revenue Customer Meter/Service (Fixed) Charges ($Millions)**	**Commodity vs. Fixed Ratio (%)**
Volumetric 3-Tier	Single-Family Residential	95.8	47.7	67%
Volumetric Single-Tier	Multi-Family Residential	37.9	7.8	83%
Volumetric Single-Tier	Commercial	19.3	3.7	84%
Volumetric Single-Tier	Industrial	27.3	0.9	97%
Volumetric Single-Tier	Institutional / Government	11.2	1.4	89%
Volumetric Single-Tier	Dedicated Irrigation	15.5	1.8	90%
Volumetric Single-Tier	Recycled	4.8	0.1	98%
Volumetric Single-Tier	Raw	0.2	0.02	91%
	Total	**212.0**	**63.4**	**77%**
Implementation Option				
Retail Waste Water (Sewer) Rate Structure by Customer Class				
Compliant?				Yes
Select the Retail Waste Water (Sewer) Rate Structure assigned to the majority of your				
Rate Structure Option	**Customer Class Name**	**Total Revenue Commodity Charges ($Millions)**	**Total Revenue Customer Meter/Service (Fixed) Charges ($Millions)**	**Commodity vs. Fixed Ratio (%)**
Volumetric 3-Tier	Single-Family Residential	5.9	17.7	**25%**
Volumetric Single-Tier	Multi-Family Residential	8.2	3.7	**69%**
Volumetric Single-Tier	Commercial	8	0.7	**92%**
Volumetric Single-Tier	Industrial	2.9	0.1	**97%**
Volumetric Single-Tier	Institutional / Government	NA	NA	NA
Volumetric Single-Tier	Dedicated Irrigation	NA	NA	NA
Volumetric Single-Tier	Recycled	NA	NA	NA
Volumetric Single-Tier	Raw	19.1	4.5	**81%**
	Total	**44.1**	**26.7**	**62%**
At Least as Effective As				
Is your agency implementing an "at least as effective as" variant of this BMP?				No
If yes, please explain in detail how your implementation of this BMP differs				NA
Exemption Request				
Agency has requested an exemption from implementing this BMP				No
Exemption Type				NA

Public Outreach - 2009		
Is the Retail Agency Performing Public Outreach?		**Yes**
Public Information Program List		
# Public Contacts	**Public Information Programs**	**Did at least one contact take place during each quarter of the reporting year?**
2.3 million	Individual mailings sent six times annually to over 376,000 water service accounts including flyers and/or brochures, bill stuffers including *Pipeline* newsletter with conservation articles and messages printed on bill.	Yes
119,304	WaterSmart Center website hits to www.ebmud.com/watersmart which includes conservation rebates and services information, water saving tips and videos, publications, access to free water saving devices, and links to information resources.	Yes
4	Workshops and media campaigns with Bay Friendly Landscaping and Gardening.	Yes
3,298	Conservation-related customer telephone contacts with EBMUD Contact Center and Water Conservation.	Yes
2	Website links to Irrigation Association of California and StopWaste.	No
2,000	EBMUD initiated customer contacts to high consumption accounts (approximately 800 annually) and responses to conservation-related email inquiries (approximately 1,200 annually).	Yes
25	Responses to Garden Grant Program application requests.	Yes
10	Conservation booths at community events.	Yes
18,930	Provide bi-monthly water use reports to customers with comparison of water use to water budget.	Yes
258	Conduct conservation presentations to community groups, schools, and other agencies. 38-(Water Conservation), 220-(Public Information Office)	Yes
42	Conduct media outreach: news releases, editorial board visits, written editorials, newspaper contacts, television, contacts, radio contact, articles or stories resulting from outreach.	Yes
1	Conducted Adult Education/Training Programs: Irrigation Courses.	Yes
3	Sponsor or co-sponsored landscape workshops/training for homeowners and/or homeowners associations: 2-Bay Friendly Presentations/year. 1-Master Gardener Presentation/year.	Yes
$3.66 million	Total reporting period budget expenditure for public outreach/training/adult education programs including 31 Water Conservation and temporary drought response staffing, three Public Information staff, and a $1.8 million drought response multi-media marketing campaign.	Yes
Contact with the Media		
# Media Contacts	**Media Contact Types**	**Did at least one contact take place during each quarter of the reporting year?**
12	Press Releases	Yes
30	Television and radio media	Yes
Performing Website Updates:		Yes
URL (website address):		http://www.ebmud.com/

Public Outreach - 2009		
Water conservation related updates to website:		
1	Quarterly Qualifying High-Efficiency Clothes Washers and WaterSense Toilets.	Yes
2	Biannual program information updates for all rebate programs	Yes
3	Biannual updates to online Mulch Coupon Offer	Yes
4	Quarterly updates to WaterSmart Center messages	Yes
5	Quarterly updates and maintenance to website online store	Yes
6	As needed updates and maintenance of Water Conservation publications & links to other sites	Yes
7	Monthly Workshops & Events updates	Yes
Public Outreach Expenses		
Expense Amount	**Expense Category**	**Personnel Costs Included?**
$22,416	Staffing Community Events.	Yes
$23,571	Water Conservation Presentations to community groups.	Yes
Additional Public Information Program		
Were there additional Public Outreach efforts?		Yes
Public Information Programs		
	Annual Water Conservation & Recycling Program Report	NA
	WaterSmart (Business) Certification Program	Yes
	WaterSmart Garden Grant Program	NA
	Annual Water Conservation Showcase	NA
	California Youth Energy Services	Yes
	Field Learning Environmental Education Sites: Chabot, Nunes and Valle Vista.	Yes
Social Marketing Programs/Branding		
Does your agency have a water conservation "brand", "theme" or mascot?		Yes
	WaterSmart is an umbrella brand for EBMUD conservation programs depicting environmentally friendly and customer oriented services. Originally developed through market research and testing, the brand is consistently deployed for water-conservation-related online and print communications.	
Market Research		
Have you sponsored or participated in market research to refine your message?		Yes
Market Research Topic:		WaterSmart Certification Program
Community Committees		
Do you have a community conservation committee?		Yes
Select the name(s) of Focus or Foci:		Landscape Advisory Committee

Public Outreach - 2010		
Is the Retail Agency Performing Public Outreach?		**Yes**
Public Information Program List		
# Public Contacts	**Public Information Programs**	**Did at least one contact take place during each quarter of the reporting year?**
2.3 million	Individual mailings sent six times annually to approximately 377,000 water service accounts including flyers and/or brochures, bill stuffers including *Pipeline* newsletter with conservation articles and messages printed on bill.	Yes
120,390	WaterSmart Center website hits to www.ebmud.com/watersmart which includes conservation rebates and services information, water saving tips and videos, publications, access to free water saving devices, and links to information resources.	Yes
4	Workshops and media campaigns with Bay Friendly Landscaping and Gardening.	Yes
2,000	Conservation-related customer telephone contacts with EBMUD Contact Center and Water Conservation.	
2	Website links to Irrigation Association of California and StopWaste.	No
2,000	EBMUD initiated customer contacts to high consumption accounts (approximately 800 annually) and responses to conservation-related email inquiries (approximately 1,200 annually).	Yes
5,000	Direct mail for WaterSmart Certification Program.	No
10	Conservation booths at community events.	Yes
18,930	Provide bi-monthly water use reports to customers with comparison of water use to water budget.	Yes
74	Conduct conservation presentations to community groups, schools, and other agencies.	Yes
8	Conduct media outreach: news releases, editorial board visits, written editorials, newspaper contacts, television, contacts, radio contact, articles or stories resulting from outreach.	Yes
2	Conducted Adult Education/Training Programs: Irrigation Courses.	Yes
3	Sponsor or co-sponsored landscape workshops/training for homeowners and/or homeowners associations: 2-Bay Friendly Presentations/year. 1-Master Gardener Presentation/year.	Yes
$2 million	Total reporting period budget expenditure for public outreach/training/adult education programs including, 16 Water Conservation and 3 Public Information staff.	Yes
Contact with the Media		
# Media Contacts	**Media Contact Types**	**Did at least one contact take place during each quarter of the reporting year?**
8	Press Releases	Yes
30	Television and radio media	Yes
Is Your Agency Performing Website Updates:		Yes
URL (website address):		http://www.ebmud.com/

Public Outreach - 2010		
Water conservation related updates to website:		
1	Quarterly Qualifying High-Efficiency Clothes Washers and WaterSense Toilets.	Yes
2	Biannual program information updates for all rebate programs	Yes
3	Biannual updates to online Mulch Coupon Offer	Yes
4	Quarterly updates to WaterSmart Center messages	Yes
5	Quarterly updates and maintenance to website online store	Yes
6	As needed updates and maintenance of Water Conservation publications & links to other sites	Yes
7	Monthly Workshops & Events updates	Yes
Public Outreach Expenses		
Expense Amount	**Expense Category**	**Personnel Costs Included?**
$31,952	Staffing Community Events.	Yes
$17,195	Water Conservation Presentations to community groups.	Yes
Additional Public Information Program		
Were there additional Public Outreach efforts?		Yes
Public Outreach Additional Information		
Public Information Programs		
	Annual Water Conservation & Recycling Program Report	NA
	WaterSmart (Business) Certification Program	Yes
	WaterSmart Garden Grant Program	NA
	Annual Water Conservation Showcase	NA
	California Youth Energy Services	Yes
	Field Learning Environmental Education Sites: Chabot, Nunes and Valle Vista.	Yes
Social Marketing Programs/Branding		
Does your agency have a water conservation "brand", "theme" or mascot?		Yes
	WaterSmart is an umbrella brand for EBMUD conservation programs depicting environmentally friendly and customer oriented services. Originally developed through market research and testing, the brand is consistently deployed for water-conservation-related online and print communications.	
Market Research		
Have you sponsored or participated in market research to refine your message?		Yes
Market Research Topic:		Customer surveys
Community		
Do you have a community conservation committee?		Yes
Select the name(s) of Focus or Foci:		Landscape Advisory Committee

School Education - 2009	
Required School Programs	
Is a wholesale agency implementing school programs which can be counted to help your agency comply with this BMP?	No
Materials meet state education framework requirements?	Yes
Description of Materials	
Materials distributed to K-6 Students?	Coloring books, educational comic books, education lesson courses, and water awareness activity workbooks.
Description of materials distributed to K-6 Students.	Creative and age appropriate introduction to water awareness consisting of coloring and comic books with simple sentences structure and content. Story lines follow "Captain Hydro's" life in the water world.
Number of students reached:	47,793
Materials distributed to 7-12 Students?	Educational workbooks, educational lesson courses, and water awareness activity lessons.
Description of materials distributed to 7-12 Students.	Materials focus on where EBMUD water comes from, how water is treated, stored, and delivered. Other lessons and lesson plans include pollution prevention waste water treatment as they relate to world history and geography and integrate with other science and social science awareness.
Number of Distribution:	19,522
Annual Budget of school education program:	$200,000
Description of all other water supplier education programs:	Newsletters (Customer Pipelines and Equalizer) Reports (Annual, Technical, and Water Supply Resource); Fact Sheets (Budget by Fiscal Year, EBMUD Energy, EBMUD & Delta, Family Disaster Preparedness, and Waterlines are Lifelines) Workshops and Events (Water Conservation Showcase, Bay Friendly Gardens, and Native Garden Tours and Irrigation Workshops); and coordination with Environmental Education Organizations (Chabot, Nunes and Valle Vista).
Voluntary School Program Activities	
Large group assemblies:	
Number of presentations:	4
Number of attendees:	185
Cooperative efforts with existing science/water education programs (various workshops, science fair awards or judging) and follow-up:	
Number of presentations:	2
Number of attendees:	40
Other methods of disseminating information (i.e. themed age-appropriate classroom loaner kits):	
Description:	Newsletters and Educational School Books distributed twice a year to all schools including 155 School Superintendents, School Board Members and County Offices of Education; 563 schools and outdoor educational entities such as Scout groups; and 30 to various water agencies and related groups. Also, Pencils & Sharpeners were distributed to all the schools.
Number distributed:	14,364 - Newsletters. 1,000 - Educational School Books. 30,000 Pencils & Sharpeners.

School Education - 2010	
Required School Programs	
Is a wholesale agency implementing school programs which can be counted to help your agency comply with this BMP?	No
Materials meet state education framework requirements?	Yes
Description of Materials	
Materials distributed to K-6 Students?	Coloring books, educational comic books, education lesson courses, and water awareness activity workbooks.
Description of materials distributed to K-6 Students.	Creative and age appropriate introduction to water awareness consisting of coloring and comic books with simple sentences structure and content. Story lines follow "Captain Hydro's" life in the water world.
Number of students reached:	47,793.00
Materials distributed to 7-12 Students?	The materials distributed to 7 - 12 students were educational workbooks, educational lesson courses, and water awareness activity lessons.
Description of materials distributed to 7-12 Students.	Materials focus on where EBMUD water comes from, how water is treated, stored, and delivered. Other lessons and lesson plans include pollution prevention waste water treatment as they relate to world history and geography and integrate with other science and social science awareness.
Number of Distribution:	19,522
Annual Budget of school education program:	$150,000
Description of all other water supplier education programs:	Newsletters (Customer Pipelines and Equalizer) Reports (Annual, Technical, and Water Supply Resource); Fact Sheets (Budget by Fiscal Year, EBMUD Energy, EBMUD & Delta, Family Disaster Preparedness, and Waterlines are Lifelines) Workshops and Events (Water Conservation Showcase, Bay Friendly Gardens, and Native Garden Tours and Irrigation Workshops); and coordination with Environmental Education Organizations (Chabot, Nunes and Valle Vista).
Voluntary School Program Activities	
Large group assemblies:	
Number of presentations:	1
Number of attendees:	20
Cooperative efforts with existing science/water education programs (various workshops, science fair awards or judging) and follow-up:	
Number of presentations:	2
Number of attendees:	40
Other methods of disseminating information (i.e. themed age-appropriate classroom loaner kits):	
Description:	Newsletters and Educational School Books distributed twice a year to all schools including 155 School Superintendents, School Board Members and County Offices of Education; 563 schools and outdoor educational entities such as Scout groups; and 30 to various water agencies and related groups. Also, Pencils & Sharpeners were distributed to all the schools.
Number distributed:	14,364 - Newsletters. 1,000 - Educational School Books.

Programmatic BMP Implementation Component and Coverage Requirement		Coverage Requirement Basis							
Implementation Component	**Coverage Requirement Description**	**Coverage Requirement Component**	**Annual Coverage Rate**	**Total Coverage Requirement**	**2008 Base Amount**	**Base Unit**	**Annual Coverage Requirement**	**Coverage Requirement Through 2010**	**Total Coverage Requirement**
BMP 3 Residential									
Residential Assistance	Provide leak detection assistance to an average of 1.5 percent per year of current single-family accounts and 1.5 percent per year of current multi-family units during the first ten years after signing the MOU. After completing the ten-year 15 percent target, agencies will maintain a program at the level of high-bill complaints or not less than 0.75 percent per year of current single-family accounts and 0.75 percent per year of current multi-family units. Showerhead distribution will be considered complete when 75 percent market saturation is achieved.	SF Leak Detection	1.50%	15.00%	320,785	Accounts	4,812	9,624	48,118
		MF Leak Detection	1.50%	15.00%	254,043	Dwelling Units	3,811	7,621	38,106
		Showerhead Saturation	7.50%	75.00%	849,670	Showerheads	63,725	127,451	637,253
Landscape Water Survey	Provide landscape water surveys to an average of 1.5 percent per year of current single-family accounts during the first ten years after signing the MOU. After completing the ten-year 15 percent target, agencies will maintain a program at the level of high-bill complaints or no less than 0.75 percent per year of current single-family accounts.	SF Surveys	1.50%	9.80%	320,785	Accounts	794	1,588	7,939
High efficiency clothes washers	Provide financial incentives for the purchase of HECWs that meet an average water factor value of 5.0. If the WaterSense Specification is less than 5.0, then the water factor value will decrease to that amount. Incentives shall be provided to 0.9 percent of current single-family accounts during the first reporting period following BMP implementation, rising to 1.0 percent per year of current single-family accounts for the remainder of ten year period following signing of the MOU. An alternative method is to demonstrate 1.4 percent per year of the market penetration during the first ten years after signing the MOU.	SF incentives WSS HEW	0.90%	10.00%	320,785	Accounts	2,887	5,774	32,079
HET Rebate Program	A financial incentive shall continue to be offered for toilets meeting the current WSS and updated standard whenever a more efficient toilet is identified by WSS. Compliance will entail demonstrating a number of toilet replacements of 3.5 gpf or greater, toilets at or above the level achieved through a retrofit on resale ordinance until 2014, or a market saturation of 75% is demonstrated, whichever is sooner.	Toilet Saturation < 3.5 gpf	7.50%	75.00%	978,500	Toilets	73,388	146,775	733,875
WSS New Development	An incentive shall continue to be offered until a water agency, or local, state or federal regulation is in effect meeting at a minimum, WSS for water efficient single-family homes. Multi-family housing shall also meet the WSS in all applicable criteria regardless of the total number of stories in the building.	Regulation	Incentive or Regulation	Incentive or Regulation	NA				

Programmatic BMP Implementation Component and Coverage Requirement		Coverage Requirement Basis							
Implementation Component	**Coverage Requirement Description**	**Coverage Requirement Component**	**Annual Coverage Rate**	**Total Coverage Requirement**	**2008 Base Amount**	**Base Unit**	**Annual Coverage Requirement**	**Coverage Requirement Through 2010**	**Total Coverage Requirement**
BMP 4 CII									
Water Savings	Coverage shall consist of meeting the annual water savings goal in Section A. Although it is not one of the criteria in meeting implementation, agencies will be considered on track if estimated savings as a percent of baseline water use equals or exceeds the following: 0.5% by the end of first reporting period (year two), 2.4% by the end of year four, 4.3% by the end of year six, 6.4% by the end of year eight, and 9% by the end of year ten. Percentages will be adjusted proportionally for up to 50% past credit referred to in the Implementation section.	Percentage of 2008 Baseline Consumption	0.50%	10.00%	49,919	Acre Feet	NA	125	4,992
BMP 5 Landscape									
Water Budgets	1) ETo-based water use budgets developed for 90% of CII accounts with dedicated irrigation meters at an average rate of 9% per year over 10 years.	Water Budgets (dedicated meters)	9.00%	90.00%	5,167	Accounts	465	930	4,650
Technical Assistance	2) Offer site-specific technical assistance annually to all accounts that are 20% over budget within six years of the date implementation was to commence.	Annual Assistance (to over budget accts)	20.00%	Accounts > 20 percent over water budgets		Accounts	Varies by year		
Water Use Surveys	3) Complete irrigation water use surveys for not less than 15% of CII accounts with mixed-use meters and un-metered accounts within 10 years of the date implementation is to commence. (Note: CII surveys that include both indoor and outdoor components can be credited against coverage requirements for both the Landscape and CII BMPs.) An agency will be considered on track if the percent of CII accounts with mixed-use meters receiving a landscape water use survey equals or exceeds the following: 1.5% by the end of the first reporting period (year two) following the date implementation is to commence; 3.6% by the end of year four; 6.3% by the end of year six; 9.6% by the end of year eight; and 13.5% by the end of year ten. Agency may credit 100% of the number of landscape water use surveys for CII accounts with mixed-use meters completed prior to July 1, 2007 that have received a follow-up inspection against the coverage requirement; agency may credit 50% of surveys that have not received follow-up inspections. Agency may credit 100% of the number of landscape water use surveys completed for CII accounts with mixed-use meters after July 1, 2007 against the coverage requirement.	Mixed-use Account. Water Surveys	1.50%	15.00%	2,745	Accounts	41	82	412
Incentives for Retrofit	4) Agency will implement and maintain a customer incentive programs) for irrigation equipment retrofits.	Maintain Program	NA	NA	Program Implemented	Yes or No			

Programmatic BMP Implementation Component and Coverage Requirement			EBMUD Coverage Requirement			2009-2010 Activity and Compliance Status					
Implementation Component	**Coverage Requirement Description**	**Coverage Requirement Component**	**Total Activity Thru 2008**	**EBMUD Basis**	**Remaining Annual Target**	**Annual Activity 2009**	**Annual Activity 2010**	**Total Activity to Date**	**Percent Coverage Requirement Thru 2010**	**Percent of Total Coverage Requirement**	**Status**
BMP 3 Residential											
Residential Assistance	Provide leak detection assistance to an average of 1.5 percent per year of current single-family accounts and 1.5 percent per year of current multi-family units during the first ten years after signing the MOU. After completing the ten-year 15 percent target, agencies will maintain a program at the level of high-bill complaints or not less than 0.75 percent per year of current single-family accounts and 0.75 percent per year of current multi-family units. Showerhead distribution will be considered complete when 75 percent market saturation is achieved.	SF Leak Detection	38,313	9,805	980	884	546	39,743	413%	83%	On Track
		MF Leak Detection	45,682	0	0	3,375	3,411	52,468	688%	138%	Complete
		Showerhead Saturation	781,696	0	0	5,119	1,656	788,471	619%	124%	Complete
Landscape Water Survey	Provide landscape water surveys to an average of 1.5 percent per year of current single-family accounts during the first ten years after signing the MOU. After completing the ten-year 15 percent target, agencies will maintain a program at the level of high-bill complaints or no less than 0.75 percent per year of current single-family accounts.	SF Surveys	2,624	5,315	532	178	35	2,837	179%	36%	On Track
High efficiency clothes washers	Provide financial incentives for the purchase of HECWs that meet an average water factor value of 5.0. If the WaterSense Specification is less than 5.0, then the water factor value will decrease to that amount. Incentives shall be provided to 0.9 percent of current single-family accounts during the first reporting period following BMP implementation, rising to 1.0 percent per year of current single-family accounts for the remainder of ten year period following signing of the MOU. An alternative method is to demonstrate 1.4 percent per year of the market penetration during the first ten years after signing the MOU.	SF incentives WSS HEW	62,883	0	0	10,465	10,258	83,606	1448%	261%	Complete
HET Rebate Program	A financial incentive shall continue to be offered for toilets meeting the current WSS and updated standard whenever a more efficient toilet is identified by WSS. Compliance will entail demonstrating a number of toilet replacements of 3.5 gpf or greater, toilets at or above the level achieved through a retrofit on resale ordinance until 2014, or a market saturation of 75% is demonstrated, whichever is sooner.	Toilet Saturation < 3.5 gpf	615,816	118,059	11,806	39,140	39,140	694,096	473%	95%	On Track
WSS New Development	An incentive shall continue to be offered until a water agency, or local, state or federal regulation is in effect meeting at a minimum, WSS for water efficient single-family homes. Multi-family housing shall also meet the WSS in all applicable criteria regardless of the total number of stories in the building.	Regulation	Regulation Implemented 2007	New Service Water Conservation Meet WSS Requirements		New Service Water Conservation Regulation Implementation			100%	NA	On Track

Programmatic BMP Implementation Component and Coverage Requirement			EBMUD Coverage Requirement			2009-2010 Activity and Compliance Status					
Implementation Component	**Coverage Requirement Description**	**Coverage Requirement Component**	**Total Activity Thru 2008**	**EBMUD Basis**	**Remaining Annual Target**	**Annual Activity 2009**	**Annual Activity 2010**	**Total Activity to Date**	**Percent Coverage Requirement Thru 2010**	**Percent of Total Coverage Requirement**	**Status**
BMP 4 CII											
Water Savings	Coverage shall consist of meeting the annual water savings goal in Section A. Although it is not one of the criteria in meeting implementation, agencies will be considered on track if estimated savings as a percent of baseline water use equals or exceeds the following: 0.5% by the end of first reporting period (year two), 2.4% by the end of year four, 4.3% by the end of year six, 6.4% by the end of year eight, and 9% by the end of year ten. Percentages will be adjusted proportionally for up to 50% past credit referred to in the Implementation section.	Percentage of 2008 Baseline Consumption	19,695	2,496	250	105	1,299	1,404	1125%	56%	On Track
BMP 5 Landscape											
Water Budgets	1) ETo-based water use budgets developed for 90% of CII accounts with dedicated irrigation meters at an average rate of 9% per year over 10 years.	Water Budgets (dedicated meters)	NA	4,650	465	3,155	3,315	3,315	356%	71%	On Track
Technical Assistance	2) Offer site-specific technical assistance annually to all accounts that are 20% over budget within six years of the date implementation was to commence.	Annual Assistance (to over budget accts)	All accounts offered assistance	Varies by year		All sites over budget are offered technical assistance			100%	NA	On Track
Water Use Surveys	3) Complete irrigation water use surveys for not less than 15% of CII accounts with mixed-use meters and un-metered accounts within 10 years of the date implementation is to commence. (Note: CII surveys that include both indoor and outdoor components can be credited against coverage requirements for both the Landscape and CII BMPs.) An agency will be considered on track if the percent of CII accounts with mixed-use meters receiving a landscape water use survey equals or exceeds the following: 1.5% by the end of the first reporting period (year two) following the date implementation is to commence; 3.6% by the end of year four; 6.3% by the end of year six; 9.6% by the end of year eight; and 13.5% by the end of year ten. Agency may credit 100% of the number of landscape water use surveys for CII accounts with mixed-use meters completed prior to July 1, 2007 that have received a follow-up inspection against the coverage requirement; agency may credit 50% of surveys that have not received follow-up inspections. Agency may credit 100% of the number of landscape water use surveys completed for CII accounts with mixed-use meters after July 1, 2007 against the coverage requirement.	Mixed-use Account. Water Surveys	485	2,260	226	13	10	508	617%	123%	Complete
Incentives for Retrofit	4) Agency will implement and maintain a customer incentive programs) for irrigation equipment retrofits.	Maintain Program	Program Implemented	NA	NA	Program Implemented			100%	NA	On Track

I-2. EBMUD Conservation Research Projects

Table I-2.1 Conservation Research Projects

Project Name	Funding Year	EBMUD Cost	Description
1.6 Gallon Per Flush (gpf) Toilets Study	1991	$125,000	To determine toilet and showerhead water savings and impact on sewer lines.
Impacts of Ultra Low-Flow Toilets (ULFT) on Sewer Laterals and Wastewater Operations Study	1992	$75,000	To determine the impact of 1.6 gpf toilets on sewer lateral flows and on wastewater operations.
Customer Incentive for Water Conservation Study	1994	$10,000	To determine the efficacy of various water conservation incentive programs.
Water Conservation Baseline Study	1995	$100,000	To determine baseline customer knowledge of water conservation practices and market penetration of water saving fixtures.
Potential Energy Savings with Off-Peak Irrigation Study	1995	$10,000	To determine irrigation habits in the EBMUD service area and estimate potential energy savings from off-peak irrigation.
Water Conservation Rate Structures Study	1997	$10,000	To determine innovative ways to price urban water service.
The High-Efficiency Laundry Metering and Marketing Analysis (THELMA) Project	1998	$25,000	To collect information to help transform the clothes washer industry to change to more efficient products.
Best Management Practices (BMPs) Costs and Savings Study	2000	$20,000	To develop methods and data to enact economic analysis for water conservation BMPs.
Laboratory Evaluation of Selected 1.6 gpf Toilet Fixtures	2001	$10,000	To determine performance of selected 1.6 gpf toilets and to propose industry testing standards.
Commercial, Industrial, and Institutional (CII) ULFT Savings Study	2001	$10,000	To determine water savings of 1.6 gpf toilets in the business sector.
Water Conservation Market Penetration Study	2002	$300,000	To determine market penetration of water saving fixtures and equipment.
Water Closet Performance Testing Study	2002	$30,000	To develop information on product performance, water savings reliability, and to help consumers evaluate products.
Demand Hardening Study	2002	$10,000	To determine the impact of demand hardening on future conservation and ability to respond to water shortages.
Toilet Freeriders Study	2002	$10,000	To determine the impact of freeriders on cost-effectiveness of toilet rebates.
Evapotranspiration (ET) Controller Evaluation	2002	$65,000	To evaluate different weather based controllers and their potential water savings.
Marketing Plan Study	2003	$50,000	To make marketing recommendations for promoting water conservation.
Residential End Use Study	2003	$100,000	To determine indoor water use and water use of different fixtures.
National Submetering Study	2004	$75,000	To determine water savings associated with submetering in multi-family dwellings.
Urban Water Conservation Potential	2004	$10,000	To determine urban water conservation potential in California.
BMP Costs and Savings Study	2004	$20,000	To determine the costs and water savings of various new water saving products.
Self-Contained Food Steamers Study	2004	$25,000	Field study on boiler versus boilerless steamers and the potential water savings and cost-effectiveness.
Pre-rinse Spray Valve and Dishwasher Study	2005	$100,000	To analyze water savings from the installation of water and energy efficient pre-rinse spray valves and dishwashers at food services.
Irrigated Area and Water Use by Major Plant Type	2005	$10,000	To determine the total irrigated area in the EBMUD service area by major plant type and the amount of water used by plant type.
Water Loss and Control Strategy	2005	$10,000	To develop an interactive On-Line Water Loss Control Manual.
Non-Compliant Showerhead Testing Study	2005	$10,000	To test selected showerheads for compliance with State and Federal Plumbing Codes.
End Use Demand and Metering Technology Study	2005-2008	$125,000	Using automated meter reading (AMR) technology to provide customer feedback on use and potential leaks.

Conservation Research Projects Continued

Project Name	Funding Year	EBMUD Cost	Description
Valuing the Environmental Benefits of Urban Water Conservation	2006	$10,000	To determine the value of saved water to the environment and society.
Expanded Metering Pilot Program and Study (Submetering)	2006	$150,000	To determine issues associated with the EBMUD metering in multi-family (MF) sector and to recommend a program.
Water-Efficiency Programs for Supply Planning	2006	$10,000	To investigate the relationship between water-efficiency programs and supply planning.
Ice Machine Efficiency Study	2006	$15,000	Field study on air and water-cooled ice machines to determine water savings potential and cost-effectiveness.
X-Ray Film Processor Pilot Project	2006	$50,000	To replace water using X-ray machines with digital X-ray machines and to determine water savings.
Pipeline Leak Detection Study	2006-2010	$500,000	Testing acoustic technology to detect leaks in the distribution system.
Aqueduct Leak Detection Study	2006-2010	$300,000	To demonstrate advanced leak detection technologies in transmission mains.
PG&E Embedded Energy Study	2007	$5,000	To evaluate utility energy savings through water conservation.
Water Budgets and Rate Structures Study	2007	$20,000	To determine impact of water budgets and rate structures on water savings.
California Single Family Water-Use Efficiency Study	2007-2011	$15,000	Provide detailed water use data and benchmark efficiency for a sample of California homes.
Water Conservation through Automated Meter Reading (AMR) Systems	2007-2012	$800,000	Provided 4,000 customers with web access to their real-time consumption information in a graphical format (Capable of hourly interval displays) incorporating water budgets and leak notification
Weather Based Irrigation Controller (WBIC) Program and Study	2008	$15,000	To evaluate water savings of pilot weather based irrigation controllers.
Potential BMPs Study	2008	$10,000	Using Automated Meter Reading (AMR) To determine the efficacy of potential new water conservation measures.
WaterSmart Guidebook Project	2008	$100,000	To determine business end uses of water and to identify water efficient fixtures, appliances, and processes.
Urban Water Conservation Accomplishments Study	2008	$5,000	To determine what California urban water agencies have accomplished in water conservation.
WaterSmart Certification and Recognition Program Marketing Plan	2009	$25,000	Pilot study to test customer interest and market acceptance of a certification program for Water Efficient Businesses
Plan Review Pilot Study	2009	$100,000	To review business construction plans for water-efficiency and estimate water savings and program cost-effectiveness.
Irrigation Controller Study	2009	$15,000	To develop testing standards to evaluate irrigation controllers for water-efficiency potential.
Subsurface Irrigation Study	2009	In-kind services	To determine the efficacy of subsurface irrigation systems.
Water system optimization through the development of an Advanced Metering Infrastructure (AMI) Implementation Plan	2009-2011	$600,000	Evaluation and implementation planning for system-wide advanced metering infrastructure and and conservation benefits study
Customer (Efficiency) Opinion Research	2009-2011	$150,000	Customer surveys, focus groups, and seminars to gain insight into customers' drought response, conservation practices and use of water-efficient technology
Fixed Network Acoustic Leak Detection	2009-2011	$50,000	Demonstration of remote reading of acoustic pipeline leak detection equipment using AMR systems
GIS-Based Landscape Water Budgeting Calculator	2010	$300,000	Development of an automated landscape water budgeting tool for customer to meet model landscape ordinance requirements
California Public Utilities Commission (CPUC) Water Profile Study	2010-2011	$7,000	Identify water and energy use patterns and water-conservation related energy savings potential for California's resource planning purposes
Water Savings Evaluation Study	Ongoing	$50,000	To determine water savings by program measure using pre- and post-intervention analysis.

Since 1991 EBMUD has fully or partially sponsored 51 conservation research projects costing approximately 3.49 million dollars. These studies are conducted to apply results and lessons learned to future conservation activities and to advance the science of water conservation. These studies are summarized in Table I-2.1.

Discussion of Research Projects

The 51 research projects itemized in Table I-2.1 are discussed chronologically in more detail below.

1.6 Gallons Per Flush (gpf) Toilets Study. This 1991 study involved the retrofitting of 25 single-family homes in the EBMUD service area to determine the water savings associated with 1.6 gpf toilets and the water and energy savings associated with water saving showerheads. This study found that (1) despite a slight increase in double flushing over conventional toilets, there were still significant water savings (5.3 gallons/person/day), and (2) the savings associated with lower flow showerheads was 2.8 gallons/person/day. This study indicated there was no energy savings because the water temperature increased with the water savings showerhead to offset showerhead aeration.

Impacts of Ultra Low-Flow Toilets (ULFT) on Sewer Laterals and Wastewater Operations Study. In 1992, when 1.6 gpf toilets were introduced into the marketplace, there was concern over their (1) impact on flows in the sanitary laterals and distribution system, and (2) impact on the wastewater treatment facility. Through a literature search and a survey of wastewater agencies, this study found that (1) there was no increase in the maintenance requirements in the sanitary line distribution system, and (2) the operating costs for a wastewater treatment plant in most cases decreased and in a few cases increased slightly.

Customer Incentive for Water Conservation Study. In 1995, EBMUD, in a collaborative effort, investigated the efficacy of various water conservation incentive programs. The purpose of this study was to assess various incentive programs from different water providers and energy companies and to make recommendations for future conservation incentive efforts.

Water Conservation Baseline Study. The purpose of this 1995 study was to determine how customers used water by (1) identifying the types and saturation of water-using hardware for selected customer groups, (2) characterizing water conservation attitudes and behaviors of the general public, and (3) developing a recommended monitoring and evaluation plan. The information collected helped in designing a plan to best market water conservation through targeted programs.

Potential Energy Savings with Off-Peak Irrigation Study. This 1995 study was conducted to determine the potential to shift current irrigation scheduling for large irrigators to off-energy peak hours. This study found that in the EBMUD service area, most irrigation customers already irrigated during off-energy peak hours, namely at night or in the early morning.

Water Conservation Rate Structures Study. EBMUD was a co-sponsor in this 1997 study titled "Designing, Evaluating and Implementing Conservation Rate Structures," which looked at methods for designing conservation-oriented rates. The handbook, while not recommending a specific rate structure, discussed the many issues a utility needs to consider in implementing conservation rates.

The High-Efficiency Laundry Metering and Marketing Analysis (THELMA) Project. This 1998 collaborative study involving EBMUD was designed to obtain data and insights for utility promotion of front loading clothes washers, which at the time of this study had only a 2% market penetration in the United States despite significant energy and water savings. EBMUD, which started offering incentives for water and energy efficient clothes washers in 1996, used this information to help transform the clothes washing market to more efficient ones. By 2005, nearly 20% of EBMUD customers had installed water and energy efficient clothes washers.

Best Management Practices (BMPs) Costs and Savings Study. EBMUD was involved in this 2000 collaborative study which served as a guide to the data and methods for cost-effectiveness analysis of urban water conservation BMPs. This study assembles the best available information currently available for quantifying and valuing conservation activity.

Laboratory Evaluation of Selected 1.6 gpf Toilet Fixtures. EBMUD was a co-sponsor in this 2001 collaborative study to identify, purchase, and laboratory test a series of water closets for which field experience is available and to analyze the gathered data as supporting documentation for the recommended tests proposed for the American Society of Mechanical Engineers (ASME) standard. The goal of this study was to determine if and how the proposed standards and test protocols would represent an improvement over the current ASME requirements.

Commercial, Industrial, and Institutional (CII) ULFT Savings Study. EBMUD was a co-sponsor in this 2001 collaborative study to empirically estimate water savings per ULFT installation in different CII market segments and to develop a practical approach for estimating the number

of toilets by CII market segment with the service area of a given water provider. This study indicates that the highest per toilet savings in the CII sector (about 52 gallons/toilet/day) were at wholesalers, food stores, and restaurants, and the lowest per toilet savings (about 20 gallons/toilet/day) were at offices, and hotels/ motels.

Water Conservation Market Penetration Study. This 2002 EBMUD study was conducted to (1) collect current data on water conservation attitudes and behavior, (2) determine the types and saturation of water-conserving hardware (fixtures and appliances), (3) assess water conservation potential for identified market sectors, and (4) relate the study findings to those of previous studies to infer market penetration rates of water conservation hardware.

Water Closet Performance Testing Study. This 2002 study co-sponsored by EBMUD was conducted to (1) develop information on toilet performance, water savings reliability, and physical characteristics that will assist the consumer in evaluating and making purchasing choices, and (2) evaluating current flush performance test protocol as a potential supplement to existing ASME pass/ fail protocols for the purpose of developing discriminatory data on toilet fixture performance.

Demand Hardening Study. This 2002 collaborative study involving EBMUD investigated the impact of past conservation efforts on the potential to reduce future use upon request during water shortages. This study found that past conservation efforts can reduce the frequency and depth of future drought responses and that habit change still represents an important element in meeting drought curtailment goals.

Toilet Freeriders Study. EBMUD was a funding partner in this 2002 study to determine freerider rates associated with ULFT programs offered by water providers in California. Freeriders are defined as utility incentive program participants who, without the incentive program, would still have replaced their toilets because of the state plumbing code requirements for ULFTs in effect since 1992. This study provides information on how to design a ULFT program to minimize the freerider potential. It also found that the highest freerider rates were associated with rebate programs (approximately 60%) and the lowest freerider rates were associated with free distribution programs (approximately 20%).

Evapotranspiration (ET) Controller Evaluation. In 2002, EBMUD, in collaboration with other water providers, initiated a study to evaluate different weather-based irrigation controllers and their potential for capturing water savings.

Marketing Plan Study. In 2003, EBMUD hired a marketing consultant to review EBMUD's current marketing efforts and to make recommendations for future marketing of the water conservation and recycling programs. The recommended marketing plan was presented in 2003, and elements of the plan were implemented in 2004. In developing the marketing plan, a number of messages and themes were tested on focus groups representing customers throughout the EBMUD service area.

Residential End Use Study. This study, funded in part with a grant from the United States Environmental Protection Agency (EPA) was completed in 2003. This study involved the monitoring of water use at 33 single-family homes within EBMUD and was designed to assess end uses of water and to measure the impacts of conservation retrofits on use. This study found that indoor per capita single-family use can be reduced to around 50 gallons/capita/day (gpcd). It also found that customers generally liked the more efficient products better than their conventional ones. One surprising study finding was the prevalence of leaks at a number of homes; accounting for nearly 30% of indoor water use at the 33 study sites. Most of the leaks disappeared when new toilets were installed indicating that flapper valve leaks is an issue that requires a targeted marketing effort.

National Submetering Study. In 2004, in cooperation with eight other water utilities and two apartment associations in seven states, EBMUD, as program administrator, implemented a nationwide assessment of conservation potential and administrative issues associated with submetering and allocation programs in multi-family residential settings. This national study investigated issues and water savings associated with third party billing programs of residents in the multi-family sector. This study indicates that submetering multi-family residents can achieve approximately a 15% savings in indoor water use. It also found that there are numerous issues associated with the mostly unregulated third party metering and allocation programs. This study furthered the water providers' understanding of third party billing and allocation practices and the national regulatory framework.

Urban Water Conservation Potential. This 2004 study, administered by the California Urban Water Agencies (CUWA) and co-funded by EBMUD in a collaborative effort, was conducted to generate an independent validation and update of the CALFED Bay-Delta Program (CALFED) estimates of water provider-funded efforts to study Best Management Practices (BMPs) for urban water conservation potential. This study provides estimates of

expected BMP-driven conservation savings and incorporates the key economic concept of cost-effective levels of BMP activities.

BMP Costs and Savings Study. This 2004 study, co-funded by EBMUD in a collaborative effort, is an update of information provided in the 2000 study under a similar name. This follow-up study updated information provided in the earlier study and added cost and savings information on new water conservation measures and devices.

Self-Contained Food Steamers Study. In 2005, EBMUD partnered with Pacific Gas and Electric (PG&E), Food Service Technology Center, and the United States Bureau of Reclamation (USBR), Mid-Pacific Region on an innovative conservation project to quantify the water and energy savings for "self-contained" or "boiler-less" commercial food service steamers. Atmospheric (boiler-based) compartment steamers are primary appliances in many commercial kitchens with recorded water consumption ranging from 20 to 40 gallons per hour, while the consumption for "boiler-less" or "connectionless" steamers can be up to 90% lower at less than 3 gallons per hour. Study results indicated significant water and energy savings.

Pre-Rinse Spray Valves and Dishwashers Study. The 2005 study administered by EBMUD in co-operation with two other California utilities involved (1) the installation of 4,400 pre-rinse spray valves and 32 dishwashers, and (2) the analysis of water savings. This study found that the water saving pre-rinse nozzles saved approximately 1.56 gallons per minute over conventional spray nozzles or 94 gallons per day (GPD) assuming one hour of use. The water savings from the more efficient dishwasher was estimated at 2,290 GPD based on an evaluation of actual metered use.

Irrigated Area and Water Use by Major Plant Type. An analysis was conducted in 2005 using Geographic Information System (GIS) information and EBMUD consumption data to estimate the irrigated area and water use by plant type in the EBMUD service area. This study found that lawn comprised about 50% of the irrigated plant material and used approximately 80% of the outdoor water. This information is important in helping to target long term and drought response efforts.

Water Loss and Control Strategy. In 2005, EBMUD began developing an interactive On-Line Water Loss Control Manual. The manual describes all state-of-the-art methods EBMUD uses to control and prevent water loses with its infrastructure and to properly account for all water delivered to its customers. This document will link other loss control programs into one comprehensive program to effectively manage losses.

Non-Compliant Showerhead Testing Study. In 2005, EBMUD took the lead in administering the testing of six suspected non-complying showerheads in cooperation with the Seattle Public Utilities and the California Energy Commission. The test results found that none of the six showerheads tested passed for compliance with State and Federal flow rate and energy standards. Based on the test results, a complaint was filed with the Federal Trade Commission.

End Use Demand and Metering Technology Study. EBMUD began working on this project in 2005 after receiving a $75,000 grant from USBR. This study used new and developing metering technologies to collect real-time demand data from customer meters. This project involved retrofitting customer meters with electronic registers that collected, recorded, and transmitted hourly and even minute-by-minute consumption. EBMUD completed studies in four areas with four different technologies. Two of the study areas used fixed network technology (tower based collector), and two of the study areas used mobile network technology (car mounted collector). The results of the study were published in the May 2008 AWWA OpFlow magazine.

Valuing the Environmental Benefits of Urban Water Conservation The purpose of this 2006 study, co-sponsored by EBMUD in a collaborative effort, was to create a methodology to assign economic value to the environmental benefits of raw water savings. The purpose of the environmental benefits model was to provide a practical tool with which utilities can estimate the environmental benefits, or costs, associated with a given BMP. This study uses the varying value of water savings based on hydrological regions, which in turn was based on changes in fish populations, vegetation, and wetlands affected by the saved water.

Expanded Metering Pilot Program and Study (Submetering). In 2006, EBMUD began a two year study that (1) investigated the issues, costs, and water savings associated with its metering of new individual multi-family (MF) dwelling units and commercial properties, (2) quantified factors impacting MF customer water use to help guide potential EBMUD policy and programs for new and existing MF service accounts, and (3) researched potential conservation incentive program to encourage

additional metering within existing MF properties. In January 2009, EBMUD began metering the individual units in MF and commercial properties in its implementation of an expanded metering program. EBMUD's expanded metering program is an important conservation tool since, in the future, more MF units will be built proportionally to the current single-family/ MF ratio. This research was a follow-up to an EBMUD sponsored national study on submetering that indicated a significant potential for water conservation savings through metering of MF units.

Water-Efficiency Programs for Supply Planning. In 2006, EBMUD did a collaborative study on the relationship between water conservation programs and water supply planning. Results of EBMUD flow modeling of the Mokelumne River (related to precipitation in the watershed) indicated that more efficient water use leads to less frequent and less severe water shortages.

Ice Machine Study. From 2006-2007 EBMUD co-sponsored a study on the efficacy of air-cooled versus water-cooled ice machines. The objectives of this study were to (1) measure actual water and energy usage in commercial ice-cube machines, (2) compare the field-measured water and energy usage rates to the Air Conditioning and Refrigeration Institute (ARI) and/ or manufacturer supplied testing data, (3) determine for each machine the annual water, wastewater, and energy consumption and savings that could be achieved through retrofits with models that are more water/ energy efficient, and (4) capture filed data that can be used to quantify the energy savings potential from reductions in regional water distribution and wastewater treatment.

X-Ray Film Processor Pilot Project. In 2006, EBMUD was awarded a $152,000 California Department of Water Resources research grant for the installation of up to 50 *WaterSaver Plus®* water recirculation units in existing x-ray film processors within EBMUD's service area. Because some film processors can use up to 2.5 gallons per minute and operate 24/7, this water recirculation unit represents a significant conservation potential with up to 85% in water savings. The grant will provide up to $3,000 in EBMUD pre-approved vouchers for each x-ray unit purchased by eligible EBMUD customers who must go through an on-site survey and inspection. Once approved, the customer will then work directly with x-ray retrofit equipment distributors. In FY05, EBMUD secured two agreements with local x-ray retrofit equipment distributors to help market EBMUD's incentive program and to provide services.

Pipeline Leak Detection Study. EBMUD began working on this project in 2006 after receivinga $300,000 grant from USBR. EBMUD installed approximately 1,000 acoustic leak detection loggers on approximately 250 miles of distribution piping in and around the City of Berkeley. The purpose of the project is to obtain water savings from intensive leak detections and subsequent repairs and to better define the nature of pipeline leaks. This project was completed in December 2010.

Aqueduct Leak Detection Study. EBMUD began working on this project in 2006 after receiving a $300,000 grant from UBR. EBMUD demonstrated advanced leak detection technologies on large pipes for which traditional leak detection technologies have not been successful. This project was intended to accelerate water savings through the identification and repair of leaks on large pipelines and aqueducts and better understand the nature of leaks on these facilities. As part of this project, three different acoustic technologies were evaluated and performed on approximately 90 miles of EBMUD's large pipelines and aqueducts. This project was completed in December 2010.

PG&E Embedded Energy Study. In 2006, EBMUD began working with its local energy company, PG&E, to determine where energy efficiency could be improved. This study involves a review of pumping schedules and equipment for the water system.

Water Budgets and Rate Structures Study. In 2007, EBMUD, in a collaborative effort, investigated the impact of water budgets and rate structures on water savings. This study found that by establishing and applying water budgets to properties based on irrigated area and plant water requirements, the water supplier can send an effective message to end users. Since water budgets are based on efficiency standards, over-watering can be identified and billed at a higher rate.

California Single-Family Water Use Efficiency Study. In 2007, EBMUD was among ten water utilities in California that provided historic consumption data and supported data collection at selected study sites. Automated data recording technology and an analytic technique known as "flow trace analysis" was used to characterize the end uses of water within a representative sample of California homes. Findings were analyzed to benchmark water use efficiency relative to comparable studies and assess water conservation potential in California. In 2010-2011, EBMUD provided extensive review of draft study reports, findings, and recommendations. Release of a final report is pending at this time.

Water Conservation through Automated Meter Reading (AMR) Systems. EBMUD began working on this project in 2006 after receiving grants from both USBR and DWR. The purpose of the project is to obtain water savings by providing customers web access to their real time water use, working with them to identify conservation opportunities, such as ET Controllers, and better evaluating the conservation benefit from these measures. This project was completed in December 2010. This project uses Advanced Metering Infrastructure (AMI) to collect real-time demand data from customer meters, which is then made available to customers via a secure website. This project uses fixed network AMI technology where the meter reading transmissions will be picked up by collector towers located within the vicinity of the meters, which will then transmit the meter reads to a centrally located computer server. The water usage data collected from the meter reads can then be accessed in graphical format via an EBMUD-supported Intranet connection where it will be shared with customers for their use in identifying water conservation opportunities. EBMUD water conservation staff will then work with these customers to identify water conservation strategies, such as fixing leaks, alternative irrigation techniques, and replacing older appliances with new higher efficiency models. EBMUD staff believes that this faster, more immediately available and customer-friendly data will facilitate water conservation.

Weather Based Irrigation Controller (WBIC) Program and Study. In 2004, the California Department of Water Resources (DWR) awarded EBMUD and five northern California partnering agencies a $1.6 million Proposition 13 Grant for the Northern California WBIC Grant Program. EBMUD served as lead agency in administering the DWR grant and reporting on the effort for northern California. EBMUD installed approximately 800 ET based controllers as part of the study that included an analysis of water savings. Self-adjusting irrigation timers have proven effective in pilot studies in reducing outdoor irrigation. A web-based database tracked implementation of the program and was used to help evaluate water savings and program cost-effectiveness. A report was issued in 2009 on the cost-effectiveness of the WBIC program and the estimated water savings.

Potential Best Management Practices (PBMPs) Study. In 2007, EBMUD, in collaboration with other water providers in California completed an initial three year study of PBMPs for possible implementation as a BMP if they are economically reasonable. Three reports were prepared in which a total of 14 PBMPs were evaluated.

WaterSmart Guidebook Project. In 2008, EBMUD produced a 242-page guidebook on end uses of water and water efficient hardware and processes in the commercial, industrial, and institutional sector. The purpose of the guidebook is to help developers be more water efficient by providing information and programs for new projects. The information may also be used by water provider staff to review water uses and hardware for water-efficiency at existing businesses. The WaterSmart Guidebook was placed on the EBMUD website for use by others. In addition, two-day training workshops on technical information provided in the guidebook are being offered.

Urban Water Conservation Accomplishments Study. This 2008 study compiled the water conservation accomplishments of the 11 members of the California Urban Water Agencies (CUWA) representing over 23 million people. CUWA's members have invested hundreds of millions of dollars over four decades to diversify their water supply portfolios to reduce dependence on imported water and to develop balance, sustainable, and reliable water supplies.

WaterSmart Certification and Recognition Program Marketing Plan. EBMUD is seeking to enhance its WaterSmart conservation services brand and water savings through the development of a WaterSmart Certification and Recognition Program targeting non-residential customers (businesses, industry, and institutions). The Program rewards organizations for implementing water-savings strategies and achieving established community-wide benchmarks for their water conservation efforts by providing visible, third-party recognition of those efforts. This effort included an assessment of market interest, potential program participants and partners, and a comprehensive Strategic Marketing and Implementation Plan.

Plan Review Pilot Study. In 2009, EBMUD began a one year plan review for water use efficiency for new construction projects. The one year pilot program will also include an evaluation of both water savings and the cooperation between EBMUD and planning agencies. As a precursor to the pilot program, a 242-page guidebook was developed, titled *WaterSmart Guidebook*, on water end uses and water efficient technology in the commercial, industrial, and institutional sector to be use as a resource guide in the plan review process. One important goal of the pilot program is to communicate the plan review requirements to project developers as early in the planning process as possible. A report will be issued in 2010 on the results of the pilot program.

Irrigation Controller Study. In 2009, EBMUD, in a collaborative effort, initiated a study to determine testing standards to evaluate irrigation controllers for water-efficiency. The Center of Irrigation Technology in Fresno was retained to conduct the testing. This study will allow for an easy review of controller features by water providers to help promote the products that have features needed for the most efficient management of an automatic irrigation system

Subsurface Irrigation Study. EBMUD provided in-kind services in 2008-2009 for a study on the water-efficiency effectiveness of subsurface irrigation systems conducted by U.C. Berkeley on large lawn areas on its campus. Early results indicate that there has been no observable water savings with the use of subsurface drip systems..

Water System Optimization through the Development of an Advanced Metering Infrastructure (AMI) Implementation Plan. This study will include the investigation of all potential costs and benefits of an Advanced Metering Infrastructure (AMI) system to improve EBMUD's operational efficiency and the water efficiency of its customers. This investigation will serve as an example for other similar small, medium, and large water utilities to follow. The study will include the development of a comprehensive implementation plan for a full AMI system deployment across more than 380,000 customer accounts and more than 400,000 meters

Customer (Efficiency) Opinion Research. Quantitative research to evaluate how EBMUD's 2008-2009 drought campaign and the evolving statewide water picture have modified customers' feelings toward water use restrictions, their opinions regarding their personal efforts to conserve, and their sense of responsibility for achieving water use reductions. Conducting this additional research through surveys, focus groups, and facilitated meetings will enable EBMUD to evaluate attitudinal changes among its 1.4 million customers and to build the most cost-effective and efficient long-term customer conservation program and strategies.

Fixed Network Acoustic Leak Detection. This project involves the installation and testing of approximately 100 fixed network acoustic leak detection technology "loggers" in Danville, California in an area known as "Blackhawk." These acoustic logging devices will identify leaks on pipes and provide early detection of pipeline leaks before they become main failures. EBMUD will receive daily signals from these devices via fixed network Advanced Metering Infrastructure (AMI) installed in the Danville area. EBMUD has previously received grants from USBR to install the AMI system in Blackhawk and to install approximately 1,000 acoustic loggers in the City of Berkeley using a mobile network collection system. This new approach will not only improve the response time to leaks in Blackhawk area, but also help establish the methodology to potentially utilize this new and developing technology throughout the EBMUD service area as well as in other comparable Western State water utilities.

GIS-Based Landscape Water Budget Calculator. This project involves developing an automated landscape water budget tool to assist customers in meeting the recently enacted Maximum Allowable Water Allowance (MAWA) within the California Model Water Efficient Landscape Ordinance. Currently EBMUD has calculated more than 5,000 water budgets for its irrigation accounts, and more than 3,200 of those accounts receive budget information printed on their water bills. The water budget information is in a plain text format that is difficult for the customer to see. The proposed water budget report will automate the presentation of the target water efficiency levels along with estimated water bill savings for residential and non-residential accounts.

California Public Utilities Commission (CPUC) Water Profile Study. In 2010, EBMUD supported a research effort to better understand the linkage between water use and energy demands. The study was managed for the CPUC by the California Institute for Energy and the Environment. EBMUD provided data for study sites and coordinated installation of automatic data recording instruments at multi-family, institutional, and industrial sites. The research aimed to determine to what extent it may be possible to impact the energy demands from municipal water agencies by means of altering the volumes and timing of water demands from their retail customers. The final report study is pending.

Water Savings Evaluation Study. EBMUD estimates water conservation savings resulting from a variety of water conservation measures. A computer program is used to analyze water savings based on customer pre- and post-intervention water use. That estimate is normalized for the effect of weather and natural replacement rates. This program is best suited for analyzing water savings in the residential sector where use is affected by fewer variables than in the non-residential sector, which is affected also by production changes and economic impacts. The savings are reported in a *"Water Savings Analysis Report"* that is updated bi-annually.

Appendix J. Glossary

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Appendix J. Glossary

J-1.ACRONYMNS

ABAG	Association of Bay Area Governments
ACT	Urban Water Management Planning Act
ACWD	Alameda County Water District
AF	Acre-Feet
AFY	Acre-Feet per Year
AMI	Advanced Metering Infrastructure
AMR	Automated Meter Reading
ARB	American River Basin
ARI	Air Conditioning and Refrigeration Institute
ASME	American Society of Mechanical Engineers
AWWA	American Water Works Association
AWWARF	American Water Works Association Foundation
BACWA	Bay Area Clean Water Agencies
BARDP	Bay Area Regional Desalination Project
BARWRP	San Francisco Bay Area Regional Water Recycling Program
BAWAC	Bay Area Water Agencies Coalition
BCC	Business Classification Code
BGS	Below Ground Surface
BMPS	Best Management Practices
CALFED	CALFED Bay-Delta Program
CAP	Customer Assistance Program
CCF	Hundred (Centi-) Cubic Feet
CCWD	Contra Costa Water District
CDCP	California Drought Contingency Plan
CDFG	California Department of Fish and Game
CDPH	California Department of Public Health
CENT	Central
CENTRAL SAN	Central Contra Costa Sanitary District
CII	Commercial, Industrial, and Institutional
CIMIS	California Irrigation Management Information System
CIS	Customer Information System
CONTINGENCY PLAN	Urban Water Shortage Contingency Plan
CREAT	Climate Resilience Evaluation and Assessment Tool
CUWA	California Urban Water Agencies

CUWCC	California Urban Water Conservation Council
CVP	Central Valley Project
CYES	California Youth Energy Services
DCP	Drought Communication Plan
DELTA	Sacramento-San Joaquin River Delta
DERWA	DSRSD-EBMUD Recycled Water Authority
DMAC	Demand Management Advisory Committee
DMP	Drought Management Program
DSOD	California Division of Safety of Dams
DSRSD	Dublin San Ramon Services District
DWR	Department of Water Resources
EB	Environmental Benefits
EBMUD	East Bay Municipal Utility District
EBMUDSIM	EBMUD Reservoir Operations Planning Model
EBRWP	East Bayshore Recycled Water Project
EIR	Environmental Impact Report
EOH	East-of-Hills
EOP	Emergency Operations Plan
EOT	Emergency Operations Team
EPA	United States Environmental Protection Agency
ESF	Emergency Support Functions
ET	Evapotranspiration
FERC	Federal Energy Regulatory Commission
FORUM	Mokelumne River Forum
FRWA	Freeport Regional Water Authority
FRWP	Freeport Regional Water Project
FSTC	Food Service Technology Center
FY	Fiscal Year
GIS	Geographic Information System
GMP	Groundwater Management Plan
GPCD	Gallons per Capita per Day
GPD	Gallons per Day
GPF	gallons per flush
HAYWARD	City of Hayward
HET	High-Efficiency Toilet
HEU	High-Efficiency Urinal
HOA	Homeowners Association
INTERTIE PROJECT	SFPUC-Hayward-EBMUD Intertie Project

IRCUP	Mokelumne River Inter-Regional Conjunctive Use Project
IRIS	Irrigation Reduction Information System
IRWMP	Integrated Regional Water Management Plan
JSA	1998 Joint Settlement Agreement
KM	Kilometer
KWH	Kilowatt Hours
LAC	Landscape Advisory Committee
LADWP	Los Angeles Department of Water and Power
LAFCOS	Local Agency Formation Commissions
LAWU	Landscaped Area Water Use
LTRC	Long Term Renewal Contract
LUDS	Land Use Unit Demands
MAWA	Maximum Applied Water Allowance
MCL	Maximum Contaminant Level
MF	Multi-Family
MG	Million Gallons
MGD	Million Gallons per Day
M&I	Municipal and Industrial
MOU	Memorandum of Understanding
MSL	Mean Sea Level
MUD	Municipal Utility District
MW	Megawatt
MWELO	State Model Water-Efficient Landscape Ordinance
MWWTP	EBMUD's Main Wastewater Treatment Plant
NCGWB	Niles Cone Groundwater Basin
NEBIGSM	Niles Cone and South East Bay Plain Integrated Groundwater and Surface Water Model
NIMS	National Incident Management System
NPDES	National Pollutant Discharge Elimination System
NRWRP	North Richmond Water Reclamation Plant
PBMPS	Potential Best Management Practices
PFMA	Potential Failure Mode Analysis
PG&E	Pacific Gas and Electric Company
PH&S	Public Health and Safety
PHG	Public Health Goal
R&E	Research and Evaluation
RARE	Richmond Advanced Recycled Expansion Water Project
REOC	Regional Operations Center
RWQCBS	California Regional Water Quality Control Boards

RWTP	Recycled Water Truck Program
SBX7-7	Senate Bill No. 7
SCVWD	Santa Clara Valley Water District
SCWA	Sacramento County Water Agency
SD-1	Special District No. 1
SEMS	California Standardized Emergency Management System
SEPS	Security and Emergency Preparedness Section
SFPUC	San Francisco Public Utilities Commission
SFR	Single-Family Residential
SLRF	San Leandro Reclamation Facility
SOC	State Operations Center
SOI	Sphere of Influence
SQ. FT.	Square Feet
SRVRWP	San Ramon Valley Recycled Water Program
SWRCB	State Water Resources Control Board
TAF	Thousand Acre-Feet
TDS	Total Dissolved Solids
THELMA	The High-Efficiency Laundry Metering and Marketing Analysis
TM2	Target Method #2
ULFT	Ultra Low-Flow Toilet
UMRWA	Upper Mokelumne River Watershed Authority
USB	Ultimate Service Boundary
USBR	United States Bureau of Reclamation
USEPA	United States Environmental Protection Agency
USFWS	US Fish and Wildlife Service
UWMP	Urban Water Management Plan
WARN	Water Agency Response Network
WATER	Water Awareness Through Education and Research
WBIC	Weather Based Irrigation Controller
WCMP	Water Conservation Master Plan
WCWD	West County Wastewater District
WOH	West-of-Hills
WPCP	Water Pollution Control Plant
WRDA	Federal Water Resources Development Act
WTP	Water Treatment Plant
WTTIP	Water Treatment and Transmission Improvements Program

J-2. SELECTED DEFINED TERMS

BEST MANAGEMENT PRACTICES	A POLICY, PROGRAM, PRACTICE, RULE, REGULATION OR ORDINANCE, OR THE USE OF DEVICES, EQUIPMENT OR FACILITIES THAT RESULTS IN THE EFFICIENT USE OR CONSERVATION OF WATER AS AN ESTABLISHED AND GENERALLY ACCEPTED PRACTICE AMONG WATER SUPPLIERS
CONSUMPTION	METERED WATER-USE BY CUSTOMERS
DEMAND OR TOTAL DEMAND	QUANTITY OF TREATED WATER DELIVERED TO THE DISTRIBUTION SYSTEM, INTERCHANGEABLE TERM WITH SYSTEM DEMAND
DROUGHT PLANNING SEQUENCE	THREE YEAR HYDROLOGY SEQUENCE REPRESENTING A WORST CASE DROUGHT SCENARIO DERIVED FROM HISTORICAL RECORD
EAST-OF-HILLS	EBMUD'S SERVICE AREA REGION EAST OF THE OAKLAND-BERKELEY HILLS RIDGE
EBMUD SPHERE OF INFLUENCE	DEFINES THE AREA THAT CAN BE SERVED BY EBMUD, AS DEFINED BY THE LOCAL AGENCY FORMATION COMMISSIONS OF ALAMEDA AND CONTRA COSTA COUNTIES
EBMUD ULTIMATE SERVICE BOUNDARY	A BOUNDARY DEFINED BY EBMUD TO DEFINE ITS LIMITS OF FUTURE ANNEXATION FOR EXTENSION OF WATER SERVICE
INTERIM LEVEL OF DEMAND	TEMPORARILY SUPPRESSED DEMAND LEVEL BELOW THE PLANNING LEVEL OF DEMAND THAT IS ANTICIPATED DURING THE RECOVERY PERIOD TO 2020 AS A RESULT OF RESIDUAL RATIONING EFFECT OF THE RECENTLY ENDED 2007-2010 DROUGHT MANAGEMENT PROGRAM AND FROM THE ECONOMIC DOWNTURN
LOWER INCOME HOUSEHOLDS	PERSONS AND FAMILIES WHOSE INCOME DOES NOT EXCEED QUALIFYING LIMITS FOR LOWER INCOME FAMILIES AS DEFINED IN SECTION 50079.5 OF THE HEALTH AND SAFETY CODE. THE INCOME LIMITS FOR LOWER INCOME HOUSEHOLDS IS AT 80 PERCENT OF THE AREA MEDIAN INCOME, ADJUSTED FOR FAMILY SIZE
PLANNING LEVEL OF DEMAND	THE ADJUSTED DEMAND FOR PLANNING PURPOSES AFTER APPLYING CUMULATIVE CONSERVATION AND CUMULATIVE RECYCLED WATER SAVINGS ACHIEVED SINCE IMPLEMENTATION OF THE 1994 WATER CONSERVATION MASTER PLAN. PLANNING LEVEL OF DEMAND ALSO REPRESENTS PROJECTED SYSTEM DEMAND
SYSTEM DEMAND	QUANTITY OF TREATED WATER DELIVERED TO THE DISTRIBUTION SYSTEM, INTERCHANGEABLE TERM WITH DEMAND OR TOTAL DEMAND
WEST-OF-HILLS	EBMUD'S SERVICE AREA REGION WEST OF THE OAKLAND-BERKELEY HILLS RIDGE

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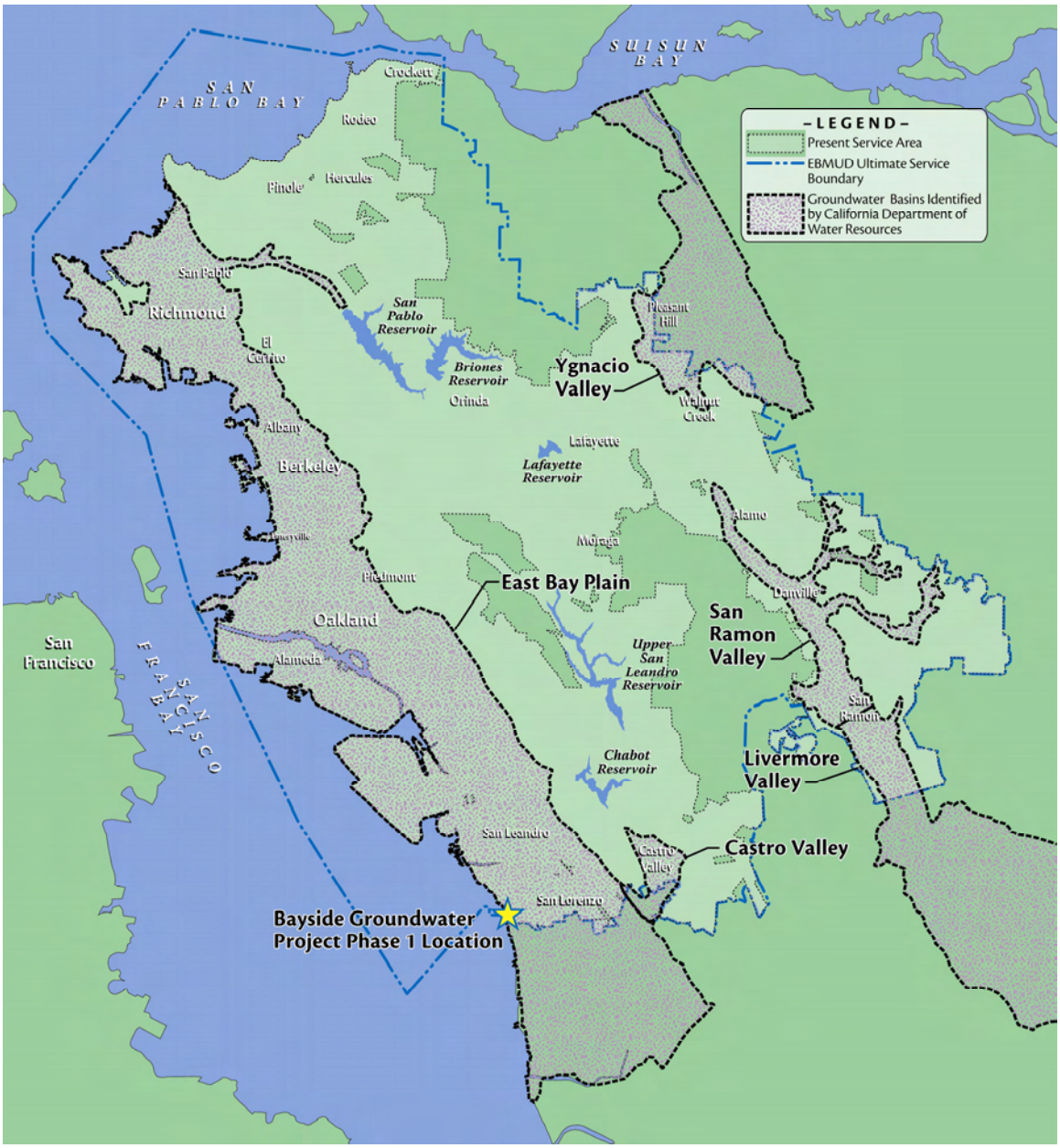
Attachment F. Map of Groundwater Facility and Basins within the EBMUD Ultimate Service Boundary



ATTACHMENT G. GROUNDWATER MANAGEMENT PLAN
(Not Applicable)

ATTACHMENT H. GROUNDWATER BANKING PLAN
(Not Applicable)

EAST BAY MUNICIPAL UTILITY DISTRICT 2010

ANNUAL WATER QUALITY REPORT

In 2010, EBMUD water met or surpassed every public health requirement set by the California Department of Public Health and the U.S. Environmental Protection Agency.

ENSURING WATER QUALITY

EBMUD samples and tests your water extensively to make sure it is safe to drink. We look for more than 100 substances in the water including bacteria, pesticides, herbicides, asbestos, lead, copper, petroleum products and by-products of industrial and water treatment processes.

Before water reaches your tap, EBMUD takes many steps to ensure its quality. This includes managing watershed lands and reservoirs, treating the water, operating a complex distribution system of pipes, pumping plants and reservoirs, testing water samples in our laboratories and in the field, maintaining facilities and addressing customer concerns.

EXCELLENT WATER SOURCE

One of the most important factors in water quality is its source: the more pristine the source, the purer the water.

Ninety percent of EBMUD's water comes from the 577 square mile watershed of the Mokelumne River on the western slope of the Sierra Nevada. This area is mostly national forest, EBMUD-owned lands and other undeveloped lands little affected by human activity. The Mokelumne watershed collects snowmelt from Alpine, Amador and Calaveras counties that flows into Pardee Reservoir near the town of Valley Springs.

Three large aqueducts carry the water more than 90 miles to the East Bay. As it travels, the water is protected from pesticides, agricultural and urban runoff, municipal sewage and industrial discharges.

When water demand is high, EBMUD supplements the Sierra supply with water from protected local watersheds. All raw water, regardless of source, is first treated and filtered at one of EBMUD's water treatment plants before entering the distribution system and reaching your tap.

EBMUD

WATER QUALITY REGULATIONS

In order to ensure that tap water is safe to drink, the U.S. Environmental Protection Agency (USEPA) and the California Department of Public Health (CDPH) prescribe regulations that limit the amount of certain contaminants in water provided by public water systems. The CDPH regulations also establish limits for contaminants in bottled water.

Drinking water, including bottled water, may reasonably be expected to contain at least small amounts of some contaminants. The presence of contaminants does not necessarily indicate that water poses a health risk. More information about contaminants and potential health effects can be obtained by calling USEPA's Safe Drinking Water Hotline at 800-426-4791 or visiting www.epa.gov/safewater.

Contaminants in drinking water
The sources of drinking water (both tap water and bottled water) include rivers, lakes, streams, ponds, reservoirs, springs, and wells. As water travels over the surface of the land or through the ground, it dissolves naturally-occurring minerals and, in some cases, radioactive material, and can pick up substances resulting from the presence of animals or from human activity. Contaminants that may be present in source water include:

Microbial contaminants, such as viruses, bacteria and protozoa, such as Cryptosporidium, that may come from sewage treatment plants, septic systems, agricultural livestock operations and wildlife.

Inorganic contaminants, such as salts and metals, that can be naturally-occurring or result from urban storm water runoff, industrial or domestic wastewater discharges, oil and gas production, mining or farming.

Synthetic organic contaminants, such as pesticides and herbicides that may come from a variety of sources, including agriculture, urban storm water and residential uses.

Volatile organic chemical contaminants from industrial processes and petroleum production, and from gas stations, urban storm water runoff, agricultural application, and septic systems.

Radioactive contaminants that can be naturally occurring or be the result of oil and gas production and mining activities.

Cryptosporidium
Cryptosporidium is a microbial contaminant found in surface water throughout the United States. Although filtration is highly effective in removing Cryptosporidium, the most commonly used filtration methods cannot guarantee 100 percent removal.

Our monitoring indicates the presence of these organisms in one of our source waters. Current test methods cannot determine if the organisms are dead or are capable of causing disease. Ingestion of Cryptosporidium may cause abdominal infection with symptoms including nausea, diarrhea and abdominal cramps.

Cryptosporidium must be ingested to cause disease, and it may be spread through means other than drinking water. Most healthy individuals can overcome the disease within a few weeks. However, immuno-compromised people, infants and small children, and the elderly are at greater risk of developing life-threatening illness. We encourage these individuals to consult their physician regarding appropriate precautions to take to avoid infection.

Low resistance
Some people may be more vulnerable to contaminants in drinking water than the general population. Immuno-compromised persons such as persons with cancer undergoing chemotherapy, persons who have undergone organ transplants, people with HIV/AIDS or other immune system disorders, and some elderly and infants can be particularly at risk from infections.

These people should seek advice about drinking water from their health care providers. USEPA/Centers for Disease Control (CDC) guidelines on appropriate means to lessen the risk of infection by Cryptosporidium and other microbial contaminants are available from the USEPA Safe Drinking Water Hotline: 800-426-4791 or www.epa.gov/safewater.

Lead
If present, elevated levels of lead can cause serious health problems, especially for pregnant women and young children. Lead in drinking water is primarily from materials and components associated with lead service lines and home plumbing. EBMUD is responsible for providing high-quality drinking water and has replaced all known lead service lines in the District, but cannot control the variety of materials used in existing home plumbing components. When your water has been sitting for several hours, you can minimize the potential for lead exposure by running your faucet for 30 seconds to two minutes before using water for drinking or cooking. If you are concerned about lead in your water, you may wish to have your water tested.

In the past five years, EBMUD has led successful efforts to strengthen state and federal environmental laws that protect consumers from lead exposure. In January 2011, President Obama signed the *Reduction of Lead in Drinking Water Act* requiring manufacturers to reduce lead in plumbing products used for drinking water to 0.25 percent by 2014. California's lead regulations require all such products currently sold in the state to meet those requirements.

Information on lead in drinking water, testing methods and steps you can take to minimize exposure is available from the USEPA Safe Drinking Water Hotline 800-426-4791 or online at www.epa.gov/safewater/lead.

SURPASSING STATE REGULATIONS

In 2010, EBMUD water met or surpassed every public health requirement set by the California Department of Public Health and the U.S. Environmental Protection Agency.

The five tables show the measured levels of constituents detected in 2010 or in the most recent required year at EBMUD source waters, water treatment plants or in the distribution system.

Table 1 – Health-Related Standards
Constituents with primary maximum contaminant levels (MCLs) are regulated to protect your health.

Table 2 – Aesthetic Standards
Constituents with secondary maximum contaminant levels (MCLs) are regulated to maintain aesthetic standards for drinking water, such as odor, taste and appearance.

Table 3 – Unregulated constituents
Water agencies are required to report these substances if detected, but no maximum contaminant levels have been established.

Table 4 – Lead and copper
Lead and copper are regulated at the customer's tap and were most recently sampled as required, in 2008.

Table 5 – Other water quality parameters
These water measurements, such as pH, hardness and alkalinity, may be of interest to some consumers.

1 Constituents with primary MCLs		Unit	Year sampled	MCL or [MRDL]	PHG, (MCLG) or [MRDLG]	Average	Water treatment plants: Walnut Creek	Lafayette	Orinda	Sobrante	Upper San Leandro	Typical sources
Microbiological	Cryptosporidium in source water	#/liter	2008	TT	(0)	NA	0	0	0	0.3	0	Naturally present in the environment
	Total Coliform	—	2010	5%	(0)	NA	0.6% (highest percentage found in any month)					Naturally present in the environment
	Turbidity	NTU	2010	1	NS	0.03	0.02 – 0.09	0.02 – 0.13	0.02 – 0.10	0.03 – 0.11	0.04 – 0.11	Soil runoff
		—		95% ≤0.3	NS	100%	100%	100%	100%	100%	100%	
Radioactive	Gross alpha in source water [a]	pCi/L	2006, 2007	15	(0)	<3	<3	<3	<3	<3 – 11	<3	Erosion of natural deposits
	Gross beta in source water	pCi/L	2006, 2007	50 [b]	(0)	<4	<4	<4	<4	<4 – 9.1	<4	Decay of natural and man-made deposits
	Uranium in source water [a]	pCi/L	2006, 2007	20	0.43	NA	<1	<1	<1	<1	<1	Erosion of natural deposits
Inorganic	Aluminum	ppb	2010	1000	600	<50	<50	<50	<50	<50	53 – 76	Erosion of natural deposits; residue from some surface water treatment processes
	Chloramine as Cl_2	ppm	2010	[4]	[4]	1.9 [c]	<0.05 – 3.3 [d]					Drinking water disinfectant added for treatment
	Fluoride in source water [e]	ppm	2010	2	1	<0.1	<0.1	<0.1	<0.1	<0.1	0.16	Erosion of natural deposits; discharge from fertilizer and aluminum factories [e]
Organic	Acrylamide	—	2010	TT	(0)	NA	met req.	NA	NA	NA	NA	Added to water during water treatment
	Control of DBP precursors/TOC	—	2010	TT	NS	NA	NA	NA	NA	met req.	met req.	Various natural and man-made sources
	Haloacetic acids, 5 species	ppb	2010	60	NS	18 [c]	16 – 27	12 – 25	12 – 19	15 – 38	8 – 33	By-product of drinking water disinfection
	Trihalomethanes	ppb	2010	80	NS	36 [c]	36 – 46	34 – 39	30 – 40	32 – 48	15 – 43	By-product of drinking water disinfection

2 Constituents with secondary MCLs	Unit	Year sampled	MCL	PHG	Average	Water treatment plants: Walnut Creek	Lafayette	Orinda	Sobrante	Upper San Leandro	Typical sources
Aluminum	ppb	2010	200	NS	<50	<50	<50	<50	<50	53 – 76	Erosion of natural deposits; residue from some surface water treatment processes
Chloride	ppm	2010	250	NS	9	4	5	5 – 6	17	17	Runoff/leaching from natural deposits; seawater influence
Color	color units	2010	15	NS	2	3	3	2	<1	2	Naturally-occuring organic materials
Odor	TON	2010	3	NS	2	3	1	1 – 3	1	2	Naturally-occuring organic materials
Specific conductance	µmhos/cm	2010	900	NS	162	61	62	76 – 122	270	383	Substances that form ions when in water; seawater influences
Sulfate	ppm	2010	250	NS	15	1.2	1.2	5.3 – 12	32	41	Runoff/leaching from natural deposits; industrial wastes
Total dissolved solids	ppm	2010	500	NS	102	45	45	54 – 76	160	230	Runoff/leaching from natural deposits
Turbidity	NTU	2010	5	NS	0.03	0.02 – 0.09	0.02 – 0.13	0.02 – 0.10	0.03 – 0.11	0.04 – 0.11	Soil runoff

3 Unregulated constituents	Unit	Year sampled	Notification level	PHG	Average	Water treatment plants: Walnut Creek	Lafayette	Orinda	Sobrante	Upper San Leandro	Typical sources
Boron	ppb	2010	1000	NS	<100	<100	<100	<100	<100	118 – 122	Runoff/leaching from natural deposits
Chlorate	ppb	2010	800	NS	247	130	160	140 – 160	170 – 410	230 – 410	By-product of sodium hypochlorite decomposition
N-Nitrosodimethylamine [f] (NDMA)	ppt	2010	10	3	4	1.4 – 2.9	0.9 – 3.5	2.5 – 3.2	1.7 – 3.3	2.6 – 21	By-product of drinking water chlorination

4 Lead and copper	Unit	Year sampled	Regulatory action level	PHG	90th percentile	Sites above regulatory action level	Typical sources
Copper	ppb	2008	1300	300	65	0 out of 53	Internal corrosion of household plumbing systems; erosion of natural deposits; leaching from wood preservatives
Lead [g]	ppb	2008	15	0.2	4	2 out of 53	Internal corrosion of household plumbing systems; discharges from industrial manufacturers; erosion of natural deposits

KEY TERMS

DBP – disinfection by-products. These are formed when chlorine and/or ozone reacts with natural constituents in water. Trihalomethanes (THMs), haloacetic acids (HAAs) and bromate are disinfection by-products.

MCL – maximum contaminant level. The highest level of a contaminant that is allowed in drinking water. Primary MCLs are set as close to the PHGs or MCLGs as is economically and technologically feasible. Secondary MCLs are set to protect odor, taste and appearance of drinking water.

MCLG – maximum contaminant level goal. The level of a contaminant in drinking water below which there is no known or expected risk to health. MCLGs are set by the U.S. Environmental Protection Agency.

MRDL – maximum residual disinfectant level. The highest level of a disinfectant allowed in drinking water. There is convincing evidence that addition of a disinfectant is necessary for control of microbial contaminants.

MRDLG – maximum residual disinfectant level goal. The level of a drinking water disinfectant below which there is no known or expected risk to health. MRDLGs do not reflect the benefits of the use of disinfectants to control microbial contaminants.

Notification level – A health-based advisory level established by the California Department of Public Health for chemicals in drinking water that lack MCLs.

PDWS – primary drinking water standard. These standards regulate contaminants that affect health by setting MCLs and MRDLs along with their monitoring, reporting and water treatment requirements.

PHG – public health goal. The level of a contaminant in drinking water below which there is no known or expected risk to health. PHGs are set by the California Environmental Protection Agency.

Regulatory action level – The concentration which, if exceeded, triggers treatment or other requirements that a water system must follow.

TOC – total organic carbon. A measure of organic compounds that could form by-products after disinfection.

Turbidity – A measure of the cloudiness of water. Turbidity is monitored because it is a good indication of the effectiveness of our filtration systems.

TT – treatment technique. A required process intended to reduce the level of a contaminant in drinking water.

90th percentile – A measure that indicates 90 percent of the samples had a lower result.

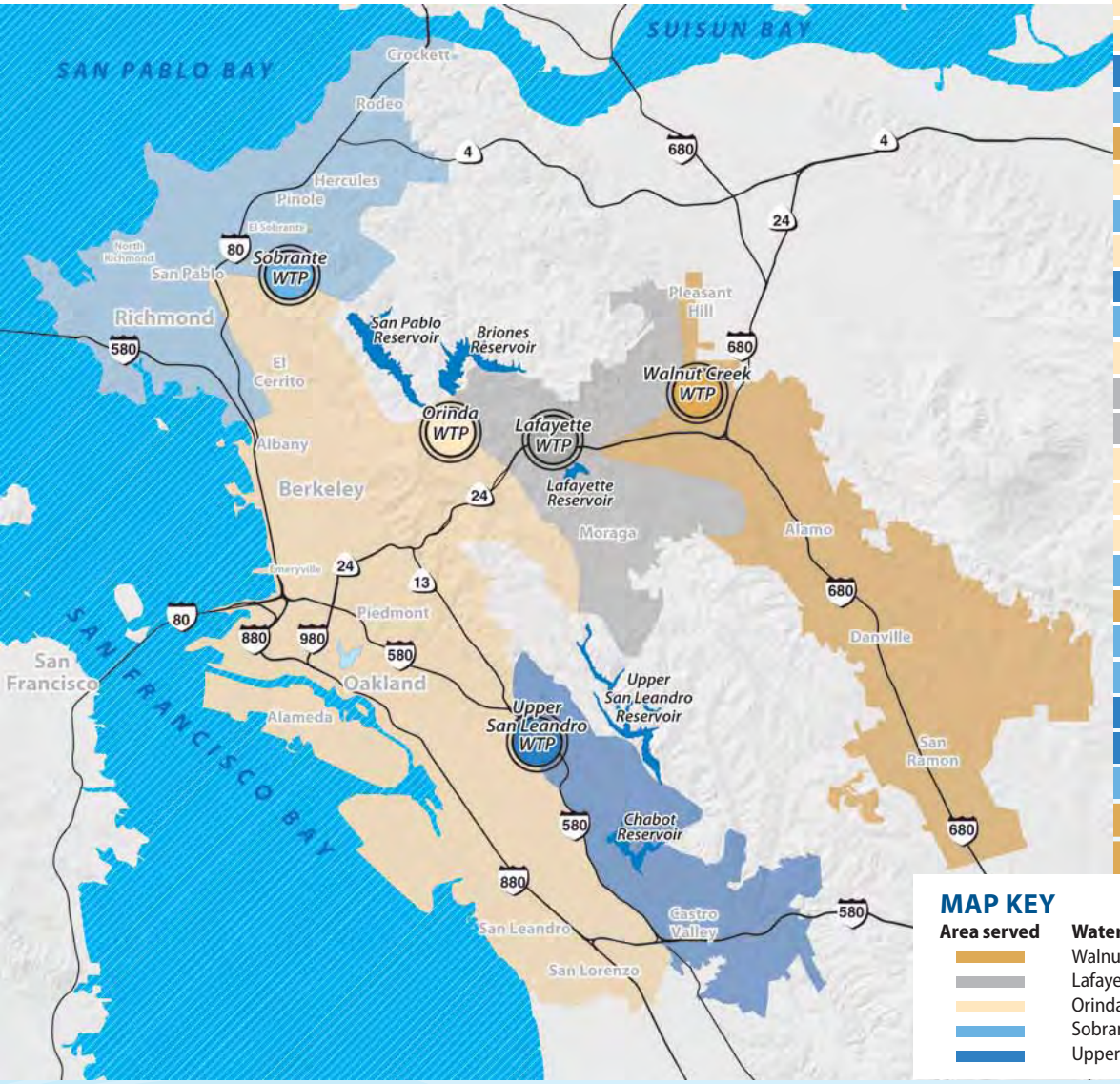
FOOTNOTES

a) Uranium was detected at 1.1 pCi/L and gross alpha was detected at 4.6 pCi/L in Chabot Reservoir. This is an emergency standby reservoir that has not been used for water supply in more than 30 years. **b)** CDPH considers 50 pCi/L to be the level of concern for gross beta particles. **c)** Highest running annual average. **d)** Chloramine residuals in the distribution system are measured as an equivalent quantity of chlorine. When the chloramine residual is less than 0.05 ppm, the sample is further analyzed to ensure that microbiological water quality is in compliance with the regulations. **e)** Fluoride is also added to help prevent dental decay in consumers. Regulations require that fluoride levels in the treated water be maintained between 0.7 to 1.4 ppm with an optimum dose of 0.8 ppm. Information about fluoridation, oral health and current issues is available from www.cdph.ca.gov/certlic/drinkingwater/pages/fluoridation.aspx. **f)** Sampling locations are chosen to represent worst-case scenarios. **g)** See *Water Quality Regulations* page for additional information about lead in drinking water. **h)** Grains per gallon (gpg) is a measure of water hardness. Knowing the amount can help improve the function of dishwashers, cooling equipment and other process applications.

MEETING DAILY WATER DEMAND

EBMUD provides high-quality drinking water to 1.3 million customers in Alameda and Contra Costa counties. EBMUD's water treatment plants are capable of filtering and processing a combined total of more than 375 million gallons of water daily.

This map of the EBMUD service area shows which water treatment plants serve your neighborhood. Lafayette, Sobrante and Upper San Leandro water treatment plants operate during periods of high demand or operational needs.



WHICH WATER TREATMENT PLANTS SERVE YOUR CITY?

City	Treatment plants
Alameda	Orinda/Upper San Leandro
Alamo	Walnut Creek
Albany	Orinda
Berkeley	Orinda
Castro Valley	Upper San Leandro/Orinda
Crockett	Sobrante/Orinda
Danville	Walnut Creek
El Cerrito	Orinda
El Sobrante	Sobrante/Orinda
Emeryville	Orinda
Hayward	Upper San Leandro/Orinda
Hercules	Sobrante/Orinda
Kensington	Orinda
Lafayette	Lafayette/Walnut Creek
Moraga	Lafayette/Orinda
Oakland	Orinda/Upper San Leandro
Orinda	Orinda/Lafayette
Piedmont	Orinda/Upper San Leandro
Pinole	Sobrante/Orinda
Pleasant Hill	Walnut Creek
Richmond	Sobrante/Orinda
Rodeo	Sobrante/Orinda
San Leandro	Upper San Leandro/Orinda
San Lorenzo	Upper San Leandro/Orinda
San Pablo	Sobrante/Orinda
San Ramon	Walnut Creek
Walnut Creek	Walnut Creek/Lafayette

MAP KEY

Area served	Water treatment plant	Source reservoir(s)
	Walnut Creek WTP	Pardee (in Sierra foothills)
	Lafayette WTP	Pardee
	Orinda WTP	Pardee, Briones
	Sobrante WTP	San Pablo
	Upper San Leandro WTP	Upper San Leandro

ABBREVIATIONS

gpg – grains per gallon
NA – not applicable
NS – no standard established
NTU – nephelometric turbidity unit, a measure of the cloudiness of water.
pCi/L – pico curies per liter, a measure of radioactivity.
ppm – parts per million, a proportion equivalent to about 30 seconds in one year. (mg/L)
ppb – parts per billion, a proportion equivalent to about 30 seconds in 1,000 years. (µg/L)
ppt – parts per trillion, a proportion equivalent to about 30 seconds in 1,000,000 years. (ng/L)
TON – threshold odor number, a measure of odor in water.
µmhos/cm – micromhos per centimeter, a measure of electrical conductance.

5 Other water quality parameters	Unit	Water treatment plants				
		Walnut Creek	Lafayette	Orinda	Sobrante	Upper San Leandro
Alkalinity, bicarbonate as $CaCO_3$	ppm	20	18	22 – 29	80	120
Alkalinity, carbonate as $CaCO_3$	ppm	1.2	1.4	3.3 – 4.1	3.8	6.6
Calcium	ppm	3.9 – 5.8	4.3 – 5.7	3.9 – 9.6	20 – 22	33 – 35
Hardness as $CaCO_3$	gpg [h]	0.7 – 1.1	0.8 – 1.1	0.8 – 1.8	4.3 – 5.0	7.6 – 8.2
	ppm	12 – 18	14 – 18	14 – 30	73 – 85	130 – 140
Magnesium	ppm	0.6 – 1.1	0.7 – 1.1	0.7 – 2.3	6.7 – 7.4	13
pH	pH	8.8 – 9.1	8.5 – 9.1	8.8 – 9.2	8.6 – 8.8	8.6 – 8.8
Potassium	ppm	0.5 – 0.6	0.5 – 0.6	0.5 – 0.9	1.3 – 1.9	1.5 – 2.1
Silica	ppm	8.6 – 11.6	8.7 – 11.7	8.7 – 10.8	6.6 – 8.8	6.6 – 7.3
Sodium	ppm	4.9 – 5.9	5.1 – 6.4	5.1 – 10	26 – 27	30 – 32

CONTACT US

For more information about water quality or to report a water quality concern, call 866-40-EBMUD (866-403-2683) or visit www.ebmud.com.

EBMUD encourages public participation in decisions affecting drinking water quality and other matters at its Board of Directors meeting held the second and fourth Tuesdays of each month at 1:15 p.m., 375 Eleventh Street, 2nd Floor, Oakland.

Board of Directors
John A. Coleman • Katy Foulkes
Andy Katz • Doug Linney • Lesa R. McIntosh
Frank Mellon • William B. Patterson

General Manager
Alexander R. Coate

ADDITIONAL CONTACTS

California Department of Public Health
Drinking Water Branch • 510-620-3463

U.S. Environmental Protection Agency
Safe Drinking Water Hotline • 800-426-4791

Alameda County
Public Health Department • 510-267-8000

Contra Costa
Public Health Division • 925-313-6712

EBMUD
375 Eleventh Street
Oakland, CA 94607
1-866-40-EBMUD
www.ebmud.com

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ENGLISH
This report contains important information about your drinking water. Translate it, or speak with someone who understands it. To request a copy of this report in Spanish or Chinese, please call (510) 287-0138.

SPANISH
Este informe contiene importante información sobre el agua potable que usted consume. Tradúzcalo, o hable con alguien que lo comprenda, o solicite un ejemplar de este informe en español llamando al (510) 287-0138.

CHINESE
這份報告包含有您飲用水的重要資訊。請翻譯該內容，或與了解內容的人討論，或者請致電 (510) 287-0138 索取中文報告。

JAPANESE
この報告書には、あなたの飲料水に関する重要な情報が含まれています。和訳するか、理解できる人に相談してください。

KOREAN
본 보고서에는 귀하의 음료수에 관한 중요한 정보가 나와 있습니다. 번역을 부탁하거나 그 내용을 이해하시는 분으로부터 설명을 들으십시오.

CAMBODIAN (KHMER)
របាយការណ៍នេះមានពត៌មានសំខាន់អំពីទឹកផឹក។ សូមរកគេផ្សេងប្រកប្រែជួនឬពិគ្រោះជាមួយអ្នកណាដែលយល់របាយការណ៍នេះ ។

THAI
รายงานฉบับนี้มีข้อมูลสำคัญเกี่ยวกับน้ำดื่มของท่าน ขอให้แปลรายงานฉบับนี้หรือพูดคุยกับผู้ที่เข้าใจเนื้อหาในรายงานนี้

LAO
ລາຍງານສະບັບນີ້ມີຂໍ້ມູນສຳຄັນກ່ຽວກັບນ້ຳດື່ມຂອງທ່ານ. ໃຫ້ທ່ານແປເອກະສານນີ້ເປັນພາສາລາວ, ຫລືໃຫ້ທ່ານເວົ້າປຶກສາກັບຜູ້ທີ່ເຂົ້າໃຈເລື່ອງ.

PUNJABI
ਇਸ ਰਿਪੋਰਟ ਵਿੱਚ ਤੁਹਾਡੇ ਪੀਣ ਵਾਲੇ ਪਾਣੀ ਬਾਰੇ ਜ਼ਰੂਰੀ ਜਾਣਕਾਰੀ ਦਿੱਤੀ ਗਈ ਹੈ। ਇਸਦਾ ਅਨੁਵਾਦ ਕਰੋ ਜਾਂ ਕਿਸੇ ਨਾਲ ਗਲ ਕਰੋ ਜੋ ਇਸਨੂੰ ਸਮਝਦਾ ਹੋਵੇ।

GUJARATI
આ રિપોર્ટમાં તમારા પીવાના પાણી વિષે મહત્વની માહિતી છે. એનો અનુવાદ કરો, અથવા જેને એની સમજણ પડતી હોય તેની સાથે વાત કરો.

HINDI
इस रिपोर्ट में आपके पीने के पानी के बारे में महत्वपूर्ण जानकारी दी हुई है। इसका अनुवाद करें, या किसी ऐसे व्यक्ति से बात करें जो इसे समझता हो।

RUSSIAN
Здесь содержится информация о вашей питьевой воде. Переведите ее, или обратитесь к тому, кто это понимает.

BOSNIAN
U ovom izvještaju nalaze se važne informacije o vašoj vodi za piće. Prevedite ga ili razgovarajte sa nekim ko razumije ovaj izvještaj.

VIETNAMESE
Bản báo cáo này có các thông tin quan trọng về nước uống của quý vị. Hãy chuyển ngữ tài liệu này, hoặc nói chuyện với người có thể hiểu được bản báo cáo này.

FRENCH
Ce rapport contient des informations importantes concernant votre eau potable. Faites-le traduire ou adressez-vous à quelqu'un qui est en mesure de le comprendre.

TAGALOG
Ang ulat na ito ay naglalaman ng importanteng impormasyon tungkol sa inyong iniinom na tubig. Isalin ito, o makipag-usap sa isang taong nakakaintindi nito.

POLISH
Ten raport zawiera ważne informacje dotyczące wody pitnej. Przetłumacz go, lub porozmawiaj z kimś, kto go rozumie.

GREEK
Η έκθεση αυτή περιέχει σημαντικές πληροφορίες σχετικά με το πόσιμο νερό σας. Μεταφράστε την έκθεση ή μιλήστε με κάποιο άτομο που την κατανοεί.

HMONG
Daim ntawv qhia no muaj cov lus qhia tseem ceeb txog koj cov dej haus. Muab txhais, los sis nrog ib tug neeg uas nkag siab txog qhov no tham.

HEBREW
דו"ח זה מכיל מידע חשוב על מי שתייה. תרגמו אותו או שאלו מישהו שמבין את תוכנו.

ARABIC
يحتوي هذا التقرير على معلومات هامة حول مياه الشرب التي تتناولها. ترجم التقرير أو تحدث إلى شخص يستطيع فهمه.

FARSI
این گزارش حاوی اطلاعات مهمی درمورد آب آشامیدنی است. آن را ترجمه کنید. یا از کسی که مطالب آن را می فهمد سئوال کنید.

URDU
اس رپورٹ میں آپ کے پینے کے پانی سے متعلق اہم معلومات ہیں. اس کا ترجمہ کریں، یا کسی ایسے شخص سے بات کریں جو اسے سمجھتا ہو.

ATTACHMENT J. NOTICES OF DISTRICT EDUCATION PROGRAMS AND SERVICES AVAILABLE TO CUSTOMERS
(Not Applicable)

ATTACHMENT K. DISTRICT AGRICULTURAL WATER ORDER FORM
(Not Applicable)

ATTACHMENT L. DRAINAGE PROBLEM AREA REPORT
(Not Applicable)

EAST BAY
MUNICIPAL UTILITY DISTRICT

Get a $100 Rebate for a High-Efficiency Toilet

Effective July 1, 2012

water SMART

Efficiency is beautiful. Upgrade your bathroom and save on your water bill.

>> Install a water saving high-efficiency toilet today.

Get $100 For Replacing Your Old Toilet With A WaterSense Model*

Save Water. Save Money.

EBMUD offers a rebate of up to $100 when you upgrade your old toilet using 3.5 gallons per flush (GPF) or higher to a new, high-efficiency model. Replacement of 3.5 GPF flush valve toilets (usually found in non-residential settings) may also qualify for a rebate of up to $100.

A toilet using 3.5 GPF or more accounts for roughly 26% of a home's indoor water use. One of the easiest ways to lower your toilet's water use by approximately 62% is to install a high-efficiency toilet (HET), which uses on average 1.3 GPF or less. Although HETs use less water, they remove waste effectively and perform well.

Terms and Conditions

- Applies to purchases between July 1, 2012 and December 31, 2012.
- Two rebates per single-family residence.
- One rebate per multi-family dwelling unit.
- Limits for commercial accounts are determined on a case-by-case basis.
- Past toilet installations rebated by EBMUD count toward limits.
- Toilet installation and rebate application postmark must be completed **within 90 days of purchase**.
- All rebates are subject to availability of funds.

Eligible Toilet Replacement

- Must replace a working toilet flushing 3.5 GPF or higher. See *Determining Your Existing Toilet's Flush Volume,* right panel.
- The exact tank and bowl model number of the toilet you purchase must be on the *WaterSense HETs* list or the *Flushometer Valve/Bowl Combination HET* list.
- Standard 1.6 GPF toilets do not qualify.
- New construction and replacement of toilets installed after 1993 do not qualify.
- Toilet installation must be within the EBMUD water service area and served by an open active EBMUD potable water service account.

look for WaterSense Meets EPA Criteria

To find a qualifying model, look for the WaterSense label, ask your toilet retailer, visit *www.ebmud.com/watersmart*, or call EBMUD at 1-866-403-2683.

How to Get a Rebate

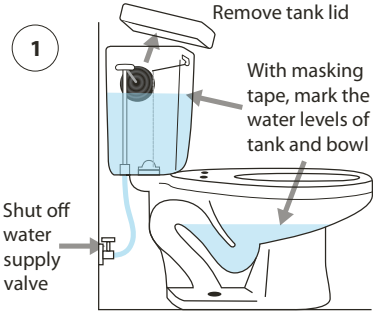
1. If replacing **10 or more toilets**, call EBMUD at 1-866-403-2683 to schedule a **required pre-installation inspection**.
2. Purchase and install any qualifying model(s).
3. Complete and submit an application with **original purchase receipt(s)**. Contractor's receipt must include applicant's name, and/or installation address.
4. If you need your original receipt(s) returned, please include a self-addressed, stamped envelope.

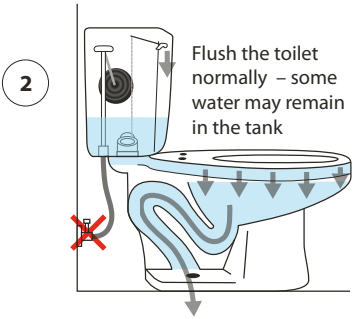
Rebates are issued as credits applied to your EBMUD account, unless you do not pay the water bill at the address where the toilet is installed. Maximum rebate amount per toilet is up to $100 or the total cost (excluding sales tax and disposal fee), whichever is less. Rebates may take up to six weeks to process.

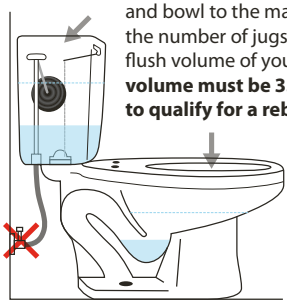
LOOK INSIDE FOR REBATE APPLICATION AND LIST OF LOCAL RETAILERS

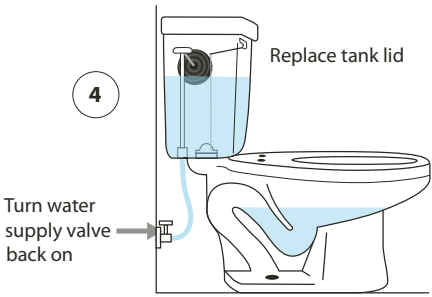
*Commercial flush valve HETs may qualify. See *www.ebmud.com/watersmart* for information.

Determining Your Existing Toilet's Flush Volume









List of Local Retail Stores*

That Stock or Special Order WaterSense Toilets

This list of local retail stores is not inclusive and should not be considered an endorsement of retailers. Please refer to the model specific list when choosing a toilet—you MUST purchase a model on the *WaterSense HET* or *Flushometer Valve/Bowl Combination HET* lists to qualify for a rebate. See *www.ebmud.com/WaterSmart*.

Alamo Ace	Alamo	925-837-2420
Albert Nahman Plumbing	Berkeley	510-843-6904
Ashby Lumber Co.	Berkeley	510-843-2225
Chase Design/Acorn Kitchens and Baths	Berkeley	510-547-6581
Ehret Co.	Berkeley	510-528-4292
University Plumbing & Hardware	Berkeley	510-848-2523
Baths & Kitchens 2000	Concord	925-671-9700
Heieck Supply	Concord	925-671-0800
Lowe's	Concord	925-566-9000
Ferguson Enterprises Inc.	Corte Madera	415-924-3200
Olivero Plumbing	El Cerrito	510-233-3511
Cal Steam	Emeryville	510-594-0400
The Lunt Marymore Co.	Emeryville	510-985-2889
Fairfax Lumber & Hardware	Fairfax	415-453-4410
Goodman Building Supply	Mill Valley	415-388-6233
Home Depot	Multiple Locations	800-466-3337
OSH Orchard Supply Hardware	Multiple Locations	888-746-7674
CTW Designs	Novato	415-883-8861
Pini Ace Hardware	Novato	415-892-1577
American Emperor	Oakland	510-536-6868
Foothill Hardware Inc.	Oakland	510-638-9317
Globe Plumbing Supply Co.	Oakland	510-569-6566
Granite Expo	Oakland	510-652-8882
Jack London Kitchen & Bath Gallery	Oakland	510-832-2284
Meyer Plumbing Supply	Oakland	510-832-3324
Moran Supply	Oakland	510-652-7437
Reed Supply Co.	Oakland	510-436-7171
Rubenstein Supply Co.	Oakland/San Rafael	510-444-6614 / 415-454-1174
Sincere Plumbing and Hardware	Oakland	510-832-2838
Style Bath and Kitchen Inc.	Oakland	510-638-8818
Richert Lumber Co.	Pleasanton	925-846-5040
Valley Plumbing	Pleasanton	925-462-1639
New Century Kitchen & Bath	San Leandro	510-347-1818
Reed's Kitchen & Bath	San Leandro	510-352-2174
Jackson's Hardware	San Rafael	415-454-3740
Pace Supply Corp.	San Rafael	415-454-8282
Rafael Lumber	San Rafael	415-453-3043
WHCI Plumbing Supply Co.	Union City/Dublin	510-471-5757 / 415-999-1818
General Plumbing Supply Co.	Walnut Creek	925-939-4622

* This list was compiled by recent visits and/or phone calls to individual stores. Any retail stores selling approved toilets that would like to be added should contact EBMUD's Water Conservation Division at 1-866-403-2683.

Toilet Disposal Sites

Berkeley Transfer Station	1201 Second Street, Berkeley	510-981-7270
Davis Street Transfer Station	2615 Davis Street, San Leandro	510-638-2303
Marin Resource Recovery Center (MRRC)	565 Jacoby Street, San Rafael	415-485-5647
Pleasanton Transfer Station	3110 Busch Road, Pleasanton	925-846-2042
Republic Service Vasco Road Landfill	4001 N. Vasco Road, Livermore	925-447-0497

The cost of disposing of an old toilet is about $10–40. EBMUD does not reimburse the disposal fee.

Manufacturer Customer Service

American Standard	1-800-442-1902
Caroma	1-800-605-4218
Crane	1-800-442-1902
Duravit	1-888-387-2848
Eljer	1-800-442-1902
Gerber	1-866-538-5536
Kohler	1-888-783-7546
Mansfield	1-877-850-3060
ProFlo (Ferguson)	1-800-221-3379
Toto	1-888-295-8134
Vortens-Lamosa	1-866-821-2811
Zurn	1-877-987-6669

Application Checklist

- ❑ Did you check that your old toilet meets eligibility rules?
- ❑ Did you enclose an original paid receipt showing applicant's name and/or installation address?
- ❑ Is the toilet model number printed and legible on the receipt? (UPC and SKU #s accepted)
- ❑ Is the EXACT MODEL NUMBER of the toilet you purchased on the qualifying WaterSense list of HETs?
- ❑ Have you completely filled out & signed the application form?
- ❑ Did you include your water service account number on the application?
- ❑ Did you install your HET and mail in the rebate application within 90 days of purchase?

Mail application & receipt(s) to:

EBMUD
Water Conservation
P.O. Box 24055, MS 109
Oakland, CA 94623-1055

HIGH-EFFICIENCY TOILET REBATE PROGRAM APPLICATION

Complete application, detach, and mail with original receipt(s) to:
EBMUD Water Conservation, P.O. Box 24055, MS 109, Oakland, CA 94623-1055

Offer good for purchases made between July 1, 2012 and December 31, 2012.
Application must be postmarked **within 90 days of purchase.**
A separate application must be submitted for each metered address.
Restrictions apply. See Program brochure for Terms and Conditions.

PLEASE PRINT:

APPLICANT FIRST NAME _____ LAST NAME _____

EBMUD ACCOUNT NUMBER _____ PHONE _____ - _____ - _____

BUSINESS OR HOA NAME (IF APPLICABLE) _____ EMAIL _____

INSTALLATION ADDRESS _____ CITY _____ ZIP _____

NEW TOILET INFORMATION (If the information does not fit below, please attach a separate sheet of paper with the requested information.)

MAKE(S) AND MODEL NUMBER(S) INSTALLED _____ NUMBER OF REBATES REQUESTED _____

APARTMENT NUMBER FOR MULTI-UNIT RESIDENTIAL AND NUMBER OF TOILETS INSTALLED IN EACH APARTMENT (Attach additional sheet of paper, if necessary)

APT.	QTY.	APT.	QTY.	APT.	QTY.	APT.	QTY.	APT.	QTY.	APT.	QTY.

OLD TOILET INFORMATION (This section must be completed for eligibility.)

NUMBER OF TOILETS AT INSTALLATION ADDRESS _____

PROVIDE THE AGE IN YEARS OR THE DATE OF MANUFACTURE OF THE TOILET(S) BEING REPLACED. THIS IS SOMETIMES FOUND ON THE INSIDE SURFACE OF THE TOILET TANK OR LID. _____

OR, IF AGE IS UNKNOWN, REFER TO THE SECTION *DETERMINING YOUR EXISTING TOILET'S FLUSH VOLUME* AND INDICATE VOLUME HERE _____

CHECK PAYEE INFORMATION (required only when the applicant does not pay the water bill)

MAKE CHECK PAYABLE TO _____

MAIL CHECK TO _____ CITY _____ ZIP _____

DISCLAIMER:

The undersigned expressly agrees that EBMUD may inspect all properties participating in the WaterSmart High-Efficiency Toilet Rebate Program; **that EBMUD does not guarantee the performance of any toilet; and that EBMUD does not warrant any toilet or installation to be free of defects; the quality of workmanship, or the suitability of the premises or the toilet for the installation. The undersigned further agrees to defend, indemnify and hold harmless EBMUD, its directors, officers, agents, and employees, from and against any and all loss, damage, expense, claims suits and liability, including attorneys fees arising out of or in any way connected with the toilet(s) and its (their) installation.** Applicant has read, understands and agrees to the terms and conditions listed on the WaterSense Toilet Rebate Program application. Applicant understands that installation of a qualifying high-efficiency toilet may not result in lower water bills. EBMUD reserves the right to add or remove eligible high-efficiency toilets from the list or change the terms of the incentive offer at any time.

PLEASE REVIEW THE APPLICATION CHECKLIST (ABOVE, RIGHT) BEFORE SIGNING THE APPLICATION.

I HAVE READ, UNDERSTAND AND AGREE TO THE TERMS AND CONDITIONS OF THIS REBATE PROGRAM.

SIGNATURE OF APPLICANT _____ DATE _____

Official Use Only:

BCC: _____

WCV: _____ Pending: _____ Approved: _____ QTY: _____

BY: _____ Denied: _____ By: _____ AMT: _____

EAST BAY
MUNICIPAL UTILITY DISTRICT

Up to $500 Rebate For Lawn Conversion

Effective July 1, 2012

water SMART

Transform your thirsty yard into a lush, water-efficient landscape.

>> Improve your scenery and start saving today.

Get up to $500 for converting your lawn

Save Water. Save Money. Reduce Waste.

Lawns are a good choice for areas that are used for sports, recreation, and foot traffic. But lawns require frequent watering and maintenance. *Sustainable landscaping* is a beautiful and healthy alternative to lawns which uses plants suited to our climate, drip irrigation, mulch, and permeable hardscape. If you don't want to plant, *sheet mulching* decomposes the lawn in place without any digging. Lawn conversion saves time and money while conserving water and providing long-term benefits to you and the environment.

Save Energy • Build Healthy Soil • Create Wildlife Habitat • Protect the Watershed and the Bay

Lawn Conversion Program Qualifications

- **All projects must be approved by EBMUD prior to removing the lawn to be converted.** EBMUD pre- and post-conversion inspections are required.
- Customers must convert **a minimum of 250 square feet** of lawn.
- Landscaped area beyond the lawn will not be included in the rebate.
- The site must be served by an EBMUD residential water service account. The **lawn being converted must be irrigated with EBMUD water and have been maintained for the last 18 months**.
- If applicant is not the property owner, written permission of the owner is required.
- Customers who have participated in the Lawn Conversion Rebate Program within the past 12 months are not eligible.
- Only one rebate will be paid per each square foot of lawn converted or sheet mulched.

Qualifying Lawn Conversions:

- **California native or climate-appropriate plants** that require little or no supplemental irrigation. Plants featured in the EBMUD plant book *Plants and Landscapes for Summer-Dry Climates* qualify, as do many other climate-appropriate plants.
- **Permeable hardscape** such as pavers, bricks or flagstone set in sand, gravel or decomposed granite. Water must pass through or be absorbed by landscaping materials.
- If converted area is irrigated, **only drip systems are allowed**.
- All planted areas must have at least a **three-inch layer of mulch**.
- Sheet mulching must be at least four inches in depth.

Non-Qualifying Lawn Conversions:

- Plant material that requires regular water and is not adapted to a summer-dry climate (see list at *www.ebmud.com*).
- Artificial turf installations.
- Non-biodegradable weed-block material.
- Exposed soil surfaces (exceptions may be made for enhancing insect habitat).
- Overhead spray/sprinkler systems.
- Impermeable surfaces such as concrete, bricks or flagstone mortared into place.

Rebate Rates

Converting your lawn to a sustainable landscape is rebated at a rate of $0.50 per square foot. Sheet mulching only (removal of lawn without planting) is rebated at the rate of $0.25 per square foot. The maximum rebate is $500 per eligible water service account.

Instructions & Application Inside

How do I participate?

1. Carefully measure the lawn area you want to convert.
2. Fill out and submit the attached application. EBMUD will call to schedule an appointment for a pre-conversion inspection.
3. Meet with EBMUD for a pre-conversion inspection.
4. Complete the project and notify EBMUD that your project is complete within six months of the pre-conversion inspection.
5. Meet with EBMUD for a post-conversion inspection.

Rebates are issued as credits applied to the EBMUD water service account and may take up to eight weeks to process. All rebates are subject to availability of funds and the program may be changed or terminated without notice.

Application checklist:

- ☐ Did you measure only the lawn area to be converted?
- ☐ Are you converting a minimum of 250 square feet?
- ☐ Is the lawn area to be converted currently being watered?
- ☐ Are you applying for a lawn area that has not already been converted?

Conversion checklist:

My plan includes one or more of the following (please check all that apply):

- ☐ Drip irrigation only *(if area is to be irrigated)*
- ☐ A minimum 3" layer of mulch on planted areas
- ☐ Climate-appropriate plants
- ☐ Permeable hardscape
- ☐ Sheet mulching *(minimum 4 inches)*

My plan does *not* include the following:

- ☐ Plants that require regular summer irrigation
- ☐ Artificial turf
- ☐ Non-biodegradable weed-block material
- ☐ Overhead spray/sprinkler systems
- ☐ Exposed soil surfaces
- ☐ Inclusion of areas that were not lawn
- ☐ Non-permeable hardscape

Resources

Visit *www.ebmud.com/watersmart* for help with your project. You'll find lists of useful books and publications, websites, and demonstration garden locations along with materials describing sheet mulching. There's also a partial list of commonly used plants that do not meet the requirement for conversion to climate-appropriate plants.

Residential Lawn Conversion Rebate
Program Application

Complete application and mail to
EBMUD Lawn Conversion Rebate, P.O. Box 24055, MS 109, Oakland, CA 94623-1055
Offer good between July 1, 2012 and December 31, 2012

Applicant Name: _____

Phone: (_____) _____

EBMUD account number: _____

You will be contacted for an appointment.
What is the best time to reach you M–F between 8:00 am and 4:30 pm?: _____

Address: _____

City: _____ ZIP: _____

Email: _____

Is the applicant the property owner?: ☐ Yes ☐ No

What is the area of proposed irrigated lawn removal project? *(length x width)* = _____ Sq. Ft.

The project includes *(check either or both)*: ☐ Sustainable landscaping
☐ Sheet mulching

On the grid to the right, please draw an aerial view of your proposed project.
Include measurements to explain the total area of lawn to be converted.

Agreement

I, the undersigned, understand that this is a limited, first-come/first-served, one-time program, that rebates are given only for projects for which applications are approved in advance of installation, and that EBMUD is entitled to deny any application that does not meet program requirements. I have voluntarily determined to participate in EBMUD's Residential Lawn Conversion Rebate Program. I have independently selected materials, supplies and labor for the purpose of performing the installation. I agree that all work performed will comply with applicable state and local laws, ordinances and regulations. I agree that EBMUD may visit the premises and verify exisitng conditions and that the work has been performed. By virtue of these inspections, I understand that EBMUD makes no determination with respect to whether materials and equipment are free of defects, the quality of the workmanship, or the suitability of the premises or the materials or equipment for the installation. I also understand that the installation of irrigation equipment and landscape materials may not result in lower water bills. If this Application is approved by EBMUD and the work proceeds, I agree to defend, indemnify and hold harmless EBMUD, its directors, officers, agents and employees against any and all loss, liability, expense, claims, suits and damages, including attorneys' fees, arising out of or resulting from the installation of irrigation equipment and landscape materials.

I have read, understand, and agree to the terms and conditions of this rebate program.

_____
Signature *Date*

Official use only:

App _____ Pre-Insp. _____ End Date _____

Final Insp. _____ Con. Sq. Ft. _____ WCV _____

water SMART

Looking for Leaks

A Homeowner's How-To List

You may routinely put new washers in the faucets and fix any leaks you can see, inside the house and around the yard but do you have any invisible leaks?

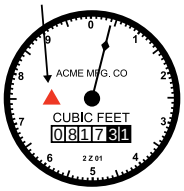
It's time to check inside your meter box. It's usually in front of the house near the curb. Lift the cover aside to expose your water meter. Flip open its hinged lid. You'll find either a straight-reading or round-reading dial.

On straight-reading meters, the large needle on the dial is used for testing. On round-reading dials, the test dial will either be labeled "one foot" or will have no markings.

With all of the faucets (inside and outside) shut tightly, mark the test-needle by laying a straight-pin or toothpick exactly on top of it.

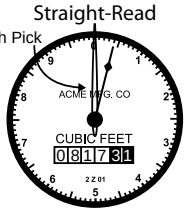
- A half hour later, check the dial again. If the test-needle has moved – and no one has used any water – you probably have a leak and should do some more investigating.
- To determine if the leak is inside or outside the house, locate the main shut-off valve (usually at the front of the house underneath an outside faucet). If the dial moves while the main house valve is turned off, you probably have an underground house line leak. Inspect along a straight line between the meter and the house valve for surface water or a wet or super-green spot.

Straight-Read w/leak detector

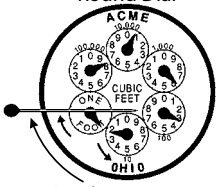


Straight-Read

Tooth Pick



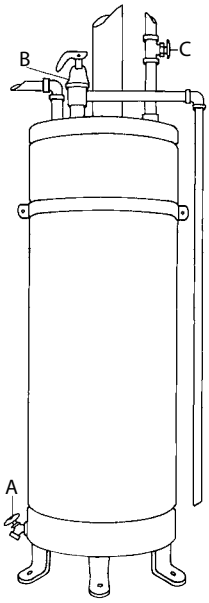
Round Dial



Straight Pin

Note: Leaks that may occur intermittently (like a running toilet, irrigation system leak or faulty swimming pool fill valve) will not always continuously register at the meter. These are all early steps you can take to locate the problem yourself before calling a plumber or leak detection specialist. (They're in the yellow pages under "pipe and leak detection.")

Read Your Meter – Often! One way to find out the 'why' of high water consumption is to determine the 'what' and 'when' consumption is occurring. Read your meter every day or every week and keep a log of the readings. Is your consumption consistent or is it higher on some days? If your sprinkler system has a timer, read the meter the day before and the day after an irrigation cycle. How much water is going into the garden? How does that compare to the days without irrigation? For tips on reading meters see the ebmud.com website (under Account Information) or call 1-866-403-2683 to request a 'Meet Your Meter' pamphlet.



A: Drain Valve; B: Pressure relief valve;
C: Cold-Water inlet valve

Check for Water Heater Leaks

Little Leaks Can Mean Big Problems

Most people visit their water heaters only if the hot water stops. Check yours. If you notice a puddle of water around the bottom of the tank, it probably indicates a leak caused by corrosion – a sure sign of old age, and the most common reason for replacing the tank. If the tank wall is corroding, more problems are coming, and it's time to retire the tank and get a new energy saving model.

Water heaters last about 15 years with proper care. To clear out any sediment, flush a few quarts of water from the drain valve at the bottom of the tank into a bucket about every six months – maybe when you change fire alarm batteries around the house. Also operate the pressure-relief valve at the top of the tank. Don't worry if a little water leaks out; that means it's working. Also close and reopen the cold-water inlet valve at the top, so you're sure it's easy to operate in an emergency.

Leaks Can Hide Outside

Look for Bright Green or "Soft" Areas

Whatever irrigation equipment you have – manual, sprinkler or drip – be aware that not all leaks are obvious. First check for overly green or soggy spots, where broken spray heads or bubblers or underground pipe cracks will tell on themselves. Buried pipes, hoses or drip lines leaking into sandy, porous soil may not show up clearly. Automatic sprinkler and drip systems that generate a hissing sound are likely leaking. Also, remember to check drip systems for damage from foot traffic or gnawing pets or pests. Got leaky hoses? Repair them with waterproof tape. Dribbling spray nozzle connection? Wrap the hose threads with Teflon tape.

water SMART

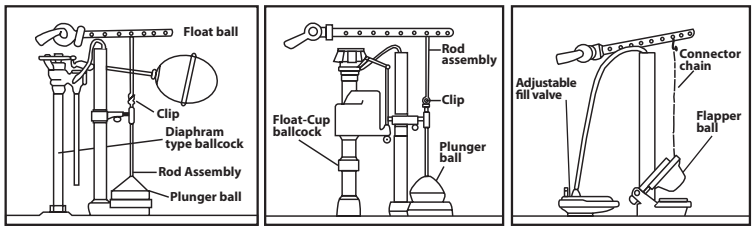
Looking for Leaks

A Homeowner's How-To List

Eliminate the Most Common Leaks

Check the Toilet First

Toilet leaks are the most common household leaks and the number one cause of high water bills. Every homeowner should know how to determine what the problem is. The leak may be caused by a failing flapper, plunger ball, float ball or fill valve. Listen closely for hissing or trickling sounds, or a periodic "whoosh" caused by the toilet topping itself off every few minutes. These are all tell-tale signs that a leak exists.



TYPICAL TOILET TANKS: Here are some toilet tanks with different ballcock and plunger ball arrangements. Shut off the water, empty the tank and take damaged parts to the hardware store for a perfect match.

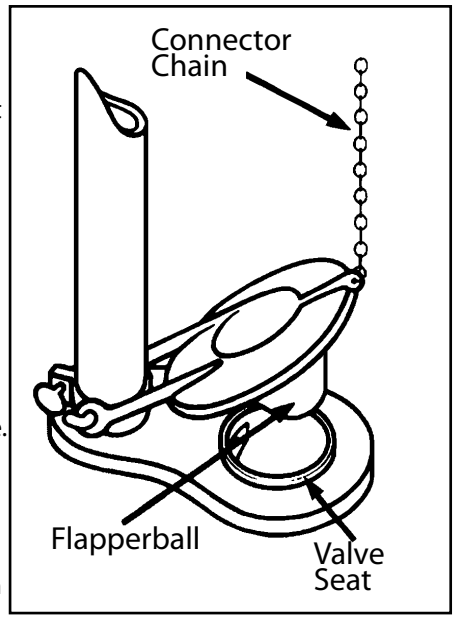
The first step is to drop a dye tablet or several drops of ordinary food coloring into the toilet tank. (EBMUD has free dye tabs for you.) Wait a few minutes. If color shows up in the toilet bowl, you have a leak.

The second step is to turn off the toilet's water supply (usually it has a diamond shaped handle, near the wall at the base of the toilet) and mark the water level inside the tank. Wait 15 minutes and then check the water level. If it has dropped below your mark, the problem is at the bottom of the toilet tank at the flapper or plunger ball.

However – if the water level has stayed the same, then the problem is an overflow near the top of the tank, involving the float ball or the fill valve – or both.

All of these items are easy and inexpensive to replace. Look for products labeled chloramine resistant at your local hardware store.

If you are not "handy" by all means hire a handyman or plumber to help. If you do find and fix a leak in your plumbing or irrigation system, you may call our Contact Center at 1-866-403-2683 to inquire about a possible adjustment to your bill once repairs are completed. (Keep your receipts.) Our staff is available to assist you Monday through Friday from 8:00 a.m. to 4:30 p.m. Thanks for all you do to find and fix leaks.



If you replace a flapper ball, take the old one to the hardware store to get the best match.

Check for Swimming Pool Leaks

Try the "Bucket Test"

Does your pool leak? Find out! If the pool has an automatic fill valve, make sure it is fully turned off. Then place a bucket on a pool step. Fill the bucket with pool water to about three to four inches from the top, matching the water level in the bucket with the level of the pool. Carefully mark the water levels on both the inside and outside of the bucket. Wait 24 hours. If the pool water has dropped below than the bucket's contents, you may have a leak. Contact a pool professional for help.

Get More Help

Check Our Website

No single document can cover all the ways available to you to locate leaks and save water. Please review the many tips on our WaterSmart Center at ebmud.com. You can get information on rebates and also check your water use. Select the "For Customers" from the drop down menu and then select "Account Information" then "My Account".

09/2011

water SMART

Lawn Conversion

List of Non-Qualifying Plants

Plants that do not qualify for inclusion in a lawn conversion

Trees

- All Maples*
- Birch
- Alder
- Poplar
- Dogwood
- Magnolia

Perennials

- Astilbe
- Cleome
- Delphinium
- Foxglove
- Peonies
- Phlox

Shrubs

- Camellia
- Pieris
- Rhododendron
- Azalea
- Gardenia
- Hydrangea

Grasses

- Japanese Forest Grass
- Mondo Grass
- Japanese Blood Grass
- Pampas Grass
- Juncus (Rush)

High Water Annuals

- Impatiens
- Marigolds
- Celosia
- Petunias
- Zinnias

Please call (866) 403-2683 or visit us online for full program details.

* including Japanese Maple

12/10

water SMART

Success Story – Cobblestone Court HOA, Pleasant Hill

For years, the landscape water use at Cobblestone Court was quite variable – some years nearly doubling. Serpico Landscaping took over this site in 2008, and with good management, cut water use in half AND maintained the water savings.

The property manager, Massingham and Associates, contacted EBMUD to ask for a review of their water use. It became clear that there was some solid water savings from 2008-on, thanks to the good management and maintenance of the irrigation systems since Serpico came on board. Additionally, two new weather-based irrigation controllers installed in 2010 were contributing to recent water savings.

EBMUD's irrigation advisor found more ways to conserve. By installing rotating nozzles with high-efficiency sprinklers with check valves and pressure regulation devices, Cobblestone Court fine tuned how water is applied in the landscape. The irrigation schedule is now carefully monitored and only the correct amount of water needed by this mature landscaping is applied. Serpico crews read their irrigation meters routinely to track consumption and check for leaks.

Well managed landscapes can save you water and money.

If you want to talk directly with this landscape company and HOA about how they achieved these water savings:

Massingham and Associates
Lisa Bockus, Property Manager
(925) 405-4900, lbockus@massingham.com

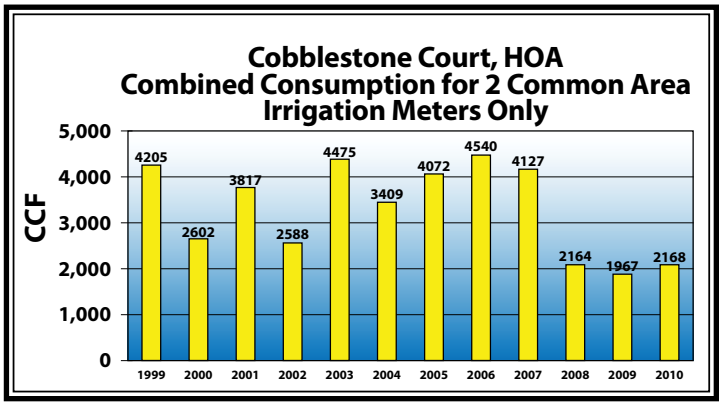
Serpico Landscaping, Inc.
Sharon Serpico Hanson
(866) 282-0341, mailbox@serpicolandscaping.com

EBMUD
Dave Langridge, Water Conservation representative
Certified Landscape Irrigation Auditor
(510) 986-7615, dlangrid@ebmud.com

How much did Cobblestone Court HOA save?

Irrigation water use was cut in half, from 3.4 million gallons in 2006 to 1.6 million gallons in 2010

Over $4,200 dollars were saved compared to 2006 water costs



EBMUD recognizes these businesses and customers for their water conserving efforts. However EBMUD makes no representation regarding these businesses or that similar water saving will be achieved at other sites.

07/01/2011

EAST BAY
MUNICIPAL UTILITY DISTRICT

Watering Guide

Proper irrigation design and careful water management will help you use water more efficiently in the landscape.

Lawn sprinklers should be spaced so that water from each sprinkler reaches the sprinklers next to it. This is called *head-to-head coverage*. The goal is to apply water evenly without runoff or overspray.

Use separate valves (stations) for plants with different water needs and for different types of irrigation. This is called *hydrozoning*.

Change watering schedules seasonally by adjusting watering days (how often you water). Plants need half as much water in spring and fall as in mid-summer. Turn automatic systems off in rainy months or install a rain shut-off device to stop watering during the winter rainy season.

EBMUD offers a variety of conservation services and programs for residential and non-residential customers in our service area. For more information on these programs please visit www.ebmud.com/watersmart.

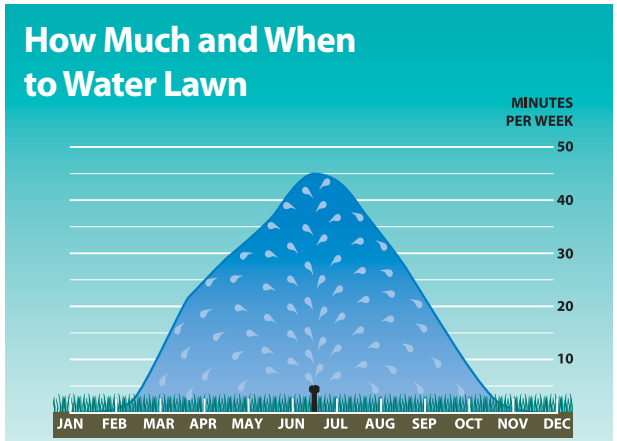
How much and when you need to water depends on how much water is already in the soil. This varies with seasonal rainfall and evaporation. Your watering schedule also depends on how fast your sprinklers apply water and the water needs of your plants.

The graph below shows the maximum water needs of lawn watered with spray head sprinklers that apply water at 1.7" per hour; most plants require less. Rotor sprinklers apply water at a lower rate and require more minutes per start.

Use your timer wisely

- Set sprinklers to come on before dawn to give water time to soak in before it evaporates in the heat of the sun.
- Write down your irrigation schedule and keep it handy for future reference.
- Don't water if it has just rained or if rain is expected.
- Fewer hours of sunlight reduces the water need of plants more than temperature. Plants need less water after July.
- If you are one of many who forgets to adjust your timer, consider a new self-adjusting controller.

EBMUD has many programs to help customers reduce water use. For information call 1-866-403-2683 or visit www.ebmud.com/watersmart.



Minutes based on sprinkler application rate of 1.7" per hour for spray heads and maximum water needs of lawn per week.

water SMART

Watering Tips

- Water to the depth of plant roots—about 6" for lawns, 9" for ground-covers, 12" for shrubs and 18 to 24" for trees.
- Water shrubs about twice as long as you water a lawn. Shrubs have deeper roots than lawn, so it takes longer for water to reach them.
- Shrubs also use water more slowly than lawns, so water them one-third as often.

Check your system

- Regularly inspect irrigation equipment in operation and repair leaks quickly.
- Adjust sprinklers for optimum coverage and to avoid overspray.
- Straighten leaning sprinkler heads.
- Trim plants and mow lawns to prevent interference with spray patterns.
- Check drip emitters to make sure they are working correctly and flush debris from lines twice a year.
- Read your water meter to check for possible leaks.

Try Drip

A drip irrigation system is best for shrubs and trees without groundcover beneath them or for groundcover that spreads without rooting.

Unlike spray systems that broadcast irrigation water, drip systems bring water slowly and directly to plant roots, eliminating overspray and minimizing runoff.

Choosing a controller:

- Conventional timers at a minimum should have features for multiple programs (calendar of watering days), multiple start times, and a 14-day calendar for drought-tolerant plants that require infrequent watering.
- Better yet, choose a self-adjusting irrigation controller that adjusts your water schedule daily based on actual plant needs and weather conditions.

Watering Schedule

How much to water (minutes and starts per day) is a fixed setting determined by your soil, plant type and irrigation system. When to water (days per week) should be changed with seasonal weather patterns.

			Minutes and starts per day				*Days per week ***		
Station number	*Plant type*	*Sprinkler type*	*Starts* per day*	*Minutes per start*	*Total min./day*	*Program code*	*Cool season*	*Warm season*	*Hot season*
1	Lawn	Spray	3	5	15	A	1	2	3
2	Lawn	Rotor	3	13	39	A	1	2	3
3	Shrubs	Spray	3	8	24	B	0	.5	1
4	Shrubs	Rotor	3	20	60	B	0	.5	1
5	Shrubs	Drip	3	10	30	B	0	.5	1
6	Ivy	Spray	3	6	18	B	0	.5	1
7	Natives	Drip	2	20	40	C	0	0	.5
8	Trees	Drip	2	30	60	C	0	0	.5
9	Potted Plants	Drip	1	5	5	D	2	4	7

** Program your starts one hour apart. The steeper the slope, the more starts you'll need. If more starts are used, reduce the minutes per start so that the total minutes per day stays approximately the same.*

***.5 days per week = 1 day every other week*

Irrigation Resources

Best Practices, Certification, and Professional Services

Water Saving Tips

Please visit EBMUD's website for more water saving tips and to purchase our award winning book, *Plants and Landscapes for Summer-Dry Climates*
www.ebmud.com

Bay Friendly Landscaping and Gardening

Bay Friendly is a program that offers workshops, classes and resources for a sustainable approach to landscaping and gardening for residents, landscape professionals and public agencies.
www.bayfriendly.org

California Landscape Contractor Association

A non-profit trade organization of licensed landscape and landscape-related contractors.
www.clca.org

EPA's WaterSense®

A program of the U.S. Environmental Protection Agency that helps consumers choose water efficient appliances.
www.epa.gov/WaterSense/

Irrigation Association

A national organization providing updates on irrigation equipment, handbooks and tips for the consumer and landscape professionals.
www.irrigation.org/smartwater/

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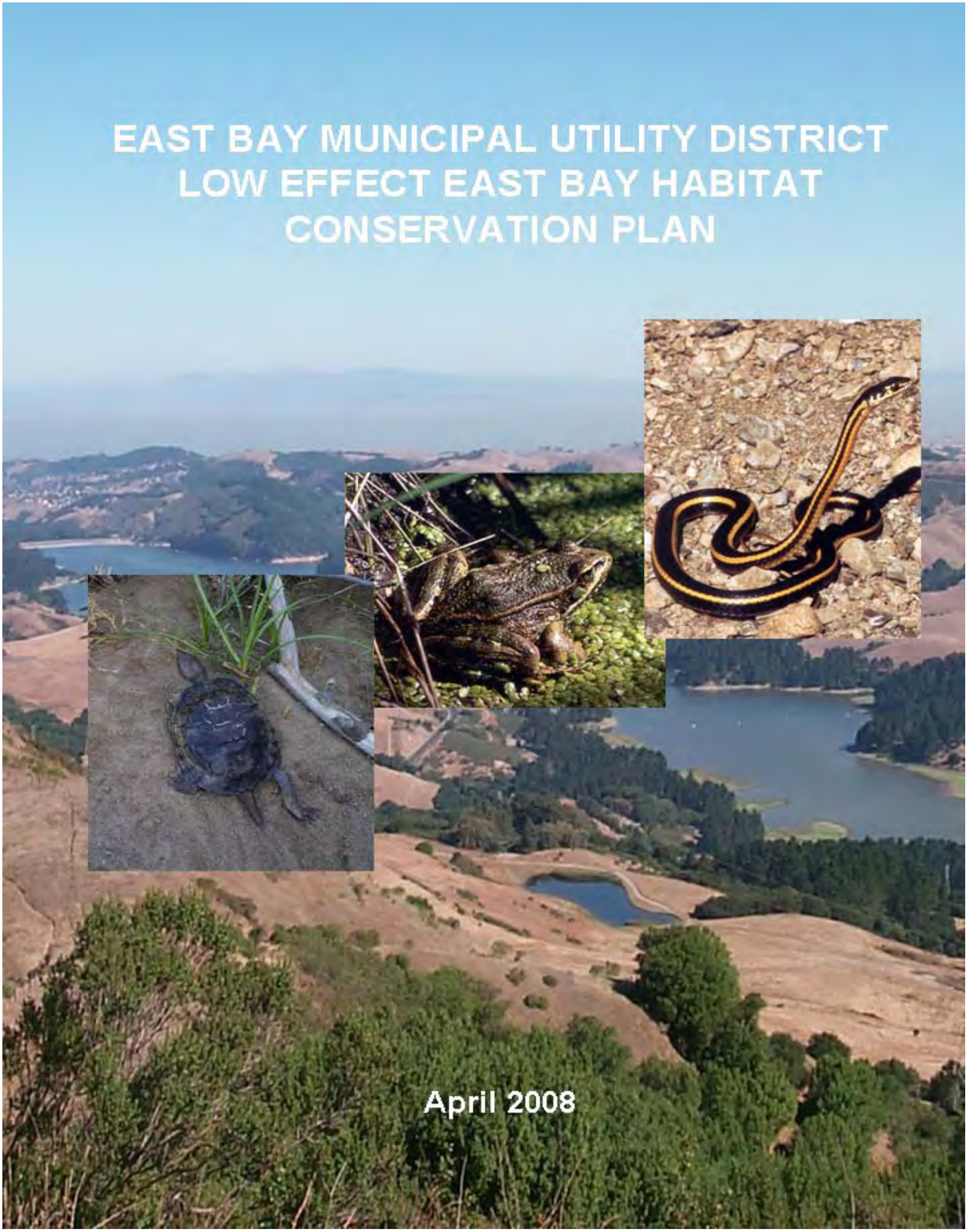
EAST BAY MUNICIPAL UTILITY DISTRICT LOW EFFECT EAST BAY HABITAT CONSERVATION PLAN



April 2008

Section 1. Introduction

The East Bay Municipal Utility District (EBMUD) owns and manages 28,200 acres of land in the East Bay, providing water and wastewater treatment to 1.3 million and 640,000 customers, respectively. EBMUD manages this large watershed area as open space, primarily as protection for water quality, and as species habitat in the otherwise developed East Bay.

Although most of EBMUD's East Bay watershed lands and facilities were constructed or acquired prior to the enactment of the Federal Endangered Species Act (ESA), ongoing operations and maintenance procedures may result in the take of sensitive species. For this reason EBMUD is pursuing an Incidental Take Permit under Section 10(a)(1)(B) of the ESA. Concurrently, EBMUD is pursuing an authorization from the state under California Fish and Game Code Section 2080.1. The term of the permit and accompanying state decision requested will be thirty years.

The ESA prohibits unauthorized "take" of listed threatened or endangered species (see Section 1.2 for definition of "take"). The ESA also permits the take of species incidental to otherwise lawful activity. Section 10 of the ESA requires that, as part of the process for obtaining an incidental take permit, an applicant prepare a "habitat conservation plan" (HCP) that specifies the potential impacts of activities associated with the take of listed species occurring in the Plan area. The applicant is required to avoid, minimize, mitigate, and monitor for such impacts.

As required, general and species specific biological goals are identified in this plan. General goals include managing for maintenance of existing covered species habitat types, and education of EBMUD personnel regarding identification and avoidance of sensitive species. Species goals are to provide for covered species individuals and habitats on EBMUD watershed, and to work toward general species recovery within the HCP area.

The plan area is mapped in Figure 1-1 and described in Table 1-2.

Section 2. Biological Resources

There are two plant and five animal species covered under this HCP: pallid manzanita – listed as federally threatened (FT), Santa Cruz tarplant (FT), Oncorhynchus mykiss (*O.*

mykiss), in Pinole Creek and above USL Dam, California red-legged frog (FT), western pond turtle, Alameda whipsnake (FT), and pallid bat. Western pond turtle, pallid bat and Oncorhynchus mykiss (resident populations) are not currently listed as federally threatened or endangered, but may be listed during the course of the permit.

Classifications of California Native Plant Society vegetation communities on EBMUD watershed lands are listed in a table and referenced to the source document. Known and estimated associations of covered species with these communities are shown in a matrix.

Life histories for the seven HCP-covered species are described in Appendix A where their distribution, threats, legal (listing) status, and any recovery plans or designated critical habitat are discussed. Their presence in the HCP area is described and mapped at the end of each species account. EBMUD's East Bay Watershed reservoir and non-reservoir basin vegetation communities are described and mapped. Occurrence of listed species on these described watershed lands is shown in a matrix.

Section 3. Activities

The East Bay Watershed Master Plan (WMP) was adopted in 1996 to define long-term management of EBMUD lands. Specific WMP programs addressed in this HCP include water quality, biodiversity, forestry, livestock grazing, agricultural operations, fire and fuels management and recreation and developed trails. The trench spoils program for placement and removal of trench spoils (defined in Section 3.2.8) from watershed lands is included as a separate program. Other programs are addressed for their potential to impact species from vehicle strikes on EBMUD watershed roadways. These programs include the reservoir water quality monitoring program, fire patrols, educational programs, access for research, access by EBMUD contractors, and other fire road travel. Activities for these programs are described in Section 3.

Section 4. Impacts and Incidental Take

Potential impacts associated with these programs may result in the incidental take or modification of habitat for HCP covered species. Take is defined under section 3(18) of the ESA and referenced to Section 1.2 of this document.

The relative health of the populations and their natural variability, and the potential for and avoidance of incidental take for the two main species (red-legged frog and Alameda whipsnake) are discussed. EBMUD is requesting authorization for incidental take resulting from modification of habitat, incidental harassment, and species mortality for all

described watershed maintenance and range activities as performed under this HCP for *O. mykiss*, California red-legged frogs, western pond turtle, Alameda whipsnake, and pallid bat. Should the *O. mykiss* (resident populations), western pond turtle or pallid bat be listed during the course of the permit, EBMUD would already be covered under this HCP from incidental take of these species as described herein.

Section 5. Avoidance and Minimization Measures

General protection measures are described. They have been designed to avoid and minimize potential impacts from watershed programs on covered species. These measures include a staff and operator education and awareness program, vehicle speed restrictions, and pre-project monitoring.

Because pond and wetland work may rarely require handling animals, avoidance procedures for ponds and wetlands relative to the protection of California red-legged frogs and western pond turtles are described. Assurances are given that pre-project surveys will occur for these species and specific limited procedures for capturing and holding species (if necessary) at project sites are described.

Specific avoidance and minimization measures are discussed for species relative to selected activities identified as potentially harmful. Protection measures for each covered species are described, and maps of known species locations are in Appendix A.

Section 6. Mitigation

General mitigation measures are described that include: rectification, reduction of impacts, and compensation for unavoidable impacts. Individual species rectification, reduction of impacts, and compensation measures are listed as required by the HCP handbook.

Section 7. Monitoring

Monitoring is divided between Compliance and Effectiveness monitoring. Compliance monitoring will track the implementation of the HCP and Incidental Take Permit (ITP). Funding, reporting, and policy implementation will be tracked.

Effectiveness monitoring will determine if the HCP is achieving the biological goals and objectives by tracking take, species status, habitat condition, biological goals, and mitigation. In addition to following covered species and habitat, “effectiveness

monitoring", as described in the HCP handbook, will measure or determine the efficacy of the species mitigation and enhancement measures.

Monitoring for the two covered plant species will consist of monitoring known sites and of advising the USFWS of any new observed locations. Monitoring will be presence/absence and habitat based for *O. mykiss*, and habitat based for red-legged frog and Alameda whipsnake. Known sites will be monitored for western pond turtles and pallid bats.

Reporting requirements include annual reports of monitoring and take, and three-year, six-year, and ten-year overall HCP reports to address adaptive management. After the ten year report, reports will be made every five years.

Section 8. Adaptive Management

Adaptive management will be implemented consistent with the federal HCP Five Point Policy. Trigger points for adaptive management of each species are described in Section 8. The required interim reports at three, six, and ten years, and every five years thereafter will address program adaptive management based on monitoring results. Program changes will be implemented based on study results as determined through discussion with USFWS, and will be reviewed at the next five-year interval.

Section 9. Unforeseen Circumstances/Plan Amendments/Adaptive Management

Foreseeable changes in circumstances are listed in a table and include acquisition of new species information, impacts from non-native species, changed circumstances resulting from wildfire under 100 acres (based on 25 years of record) including loss of habitat such as the April Creek barn, forest die-off due to cold or disease, spread of disease, and landscape change due to a "strong" earthquake registering up to 6.9 on the Richter scale. The regulatory assurances also apply to changes from unforeseen circumstances such as unforeseeable facility failure or accidents.

In the event of a change in status for a species (listing of a new species), new data that significantly changes management strategies and procedures, or other altering circumstance, an amendment procedure to the HCP may be initiated by either EBMUD or USFWS as described in Section 9.

Events which cannot be foreseen at this time such as damage to the watershed resulting from a wildfire greater than 100 acres or an earthquake of 7.0 or higher, an unknown

disease, or other circumstance that cannot reasonably be anticipated will be considered an unforeseen circumstance subject to regulatory assurances as described herein.

A statement is included to clarify that this HCP will not prevent EBMUD from creating a mitigation bank or selling habitat mitigation credits (e.g., wetlands, riparian) or other otherwise using the Pinole Valley watershed for mitigation in the future.

Section 10. Funding

A statement of funding source and commitment is included as part of the incidental take permit process. Funding for HCP operations and mitigation has been budgeted as part of EBMUD's commitment under the Habitat Conservation Plan and Implementation Agreement. Total EBMUD HCP labor costs will be 1.18 FTE, of which 0.12 is from biological contractors. A total of 0.36 FTE, work currently performed for the East Bay Watershed Master Plan (WMP) will cover both plans. Total new EBMUD commitment will be 0.70 FTE (1450 hours per year) dedicated to the HCP. Annual HCP labor costs will be $101,000 and one time capital costs will be $45,000. Annual costs, including FTE labor costs, are adjusted for inflation in each biennial budget. A rationale is given to show how EBMUD has conservatively planned for inflation.

Section 11. Alternatives

A "no HCP" alternative would require EBMUD to address each watershed activity that may impact listed species on a case-by-case basis, requiring a greater commitment of personnel with a reduced likelihood of positive results for the species. Only the No Action alternative need be considered for a low-effect HCP.

Appendices

Life histories of HCP covered species, the EBMUD Integrated Pest Management Program (2003), and the EBMUD Natural Resources/CDFG Section 1600 Memorandum of Understanding are presented in Appendices A through C, respectively.

TABLE OF CONTENTS

1 INTRODUCTION 1-1

1.1 INTRODUCTION 1-1
1.1.1 Sources of Water Supply 1-3
1.1.2 East Bay Terminal Reservoirs 1-3
1.2 APPLICABLE LAW 1-6
1.3 EBMUD HABITAT CONSERVATION PLAN 1-7
1.4 BIOLOGICAL GOALS AND OBJECTIVES 1-8
1.4.1 General Biological Goals 1-8
1.4.2 Specific Biological Goals and Objectives 1-8
1.5 PLAN AREA 1-14
1.6 PUBLIC INVOLVEMENT 1-14
1.7 REFERENCES 1-15

2 BIOLOGICAL RESOURCES 2-1

2.1 BACKGROUND 2-1
2.2 VEGETATION COMMUNITIES 2-1
2.2.1 Tree Dominated Communities 2-4
2.2.2 Shrub Dominated Communities 2-13
2.2.3 Herbaceous Dominated Communities 2-19
2.3 COVERED SPECIES 2-28
2.4 HABITAT CONSERVATION PLAN AREAS 2-31
2.4.1 San Pablo Reservoir Watershed 2-31
2.4.2 Siesta Valley 2-31
2.4.3 Gateway Area 2-31
2.4.4 Briones Reservoir Watershed 2-32
2.4.5 Lafayette Reservoir Watershed 2-32
2.4.6 Upper San Leandro Watershed 2-33
2.4.7 Chabot Reservoir Watershed 2-33
2.4.8 Pinole Valley 2-33
2.4.9 Other Non-Watershed Areas 2-34
2.4.10 Potential Mitigation Lands 2-34

3 ACTIVITIES 3-1

3.1 EAST BAY WATERSHED LANDS 3-1
3.2 ACTIVITIES 3-2
3.2.1 Water Quality Program 3-3
3.2.2 Biodiversity Program 3-10
3.2.3 Forestry Program 3-14
3.2.4 Livestock Grazing Program 3-17
3.2.5 Agricultural Operations Program 3-21
3.2.6 Fire and Fuels Program 3-23
3.2.7 Developed Trails and Recreation Program 3-28
3.2.8 Trench Spoils Storage and Removal Program 3-31
3.2.9 Multiple Program Activities 3-32

4 IMPACTS AND INCIDENTAL TAKE 4-1

4.1 INTRODUCTION 4-1
4.2 INCIDENTAL TAKE FROM ACTIVITIES 4-1
4.2.1 Water Quality Program 4-1
4.2.2 Biodiversity Program 4-7
4.2.3 Forestry Program 4-9
4.2.4 Livestock Grazing Program 4-10
4.2.5 Agricultural Operations Program 4-12
4.2.6 Fire and Fuels Program 4-13
4.2.7 Developed Trails and Recreation Program 4-15
4.2.8 Trench Spoils Storage and Removal Program 4-16
4.2.9 Multiple Program Activities 4-17
4.3 CURRENT STATUS OF COVERED SPECIES IN HCP AREA 4-18
4.4 IMPACTS 4-20

5 AVOIDANCE AND MINIMIZATION MEASURES 5-1

5.1 INTRODUCTION 5-1
5.2 GENERAL AVOIDANCE AND MINIMIZATION MEASURES 5-1
5.3 SPECIFIC AVOIDANCE AND MINIMIZATION MEASURES 5-2
5.3.1 Santa Cruz Tarplant 5-3
5.3.2 Pallid Manzanita 5-4
5.3.3 Rainbow Trout 5-5
5.3.4 California Red-legged Frog 5-7
5.3.5 Western Pond Turtle 5-10
5.3.6 Alameda Whipsnake 5-12
5.3.7 Pallid Bat 5-14

6 MITIGATION 6-1

6.1 GENERAL MITIGATION 6-1
6.2 SPECIFIC MITIGATIONS 6-2
6.2.1 Santa Cruz tarplant 6-2
6.2.2 Pallid manzanita 6-2
6.2.3 Rainbow trout 6-3
6.2.4 California red-legged frog 6-4
6.2.5 Western pond turtle 6-4
6.2.6 Alameda whipsnake 6-5
6.2.7 Pallid bat 6-5

7 MONITORING 7-1

7.1 MONITORING 7-1
7.1.1 COMPLIANCE MONITORING 7-1
7.1.2 EFFECTIVENESS MONITORING 7-2
7.2 REPORTING 7-10

8 ADAPTIVE MANAGEMENT 8-1

8.1 ADAPTIVE MANAGEMENT 8-1
8.2 SPECIES ADAPTIVE PROTECTION MEASURES 8-2

9 CHANGED/UNFORSEEN CIRCUMSTANCES 9-1

9.1 INTRODUCTION 9-1
9.2 ASSURANCES REQUESTED BY EBMUD 9-1
9.2.1 Regulatory Assurances 9-1
9.2.2 Changed Circumstances 9-1
9.2.3 Changes in the Status of Plan Species or Acquisition of New Information about Species and Habitat Management 9-8
9.2.4 Changed Circumstances – Natural Disasters and Accidents 9-8
9.2.5 Unforeseen Circumstances 9-9
9.3 AMENDMENT PROCEDURE 9-11
9.3.1 Minor Permit Modifications and Amendments 9-11
9.3.2 Major Modifications - Permit Amendments 9-12
9.4 POTENTIAL TO INCLUDE PINOLE VALLEY LANDS FOR CONSERVATION EASEMENTS OR MITIGATION BANK 9-13

10 FUNDING 10-1

10.1 INTRODUCTION 10-1
10.2 HCP IMPLEMENTATION COSTS 10-1
10.3 HCP MITIGATION COSTS FOR SPECIES INCIDENTAL TAKE 10-3

11 ALTERNATIVES 11-1

11.1 INTRODUCTION 11-1
Alternative 1. No Action 11-1

12 REFERENCES 12-1

APPENDICES

Appendix A - Species Accounts for East Bay Municipal Utility District's East Bay Watershed Habitat Conservation Plan

Appendix B - East Bay Municipal Utility District's Integrated Pest Management Program (2003)

Appendix C - East Bay Municipal Utility District's Natural Resources/CDFG Section 1600 Memorandum of Understanding

FIGURES

Figure # and Title **Page #**

1-1 East Bay Watershed Service District and Lands 1- 2
1-2 East Bay Watershed Basins 1- 5
2-1a Vegetation Communities: North Watershed.....2- 2
2-1b Vegetation Communities: South Watershed.....2- 3
3-1 Ponds Managed for Western Pond Turtle.....3-20
3-2 Trench Spoils Sites and Cultivated Lands 3-22
A-1 Santa Cruz Tarplant: Watershed .....A- 3
A-2 Pallid Manzanita: Watershed .....A- 6
A-3 Rainbow Trout .....A- 9
A-4 California Red-legged Frog A-15
A-5 Western Pond Turtle A-19
A-6 Alameda Whipsnake A-23
A-7 Pallid Bat.....A-26

Table # **Page #**

1-1 EBMUD East Bay Reservoirs 1-4
1-2 USGS Map References EBMUD East Bay HCP Plan Area 1-14
2-1Vegetation Communities in the HCP Area.....2-27
2-2 Plant and Animal Species Addressed in EBMUD's HCP 2-29
2-3 EBMUD Watershed Vegetation Communities with Survey Records
for HCP Covered Species 2-30
2-4 General Locations of EBMUD HCP Covered Species 2-32
3-1 Acreages of Educational Use Areas 3-1
3-2 Past Controlled burns on the East Bay Watershed 3-26
4-1 Potential Incidental Take of HCP Covered Species 4-2
5-1 Specific Avoidance and Minimization Measures..... 5-3
7-1 EBMUD HCP Effectiveness Monitoring Summary..... 7-4
8-1 East Bay HCP Adaptive Management..... 8-2
9-1 Fire Sizes on EBMUD Watershed From 1980-2005.....9-10
10-1 Summarized Total Annual Implementation Hours.....10-2
10-2 Summarized Implementation Costs.....10-2

GLOSSARY

List of Acronyms used in the Document

AGP	Annual Grazing Plan
AMM	Avoidance and Minimization Measure
AMP	Allotment Management Plan
ATV	All-terrain Vehicle
BMP	Best Management Practice
CDF	California Department of Forestry
CDFG	California Department of Fish and Game
CESA	California Endangered Species Act
CNDDB	California Natural Diversity Database
CNPS	California Native Plant Society
DSOD	California Division of Safety of Dams
EA	Environmental Assessment
EBMUD	East Bay Municipal Utility District
EBRPD	East Bay Regional Park District
EHC	Equivalent Habitat Components
WMP	East Bay Watershed Master Plan (EBMUD)
EIR	Environmental Impact Report
ESA	Endangered Species Act
ESU	Evolutionarily Significant Unit
EBMUD F&W	EBMUD Fisheries and Wildlife Division
HCP	Habitat Conservation Plan
IPM	Integrated Pest Management
ITP	Incidental Take Permit

LLMP	Limited Landuse Management Plan
MGD	Million Gallons per Day
MOU	Memorandum of Understanding
NMFS	National Marine Fisheries Service
PEIR	Programmatic Environmental Impact Report
USFWS	US Fish and Wildlife Service
USL	Upper San Leandro Reservoir
VMC	Vegetative Management Consortium
YOY	Young of the Year

Definition of Terms

Adaptive management –A management system in which answers are obtained to crucial questions by conducting experiments in conjunction with management activities. Responsive species management actions are then based on the new information.

Aestivate – To pass the summer in a state of torpor or inactivity.

Avoidance and Protection Measures – Project-specific guidelines, generally promulgated following a biological survey, which specify how best to avoid and protect species and habitats.

Best Management Practices – General guidelines for conducting activities with a minimum of environmental impacts.

Blackline – Margin of area where fuels have been burned off to provide firebreak.

Carapace – The upper case or shell, as of a turtle.

Core Alameda whipsnake habitat – Defined by Swaim (1994, 2000) as "chaparral, Diablan sage scrub, northern coyote brush scrub, and riparian scrub, with open or partially open canopy on east, southeast, south and southwest facing slopes or in nearby grassland habitats (within 500 feet of scrub) with the same aspects."

Coldtrial – Fuel break created by removing combustible vegetation down to mineral soil; usually performed with hand tools.

Fire control line – A firebreak line such as a discline, black line, or line of mowed vegetation.

Ecotone – A transition zone between two ecological communities such as forest and grassland.

Emergencies – The term emergencies shall include watershed fire fighting related activities, chemical spills, earthquakes and resultant collateral damage, rescue operations, and other activities responding to imminent threats to injury, life, property or wildland habitat.

Enhancement – Management activities that improve or augment existing habitat values for the benefit of natural communities or a specific species.

Equivalent Habitat Component – Take in habitat or preferred habitat components (e.g., depth of 2 feet for California red-legged frogs) that is determined by the Services to be equal in take to one HCP covered species individual.

Exerted – Thrust forward, as when a plant stigma is exerted from the flower.

Fuel loads – The weight of specific combustible materials expressed in tons per acre.

Fuelbreak – A wide strip of land, strategically placed for fighting anticipated fires, where hazardous fuels have been replaced with less burnable fuels. May include blacklines, coldtrails, disclines, and mowed areas.

Ground disturbing activity – Ground disturbing activities shall include all watershed activities that result in loss of soil surface integrity. Activities such as blading, disking, grazing if RDM < 1200 lbs/acre or >24% bare ground in primary fields. Road construction and logging are examples of ground disturbing activities.

Herbicide – Any chemical used to destroy or inhibit plant growth, especially of weeds or other undesirable vegetation.

Hibernacula – A shelter that is occupied during the winter by a dormant animal.

Hydrologic – Of or relating to the properties, distribution and circulation of water.

Mesic – Having or characterized by a moderate amount of moisture. Neither hydric (wet) nor xeric (dry).

Mitigation – Measures taken to diminish or compensate for the negative environmental impacts of a project or activity.

Non-point source pollution – Pollution that originates from many diffuse sources and is usually not regulated.

Perennial stream – A stream that flows continuously throughout the year.

Plastron – The ventral part of the shell of a tortoise or turtle consisting typically of nine symmetrically placed bones overlaid by horny plates.

Point source pollution – Pollution discharged from a specific location such as a pipe or other conduit.

Prescribed burns – The purposeful setting afire of vegetation in an attempt to imitate the natural fire regime.

Redd – Nest or depression in the gravel of a streambed made by salmonids for egg deposition.

Restoration – Management activities whereby a community, species, or habitat type is reinstated in an area where it occurred under natural conditions.

Riparian – The vegetated zone adjacent to a stream or any other water body.

Riprap – Stones of varying sizes used to stabilize streambanks and other slopes.

Serpentine – General term for rocks with unusually high concentrations of magnesium and iron or the soils derived from them. Both are characterized by low levels of calcium and other nutrients and high levels of magnesium, iron and certain toxic metals. Many plant taxa are restricted to or excluded from serpentine soils.

Standard Practices – General EBMUD watershed guidelines for conducting management activities. It is a generally broader category than Best Management Practices (BMPs), which usually directs limits to impacts. Where Standard Practices and Best Management Practices are the same, the term BMPs is used in this document as the more common term.

Take – To harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct with respect to federally listed endangered species of wildlife.

Terminal reservoir – East Bay reservoirs which receive water from the Mokelumne Aqueduct.

Trench spoils – Material excavated from trenches in the process of repairing and maintaining the District's pipelines and facilities.

Watershed – An area of land that drains into a particular river or body of water.

1 INTRODUCTION

1.1 INTRODUCTION

The East Bay Municipal Utility District (EBMUD) owns and manages approximately 28,000 acres of watershed in the San Francisco East Bay Area (Figure 1-1). These lands surround five reservoirs (Briones, San Pablo, Upper San Leandro – USL, Chabot, and Lafayette) and a portion of one basin that does not have a reservoir (Pinole Valley). EBMUD's reservoirs store drinking water and emergency water supplies for 1.3 million people residing in Alameda and Contra Costa Counties.

EBMUD is guided in managing these lands by the primary goals identified in the East Bay Watershed Master Plan (WMP): to protect water quality and biodiversity. To achieve these goals, EBMUD maintains its East Bay watershed lands as open space with limited and controlled public access. These lands are a significant resource that provide habitat and benefit a variety of species near an East Bay metropolitan area with a population of 2.4 million. EBMUD is a relatively built-out district and the watershed is expected to remain intact. These undeveloped areas will retain species habitat value.

EBMUD must undertake certain activities on these watershed lands to meet its various obligations as a public entity to provide water service to its customers in the East Bay. As a publicly owned utility formed under California's Municipal Utility District Act, EBMUD is required to provide drinking water that meets or exceeds all primary and secondary regulatory standards established by the U.S. Environmental Protection Agency and the California Department of Health Services. EBMUD is also committed to attaining the highest water quality and dependability of service at the lowest possible rates. Customer demands, legislative mandates, state and federal regulations, and district goals require that EBMUD facilities be adequately constructed and maintained to ensure public health, safety, and reliability. EBMUD's policies allow for uses of its watershed lands that are compatible with the primary purpose of protecting the water supply, with emphasis on protecting open-space values.

EBMUD activities include programs for water quality, biodiversity, forestry, livestock grazing, agricultural operations, fire and fuel management, recreation and developed trails, and the storage and removal of trench spoils. By EBMUD's continued preservation of these lands as open space, and the affirmative actions of the District summarized

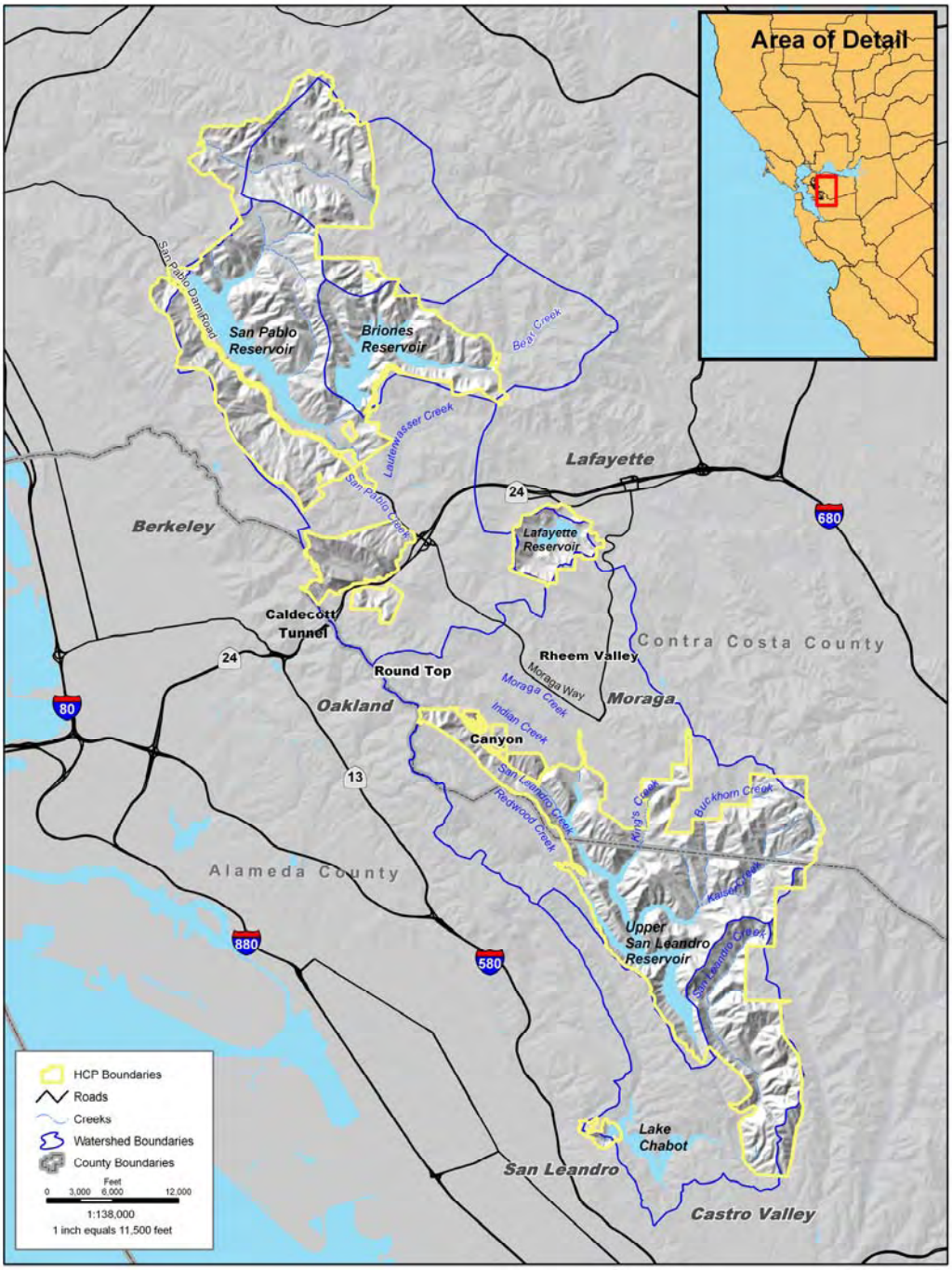


Figure 1.1 Lands to be covered under the EBMUD Habitat Conservation Plan

below, this Habitat Conservation Plan (HCP) should improve the habitat conditions of sensitive species. These sensitive species include those requiring protection afforded by the Federal and State endangered species acts, respectively the ESA and CESA. Some of the actions EBMUD is required to undertake may result in minor inadvertent incidental take on its watershed lands. This potential incidental take creates the need for both this Habitat Conservation Plan (HCP) to preserve and protect these species, and an application for an Incidental Take Permit from the U.S. Fish and Wildlife Service (USFWS).

This HCP does not propose any new permanent project footprint that will displace existing species. Still, a incidental take permit is requested for any incidental take that may result from EBMUD's continued operations on these lands.

1.1.1 Sources of Water Supply

Mokelumne River - Most of the water used by EBMUD comes from the 577-square-mile watershed draining the Mokelumne River basin in Alpine, Amador, and Calaveras Counties, California. The Mokelumne River Watershed basin is located on the west slope of the Sierra Nevada from the crest of the Sierra Nevada Mountains (elevation 10,000 feet) to Pardee Reservoir (maximum water surface elevation 567 feet). EBMUD has water rights for up to 325 million gallons (997 acre feet) per day from the Mokelumne River, and the average usage is about 220 million gallons per day (MGD). EBMUD has an amendatory contract with the US Bureau of Reclamation, for a maximum of 133,000 acre-feet of water per year, with a limit of 165,000 acre-feet of water (total) during three consecutive dry years, at a maximum rate of diversion of 100 MGD from the Sacramento River at Freeport.

Local runoff - In average rainfall years, District reservoirs in the East Bay receive an additional 30,000 acre-feet of water from local watershed runoff. Much of it is stored in the East Bay reservoirs for system use. In dry years, evaporation may exceed local runoff.

1.1.2 East Bay Terminal Reservoirs

EBMUD takes its Mokelumne River water from Pardee Reservoir, 38 miles northeast of Stockton, California near the town of Jackson. EBMUD's Camanche Reservoir, located 10 miles downstream from Pardee Dam on the Mokelumne River, provides recreation, flood control, power generation, and agricultural water as well as needs for resident and

downstream fisheries. Water from Pardee Reservoir is treated prior to conveying the water 92 miles to East Bay water treatment plants or terminal reservoirs.

Water not immediately routed through water treatment plants and into the distribution system is stored in five East Bay terminal reservoirs (Table 1-1, Figure 1-2). Their combined maximum capacity is 151,670 acre-feet of raw water, about a six-month domestic supply for EBMUD's customers.

Table 1-1.
EBMUD East Bay Reservoirs.

	Briones	Chabot	Lafayette	San Pablo	Upper San Leandro
Year Completed	1964	1875	1928	1919	1926
Capacity (acre-feet)	60,510	10,350	4,250	38,600	37,960
Water surface (acres)	725	340	126	834	771
Shoreline (miles)	14	9	3	14	25
Watershed area (square miles)	9	12	1	23	30

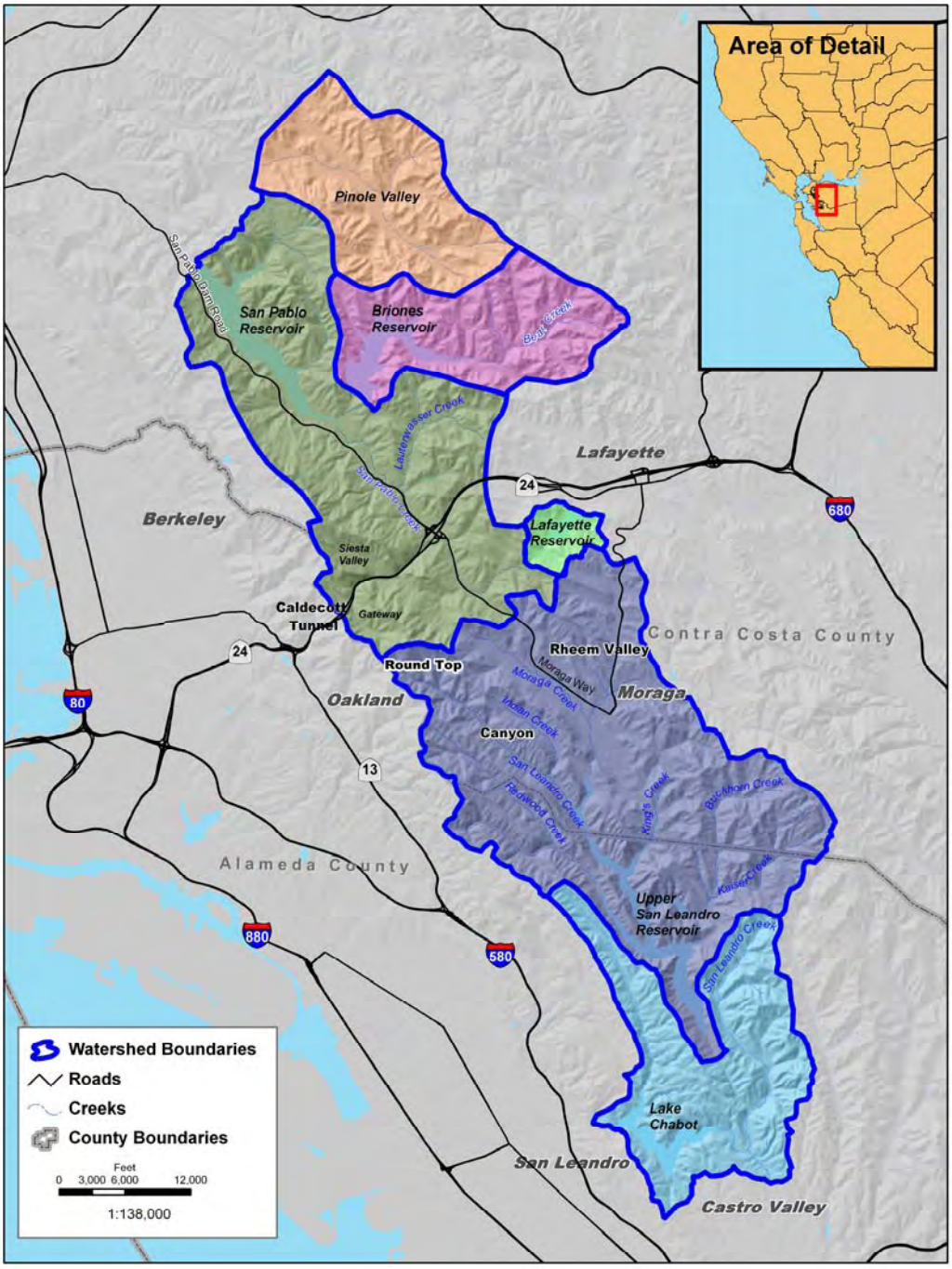


Figure 1-2. Watershed basins of EBMUD terminal reservoirs, Contra Costa and Alameda counties, California.

1.2 APPLICABLE LAW

The East Bay Municipal Utility District was formed and operates under the Municipal Utility District Act of the State of California as codified by the Public Utilities Code of the State of California, Ch. 764, Stats. 1951, and as amended. EBMUD governance is vested in a board of directors. Elected from wards, the seven-member Board determines policy. The EBMUD Board establishes recreation fees, rules and regulations, contracts, practices, and schedules, for or in connection with any service, product, or commodity owned or controlled by EBMUD.

The Federal Endangered Species Act (ESA), 15 USC Section 1531 et seq., provides for the protection and conservation of fish, wildlife, and plants that have been listed as threatened or endangered. Activities otherwise prohibited by ESA Section 9 and subject to the civil and criminal enforcement provisions of ESA Section 11 may be authorized for appropriate Federal agency action pursuant to ESA Section 7 and for other persons pursuant to ESA Section 10.

Under section 3(18) of the ESA, take is defined as "… to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct" with respect to federally listed species of fish or wildlife. Federal regulations provide the same taking prohibitions for threatened fish or wildlife species unless otherwise authorized at the time of listing [50 CFR 17.31(a)]. Harm is defined in regulations implementing the ESA promulgated by the Department of the Interior as an act "which actually kills or injures" listed fish or wildlife; harm may include "significant habitat modification or degradation where it actually kills or injures [fish or] wildlife by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering" (50 CFR 17.3). Harass is defined in regulations implementing the ESA promulgated by the Department of the Interior as "an intentional or negligent act or omission which creates the likelihood of injury to [fish or] wildlife by annoying it to such an extent as to significantly disrupt normal behavioral patterns which include, but are not limited to, breeding, feeding, and sheltering" (50 CFR 17.3).

Pursuant to ESA Section 10(a)(1)(B), the USFWS may issue permits, under such terms and conditions as the Secretary of the Interior or the Secretary of Commerce, respectively, may prescribe, for acts otherwise in violation of the ESA Section for the taking of any species incidental to an otherwise lawful activity. Section 10(a)(2)(B) requires an applicant for an Incidental Take Permit to submit a "Habitat Conservation

Plan" (HCP) that specifies, among other things, the impacts that are likely to result from the taking and the measures the applicant will undertake to monitor, avoid, minimize and mitigate such impacts.

The California Endangered Species Act (CESA), California Department of Fish and Game (CDFG) Code, Section 2050 et seq., provides for the protection and conservation of fish, wildlife and plants that have been listed by the State of California as threatened, endangered, or as candidate species. Activities prohibited by Section 2080 and subject to the civil and criminal enforcement provisions of Section 12000 et seq. may be authorized pursuant to Sections 2080.1, 2081 and 2084. CDFG has indicated that if this HCP satisfies their requirements for state-listed species, incidental take may be authorized under Section 2080.1 (Janice Gann, personal communication).

1.3 EBMUD HABITAT CONSERVATION PLAN

The development of the East Bay into a major industrial and residential area, especially since 1900, has resulted in changes to natural biological communities. Native plant and wildlife species that depend on the natural communities have obviously been affected. Some of these affected species have been listed as endangered or threatened, or have been proposed for listing as threatened or endangered by the USFWS and the CDFG.

The foundation of EBMUD's HCP is to protect and enhance the natural ecosystems that support the native species of the East Bay, and to implement species' protection measures. This plan addresses seven species (referred to as covered species). Covered species include two animal species and two plant species listed as federally threatened: California red-legged frog (*Rana aurora draytonii*); Alameda whipsnake (*Masticophis lateralis euryxanthus*); (Santa Cruz tarplant (*Holocarpha macradenia*) (listed as federally threatened – FT), and pallid manzanita (*Arctostaphylos pallida*) (FT). Unlisted covered species include: *Oncorhynchus mykiss* (referred to hereafter as *O. mykiss*), western pond turtle (*Clemmys marmorata*), and pallid bat (*Antrozous pallidus*). Alameda whipsnake is also listed as a State Threatened (ST) species under the California Endangered Species Act (CESA). On the EBMUD watershed, resident *O. mykiss* are found in Pinole Creek and above Upper San Leandro Dam. This plan covers the resident form should it become listed. The Plan identifies EBMUD's existing and prospective maintenance and operation activities that may result in incidental take of endangered, threatened, or candidate species. The Plan also describes the measures EBMUD will employ to avoid, minimize, or mitigate such impacts. The plan identifies biological goals and objectives for purposes

of monitoring the HCP, adaptive management measures and triggers for changing the HCP, a 30-year plan duration, and public participation in the HCP process.

1.4 BIOLOGICAL GOALS AND OBJECTIVES

1.4.1 General Biological Goals

Many of the general biological goals for the HCP are existing components of the WMP and its subdocuments: the Range Resource Management Plan (RRMP), and the Fire Management Plan (FMP). Links to the East Bay Watershed Master Plan as well as the two Plan sub documents listed above may be found on the web at the following web-page:

http://www.ebmud.com/water_&_environment/environmental_protection/east_bay/default.htm

The HCP general biological goals are listed below.

- Maintain covered species habitats currently on EBMUD watershed lands within natural weather-driven variability.
- As outlined in the WMP, protect water quality by managing the watershed for high biodiversity.

1.4.2 Specific Biological Goals and Objectives

Specific biological goals and objectives for HCP covered species are listed below in Sections 1.4.2.1 through 1.4.2.7.

1.4.2.1 SANTA CRUZ TARPLANT BIOLOGICAL GOALS AND OBJECTIVES	
GOAL: A. Maintain and improve conditions for survival of Santa Cruz tarplant at known site of experimental population.	
OBJECTIVES:	SUCCESS CRITERIA/PERFORMANCE STANDARDS:
A.1 Provide optimal conditions for germination and growth of tarplant.	A.1 Grazing of area maintained to level sufficient to reduce competition with other plants.

1.4.2.2 PALLID MANZANITA BIOLOGICAL GOALS AND OBJECTIVES	
GOAL: A. Improve site conditions for germination and growth of pallid manzanita	
OBJECTIVES:	SUCCESS CRITERIA/PERFORMANCE STANDARDS:
A.1 Remove competing species (pines, madrones) to improve light penetration.	A.1 Trees removed in first year; other plants shading the site pruned as necessary.
A.2 Introduce pallid manzanita seeds or seedlings into the Big Burn peninsula area of USL following a watershed fire.	A.2 Pallid manzanita germination and plant growth monitored post burn.

1.4.2.3 RAINBOW TROUT BIOLOGICAL GOALS AND OBJECTIVES	
GOAL: A. Maintain and improve conditions for *O. mykiss* in Pinole Creek and tributaries of Upper San Leandro Reservoir.	
OBJECTIVES:	SUCCESS CRITERIA/PERFORMANCE STANDARDS:
A.1 Install and manage new permanent exclusion of livestock from Pinole Creek riparian corridor and manage existing exclusions on Kaiser, Buckhorn, Moraga, San Leandro, Indian, and Redwood creeks to protect existing riparian vegetation and structure.	A.1 Maintain permanent or electric fencing during grazing activities in the pastures bordering Pinole Kaiser, Buckhorn, Moraga, San Leandro, Indian, and Redwood creeks. Livestock are normally prevented from entering riparian areas. Fence out remaining 1,400meter (4,200ft) section riparian area on Pinole Creek. Fences are gated to allow for later riparian grazing as a management tool. Minimum buffer of 17meters (50ft) will be allowed between fence and creek bank.
A.2 Inventory and remove debris jams that prevent fish passage below natural waterfall within District-managed portion of Pinole Creek. Inventory and remove debris jams that prevent fish passage within District-managed portion of USL watershed within one year of discovery.	A.2 Debris jams/barriers identified and removed before spawning season. Also, EBMUD will encourage modification of existing culvert barrier at old railroad trestle on Indian Creek through issuance of Watershed Entry Permits and letters of support to funded project or project proposals.

1.4.2.4 CALIFORNIA RED-LEGGED FROG BIOLOGICAL GOALS AND OBJECTIVES	
GOAL: A. Maintain and improve California red-legged frog aquatic habitat on EBMUD watershed lands.	
OBJECTIVES:	SUCCESS CRITERIA/PERFORMANCE STANDARDS:
A.1 Maintain stockponds known to contain red-legged frog based on California red-legged frog recovery plan criteria (USFWS 2002).	A.1 Red-legged frog habitat components in stockponds maintained through necessary maintenance or rebuild of one to five stockponds per year.
A.2 Remove or treat non-native species to favor California red-legged frog in specific habitats.	A.2 Ponds containing bullfrogs drained as per California red-legged frog recovery plan criteria. With the exception of Nunes Pond (see Section 6.2.5), non-native fish species in watershed ponds removed when found.
A.3 Protect Pinole Creek from grazing activities.	A.3 Remaining 1,400meter (4,200 ft) unfenced portion of Pinole Creek electrically fenced during grazing. Permanent fence completed to replace 1,400 meter electric fence within five years of start of HCP.
A.4 Maintain fences bordering perennial stream habitat on watershed.	A.4 Permanent and electric fencing maintained to exclude livestock from perennial streams.

1.4.2.4 CALIFORNIA RED-LEGGED FROG BIOLOGICAL GOALS AND OBJECTIVES (Cont.)	
GOAL: B. Maintain California red-legged frog riparian and upland retreat habitat on the watershed.	
OBJECTIVES:	SUCCESS CRITERIA/PERFORMANCE STANDARDS:
B.1 Manage watershed to protect riparian cover.	B.1a Additional protection measures activated for unfenced streams if monitoring shows localized impact from covered activities (a reduction >10% streamside vegetation). B.1b Watershed grazing program follows moderate levels as delineated in WMP (1996) and RRMP (2001) (refer to HCP Section 3.2.4).
B.2 Maintain California red-legged frog dispersal cover during winter and spring dispersal periods.	B.2 Follow livestock grazing and land management activities as described in the RRMP and FMP and as outlined in residual dry matter (RDM) standards to maintain dispersal cover (e.g., 840-1,400 lbs/acre of minimum RDM, depending on slope) (RRMP 2001).

1.4.2.5 WESTERN POND TURTLE BIOLOGICAL GOALS AND OBJECTIVES	
GOAL: A. Maintain and improve western pond turtle habitat on the watershed.	
OBJECTIVES:	SUCCESS CRITERIA/PERFORMANCE STANDARDS:
A.1 Maintain the integrity of five stockponds containing turtles (Ponds: 11, 22, 28, 62, and 85) (Stebbins 1996) and the overall amount of western pond turtle habitat.	A.1 Existing western pond turtle pond habitats maintained or rehabilitated where necessary. Dam integrity maintained. Pond maximum depth at least 1.5 meters (5 ft) for escape from predators.
A.2 Annually survey for and remove non-native turtle species when encountered.	A.2 Non-native turtle species populations are removed when encountered on EBMUD watershed. Non-native turtles removed from reservoirs when feasible (i.e., reservoirs reduced by operations or for facilities repair).
A.3 Maintain fences and gates on western pond turtle stream habitat on watershed.	A.3 Existing fences on perennial drainages maintained. Annually inspect fences before livestock are moved into adjacent fields.
A.4 Fence out or manage watershed to limit public access to western pond turtle ponds.	A.4 Stockponds that serve as western pond turtle habitat are fenced out and signage installed within first five years of permit to limit or discourage public access.
A.5 Provide basking areas in western pond turtle habitats within first two years of HCP.	A.5 Basking habitats installed or maintained in five known watershed turtle ponds (ponds 11, 22, 28, 62, and 85) (Stebbins 1996).

1.4.2.6 ALAMEDA WHIPSNAKE BIOLOGICAL GOALS AND OBJECTIVES	
GOAL: A. Maintain overall amount of Alameda whipsnake habitat on the watershed.	
OBJECTIVES:	SUCCESS CRITERIA/PERFORMANCE STANDARDS:
A.1 Alameda whipsnake habitat (coastal scrub and chaparral) will not drop, except through wildfire or USFWS approved burn, below 99% of original acreage identified in initial watershed mapping.	A.1 Alameda whipsnake habitat (coastal scrub and chaparral) not reduced by over 1% over the life of the permit (approximately 3,414 hectares) (8,435 acres).

1.4.2.7 PALLID BAT BIOLOGICAL GOALS AND OBJECTIVES	
GOAL: A. Maintain active pallid bat nursery colonies on EBMUD watershed lands.	
OBJECTIVES:	SUCCESS CRITERIA/PERFORMANCE STANDARDS:
A.1 Maintain bat habitat at the existing April Creek barn site.	A.1a Barn structure reinforced if necessary to stabilize habitat. A.1b Bat habitat provided, in the form of bat boxes, at or near April Creek Barn site.

1.5 PLAN AREA

EBMUD's East Bay HCP area comprises approximately 28,200 acres of watershed lands owned and operated by EBMUD in Contra Costa and Alameda Counties, California (Figure 1-1). The Plan area is described in Section 2.4 and includes land within the Briones, San Pablo, Upper San Leandro, and Chabot reservoir watersheds. It also includes all of the Lafayette Reservoir watershed, approximately 1,497 hectares (3,700 acres) of Pinole Valley, and an additional 256 hectares (633 acres) of non-watershed land (Figure 1-2). The HCP area is located in the Oakland-Berkeley Hills, is bisected by State Highway 24, and includes all EBMUD watershed property within the map area designations listed in Table 1-2. EBMUD filtration plants, water treatment plants, and other facilities outside the watershed boundary are not included in this HCP.

Table 1-2.
USGS Map References EBMUD East Bay HCP Plan Area
(all EBMUD watershed lands within listed map references)*

TOWNSHIP	RANGE	SECTIONS
01N	02W	7, 18, 31
01N	03W	2-24, 26-36
01N	04W	1, 11-14, 24, 25
01S	02W	6, 7, 17-22, 26-35
01S	03W	1-5, 8-16, 22-27, 34-36
02N	03W	28-34
02S	02W	3-10, 15-23, 27-34
02S	03W	1, 2, 12

***** Data from Teale Data Center.

1.6 PUBLIC INVOLVEMENT

The watershed activities described in Section 3 are taken from the East Bay Watershed Master Plan (WMP) (EBMUD 1996), the Range Resource Management Plan (RRMP) (EBMUD 2001), and the Fire Management Plan (FMP) (EBMUD 2000). The WMP was

created from a process requiring extensive public involvement, including a 25 member Community Advisory Committee (CAC). The CAC met monthly for at least 3 hours over a 4 ½ year period and received expert testimony on the management of Fire and Fuels, Biodiversity, Water Quality, Livestock, Recreation, and a number of other programs. The CAC used this information, in collaboration with EBMUD staff, to develop program direction and policy guidance that was ultimately adopted by the EBMUD Board of Directors.

The WMP Programmatic Environmental Impact Report (PEIR) (EBMUD 1995) described the potential impacts from implementation of the WMP and the benefits of the described management activities. The PEIR analysis compared the impacts associated with implementing fire management strategies proposed in the WMP to existing watershed conditions. One component of the WMP was the development and implementation of the FMP. The subsequent FMP was covered under the PEIR. After analyzing potential impacts of the RRMP with impacts described in the WMP programmatic EIR, a mitigated negative declaration was prepared for the RRMP. Because the WMP, FMP, and RRMP support maintenance and enhancement of habitats for listed and other sensitive species, the biological program was not controversial. A public hearing was conducted to provide additional information and interpretation of the RRMP. Written comments were received and addressed during the review period.

The low effect HCP will be accompanied by a Categorical Exclusion as NEPA documentation to support a USFWS decision. There will be a 30-day public comment period for the HCP.

1.7 REFERENCES

The information presented here was compiled from EBMUD documents and other documents as cited. Species descriptions and information are from the Federal Register notices, California Department of Fish and Game listings, cited texts, refereed and technical documents, or personal communications as cited in Section 12 and Appendix A.

2 BIOLOGICAL RESOURCES

2.1 BACKGROUND

The topography of the EBMUD Watershed lands is varied, ranging in elevation from 43 meters (140 feet) at Pinole Valley to 617 meters (2,024 feet) at Rocky Ridge. The regional climate is complex and average daily temperature may range from 15.5-21ºC (60-70°F) on the west near San Francisco Bay to over 37.8ºC (100°F) on the east side of the Oakland Hills. Annual rainfall near Pinole Valley in the north end of the HCP area averages about 36 cm (14 inches), while nearby San Pablo Reservoir may receive more than twice that amount. The local Mediterranean climate has about 90% of rainfall from October to April. This combination of climate and topography creates diverse biological communities. The most significant current effects on the area's biodiversity and resources are from human development. However, the area still supports populations of sensitive species (CNDDB 2001, Stebbins pers. observ.).

2.2 VEGETATION COMMUNITIES

Both native and non-native vegetation communities occur within the HCP Area (Figures 2-1a and 2-1b). These communities are identified based on descriptions from A Manual of California Vegetation (Sawyer and Keeler-Wolf 1995). Plant species nomenclature conforms to The Jepson Manual (Hickman 1993). Vegetation communities and their relative acres within the HCP are listed in Table 2-1.

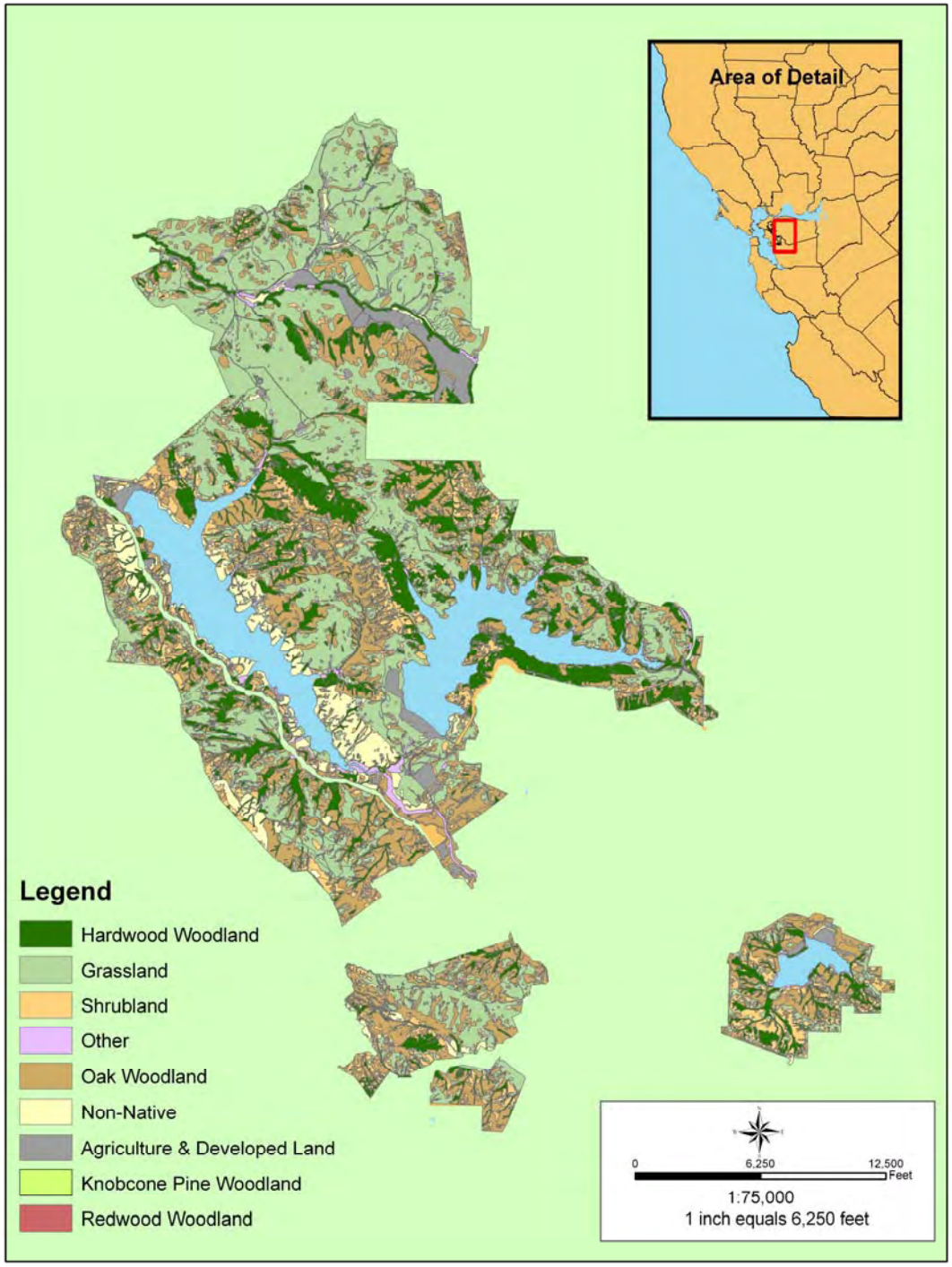


Figure 2-1a. Vegetation category map of north watershed EBMUD HCP covered lands, Contra Costa County, California

Figure 2-1b. Vegetation category map of south watershed EBMUD HCP covered lands, Contra Costa and Alameda counties, California

2.2.1 Tree Dominated Communities

Arroyo willow series

Arroyo willow (*Salix lasiolepis*) is the sole or dominant shrub or tree in the canopy. Bigleaf maple (*Acer macrophyllum*), black cottonwood (*Populus balsamifera*), box elder (*Acer negundo*), California sycamore *(Platanus racemosa*), coyote brush (*Baccharis pilularis*), Fremont cottonwood (*Populus fremontii*), blue elderberry (*Sambucus mexicana*), mulefat (*Baccharis salicifolia*), American dogwood (*Cornus sericea*), wax-myrtle (*Myrica californica*), white alder (*Alnus rhombifolia*), and willows (*Salix* spp.) may be present. Trees are typically less than 10 meters (32.8 ft) in height and the canopy is continuous. Shrubs are sparse under the tree canopy, and the ground layer is sparse to abundant. This community is usually seasonally flooded or saturated and occurs in floodplains, low gradient depositions along rivers and streams. It is distributed in California ranges from sea level to about 1,800 m (5,905 ft) in elevation.

This series occurs on approximately 64 hectares (159 acres) of the HCP area (Figures 2-1a and 2-1b) and is characterized by arroyo willow, red willow (*Salix laevigata*), coast live oak (*Quercus agrifolia*), valley oak (*Quercus lobata*), California bay (*Umbellularia californica*), California buckeye (*Aesculus californica*), black walnut (*Juglans californica*), blue elderberry, red elderberry (*Sambucus racemosa*), mulefat, California blackberry (*Rubus ursinus*), Himalayan blackberry (*Rubus discolor*), California rose (*Rosa californica*), stinging nettle (*Urtica diocia*), rushes (*Juncus* spp.), sedges (*Carex* spp.), nutsedge (*Cyperus eragrostis*), creeping wildrye (*Leymus triticoides*), annual beard grass (*Polypogon monspeliensis*), water cress (*Rorippa nasturtium-aquaticum*), horsetails (*Equisetum* spp.), and non-native annual grasses and weeds.

Black Oak series

Black oak (*Quercus kelloggii*) is the sole, dominant, or important tree in the canopy. California bay, California buckeye, canyon live oak (*Quercus chrysolepis*), coast live oak, knobcone pine (*Pinus attenuata*), madrone (*Arbutus menziesii*), Oregon white oak (*Quercus garryana*), and/or valley oak may be present. Trees are typically less than 40 m (131 ft) in height and the canopy is continuous or intermittent. Shrubs are infrequent to common, and the ground layer

is grassy. Its distribution in California ranges from about 60 to 2,500 m (197-8202 ft) in elevation.

This series occurs on approximately 29 hectares (72 acres) of the HCP area (Figures 2-1a and 2-1b) and is characterized by black oak, California bay, California buckeye, valley oak, coast live oak, western leatherwood (*Dirca occidentalis*), poison-oak (*Toxicodendron diversilobum*), coyote brush, toyon (*Heteromeles arbutifolia*), California coffeeberry (*Rhamnus californica*), snowberry (*Symphoricarpos albus* var. *laevigatus*), creeping snowberry (*Symphoricarpos mollis*), oso berry (*Oemleria cerasiformis*), California fescue (*Festuca californica*), blue wildrye (*Elymus glaucus*), bent grass (*Agrostis pallens*), woodrush (*Luzula comosa*), mugwort (*Artemesia douglasiana*), hound's tongue (*Cynoglossum grande*), poison sanicle (*Sanicula bipinnata*), aster (*Aster radulinus*), soaproot (*Chlorogalum pomeridianum*), death camas (*Zigadenus fremontii*), *Nemophila heterophylla*, Chinese houses (C*ollinsia heterophylla)*, mission bells (*Fritillaria affinis*), giant trillium (*Trillium chloropetalum*), western trillium (*Trillium ovatum*), coffee fern (*Pellaea andromedifolia*), and wood fern (*Dryopteris arguta*).

California Bay series

California bay is the sole or dominant tree in the canopy. Coast live oak, interior live oak *(Quercus wislizenii*), madrone, redwood (*Sequoia sempervirens*), western leatherwood (*Dirca occidentalis*), and/or coyote brush may be present. Trees are typically less than 25 m (82 ft) in height. The canopy is continuous, shrubs are infrequent and the ground layer is sparse or absent. It occurs on sandstone or schist-derived soils and streamsides from about sea level to 500 m (1,640 ft) in elevation.

This series occurs on approximately 63 hectares (156 acres) of the HCP area (Figures 2-1a and 2-1b) and is characterized by California bay, coast live oak, madrone, poison-oak, California blackberry, snowberry, wood fern, sword fern (*Polystichum munitum*), Torrey's melic (*Melica torreyana*), woodland daisy (*Arnica discoidea*), wild ginger (*Asarum caudatum*), and angelica (*Angelica tomentosa*).

California Buckeye series

California buckeye is the dominant or important tree in the canopy. California bay, coast live oak, interior live oak, valley oak, coffeeberry, and/or toyon may be present. The trees are typically less than 10 meters (32.8 ft) in height and the canopy is continuous or intermittent with one or two tiers. Shrubs are infrequent and the ground layer is sparse. It occurs on north-facing, steep slopes with shallow, moderately to excessively drained soils. Elevation ranges from about 100 to 1,500 m (328-4921 ft).

This series occurs on approximately 5 hectares (12 acres) of the HCP area (Figures 2-1a and 2-1b) and is characterized by California buckeye, California bay, toyon, oso berry, California blackberry, blue wildrye, and non-native annual grasses and weeds.

California Sycamore series

California sycamore is the sole or dominant tree in the canopy as widely spaced trees. Arroyo willow, black willow, Oregon ash (*Fraxinus latifolia*), black walnut, bigleaf maple, California bay, coast live oak, Fremont cottonwood, red willow, valley oak, white alder, and/or yellow willow may be present. Trees are usually less than 35 m (115 ft) in height and the canopy is open. Shrubs may be common or infrequent, and the ground layer is grassy.

This series occurs on approximately 13 hectares (32 acres) of the HCP area and is characterized by California sycamore, coast live oak, black oak, valley oak, arroyo willow, red willow, and/or California bay.

Canyon Live Oak series

Canyon live oak is the sole, dominant, or important tree in the canopy. Bigleaf maple, black oak, California bay, madrone, and coast live oak may be present. Trees are usually less than 30 m (98.4 ft) in height and the canopy is continuous and may be two-tiered. Shrubs are infrequent and the ground layer is sparse or absent.

This series occurs on approximately 1 hectare (2.5 acres) of the HCP area and is characterized by canyon live oak, usually in a dense continuous canopy with little or no understory.

Coast Live Oak series

Coast live oak is the sole, dominant or important tree in the canopy. Bigleaf maple, blue oak (*Quercus douglasii*), valley oak, box elder (*Acer negundo* var. *californicum*), California bay, California buckeye, elderberry, toyon, coffeeberry, and /or madrone may be present. Trees are typically less than 30 m (98.4 ft) tall in the continuous, intermittent or open canopy. Shrubs occur occasionally to commonly and the ground layer is grassy or absent. It occurs on steep slopes, raised streambanks and terraces on sandstone or shale-derived soils from about sea level to 1,200 m (3,937 ft) in elevation.

This series occurs on approximately 1,653 hectares (4,083 acres) of the HCP area (Figures 2-1a and 2-1b 1) and is characterized by coast live oak, bigleaf maple, California bay, madrone, black oak, valley oak, blue elderberry, coyote brush, poison-oak, snowberry, soap root, hound's tongue, bent grass, blue wildrye, and non-native annual grasses, forbs, and weeds. This series is usually found in the HCP area as an intermittent or open canopy.

Eucalyptus series

Eucalyptus (*Eucalyptus* spp.) is the sole or dominant tree in the canopy with few other species present. Trees are typically less than 50 m (164 ft) in height with a continuous canopy. Shrubs are infrequent and the ground layer is usually sparse. It occurs on all slopes from sea level to about 300 m (985 ft) in elevation.

This series occurs on approximately 65 hectares (160 acres) of the HCP area (Figures 2-1a and 2-1b) and is characterized by blue gum (*Eucalyptus globulus*), other species of eucalyptus, coast live oak, California bay, madrone, and California blackberry

Fremont Cottonwood series

Fremont cottonwood is the sole, dominant, or important tree in the canopy. Gooddings black willow (*Salix gooddingii*), box elder, California sycamore,

California bay, valley oak, coast live oak, narrowleaf willow, Oregon ash, Pacific willow (*Salix lucida* spp. *lasiandra*), red willow, and/or walnut may be present. Trees are typically less than 25 m (82 ft) in height in a continuous or open canopy. Shrubs and grape lianas are infrequent to common and the ground layer is variable. This series occurs on soils intermittently or seasonally flooded or saturated in riparian corridors, floodplains subject to high-intensity flooding, and low-gradient depositions along rivers, streams and seeps. Fremont cottonwood series is found from sea level to about 2,400 m (7,874 ft) in elevation.

This series occurs on approximately 2 hectares (5 acres) of the HCP area (Figures 2-1a and 2-1b) and is characterized by Fremont cottonwood, box elder, California sycamore, narrowleaf willow, bigleaf maple, California black walnut, red willow, white alder, Oregon ash, arroyo willow, valley oak, blackberry, snowberry, ninebark (*Physocarpus capitatus*), stinging nettle, Barbara sedge (*Carex barbarae*), and water smartweed (*Polygonum amphibium* var. *stipulaceum*).

Knobcone Pine series

Knobcone pine is the sole or dominant tree in the canopy of this fire-dependent community. Canyon live oak, interior live oak, hybrid oaks, chinquapin (*Chrysolepis chrysophylla* var. *minor*), Monterey pine (*Pinus radiata*), brittleleaf manzanita (*Arctostaphylos tomentosa* ssp. *crustacea*), coyote brush, and/or deerweed (*Lotus scoparius*) may be present. Trees are typically less than 25 m (82 ft) in height in the continuous, intermittent or open canopy, which may be two-tiered. Shrubs are infrequent or continuous and the ground layer is sparse. This series occurs on ridges and upper slopes on infertile, rocky, dry soils. Knobcone pine series occurs from about 180 to 2,000m (591-6562 ft) above sea level.

This series occurs on approximately 41 hectares (102.5 acres) of the HCP area (Figures 2-1a and 2-1b) and is characterized by knobcone pine, canyon live oak, interior live oak, coast live oak, California bay, chamise (*Adenostoma fasciculatum*), brittleleaf manzanita (*Arctostaphylos tomentosa* ssp. *crustacea*), huckleberry (*Vaccinium ovatum*), coyote brush, toyon, ocean spray (*Holodiscus discolor*), bush poppy (*Dendromecon rigida*), chaparral pea (*Pickeringia montana)*, poison-oak, snowberry, deerweed, honeysuckle, bracken, soaproot, skullcap (*Scutellaria tuberosa*), woodfern, bush monkeyflower (*Mimulus aurantiacus*), Indian warrior (*Pedicularis densiflora*), Rupert's scurf-pea (*Rupertia physodes*),

California everlasting (*Gnaphalium californicum*), woodrush, Torry's melica, bentgrass, reedgrass (*Calamagrostis koelerioides*), foxtail fescue (*Vulpia myuros*), and pine mushroom (*Chroogomphus tomentosus*).

Madrone series

Madrone is the sole or dominant tree in the canopy. California bay, black oak, coast live oak, hybrid oaks, and/or other native and non-native woody and herbaceous species may be present. Trees are usually less than 12 m (39.4 ft) in height and the canopy is generally closed. Shrubs are scattered or infrequent and the ground layer may be sparse or patchy.

This series occurs on approximately 4 hectares (10 acres) of the HCP area and is characterized by madrone, coast live oak, California bay, and/or black oak with native and/or non-native shrubs and herbaceous species in the understory.

Mixed Hardwood series

California bay, coast live oak, valley oak, black oak, hybrid oaks, California buckeye, madrone, bigleaf maple, elderberry, and/or box elder are important trees in the canopy. Trees are typically less than 30 m (98.4 ft) in height and the canopy is continuous. Shrubs may be common or infrequent and the ground layer is usually sparse or patchy.

This series occurs on approximately 2,388 hectares (5,901 acres) of the HCP area and is characterized by California bay, coast live oak, poison-oak, blackberry, snowberry, and woodfern.

Mixed Oak series

Black oak, blue oak, coast live oak, interior live oak, hybrid oaks, canyon live oak, and/or valley oak are important trees in the canopy. California bay, California buckeye, Douglas fir, foothill pine, madrone, and/or ponderosa pine may be present. Trees are typically less than 30 m (98.4 ft) in height in the continuous canopy that may be two-tiered. Shrubs are infrequent to common and the ground layer is sparse to abundant and may be grassy. Mixed oak series occurs in valleys and gentle to steep slopes on moderately deep soils. The elevation range for this series is from 250 m to about 2,000 m (820-6562 ft) above sea level.

Mixed oak series occurs on approximately 750 hectares (1,852 acres) of the HCP area (Figures 2-1a and 2-1b) and is delineated from other oak series. This series is characterized by coast live oak, black oak, valley oak, interior live oak, canyon live oak, hybrid oaks, bigleaf maple, California bay, blue elderberry, poison-oak, blackberry, snowberry, creeping snowberry, coyote brush, toyon, oso berry, Jim brush (*Ceanothus oliganthus var. sorediatus*), western leatherwood, Ithuriel's spear (*Triteleia laxa*), hound's tongue, poison sanicle, bentgrass, mugwort, woodland daisy, giant trillium, western trillium, woodrush, blue wildrye, and hedgehog dogtail (*Cynoserus echinatus*). This series is usually found in the HCP area as woodland but occasionally occurs as savanna.

Mixed Willow series

More than one willow species is important in the shrub or tree canopy. Arroyo willow, big-leaf maple, black cottonwood, box-elder, California sycamore, Fremont cottonwood, narrowleaf willow, red willow, and/or white alder may be present. If shrubland, emergent trees may be present. Trees are typically less than 10 meters (32.8 ft) in height and the canopy is continuous. Shrub and ground layers are sparse. The elevation range for this series is from sea level to 1,800 m.

This series occurs on approximately 23 hectares (57.5 acres) of the HCP area and is characterized by arroyo willow, red willow, and/or narrowleaf willow. White alder, California sycamore, and Fremont cottonwood may also be present.

Pine series

Monterey pine is the sole or dominant tree in the canopy, and coast live oak may be important. Bishop pine (*Pinus muricata*), Douglas fir, madrone, and/or redwood may be present. Trees are typically less than 30 m (98.4 ft) in height in the continuous or intermittent canopy. Shrubs are absent, infrequent or common and the ground layer is sparse or abundant. It occurs on maritime terraces and headlands on excessively drained soils. Elevation ranges from sea level to about 300 m (984 ft). This series occurs on approximately 208 hectares (520 acres) of the HCP area (Figures 2-1a and 2-1b) and is characterized by Monterey pine, ponderosa pine, other *Pinus* species, coast live oak, madrone, California bay, poison-oak, purple needlegrass (*Nassella pulchra*), Italian thistle (*Carduus*

pycnocephalus), hedgehog dogtail, and pungent slippery jack mushroom (*Suillus pungens*).

Red Willow series

Red willow is the sole or dominant shrub or tree in the canopy. California sycamore, coyote brush, Fremont cottonwood, blue elderberry, coast live oak, valley oak, California buckeye, California bay, elderberry, dogwood, mulefat, white alder, and/or willows may be present. Trees are typically less than 15 m (49.2 ft) in height with a continuous canopy. Shrubs are sparse under the tree canopy. Ground cover is variable. It occurs in seasonally flooded or saturated ditches, floodplains, lake edges and low-gradient deposits along rivers and streams from sea level to about 1,700 m (5,577 ft) in elevation.

This series occurs on approximately 8 hectares (20 acres) of the HCP area (Figures 2-1a and 2-1b) and is characterized by red willow, arroyo willow, coast live oak, valley oak, black walnut, California bay, California buckeye, coyote brush, blue elderberry, mulefat, blue elderberry, poison-oak, creeping wildrye, sedges, rushes, horsetail, mugwort, stinging nettle, California blackberry, and non-native annual grasses and weeds.

Redwood series

Redwood is the sole, dominant, or important tree in the canopy. California bay, Douglas fir, madrone, box elder, and/or coast live oak may be present. Trees are typically less than 120 m (394 ft) in height in the continuous or intermittent canopy, which may be two-tiered. Shrubs are infrequent or common. The ground layer varies from absent to abundant. It occurs on sandstone or schist-derived soils on slopes and raised stream benches and terraces from about 10 to 600 m (32.8-1,969 ft) in elevation.

This series occurs on approximately 129 hectares (318 acres) of the HCP area (Figures 2-1a and 2-1b) and is characterized by redwood, California bay, madrone, coast live oak, interior live oak, wood rose (*Rosa gymnocarpa*), sword fern, wood fern, lady fern, and giant chain fern. Notable is the complete absence of tanoak (*Lithocarpus densiflorus*) and Douglas fir.

Valley Oak series

Valley oak is the sole or dominant tree in the canopy. Black oak, blue oak, California sycamore, coast live oak, hybrid oaks, California bay, California buckeye, dogwood, toyon, coffeeberry, and/or Oregon ash may be present. Trees are typically less than 30 m (98.4 ft) in height in the continuous, intermittent or open canopy. Shrubs occur occasionally and lianas are common. The ground layer is grassy. This series occurs on alluvial or residual soils intermittently flooded or seasonally saturated in valley bottoms, gentle slopes and summit valleys. It is found from sea level to about 775 m (2,543 ft) in elevation.

Valley oak series occurs on approximately 182 hectares (455 acres) of the HCP area (Figures 2-1a and 2-1b) and is characterized by valley oak, coast live oak, black oak, blue oak, buckeye, oso berry, toyon, buckeye, poison-oak, California bay, Ithuriel's spear, blue wildrye, hedgehog dogtail, and non-native annual grasses, forbs, and weeds. This series is found in the HCP area in intermittent or open canopy.

White Alder series

White alder is the sole or dominant tree in the intermittent or open canopy. Bigleaf maple, California sycamore, California bay, California buckeye, coast live oak, valley oak, walnut, willows, and/or Oregon ash may be present. Trees are typically less than 35m (115 ft) in height. Shrubs are common or infrequent and the ground layer is variable. It occurs on intermittently flooded or saturated riparian corridors, floodplains subject to high-intensity flooding, incised canyons, river and stream margins, banks and terraces and seeps. This series is found from sea level to about 2,500 m (8,202 ft) in elevation.

This series occurs on approximately 0.4 hectare (1 acre) of the HCP area (Figures 2-1a and 2-1b) and is characterized by white alder, California bay, arroyo willow, nut sedge, *Juncus patens*, common rush (*Juncus effusus*), California blackberry, and stinging nettle.

Sitka Willow series

Sitka willow (*Salix sitchensis*) is the sole or dominant shrub or tree in the continuous canopy. Bigleaf maple, black cottonwood, California sycamore,

Fremont cottonwood, blue elderberry, dogwood, white alder, Monterey pine, and/or other willows may be present. Trees are typically less than 7 m (23 ft) in height and shrubs are sparse under the tree canopy. The ground layer is variable. This series occurs in seasonally flooded or saturated floodplains and low-gradient depositions along rivers and streams. It is found from sea level to about 400 m (1,312 ft) in elevation.

This series occurs on approximately 0.4 hectare (1 acre) of the HCP area (Figures 2-1a and 2-1b) and is characterized by Sitka willow, nutsedge, rushes, leopard lily (*Lilium pardalinum)*, arroyo willow, American dogwood, coyote brush, poison-oak, California blackberry, lady fern (*Athyrium filix-femina*), fragile fern (*Cystopteris fragilis*), hedgenettle (*Stachys pycnantha*), Franciscan thistle (*Cirsium andrewsii)*, stinging nettle, annual beard grass (*Polypogon monspeliensis*), cut-leaf parsley (*Berula erecta)*, wax-myrtle, *Montia fontana*, *Epilobium densiflorum*, dwarf bullrush (*Scirpus cernuus*), horkelia (*Horkelia californica* ssp. *frondosa*), willow dock (*Rumex salicifolius*), common spikerush (*Eleocharis macrostachya*), California lousewort (*Scrophularia californica*), bitter dogbane (*Apocyum androsaemifolium*), mugwort, gooseberry (*Ribes californicum*), mule fat, and poison hemlock (*Conium maculatum*).

2.2.2 Shrub Dominated Communities

Broom series

Broom is the sole or dominant shrub in the canopy. French broom, gorse, Spanish broom, Scotch broom, and/or other species of *Cytisus* or *Genista* may be present. Emergent trees may be present. Shrubs are usually less than 6 m (19.7 ft) in height and the canopy is continuous. The ground layer is sparse.

This series occurs on approximately 4 hectares (10 acres) of the HCP area and is characterized almost exclusively by French broom (*Genista monspessulana*). French broom is a target species when clearing fuel breaks and in the control of invasive plants; however, there are seed sources on most lands surrounding EBMUD watershed, especially on county roadsides.

Bush Monkeyflower series

Bush monkeyflower is the sole or dominant shrub in the canopy. California

sagebrush, coyote brush, silver lupine, and herbaceous species may be present. Shrubs are usually less than 5 m (16.4 ft) in height and the canopy may be continuous or intermittent. The ground layer is sparse or patchy.

This series occurs on approximately 0.4 hectare (1 acre) of the HCP area and is characterized by bush monkey flower, California sagebrush, silver lupine, and/or coyote brush.

California Sagebrush series

California sagebrush is the sole or dominant shrub in the intermittent or continuous canopy. Black sage, bush monkeyflower, chamise, manzanita, coyote brush, deer weed, silver lupine, poison-oak, may be present. Emergent blue elderberry may be present. Shrubs are typically less than 2 m (6.6 ft) in height and the ground layer is variable. It occurs on steep, south-facing slopes and rarely on flooded low-gradient deposits along streams on alluvial or colluvial-derived, shallow soils. It is found from sea level to about 1,200 m (3,937 ft) in elevation.

This series occurs on approximately 17 hectares (42.5 acres) of the HCP area (Figures 2-1a and 2-1b) and is characterized by California sagebrush, bush monkeyflower, coyote brush, and non-native annual grasses and weeds.

Chamise series

Chamise is the sole or dominant shrub in the continuous canopy of this fire-dependent community. Black sage (*Salvia mellifera*), buckwheats (*Eriogonum spp.*), ceanothus (*Ceanothus* spp.), manzanita (*Arctostaphylos* spp.), poison-oak, interior live oak, coast live oak, California bay, scrub oak (*Quercus berberidifolia*), and/or toyon may be present. Emergent trees may be present. Shrubs are typically less than 3 m (9.8 ft) in height and the ground layer is sparse. It occurs on all slopes on shallow soils that may be mafic-derived. It is found from about 10 to 1,800 m (32.8-5,905 ft) in elevation.

This series occurs on approximately 39 hectares (97.5 acres) of the HCP area (Figures 2-1a and 2-1b) and is characterized by chamise, brittleleaf manzanita, coast live oak, poison-oak, toyon, coyote brush, deerweed (*Lotus scoparius*), foothill needlegrass, bush monkeyflower, California sagebrush (*Artemisia californica*), soaproot, bush poppy, chaparral pea, bracken, goldenback fern

(*Pentagramma triangularis*), bush monkeyflower, peak rush-rose (*Helianthemum scoparium*), foothill needlegrass (*Nassella lepida*), California everlasting, soaproot, and foxtail fescue.

In some areas of the chamise series, brittleleaf, or pallid manzanita is the sole or dominant canopy species. These occurrences are found on East Ridge (where the pallid manzanita can be over-topped by madrone if not treated) and in the Rodeo Shale soils of the hills between Briones Reservoir and Orinda.

Chamise-Black Sage series

Chamise and black sage are important shrubs in the continuous canopy of this fire-dependent community. Buckwheat, wedgeleaf ceanothus (*Ceanothus cuneatus*), and/or mountain mahogany (*Cercocarpus betuloides*) may be present. Shrubs are typically less than 3 m (9.8 ft) in height and the ground layer is sparse. This series occurs on south-facing slopes on shallow, often rocky soils. It is found from about 10 to 1,600 m (32.8-5249 ft) in elevation.

This series occurs on approximately 55 hectares (137.5 acres) of the HCP area (Figures 2-1a and 2-1b) and is characterized by chamise, black sage, mountain mahogany, coast live oak, California bay, wedgeleaf ceanothus, coyote brush, brittleleaf manzanita, deerweed, bush monkeyflower, California sagebrush, California blackberry, and soaproot.

Coyote Brush series

Coyote brush is the sole or dominant shrub in the continuous or intermittent canopy. California blackberry, Himalayan blackberry, California coffeeberry, California sagebrush, poison-oak, buckwheats, bush monkeyflower, toyon, and/or silver bush lupine (*Lupinus albifrons*) may be present. Shrubs are typically less than 2 m (6.6 ft) in height and the ground layer is variable. This series occurs on stabilized dunes of coastal bars, river mouths, spits along the coastline, coastal bluffs, open slopes, and terraces from sea level to about 1,000 m (3,281 ft) in elevation.

This series includes approximately 961 hectares (2402.5 acres) of the HCP area (Figures 2-1a and 2-1b) and is characterized by coyote brush, California sagebrush, coast live oak, bush monkeyflower, poison-oak, ocean spray, California

blackberry, toyon, California coffeeberry, silver bush lupine, imperfect melic (*Melica imperfecta*), California everlasting, soaproot, and woolly Indian paintbrush (*Castilleja foliolosa*).

Coyote Brush with Emergent Trees series

Coyote brush is the dominant shrub but coast live oak, California bay, and/or blue elderberry are present, usually as scattered young trees emerging from the scrub. Poison-oak, blackberry, bush monkeyflower, silver lupine, and/or California coffeeberry (*Rhamnus californica*) may be present. Shrubs are typically less than 2 m (6.6 ft) in height and trees are typically less than 10 m (32.8 ft). The shrub canopy can be continuous or intermittent. The tree canopy is widely intermittent. The ground layer is sparse or patchy.

This series occurs on approximately 6 hectares (15 acres) of the HCP area and is characterized by coyote brush, coast live oak, California bay, California coffeeberry, blue elderberry, and/or poison-oak.

Coyote Brush – Poison-oak series

Coyote brush and poison-oak are the dominant shrubs in the canopy, usually in equal or near-equal proportions. California sagebrush, bush monkeyflower, and/or blackberry may also be present. Shrubs are usually less than 5 m (16.4 ft) in height and the canopy may be continuous or intermittent. The ground layer is sparse or patchy.

This series occurs on approximately 0.4 hectare (1 acre) of the HCP area and is characterized by coyote brush and poison-oak, usually in equal portions. California sagebrush, bush monkeyflower, and/or blackberry may also be present.

Holodiscus series

Ocean spray is the sole, dominant, or important shrub in the intermittent canopy. Coyote brush, bush monkeyflower, snowberry, silktassel (*Garryaelliptica*), poison-oak, service berry (*Amelanchier alnifolia*), and/or California fescue may be present. Emergent trees may also be present. The shrubs are typically less than 1 m (3.3 ft) in height and the ground layer is sparse. It occurs on ridges, upper slopes

and steep talus on loam, sand, rocky skeletal soils. This series is found from 700 to 2,800 m (2,297-9,186 ft) in elevation.

This series occurs on approximately 4 hectares (10 acres) of the HCP area (Figures 2-1a and 2-1b) and is characterized by ocean spray, coast live oak, California bay, California blackberry, honeysuckle (*Lonicera hispidula* var. *vacillans*), poison-oak, bush monkeyflower, coyote brush, blue elderberry, imperfect melic, Torry's melic, soaproot, bent grass, blue wildrye, and California fescue.

Blue Elderbery Scrub series

Blue elderberry is sole or dominant in the canopy. Coyote brush, willows, poison-oak, and/or Oregon ash may be present. Emergent Fremont cottonwood, coast live oak, California bay, or valley oak may be present. Shrubs are less than 8 m (26.2 ft) in height and the canopy can be continuous, intermittent, or open. The ground layer is grassy.

This series occurs on approximately 2 hectares (5 acres) of the HCP area and is characterized by blue elderberry, poison oak, and blackberry.

Mixed Chaparral series

Pallid manzanita (*Arctostaphylos pallida*) is sole or abundant in the canopy. Brittleaf manzanita (*Arctostaphylos tomentosa ssp. crustacea*) madrone, coast live oak, California bay, Monterey pine, deerweed, and/or other native and non-native woody and herbaceous species may be present. Shrubs are usually less than 3 m (9.8 ft) in height and the canopy may be closed, continuous or open, and can be over-topped by trees. The ground layer is sparse, covered with litter, or grassy.

This series occurs on approximately 1 hectare (2.5 acres) of the HCP area and is characterized by pallid manzanita, brittleleaf manzanita, Monterey pine, and coast live oak.

Mule Fat series

Mule fat is the sole or dominant shrub in the continuous canopy. Arroyo willow, coast live oak, valley oak, California bay, California sycamore, black walnut, white alder, red willow and/or narrowleaf willow may be present. Shrubs are typically less than 4 m (13.1 ft) in height and the ground layer is sparse. It occurs in

seasonally flooded or saturated soils in canyon bottoms, irrigation ditches and stream channels from sea level to about 1,250 m (4,101 ft) in elevation.

This series occurs on approximately 0.2 hectare (<0.5 acre) of the HCP area (Figures 2-1a and 2-1b) and is characterized by mulefat, sedges, rushes, poison-oak, mugwort, willow herb (*Epilobium ciliatum* ssp. *ciliatum*), oxtongue thistle (*Picris echioides*), sow thistle (*Sonchus asper*), and stinging nettle.

Narrowleaf Willow series

Narrowleaf willow is the sole or dominant shrub in the continuous canopy. Fremont cottonwood, white alder, coast live oak, valley oak, California bay, smartweed and/or other willows may be present. Emergent trees may also be present. Shrubs are typically less than 7 m (23 ft) in height and the ground layer is variable. It occurs on seasonally flooded or saturated floodplains and depositions along rivers and streams. It is found from sea level to about 2,700 m (8,858 ft) in elevation.

This series occurs on approximately 4 hectares (10 acres) of the HCP area (Figures 2-1a and 2-1b) and is characterized by narrowleaf willow, water smartweed, cockleburr (*Xanthium strumarium*), stinging nettle, and knotgrass *(Paspalum distichum*).

Poison-oak Scrub series

Poison-oak is the sole or dominant species in the canopy. Coyote brush, California sagebrush, bush monkeyflower, California blackberry, Himalaya blackberry, and/or other native or non-native woody or herbaceous species may be present. Shrubs are typically less than 2 m (6.6 ft) tall and the canopy is usually continuous. The ground layer is sparse or patchy.

This series occurs on approximately 3 hectares (7.5 acres) of the HCP area and is characterized by poison-oak, coyote brush, blackberry, and/or bush monkeyflower.

Silver Lupine series

Silver bush lupine is the sole or dominant shrub in the canopy. Coyote brush, California sagebrush, annual grasses and forbs, and other native or non-native woody and herbaceous species may be present. Shrubs are typically less than 1.5 m

(5 ft) in height and the canopy is generally open. The ground layer may be sparse or grassy.

This series occurs on approximately 0.8 hectare (2 acres) of the HCP area and is characterized by silver bush lupine and California sagebrush.

2.2.3 Herbaceous Dominated Communities

Bulrush series

Bulrushes (*Scirpus* spp.) are the sole or dominant species in the herbaceous canopy. Broadleaf cattail, California bulrush, common three-square, common tule, narrowleaf cattail, rushes, saltgrass, saltmarsh bulrush, southern cattail, spikerush, nutsedge, water-plantain, water smartweed, and/or yerba mansa may be present. Herbs are typically less than 4 m (13.1 ft) in height and cover is continuous, intermittent, or open. It occurs on permanently, regularly, semipermanently, seasonally and irregularly flooded soils in bays, estuaries, dune swales, slough terrace edges; berms, backwaters, banks and bottomland margins of rivers; channels, creeks, ditch margins; lake beds; and the margins of lagoons, ponds and reservoirs. It is found from sea level to about 2,100 m (6,890 ft) in elevation.

This series occurs on approximately 4.5 hectares (11 acres) of the HCP area (Figures 2-1a and 2-1b) and is characterized by bulrush, cattail, stinging nettle and duckweed.

Bulrush-cattail series

Bulrushes and cattails are important herbs emerging from the water. Broadleaf cattail, California bulrush, common three-square, common tule, narrowleaf cattail, rushes, saltgrass, saltmarsh bulrush, southern cattail, spikerush, nutsedge, water-plantain, water smartweed, and/or yerba mansa may be present. Herbs are typically less than 4 m (13.1 ft) in height and the cover is continuous, intermittent or open. It occurs on permanently, regularly, semipermanently, seasonally and irregularly flooded soils in bays, estuaries, dune swales, slough terrace edges; berms, backwaters, banks and bottomland margins of rivers; channels, creeks, ditch margins; lake beds; and the margins of lagoons, ponds and reservoirs. It is found from sea level to about 2,100 m (6890 ft) in elevation.

This series occurs on approximately 2 hectares (5 acres) of the HCP area (Figures 2-1a and 2-1b) and is characterized by bulrush, cattail, stinging nettle and duckweed.

California Annual Grassland series

Non-native annual grasses and herbs dominate in the ground layer. Bromes (*Bromus* spp.), barleys (*Hordeum* spp.), California poppy (*Eschscholzia californica*), filarees (*Erodium* spp.), goldfields (*Lasthenia* spp.), lupines (*Lupinus* spp.), mustards (species in *Brassica*, *Hirschfeldia*, *Sinapis* and *Sisymbrium)*, oats (*Avena* spp.), owl's-clovers (*Castilleja* spp.), annual ryegrass (*Lolium multiflorum*), and/or star-thistles *(Centaurea* spp.) may be present. Emergent shrubs and trees may also be present. Grasses are typically less than 1 m (3.3 ft) in height and cover may be continuous or open. It occurs in all topographic locations from sea level to about 1,200 m (3,937) in elevation.

This series occurs on approximately 3,059 hectares (7647.5 acres) of the HCP area (Figures 2-1a and 2-1b) and is characterized by soft chess (*Bromus hordeaceus*), ripgut (*B. diandrus*), slender wildoat (*Avena barbata*), foxtail fescue, annual ryegrass, wild barley (*Hordeum murinum* ssp. *leporinum*), mustards, filarees, star-thistles, oxtongue thistle, milk thistle (*Silybum marinum*), bull thistle (*Cirsium vulgare*), Italian thistle, whorled dock (*Rumex conglomeratus*), California poppy, hayfield tarweed (*Hemizonia congesta*), and miniature lupine (*Lupinus bicolor*).

California Oatgrass series

California oatgrass *(Danthonia californica*) is the sole or dominant grass in the ground layer. Bracken (*Pteridium aquilinum*), California melic (*Melica californica*), foothill sedge (*Carex tumulicola*), Idaho fescue (*Festuca idahoensis*), one-sided bluegrass (*Poa secunda*), purple needlegrass, red fescue (*Festuca rubra*), and/or velvet grass (*Holcus lanatus*), may be present. Emergent trees and shrubs may also be present. Grass is typically less than 1 m (3.3 ft) in height and cover is open. This series occurs in seasonally or permanently saturated valley bottoms and lower portions of alluvial slopes as well as coastal bluffs, terraces, slopes, and ridges. California oatgrass series is found from sea level to about 2,200 m (7,218 ft) in elevation.

This series occurs on approximately 1.6 hectares (4 acres) of the HCP area (Figures 2-1a and 2-1b) and is characterized by California oatgrass, purple needlegrass, blue wildrye, California brome (*Bromus carinatus*), yarrow (*Achillea millifolium*), lupines, mustards, blue dicks (*Dichelostemma capitatum*), Ithuriel's spear, bracken, hayfield tarweed, miniature lupine, blue lupine (*Lupinus formosus*), California yampa (*Perideridia kelloggii*) and non-native annual grasses, forbs, and weeds.

Cattail series

Cattails (*Typha* spp.) are the sole or dominant herb emerging from water. Broadleaf cattail (*Typha latifolia*), California bulrush (*Scirpus californicus*), common three-square (*Scirpus americanus*), common tule (*Scirpus acutus*), duckweed, narrowleaf cattail (*Typha angustifolia*), rushes, saltgrass *(Distichlis spicata*), saltmarsh bulrush (*Scirpus maritimus*), southern cattail *(Typha domingensis*), nutsedge, spikerush, water-plantain (*Allisma plantago-aquatica*), water smartweed, and/or yerba mansa (*Anemopsis californica*) may be present.

Herbs are typically less than 4 m (13.1 ft) in height and ground cover is continuous, intermittent or open. It occurs in permanently, regularly, semipermanently, seasonally and irregularly flooded or irregularly exposed soils in bay, estuary, dune swale, slough terrace edges; berm, backwater, bank, bottomland, mouth margins of rivers; channel, creek, ditch margins; lake beds; lagoon, pond, reservoir margins; and along geologic faults. It is found from sea level to about 2,000 m (6,562 ft) in elevation.

This series occurs on approximately 2.8 hectares (7 acres) of the HCP area (Figures 2-1a and 2-1b) and is characterized by cattails, bulrushes, stinging nettle, rushes, duckweed, and other aquatic plants.

Creeping Ryegrass series

Creeping wildrye is the sole or dominant grass in the ground layer. Bromes, oats, thistles, purple needlegrass, foothill needlegrass, yarrow, yampah, mustards, wild lettuce, poison hemlock, and/or squirreltail (*Elymus* spp.) may be present. Emergent shrubs may be present. Grasses are typically less than 1 m (3.3 ft) in height and ground cover is open. It occurs in permanently saturated valley bottoms and lower portions of alluvial slopes from sea level to about 2,300 m (7,546 ft) in elevation.

This series occurs on approximately 49 hectares (122.5 acres) of the HCP area (Figures 2-1a and 2-1b) and is characterized by creeping wildrye and hayfield tarweed.

Duckweed series

Duckweeds (*Lemna* spp.) are the sole or dominant plants floating on the water surface. Duckmeats (*Spirodela* spp.), Mexican mosquito fern (*Azolla mexicana*), mosquito fern (*Azolla filiculoides*), mud-midgets (*Wolffiella* spp.), potamogeton (*Potamogeton* spp.), water milfoil (Myriophyllum spp.), and/or water-meals (*Wolffia* spp.) may be present. Emergent plants may also be present. Plants are 0.3 to 8 mm (0.01-0.3 in) in size and cover may be continuous, intermittent or open. It occurs in permanently, semipermanently or seasonally flooded ditches, rivers, stream channels, and ponds. This series is found from sea level to about 2,300 m (7,546 ft) in elevation.

This series occurs on approximately 0.4 hectare (1 acre) of the HCP area (Figures 2-1a and 2-1b) and is characterized by duckweed and Mexican mosquito fern. Most duckweed is in the understory of riparian woodland.

Foothill Needlegrass series

Foothill needlegrass is the sole or dominant grass in the ground layer. California fescue, California melic, one-sided bluegrass, purple needlegrass, yarrow, and/or other native and non-native annual and perennial herbs may be present. Emergent shrubs and trees may be present. Grass is typically less than 1 m (3.3 ft) in height and cover is open. This series occurs in all topographic locations on sandstone or ultramafic-derived soils with high clay content. It is found from sea level to about 1,700 m (5,577 ft) in elevation.

This series occurs on approximately 2 hectares (5 acres) of the HCP area (Figures 2-1a and 2-1b) and is characterized by foothill needlegrass, California melic, imperfect melica, purple needlegrass, blue wildrye, soaproot, blue dicks, Ithuriel's spear, Mariposa lily (*Calochortus argillosus*), bracken, yarrow, and non-native annual grasses, forbs and weeds.

Idaho Fescue series

Idaho fescue is the sole or dominant grass in the ground layer. California melic, California oatgrass, California fescue, bracken, foothill sedge, one-sided bluegrass, purple needlegrass, red fescue, velvet grass, and/or other native and non-native annual and perennial herbs may be present. Emergent shrubs and trees may also be present. Grass is typically less than 1 m (3.3 ft) in height and cover is open. This series occurs on slopes and ridges from about 20 to 1,800 m (65.6-5,906 ft) in elevation.

This series occurs on approximately 2.4 hectares (6 acres) of the HCP area (Figures 2-1a and 2-1b) and is characterized by Idaho fescue, California melic, California oatgrass, California brome, woodrush, one-sided bluegrass, purple needlegrass, blue wildrye, Junegrass (*Koeleria micrantha*), Diablo sunflower (*Helianthella castanea*), soaproot, lupines, blue dick, Ithuriel's spear, Mariposa lily, gold nuggets (*Calochortus luteus*), bracken, squirreltail, yarrow, California yampa, hayfield tarweed and non-native annual grasses, forbs and weeds.

Introduced Perennial Grassland series

Introduced perennial grasses are the sole or dominant grasses in the ground layer. Harding grass (*Phalaris aquatica*), blue wildrye, bracken, California oatgrass, California brome, other bromes, barleys, creeping bent (*Agrostis stolonifera*), foothill sedge, Kentucky bluegrass (*Poa pratensis*), one-sided bluegrass, orchard grass (*Dactylis glomerata*), red fescue, velvet grass, and/or other native and non-native annual and perennial herbs. Emergent shrubs and trees may also be present. Grasses are typically less than 1 m (3.3 ft) in height and cover is open. It occurs in seasonally and permanently saturated clay, loam and sand soils in all topographic locations. This series is found from sea level to about 3,500 m (11,483 ft) in elevation.

This series occurs on approximately 5 hectares (12.5 acres) of the HCP area (Figures 2-1a and 2-1b) and is characterized by Harding grass, and non-native grasses, forbs and weeds.

Mixed Native Perennial Grassland series

Native perennial and annual forbs and grasses are dominant, abundant, or scattered.

Purple needlegrass, foothill needlegrass, one-sided bluegrass, California fescue, Idaho fescue, red fescue, Junegrass, California melic, California oatgrass, California brome, blue wildrye, squirreltail, soaproot, lupines, blue dicks, Ithuriel's spear, Mariposa lily, gold nuggets (*Calochortus luteus*), bracken, yarrow, California yampah, hayfield tarweed, and non-native annual grasses, forbs and weeds may be present. Widely scattered shrubs or trees may be present. The ground layer is generally grassy.

This series occurs on approximately 80 hectares (200 acres) of the HCP area and is characterized by purple needlegrass, one-sided bluegrass, California fescue, Idaho fescue, red fescue, Junegrass, California melic, California oatgrass, California brome, blue wildrye, squirreltail, soaproot, miniature lupine (*Lupinus bicolor*), summer lupine (*Lupinus formosus*), blue dicks, Ithuriel's spear, bracken, yarrow, California yampah, hayfield tarweed, and/or other native or non-native annual grasses, forbs and weeds.

One-sided Bluegrass series

One-sided bluegrass is the sole or dominant grass in the ground layer. Big squirreltail, creeping wildrye, mission bells (*Fritillaria affinis*), squirreltail, and/or other native and non-native annual and perennial herbs may be present. Emergent shrubs and trees may also be present. Grasses are typically less than 1 m (3.3 ft) in height and cover is open. This series occurs in seasonally and permanently saturated valley bottoms, and lower portions of alluvial slopes as well as all topographic locations in uplands. It is found from sea level to about 3,800 m (12,467 ft) in elevation.

This series occurs on approximately 0.4 hectare (1 acre) of the HCP area (Figures 2-1a and 2-1b) and is characterized by one-sided bluegrass, blue wildrye, California brome, bracken, blue lupine, Ithuriel's spear, Mariposa lily, gold nuggets, mission bells, yarrow, and non-native annual grasses and forbs.

Purple Needlegrass series

Purple needlegrass (*Nassella pulchra*) is the sole or dominant grass in the ground layer. Blue wildrye, California fescue, California melic, California brome, Junegrass, one-sided bluegrass, imperfect melica, yarrow and/or other native and non-native annual and perennial herbs may be present. Annual grasses and flowers

are common. Emergent shrubs and trees may also be present. Grasses are typically less than 1 m (3.3 ft) in height and cover is open. It occurs in all topographic locations on deep soils with high clay content. It is found from sea level to about 1,300 m (4,265 ft) in elevation.

This series occurs on approximately 56 hectares (140 acres) of the HCP area (Figures 2-1a and 2-1b) and is characterized by purple needlegrass, squirreltail, miniature lupine, yarrow, bracken, hayfield tarweed, and non-native annual grasses, forbs and weeds.

Rush Riparian series

Iris-leaved rush, common rush, Baltic rush or bog rush are the sole or dominant species in the grassland. Nutsedge, cattails, sedges, spikerush, toadrush (*Juncus bufonius*), creeping wildrye, and/or other native or non-native aquatic, riparian, and upland woody and herbaceous species may be present. The cover can be closed, continuous, or open. Shrubs may be widely scattered or infrequent. The ground layer may be sparse or grassy.

This series occurs on approximately 21 hectares (53 acres) of the HCP area and is usually dominated by iris-leaved rush or common rush. Other characteristic species are nutsedge, toadrush, spikerush, creeping wildrye, and sedges.

Sedge series

Sedges are the sole, dominant or important herbs in the ground layer. Bulrushes, cattails, rushes, nutsedge, spiny cocklebur (*Xanthium spinosum*), other sedges and/or spikerushes (*Eleocharis* spp.) may be present. Herbs are typically less than 1 m (3.3 ft) in height and canopy is continuous or intermittent. This series occurs in seasonally, semipermanently and permanently flooded or saturated channel, lake, pond, reservoir, river and stream margins; and depressions, seeps and swales from sea level to about 2,900 m (9,514 ft) in elevation.

Sedge series occurs on approximately 18 hectares (45 acres) of the HCP area (Figures 2-1a and 2-1b) and is characterized by sedges, nutsedge, rushes, common spikerush, stinging nettle, annual beard grass, water cress, cattails, creeping wildrye, monkeyflower (*Mimulus guttatus*), willow herb, *Epilobium densiflorum* and non-native annual grasses, forbs, and weeds.

Spikerush series

Spikerushes are the sole or dominant herb in the ground layer. Bulrushes, spikerushes, cattails, nutsedge, monkey flower, rushes, and/or sedges may be present. Herbs are typically less than 0.5 m (1.6 ft) in height and cover is continuous or intermittent. This series occurs on seasonally, semipermanently and permanently flooded or saturated channel, lake, pond, reservoir, stream and river margins; and depressions, swales and seeps. It is found from sea level to about 2,500 m (8,202 ft) in elevation.

This series occurs on approximately 1.2 hectares (3 acres) of the HCP area (Figures 2-1a and 2-1b) and is characterized by common spikerush, nutsedge, rushes, duckweed, Mexican mosquito fern, annual beard grass, watercress, and sow thistle.

Table 2-1.
Vegetation Communities in the HCP Area.

COMMUNITY	HABITAT	ACRES WITHIN HCP AREA*
Tree Dominated		
Arroyo Willow series	Valley Foothill Riparian	159
Black Oak series	Montane Hardwood	72
California Bay series	Montane Hardwood	156
California Buckeye series	Montane Hardwood	12
California Sycamore series	Valley Foothill Riparian	32
Coast Live Oak series	Coastal Oak Woodland	4,083
Eucalyptus series	Eucalyptus	160
Fremont Cottonwood series	Valley Foothill Riparian	5
Knobcone Pine series	Closed-Cone Pine-Cypress	41
Madrone series	Coastal Oak Woodland	9
Mixed Hardwood series	Montane Hardwood	5,901
Mixed Oak series	Coastal Oak Woodland	1,852
Mixed Willow series	Valley Foothill Riparian	57
Pine series	Closed-Cone Pine-Cypress	513
Red Willow series	Valley Foothill Riparian	20
Redwood series	Redwood	318
Valley Oak series	Valley Oak Woodland	451
White Alder series	Valley Foothill Riparian	1
Sitka Willow series	Valley Foothill Riparian	1
Shrub Dominated		
Bush Monkeyflower series	Coastal Scrub	1
California sagebrush series	Coastal Scrub	42
Chamise series	Chamise-Redshank Chaparral	96
Chamise-Black Sage series	Chamise-Redshank Chaparral	137
Coyote Brush series	Coastal Scrub	2,373
Coyote Brush with Emergent Trees series	Coastal Scrub	14
Coyote Brush – Poison Oak series	Coastal Scrub	1
Holodiscus series	Montane Chaparral	9
Mixed Chaparral series	Mixed Chaparral	2
Mule Fat series	Valley Foothill Riparian	< 0.5
Narrowleaf Willow series	Valley Foothill Riparian	10
Silver Lupine series	Coastal Scrub	2
Poison Oak scrub series	Coastal Scrub	7
Blue elderberry series	Freshwater emergent wetland	4

* Total EBMUD acreage additionally includes orchard, pond, developed, cultivated, and golf course land classifications (not featured here).

Table 2-1. Vegetation Communities in the HCP Area. (Cont.)		
COMMUNITY	**HABITAT**	**ACRES WITHIN HCP AREA***
Herbaceous Dominated		
Bulrush series	Lacustrine	11
Bulrush-cattail series	Lacustrine	5
California Annual Grassland series	Annual Grassland	7,559
California Oatgrass series	Annual Grassland	4
Cattail series	Lacustrine	7
Creeping Ryegrass series	Perennial Grassland	122
Duckweed series	Perennial Grassland	1
Foothill Needlegrass series	Perennial Grassland	4
Idaho Fescue series	Perennial Grassland	6
Introduced Perennial Grassland series	Perennial Grassland	12
Mixed Native Perennial Grassland series	Perennial Grassland	198
One-sided Bluegrass series	Perennial Grassland	1
Purple Needlegrass series	Perennial Grassland	140
Rush riparian series	Perennial Grassland	53
Sedge series	Perennial Grassland	43
Spikerush series	Freshwater Emergent Wetland	3

* Total EBMUD acreage additionally includes orchard, pond, developed, cultivated, and golf course land classifications (not featured here).

2.3 COVERED SPECIES

The HCP covered species include those animals and plants that occur on EBMUD watershed land and are in least one of the following categories:

- listed as threatened or endangered under the federal ESA;
- listed as threatened or endangered under the CESA;
- proposed for listing under the federal ESA;
- candidate for listing CESA (California Fish and Game Code);
- California state species of special concern;
- Plants known to occur on EBMUD watershed and listed by California Native Plant Society as C1b (rare and endangered in California and elsewhere; nearly extinct).

Table 2-2 lists the covered species and their status. Table 2-3 lists the covered species and the vegetation communities where EBMUD GIS species records exist in the HCP area. Most of the other vegetation communities support at least one HCP species at some point in their life cycle. Biological information (species distribution, occurrence and ecology) for the species addressed in this plan is presented in Appendix A.

Table 2-2
Plant and Animal Species Addressed in EBMUD's East Bay Habitat Conservation Plan

Common Name	Species	Federal Status	State Status	Critical Habitat in HCP Area
Santa Cruz tarplant	*Holocarpha macradenia*	T	E; C1b	No
Pallid manzanita	*Arctostaphylos pallida*	T	E; C1b	No
Resident Wild Rainbow Trout	*Oncorhynchus mykiss*	None	None	No
California Red-legged Frog	*Rana aurora draytonii*	T	SSC	No
Western Pond Turtle	*Clemmys mamorata*	None	None	No
Alameda Whipsnake	*Masticophis lateralis euryxanthus*	T	T	Yes
Pallid Bat	Antrozous pallidus	None	SSC	No

STATUS: E = Endangered; **T** = Threatened; **SSC** = California Species of Special Concern; **C1b** = California Native Plant Society 1b (rare and endangered in California and elsewhere; nearly extinct).

Table 2-3.
EBMUD Watershed Vegetation Communities with Survey Records for HCP Covered Species.*

Vegetation Community Series	Santa Cruz Tarplant	Pallid Manzanita	Rainbow Trout	CA Red-legged Frog	Western Pond Turtle	Alameda Whipsnake	Pallid Bat	Number of Sensitive Species
Tree Series								
Arroyo Willow				✓	✓			2
California Bay				✓				1
California Black Walnut			✓					1
Coast Live Oak				✓	✓	✓		3
Eucalyptus			✓					1
Mixed Hardwood			✓	✓	✓	✓		4
Mixed Willow Riparian			✓	✓	✓			3
Mixed Oak				✓	✓	✓		3
Pine Series (all pines)					✓	✓		2
Red Willow			✓	✓				2
Redwood			✓					1
Valley Oak				✓	✓			2
Shrub Series								
Chamise Chaparral						✓		1
Coyote Brush						✓		1
Mixed Chaparral		✓						1
Herbaceous Series								
Bulrush					✓			1
Bulrush-cattail					✓			1
California Annual Grassland	✓			✓	✓	✓	✓	5
Cattail				✓	✓			2
Creeping Ryegrass				✓				1
Duckweed Riparian				✓	✓			2
Introduced Perennial Grassland					✓			1
Mixed Native Perennial Grassland					✓	✓		2
Purple Needlegrass	✓							1
Rush Riparian Grassland				✓	✓			2
Sedge Riparian				✓	✓			2
Spikerush Riparian				✓	✓			2

*Source: EBMUD Geographic Information System sensitive species and vegetation community data layers.

2.4 HABITAT CONSERVATION PLAN AREAS

The approximately 11,412 hectares (28,530 acres) of HCP Plan area is divided naturally into discrete watersheds or "conservation areas" where conserved habitats are managed as a single unit. Conservation areas include sites of habitat protection, enhancement, and restoration as well as buffer areas and other lands included in the conservation area design.

2.4.1 San Pablo Reservoir Watershed

The watershed area contiguous with San Pablo Reservoir comprises coastal foothills 91-488 meters (300-1,600 feet) in elevation, interspersed with flat to gently rolling valley floors and a few level, mid-elevation benches. Major vegetation communities include California annual grassland, mixed oak woodland, coast live oak, Monterey pine, eucalyptus, and coyote brush series. EBMUD owns 2,842 hectares (7,105 acres) (Figure 1-2) of this watershed area. HCP covered species recorded in the San Pablo Reservoir watershed are listed in Table 2-4.

2.4.2 Siesta Valley

Siesta Valley, located near the middle latitude of the HCP area (Figure 1-2) near State Highway 24, is slightly more than 405 hectares (1,012.5 acres) in the headwaters of the San Pablo Reservoir basin. The central section of the property is a valley between steep, U-shaped ridges of volcanic strata that dip beneath the valley floor on one side and reappear on the opposite ridge. The valley has geological significance and has been used for many years as an outdoor geology laboratory by various colleges and universities. The valley floor has gently sloping benches and covers about 16.1 hectares (40 acres). Primary vegetation types include coast live oak, coyote brush, and California annual grassland series. The valley floor and western slopes support stands of eucalyptus and cypress that were planted from 1912 to 1915. HCP covered species recorded in Siesta Valley are listed in Table 2-4.

2.4.3 Gateway Area

This area is an isolated 99 hectare (247.5 acre) parcel located south of Siesta Valley and State Highway 24 (Figure 1-2), also within the upper portion of the San Pablo Reservoir basin. The land consists of moderate to steep slopes rising

abruptly to a ridge that carries over from Siesta Valley. Relatively level areas are present where two ravines were filled as a result of Bay Area Rapid Transit District work and freeway expansion in the area. Primary vegetation communities include mixed oak, coyote brush, and California bay series. The slopes also support some of the best examples of native perennial grasses and forbs found on EBMUD land. No HCP covered species has been recorded in the EBMUD owned portions of Gateway Valley, although it includes Alameda whipsnake habitat (Swaim, 1999).

Table 2-4.
General locations of EBMUD HCP covered species*

	Briones Watershed	Gateway	Lafayette Watershed	Pinole Valley	San Pablo Watershed	Siesta Valley	Upper San Leandro	Chabot Watershed	Non Reservoir
Santa Cruz Tarplant					✓				
Pallid Manzanita							✓		
Rainbow Trout				✓			✓		
California Red-legged	✓			✓	✓		✓	✓	✓
Western Pond Turtle	✓		✓	✓	✓		✓	✓	✓
Alameda Whipsnake	✓			✓	✓	✓	✓	✓	
Pallid Bat				✓	✓				

*Source: EBMUD GIS species database, 2005.

2.4.4 Briones Reservoir Watershed

Briones Reservoir covers 293 hectares (732.5 acres) and EBMUD owns 1,069 hectares (2,672.5 acres) of Briones watershed lands, about 50% of the entire basin (Figure 1-2). The area ranges in elevation 175 to 457 meters (575-1,500 feet). Primary vegetation types include mixed oak, coast live oak, coyote brush, and California annual grassland series. HCP covered species recorded in the Briones Reservoir watershed are listed in Table 2-4.

2.4.5 Lafayette Reservoir Watershed

EBMUD owns the entire Lafayette basin, which comprises 308 hectares (770 acres), including the 51 hectare (127.5 acre) reservoir (Figure 1-2). Watershed lands range in elevation from about 107 meters (350 ft) to more than 305 meters (1,000 ft). Primary vegetation types are mixed oak, coast live oak, and coyote brush series. HCP covered species recorded in Lafayette Reservoir watershed are

listed in Table 2-4. Over 850,000 people visit Lafayette Reservoir watershed annually, and the area is nearly enclosed by residential development. A USFWS protocol Alameda whipsnake-trapping effort was undertaken at Lafayette Reservoir in 2000 by Swaim Biological. After no whipsnakes were observed, Ms. Swaim suggested that whipsnakes might have been extirpated from this small watershed due to development and a loss of connectivity with surrounding habitat. It was further speculated that an introduced population would not survive in the area (Swaim 2000b).

2.4.6 Upper San Leandro Watershed

Upper San Leandro Reservoir covers 321 hectares (802.5 acres). It is a dendritic reservoir with 25-miles of shoreline (Table 1-1) located in the south portion of the HCP area in seven steep-walled canyons. EBMUD owns 3,285 hectares (8212.5 acres) of the watershed, which comprises 43% of the basin (Figure 1-2). This area ranges in elevation from 140 to 610 meters (460-2,000 ft) and is both rugged and ecologically diverse. Primary vegetation types include California annual grassland, coyote brush, chamise-black sage chaparral, mixed oak, coast live oak, and eucalyptus series. This area also contains the only occurrences of knobcone pine forest and a large stand of second growth redwood. HCP covered species recorded in Upper San Leandro Reservoir watershed are listed in Table 2-4.

2.4.7 Chabot Reservoir Watershed

Chabot Reservoir is located in the south end of the HCP area. The 138 hectare (345 acre) reservoir and approximately 1,538 hectares (3,845 acres) of surrounding land are leased to East Bay Regional Park District (EBRPD). Operations in this area are performed by EBRPD and are not included in this HCP.

EBMUD's maintains a 48 hectare (120 acre) area of the San Leandro watershed between the base of Chabot Dam and the edge of Chabot Park, and these activities are included in this HCP. Also included are EBMUD's activities on infrastructure, including spillway cleanout, below Chabot Dam.

2.4.8 Pinole Valley

Pinole Valley is the northernmost portion of the HCP area, two miles north of San Pablo Reservoir (Figure 1-2). The valley (1,490 hectares (3,725 acres) was purchased in the 1920s as a potential reservoir site. About 154 hectares (380 acres)

in the valley floor are flat, and much of this is Class-I farmland cultivated for red oat hay production. The rest of the area, with slopes of 30-70%, rises up to 305 meters (1,000 ft). Vegetation types include California annual grassland, valley oak savanna, and coast live oak series. HCP covered species recorded in Pinole Valley are listed in Table 2-4.

2.4.9 Other Non-Watershed Areas

EBMUD owns approximately 256 hectares (633 acres) of land that are not reservoir watershed or part of Pinole Valley. These areas are below dams or on ridges where runoff would not contribute to one of the five EBMUD terminal reservoirs. Vegetation types are varied and include coast live oak, eucalyptus, coyote brush, and annual grassland series. HCP covered species recorded in non-watershed areas are listed in Table 2-4.

2.4.10 Potential Mitigation Lands

As noted elsewhere in the HCP, EBMUD may desire to use all or a portion of its watershed lands in the future to provide compensatory mitigation for projects undertaken by EBMUD or others. EBMUD intends to ensure that the provisions of this HCP are consistent with these plans and that nothing in the HCP will conflict with efforts to further restore, or enhance these lands for use for mitigation.

3 ACTIVITIES

3.1 EAST BAY WATERSHED LANDS

Public access to most EBMUD-owned watershed lands is limited to use by permit only, in accordance with a comprehensive set of rules and regulations designed to protect water quality and other natural resources (EBMUD 1996). EBMUD lands are fenced, posted, and patrolled by contract law enforcement officers and EBMUD rangers to protect water quality and natural resources. EBMUD opened Lafayette Reservoir to non-body contact public recreation in 1966. Lake Chabot, which is leased to EBRPD, was opened for public use in 1966; and San Pablo Reservoir was opened to recreation in 1973. In 1973 and 1974, 104 kilometers (65 miles) of trails were opened to the public, and 1,028 hectares (2,541 acres) were set aside for environmental education purposes in 1976 (Table 3-1). Briones Reservoir is closed to the public, except for the trail system surrounding the reservoir and limited use for practice by local university crew rowing teams. Upper San Leandro Reservoir watershed remains closed to public access except for the trail system.

Table 3-1.
Acreages of Educational Use Areas (1 acre = 0.4 hectare)

WATERSHED	Acres
San Pablo	853
Briones	232
Siesta Valley	200
Upper San Leandro	1,038
Chabot	218
Total Acres	**2,541**

The Board of Directors approved EBMUD's East Bay Watershed Master Plan (WMP) and related Environmental Impact Report (EIR) in 1996, as well as the Fire Management Plan (FMP) in 2000 and the Range Resource Management Plan (RRMP) and related Mitigated Negative Declaration (MND) in 2001. These documents establish long-term

management direction for the activities on EBMUD-owned lands and reservoirs that will ensure the protection of EBMUD's natural resources and water quality (EBMUD 1996).

The WMP describes the management direction for the programs (water quality, biodiversity, forestry, fire and fuels, livestock grazing, agricultural operations, recreation and trails, and environmental education) and associated maintenance activities on the watershed lands. It also provides goals and objectives for the biodiversity management program, and guidelines to enhance biodiversity and minimize impacts of other management programs to covered species.

The activities for these programs follow EBMUD practices (including Best Management Practices (BMPs)) and guidelines from the Natural Resource Conservation Service (NRCS). Many conservation measures described in the WMP were developed specifically for EBMUD's watersheds and we refer to them generally in this document as BMPs. In addition to these conservation measures, project sites are surveyed by qualified staff prior to project initiation, to develop project and site-specific Avoidance and Minimization Measures (AMMs) for species covered by this HCP.

Applicable BMPs are listed at the end of most activity descriptions below. Potential impacts and incidental take from these activities are discussed in Section 4.

3.2 ACTIVITIES

Guidelines in the HCP Handbook require an HCP to include a description of all actions within the planning area that (1) are likely to result in incidental take, (2) are reasonably certain to occur over the life of the permit, (3) for which the applicant or landowner has some form of control.

Subject to the conditions and restrictions identified in this Plan, activities covered by the authorization for incidental take include:

- Water Quality Program
- Biodiversity Program
- Forestry Program
- Livestock Grazing Program
- Agricultural Operations Program
- Fire and Fuels Program
- Recreation and Trails Program

- Trench Spoils Storage and Removal Program
- Multiple Program Activities

Where possible, these watershed activities are presented as they are in the WMP to facilitate coordination with that parent document. As a result, a few similar activities appear in more than one place. For instance, "Construct and Maintain Boundary Fences" (Water Quality Program Section 3.2.1.6) has similar on-site impacts as "Construct and Maintain Fences and Corrals" (Livestock Grazing Program Section (3.2.4.1). However, these activities often occur at different times, impact different amounts of habitat, and with different access. "Prescribed Burning" (sections 3.2.6.2, 3.2.2.2,) also appears in more than one place for similar reasons. Finally, "Vehicular Access to Watershed Roads and Trails" is the only potential impact for many activities, including activities such as Water Quality sampling that are not contained in the WMP. These activities have all been listed together under Vehicular Access to Watershed Roads and Trails (Section 3.2.9.1) at end of the WMP programs.

3.2.1 Water Quality Program

EBMUD's water quality program as described in the WMP involves activities to maximize drinking water quality by encouraging natural sediment control, biofiltration processes, and point and non-point source pollution control. It also includes existing source water treatment (oxygenation) in Upper San Leandro Reservoir, and ongoing water quality monitoring in reservoirs and tributary streams. Key elements of this program are identification and prompt repair of erosion problems, and coordination with other agencies to minimize impacts to reservoir water quality from non-EBMUD land-use activities.

The goal of the water quality program is to maximize reservoir water quality to comply with current and anticipated future drinking water regulations. The objectives are:

- Manage for high quality water stored in EBMUD reservoirs.
- Ensure that riparian buffers and upland residual dry matter allow sufficient filtering of surface runoff from EBMUD watershed lands to minimize contaminant loading.
- Restore degraded areas on the watershed that are a source of excessive sediment which may reduce the life of reservoirs.

- Address existing and potential water quality impacts from lands not owned by EBMUD in reservoir basins.

The specific activities associated with the water quality program that have the potential to result in the incidental take of covered species include:

3.2.1.1 Operation of reservoirs.

Briones, San Pablo, and Upper San Leandro reservoirs are used to store water for ongoing domestic use, whereas Lafayette and Chabot reservoirs are used only in emergencies. All EBMUD reservoirs are also operated to provide storage for stormwater run-off. In the winter, water may be released through (blowoff) valves to the outfall at the base of the dams to maintain water levels within the operational range of the reservoir. Uncontrolled releases occur when water exits the reservoirs via the spillway.

Subsequent to the 2007-08 San Pablo Dam Seismic Upgrade Project (see Section 3.2.1.3 below), red-legged frog and western pond turtle habitat will be permanently reduced under US Army Corps of Engineers (USACE) permit and Section 7 consultation by 1.0 wetland hectare (2.46 acres) (ESA 2006). The remaining San Pablo Dam area habitat will be subsequently maintained as short grassland to facilitate dam inspection. Only incidental take for activities extending beyond the San Pablo Dam Section 7 coverage, such as for subsequent maintenance of the redesigned channels, will be covered under this HCP.

At Upper San Leandro Reservoir, a 0.25 hectare (0.62 acre) defined creek segment below the spillway will be cleared of vegetation and maintained for the ongoing Upper San Leandro Reservoir Spillway and Channel Restoration Project on a semi-annual basis (Sycamore 2006). This project will also result in the daylighting of 63 meters (190 feet) of a currently culverted section of Miller Creek that opens to the spillway area. Like the San Pablo Dam Project, the Upper San Leandro Spillway and Channel Restoration Project is currently being permitted separately by the US Army Corps and related Section 7 consultation, and incidental take is covered under that consultation. Only incidental take for activities extending beyond the USL Section 7 coverage, such as for subsequent maintenance of the redesigned channels, will be covered under this HCP.

Appendix A describes species presence relative to reservoir operations (see “Presence in HCP Area” for each species).

3.2.1.2 Manage creek beds.

EBMUD leaves fallen riparian vegetation in the creek bed and on banks for fish and wildlife habitat unless it will increase erosion. However, removal of sediment and vegetation is done near roads to maintain the channel's capacity to carry peak runoff and prevent flooding. The work may include excavating roots within the channel and grading to accommodate peak runoff. This work is typically conducted in summer and early fall with manual labor, backhoe, and/or excavator. These projects are limited to sites of less than 0.04 hectare (less than 0.1 acre). Projects are performed when one of the following criteria is met:

1) Material deposition alters flow patterns to create a potential for erosion.
2) Channel carrying capacity is reduced to cause or create a hazard of flooding.
3) Material deposition and impoundment is a safety or operational concern.

BMPs for creek bed management projects are:

- Perform a biological survey of project area for covered species and develop site specific AMMs prior to project initiation.
- Follow CDFG guidelines as outlined in the 2003 CDFG Section 1601 Lake and Streambed Alteration Agreement Memorandum of Understanding (MOU) (Appendix C) for working in stream channels.
- Conduct projects between mid-April and October.
- Minimize channel disturbance by using the nearest safe access to the channel.
- Minimize heavy equipment use adjacent to and on creek banks.
- Retain trees and shrubs necessary for bank stabilization and wildlife habitat, unless otherwise ordered by the State of California Department of Water Resources Division of Safety of Dams (DSOD).
- Remove green slash from creek.
- Reduce exposure of bare soil to erosion through seeding and/or mulching, as necessary.

3.2.1.3 Manage spillways.

San Pablo, Briones, Upper San Leandro, and Chabot dams each have concrete spillways that function to release (uncontrolled) water. At the end of each spillway there are energy dissipaters and an associated sill to reduce the velocity of water exiting the spillway.

Each of the spillway outfalls is located downslope from the dam base. The 61- meter (200 ft) distance downstream of the end (sill) of each spillway channel consists of a designed creek bed consisting of concrete sacks, large riprap, and sculpted banks.

EBMUD is preparing permits for a major project to seismically strengthen San Pablo Dam. EBMUD (ESA 2006) has also obtained federal and state permits to clean out the Upper San Leandro Dam spillway (BO#1-1-07-F-0176) (USFWS 2007), to replace or daylight two occluded culverts near the spillway, and to stabilize a large landslide in the Chabot Reservoir watershed that may affect the Upper San Leandro Reservoir spillway area.

The USACE permits for these projects will also seek, through Section 7 consultations, ESA take coverage for a period of follow up maintenance. However, this incidental take coverage will be limited to five to ten years, much shorter than the term of this HCP. EBMUD therefore seeks incidental take coverage under this HCP to manage these two spillways for the balance of the 30-year term of this permit.

Spillway management activities as ordered by DSOD at Briones, Chabot, and Lafayette reservoirs will also be included. All EBMUD spillways are inspected monthly for structural defects, vegetation encroachment, logs, trash and other impediments to water flow. Spillway management projects are planned each year according to the following guidelines:

- Within the limits of the structure, this includes the areas constructed of concrete or pipe and the areas within the overflow line along the banks of the downstream lined spillway channel.
- An additional 61 meter (200 ft) downstream of the termination of the concrete lined or bagged (erosion-protected) spillway channel as required by DSOD.
- When required after inspection by DSOD: management of the spillway includes removing vegetal root systems and sediment to the surface of concrete or erosion protection, and draining pools of stagnant water within the concrete structures.

The 61-meter (200 ft) distance downstream of the end of the spillway channel may consist of a designed creek bed, which is managed under the guidelines and BMPs of Section 3.2.1.2. The estimated area of creek channel affected below the San Pablo and USL spillways is 0.13 hectare (0.33 acre) for each project. No management projects have

been implemented in the San Pablo or Upper San Leandro spillways since 1996. Vegetation may be removed annually using hand tools, chainsaw, backhoe, and/or excavator. EBMUD is proposing to conduct ongoing maintenance to defined quadrats within the 0.40- hectare (0.62 acre) area below the USL Dam spillway on a biennial (every two years), rotating basis. This biennial, rotating quadrat approach will reduce the temporal loss for covered species i.e., refugia, foraging, and dispersal.

BMPs for spillway management projects are:

- Perform a biological survey of project area for covered species and develop site specific AMMs prior to project initiation.
- Follow CDFG guidelines as outlined in the 2003 CDFG Section 1601 Lake and Streambed Alteration Agreement (Appendix C) for working in stream channels.
- Conduct projects mid-April through October.
- Use the least disturbing economically feasible technique to clear vegetation and sediment to allow spillways to function as designed.
- Construct temporary sediment retention devices as necessary, to minimize potential erosion.
- Follow regulations for dam maintenance to limit the cleared area.

3.2.1.4 Culvert installation and replacement.

There are approximately 200 (0.3m to 2.4m dia) (1ft to 8ft dia) culverts on EBMUD watershed property, 42% of them in the San Pablo and Lafayette reservoir recreation areas. Each of the recreational areas will replace an average of one culvert per year or 60 total culverts over the term of the permit. The frequency of replacement varies. In some years, no culverts will be replaced but in years following runoff from 50-100 year storm events (e.g. January 1997), up to ten may be replaced. This situation is likely to occur once during the permit term, but the overall number of replacements over the permit term should not increase. Culverts are replaced when they fail or when roads or trails are rebuilt. Work is typically done with a shovel, backhoe, track loader and/or excavator when the channel is dry. These projects follow the 2003 CDFG Section 1602 Lake and Streambed Alteration Agreement (Appendix C) that delineates BMPs, monitoring and development of AMMs, and replacement of lost vegetation and habitat.

Up to three culverts are replaced each year on the remainder of the watershed or up 30 culverts for the term of the permit. The old culvert is excavated and the new culvert installed. Fill is then placed around the culvert and rock is added as needed (up to 10 cu/m) to prevent erosion. Mulching is done manually or with a straw blower. Seeds are sown using a hand-operated broadcast-seeder.

It is anticipated that in a small percentage of culvert replacements (approximately 4%) work will be conducted while the channel is wetted and/or flowing. These projects are typically conducted when the failure (actual or imminent) of the culvert restricts access to a facility or endangers the integrity of a road. In these instances, the wetted areas 30 meters (100ft) upstream and downstream of the project will be surveyed for red-legged frog, western pond turtle and *O. mykiss*. If any of these species are found and judged to have the potential to move into the actual project site (footprint), they will be moved outside of the project site but within the drainage using approved NMFS protocols and/or standard protective methods. The moved species individuals would have unrestricted access to the project site after project completion, so relocations would likely be temporary. Projects conducted under wetted conditions would require the presence of an approved biologist. Flowing water will be diverted around the project area by a screened bypass.

BMPs for erosion control projects are:

- Perform a biological survey of project area for covered species and develop site specific AMMs prior to project initiation.
- Minimize channel disturbance by using the nearest safe access to the channel.
- Minimize heavy equipment use adjacent to and on creek banks.
- Retain trees and shrubs necessary for bank stabilization and wildlife habitat.
- Construct temporary sediment retention devices as necessary, to minimize potential erosion.
- Remove easily eroded material from channel resulting from culvert replacement.
- Use appropriately sized culverts to handle peak flows.
- Place culverts slightly below channel bottom to avoid outfall barriers. Do not alter upstream channel, unless necessary to protect fill material or prevent culvert blockage.

- Compact fill material to prevent erosion, seepage, and failure. Armor inlet and outlet with rock or other suitable material where needed.
- Install or replace culverts so as to maintain existing fish passage.
- Reduce exposure of bare soil to erosion through seeding and/or mulching, as necessary.

3.2.1.5 Control invasive plants.

EBMUD conducts vegetation management activities to eliminate weeds, control brush and trees around facilities and at the wildland/urban interface, and to control selected state-listed noxious weeds (including French broom) throughout the watershed. This activity is performed for fire hazard reduction, safety of the public, district employees and property, to improve native species' habitat, and to provide maintenance access. EBMUD also eliminates noxious weed seed sources; to reduce poisonous and allergy producing plants (e.g., poison oak in high use public areas). Projects are timed to avoid or minimize impacts.

EBMUD's Integrated Pest Management (IPM) program (EBMUD 2003) prioritizes the most environmentally safe practices for pest control (Appendix B). The IPM program evaluates all appropriate alternatives for pest control, including no control, physical/mechanical control, biological control, and chemical control (not covered under this HCP). Invasive plants are removed mechanically or by hand. The forestry program is also designed to discourage and prevent establishment of new stands of non-native woody vegetation and the expansion of existing native stands (refer to Section 3.2.3.1). Remediation methods are site and species specific, but may include reseeding, protection (caging) of native trees present, and/or allowing native plants to establish. Finally, vegetation shading the pallid manzanita site is periodically trimmed with hand tools.

BMPs for control of invasive plants are:

- Perform a biological survey of project area for covered species and develop site specific AMMs prior to project initiation.
- Minimize heavy equipment use adjacent to and on creek banks.
- Use only hand tools to clear invasive plants in areas where covered species may occur.

3.2.1.6 Construct and maintain boundary fences.

EBMUD restricts public access to the watershed through the construction and maintenance of boundary fence lines and posting in accord with Section 555 of the California Penal Code. Violators are cited for trespassing. Fence construction and maintenance necessitates site access by 4WD vehicles or all-terrain-vehicles (ATVs) off established roads. Fence construction and maintenance may be necessary year-round with one or more five to six person crews. Fencelines are selected to minimize impacts and to avoid large trees and brush where possible. It is estimated that approximately 1219.2 meters (4000 feet) of boundary fence may be constructed or repaired annually. An annual average of 0.45 hectare (1.1 acres) of linear watershed area is affected by the removal of coastal scrub and overgrown vegetation, for a maximum of 13.3 hectares (33 acres) during the permit term. If funding becomes available (e.g., grant monies), it is anticipated that one to three projects of 8-9.6 kilometers (5-6 miles) of fenceline may also be done. This would accelerate boundary fence work on some years (up to 2194.6 meters (7200 feet) per year), but would not change the total amount of boundary fence to be completed over the permit term.

BMPs for construction and maintenance of boundary fences are:

- Perform a biological survey of project area for covered species and develop site specific AMMs prior to project initiation. AMMs will include project timing for least potential impact.
- Habitat features for covered species will be flagged as areas to avoid. Staff or workers will use discretion in placing postholes to avoid the flagged areas, and with their direction of access to help to accomplish this avoidance goal.
- Ground disturbing activities will follow applicable BMPs for erosion control (Section 3.2.1.4 and Section 3.2.1.5).

3.2.2 Biodiversity Program

The biodiversity program is an important element of the WMP. It consists of activities that EBMUD undertakes to protect and enhance habitats and species, including species covered in this HCP. These activities maintain or improve biological diversity on EBMUD property through active management and careful coordination with other resource management programs. Biodiversity management guidelines are included as a key element in all other management activities. EBMUD's commitment to biological diversity is achieved by actively monitoring and maintaining ecosystem processes,

especially those that also protect or enhance water quality. The objectives of the biodiversity management program are:

- Maintain, enhance and where practically feasible, restore plant and animal communities.
- Implement an ecosystem management approach that maintains and enhances natural ecological processes.
- Apply an adaptive management strategy using inventory, management, monitoring, and research.
- Coordinate all resource management programs to ensure that biological resources are protected.

The specific activities associated with the biodiversity program that intend to enhance the habitat for covered species, but may also result in incidental take include:

3.2.2.1 EBMUD monitoring of species populations.

Biological monitoring and sampling programs are conducted to enumerate plant and animal species and to monitor populations on EBMUD watershed property. Sampling and collecting are conducted under the authority of scientific collecting permits issued to EBMUD staff by CDFG and through Section 10(a)(1)(A) (recovery permits) issued by USFWS and NOAA Fisheries (NMFS).

Monitoring and sampling techniques include electrofishing, seining, netting, live trapping, salvaging, and observing without handling (visually, aurally). All sampling and collecting is currently conducted in accordance with the terms, conditions, and authorizations specified by CDFG in California scientific collecting permits, special request NMFS endangered species handling permits requiring NMFS steelhead sampling protocols, Federal ESA 10(a)(1)(A) permits currently held by consultants, and other species protective handling methods.

During the course of monitoring, covered species may be unavoidably taken. These short-term effects are offset by the improvement of resource management activities to better protect and enhance species populations. As part of the adaptive management program, EBMUD may revise its monitoring and sampling methods during the term of this permit.

General monitoring for projects throughout the watershed lands is done 1-10 times per month, but electrofishing is annual or biannual. Typically, up to 305 meters (1000 ft) of stream is electrofished in each watershed surveyed.

Electrofishing of reservoirs is performed annually. Other activities are performed within limits of approved NMFS sampling protocols or as needed to adequately sample species populations.

BMPs for biological monitoring and sampling are:

- Assess the project area during initial site contact and, develop site specific AMMs before proceeding
- Include monitoring results with regular reports to USFWS (see Section 7.2) to support species recovery programs and to facilitate long term ecosystem management.

3.2.2.2 Conduct habitat restoration activities.

Current and possible future habitat restoration projects include:

- Fisheries habitat enhancement (see also Section 3.2.1.2)
- Riparian restoration
- Stock pond restoration (see also Section 3.2.4.2)
- Bat and bird habitat enhancement
- Prescribed burning for enhancement of native species (see also Section 3.2.2.2)
- Improvement of site conditions for pallid manzanita
- Control of invasive plants (see also Section 3.2.1.5)
- Control of non-native animals (see also Section 3.2.2.3)

Fisheries habitat enhancements, trash removal along creek drainages, riparian restoration, and pond restorations are conducted with the knowledge and approval as appropriate of USFWS, NMFS, and/or CDFG. Prescribed burning is coordinated with the California Department of Forestry and Fire Protection (CDF), and other agencies as appropriate. Structural improvements in habitats, such as may be needed for mitigation, are built

under the guidelines of CDFG (Flosi and Reynolds 1994, McEwan and Jackson 1996) and under the guidelines described herein.

EBMUD manages a native species habitat enhancement program. Wood duck boxes, bluebird boxes, osprey platforms, and bat houses are all installed and maintained on watershed land by volunteers from the California Wood Duck Program, the Bluebird Recovery Program, EBMUD, and private individuals respectively. With no negative impact to covered species habitats, these programs maintain habitat for their target species and many non-target species.

EBMUD sponsors classroom activities on the watershed that are designed to teach the enhancement of riparian areas. District Rangers work with local classrooms to plant willows and restore denuded watershed creek channels. The ephemeral creek channels targeted for these restoration activities are badly degraded and have little or no flow when worked on. The school children are taught willow wattling techniques and willow shoot planting on these dirt slopes to help stabilize the creekbanks. There is some sedimentation caused by their activities, but it is compensated by the beneficial affects of the willows that hold the soil later in the year and thereafter. EBMUD has used this technique to restore approximately 11 acres with success since the early 1990s.

BMPs for habitat restoration projects are:

- Assess the project area during initial site contact and, develop site specific AMMs before continuing.

3.2.2.3 Control non-native animals.

EBMUD may contract annually with animal control specialists or wildlife biologists to remove feral or nonnative animals from the watershed including, but not limited to, pigs, cats, wild turkeys, non-native turtles, and bullfrogs. This activity positively impacts native species, including covered species.

Pigs are removed under a Memorandum of Understanding with CDFG. Non-target animals are not harmed and impacts are limited to access. Pigs are destructive, and their removal from the watershed reduces damage to watersheds and displacement of indigenous species.

Bullfrogs may be removed in areas where red-legged frogs have been extirpated. Where the two species are sympatric, bullfrog removal is done only after the red-legged frog breeding season (January to March) is over and while bullfrogs are still breeding

(February to July). Red-legged frogs and bullfrogs are identified by both visual and aural differences. Bullfrog egg masses are identified by mass size, egg size, position in the water column, and date present. To prevent the possibility of confusion with other egg masses (newts, red-legged frogs), they are removed when found after April 1.

Non-native turtles and Mississippi diamondback watersnakes (*Nerodia rhombifera*) may be captured using live traps in Lafayette Reservoir. Traps are checked twice daily, and set so turtles and non-target snakes will not drown. They are immediately removed from the watershed. Non-target animals, including western pond turtles, are released unharmed. Watersnake trapping has not been necessary since 1998, but may occur before the end of the permit term. Watersnakes may be kept alive after trapping for radio-tagging. The snakes are then followed in cold weather by an animal control contractor to the winter hibernacula where many animals may be removed at one time. Non-native species (including non-native turtles) cannot be legally released elsewhere in California, nor transferred out of state where they may spread disease. The Mississippi diamondback watersnake only occurs in Lafayette Reservoir where red-legged frogs are absent.

Turkeys are a threat to larval and young red-legged frogs and to whipsnakes. They are currently removed when authorized by CDFG. The future status of turkey populations in the Bay Area is unknown, and EBMUD may increase its efforts for turkey control under the appropriate CDFG permits. BMPs for non-native animal control projects are:

- Assess the project area during initial site contact and, develop site specific AMMs before continuing.

3.2.3 Forestry Program

EBMUD's lands support a substantial area of native and non-native forest habitats. Native forest communities include redwood, knobcone pine, and several hardwood-dominated forest types. Most of the non-native forest stands consist of monocultures of Monterey and other pines planted 1940s and 1950s for soil stability, and eucalyptus stands planted between 1910 and 1920 to provide wood for fuel, lumber, and windbreaks. Forest management includes planned selective removal of the non-native stands, the encouragement of the natural understory, and the maintenance and enhancement of the habitat values of native forests.

The goal of the forestry program is to develop and implement a long-term management strategy for native forests that will maintain and enhance resources such as water quality, fire protection, biodiversity, and aesthetic quality. The objectives are:

- Develop and implement a long-term management strategy for non-native forest species that includes maintenance of stand health and vigor and step-wise conversion of non-native forests to native forests or other ecologically suitable habitats.
- Use forest management as a tool to achieve strategic fire management goals, biodiversity goals, and other resource goals.
- Protect water quality and other resource values during forest management program implementation.
- Manage trees in areas of high public use to ensure visitor safety and to maintain aesthetic values.

The specific activities associated with the forestry program that have the potential to result in the incidental take of covered species include:

3.2.3.1 Remove diseased and hazard trees, and convert Monterey pine and Eucalyptus stands.

Tree removal on EBMUD's watershed lands targets very specific vegetation management objectives and is not performed for timber production. Except for the removal of single trees for public safety (typically less than 0.4 hectare (1 acre) annually), forestry management targets the step-wise removal of stands of Monterey pine and eucalyptus.

Monterey pines on EBMUD lands are outside their normal range (i.e., within the fog belt 11.2 kilometers – 7 miles – of the coast) and are approaching or have surpassed their typical life expectancy. Because of the confirmed occurrence of pitch canker in these trees, approximately 10 hectares (24.7 acres) are being removed over approximately 60-80 days annually and the native understory vegetation allowed to naturally succeed. In the event of a large die-off, a larger scale removal effort will be planned to manage the resulting fire hazard (refer to Section 9.2.2).

Harvest operations are typically conducted by EBMUD staff and/or contractors from July through October to minimize soil erosion impacts and encounters with nesting bird species. Felling crews conduct tree-falling operations; yarding techniques (skyline or skidding) are used when removal of harvested material from the site is required. Hand

removal, removal by draft horses, or heavy equipment may be used for ground skidding, depending on the project requirements and site conditions.

More than four years of monitoring show that the Monterey pine removal program has no detectable effect on resident amphibians or nesting birds. Trees are surveyed before removal. If wildlife or nesting birds are found, the tree will be avoided or the project delayed, if the tree is not a safety hazard. Oak trees, sycamores, or cottonwoods may contain large enough cavities for bat roosting. Live Monterey pines that become hazard trees are removed before they can develop the hole nests found in other trees. Dead Monterey pines are only left standing as snags in non-public areas. A large Monterey pine shades the single pallid manzanita site in the USL watershed. It will be topped or removed after the adoption of this plan.

EBMUD prefers thinning over clear-cutting for the following reasons:

- Both eucalyptus and Monterey pines provide habitat for native plants and animals.
- Clear cutting favors the spread of invasive weeds.
- Clear cutting increases surface fuel loading.

BMPs for diseased and hazard tree removals are:

- Perform a biological survey of project area for covered species and develop site specific AMMs prior to project initiation.
- Avoid operating equipment where soil compaction and rutting may cause erosion that affects water quality.
- Fill in ruts, reseed and mulch skid trails and landings to prevent erosion and sedimentation in creeks and reservoirs.
- Monitor erosion control measures during and after storms to ensure efficacy.
- Do not pile slash where it may wash into creeks, wetlands, or reservoirs.
- Locate landings outside riparian management zones.
- Use existing landings if possible.
- Locate residue piles (sawdust, chips, etc.) away from drainages.
- Keep skid trail grades to 15% or less.
- Use existing trails, if possible.

3.2.4 Livestock Grazing Program

Livestock grazing has occurred on East Bay grasslands for 100 years or more. Prior to 1992, grazing pressure on EBMUD rangeland was optimized to produce beef, prevent brush encroachment, reduce wildfire potential, provide revenue to EBMUD, and increase runoff. The livestock program was refocused in 1993 to reduce impacts on water quality and biodiversity, to use grazing selectively to reduce fire hazard (particularly at the wildland/urban interface), and to provide revenues to EBMUD. Grazing levels were reduced over standard levels by the following WMP policy directive (EBMUD 1996):

> *LG.5 As a general standard, establish livestock stocking rates (in animal unit months [AUMs]) to maintain approximately 140% of minimal residual dry matter standards (modified U.S. Soil Conservation Service Standards). Stocking rates for individual areas may vary from this standard to meet site-specific management objectives and may need to be higher or lower in strategic fuels management areas.*

The objectives of the livestock grazing program are:

- Use grazing by domestic livestock (horses, cattle, llamas and goats) as a tool to manage vegetation for other resource needs (including fire hazard reduction).
- Eliminate or restrict grazing in areas where substantial impacts on water quality, biodiversity, fire control, or other management objectives may occur.
- Retain current levels of runoff by managing for water capture, storage, and beneficial release (Section 2.1 RRMP) (2001).
- Generate livestock grazing revenue for EBMUD where consistent with other resource values.

The specific activities associated with the livestock grazing program that have the potential to result in the incidental take of covered species include:

3.2.4.1 Construct and maintain fences and corrals.

This activity is typically performed during dry periods in spring, summer, and fall. An estimated twelve fence and corral projects are performed each year. The projects range from 3.6 meters (12 feet) to 61 meters (200 feet), with a footprint of 3 meters (10-feet) wide. The annual footprint for potential disturbance from this activity is up to 0.22 hectare (0.55 acre), or a total permit-length temporary disturbance of up to 6.7 hectares

(16.5 acres). The average fence project requires access of 0.05 hectare (0.12 acres) (or approximately 500 linear feet) in vehicles going overland from a managed fire road.

BMPs for construction and maintenance of fences and corrals are as follows (see also Section 3.2.1.6):

- Perform a biological survey of project area for covered species and develop site specific AMMs prior to project initiation.
- Permanent fencing may be used in areas that have multiple management objectives (ESA species, water quality issues, slumping, mass-wasting, or other degradation) that require long term protection from livestock.
- Corrals will not be constructed within 30 meters (100 ft) of Alameda whipsnake or red-legged frog habitats (i.e., chaparral and wetlands, respectively).

3.2.4.2 Construct, maintain, and repair ponds, spring boxes, and troughs.

Ponds on EBMUD Watershed lands are constructed to collect and hold runoff for livestock and wildlife. Design considerations include size of drainage area, pond capacity, topographical suitability, environmental compatibility, and sedimentation rate. Typically, a basin is excavated with a bulldozer and/or backhoe, and an earthen embankment and spillway is constructed from the excavated material. Depending on soil erodibility, a spillway may be constructed and lined with rock. Fill slopes are seeded to reduce erosion potential. Depending on habitat needs or water quality concerns, the pond may be surrounded by a fence and/or off-site water may be provided by a drain line or solar pump.

Pond management is performed periodically with the use of a backhoe, excavator, or bulldozer to remove sedimentation and repair dams. This activity is usually performed to repair a failed or compromised dam and/or to clear out sediment accumulation. In most cases material dredged from the pond is used to repair the dam or spillway. Management is generally performed in the fall on 10-15 of approximately 115 ponds, 130 troughs, and 65 developed springs per year. Ponds and springs provide most of the remaining perennial habitat for red-legged frogs. The five turtle pond habitats shown in Figure 3-1 and identified in Section 6.2.5 will be repaired when necessary as soon as practicable under prevailing conditions, typically in late spring or summer.

Troughs are plumbed from municipal water supplies, springs, or ponds. Water is collected from springs, either by spring boxes or by horizontal drilling. An excavator or backhoe is used to dig out a spring to accommodate the box. Drain rock is set around the box to aid in water seepage into the box. Typically the spring box, horizontal drilling, and springs are surrounded by a fence to protect from livestock trampling.

BMPs for the construction and management of ponds, spring boxes, and troughs are:

- Perform a biological survey of project area for covered species and develop site specific AMMs prior to project initiation.
- Minimize heavy equipment use adjacent to and on creek banks.
- Pond design guidelines outlined in the red-legged frog recovery plan will be followed to the extent possible (hard pan limitations, access restrictions).
- Retain trees and shrubs necessary for bank stabilization and wildlife habitat.
- Perform maintenance on ponds when dry except for ponds 11, 22, 28, 62 and 85 (Stebbins 1996) which do not typically dry up (Figure 3-1).

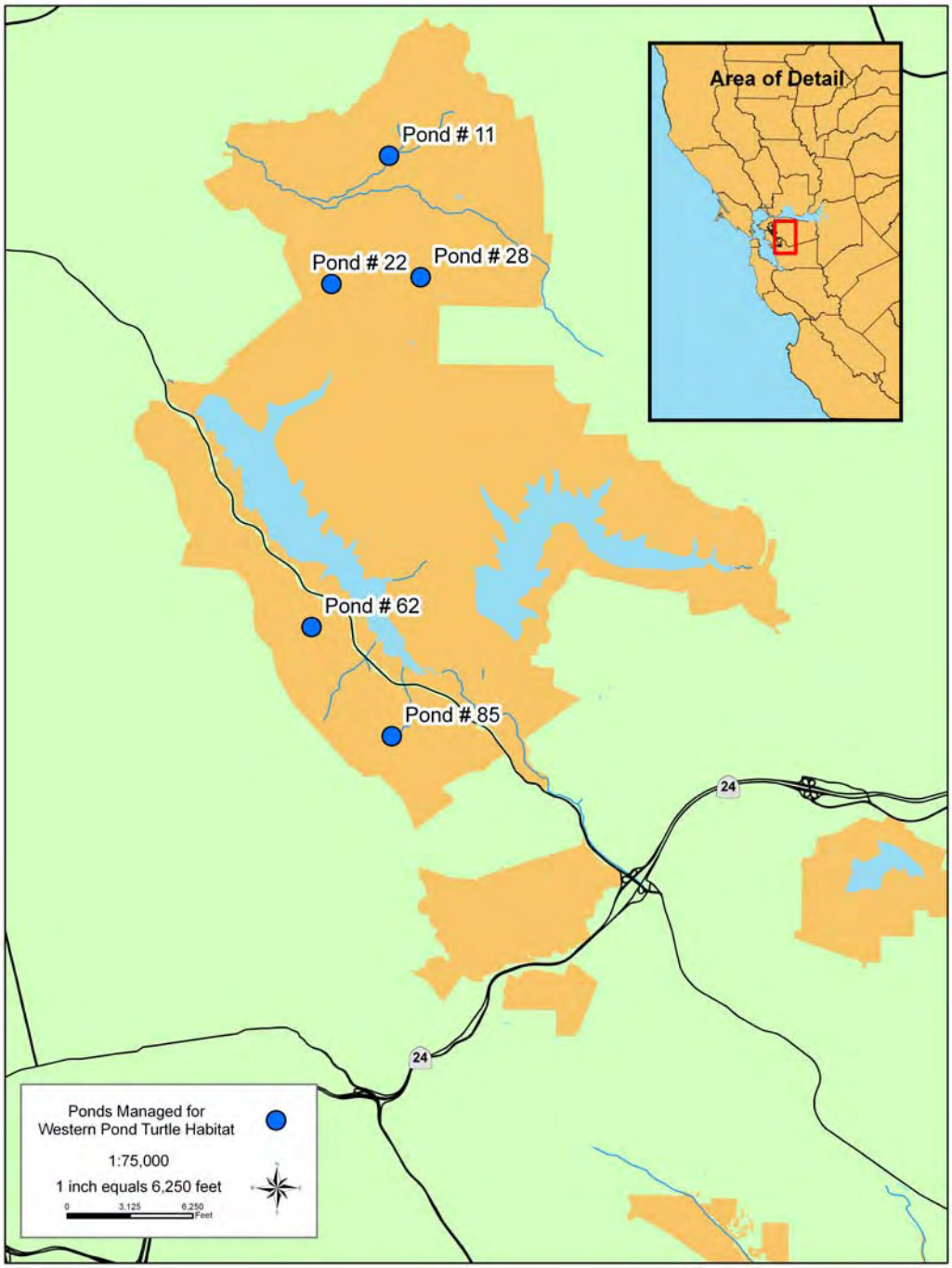


Figure 3-1. Ponds managed for western pond turtle on EBMUD lands, Contra Costa and Alameda counties, California.

3.2.4.3 Conduct livestock grazing.

While pasture rotation schedules limit overuse of any single annual grassland habitat, unfenced creeks may be subject to trampling. Ponds and creek pools may be reduced in size by cattle use through the summer, and herding may concentrate animals and exacerbate ground-disturbing activities. EBMUD has reduced livestock use of open water sources by systematically fencing out ponds and riparian areas, while developing other water sources for livestock (e.g., plumbed troughs). Grazing allotment lessees space molasses and salt blocks so as to minimize impacts from uneven livestock distribution.

BMPs for livestock grazing are listed below:

- Resource managers and biologists will review livestock management plans.
- Adaptively manage livestock grazing where impacts result in increased sedimentation, degraded water quality, decreased riparian vegetation, or decreased habitat quality for covered species.
- Manage livestock grazing to promote riparian vegetation and to improve wildlife and aquatic habitat and reduce pollutants in stormwater runoff.
- Exclude cattle along perennial *O. mykiss* streams as needed to maintain a healthy and diverse riparian habitat.
- Review grazing plans at the close of the year for efficacy in achieving fuel reduction and wildlife habitat goals.

3.2.5 Agricultural Operations Program

Agricultural operations occur on approximately 88 hectares (217 acres) of EBMUD land (Figure 3-2) classified by the Natural Resource Conservation Service as “Prime Farmland.” Red-oat hay is currently grown in Pinole Valley, and Christmas trees are currently produced in the Chabot Reservoir watershed. Future agricultural uses may include viticulture, U.C. Berkeley farming operations, and organic farming. The agricultural operations are conducted through leasing arrangements with growers.

The goals of the program are to perform farming operations on a limited scale using methods that are consistent with the integrated pest management program and designed to protect water quality and other resource values.

Figure 3-2. Trench spoil sites and cultivated lands on EBMUD property, Contra Costa and Alameda counties, California.

The specific activities associated with the agricultural operations program that have the potential to result in the incidental take of covered species include:

3.2.5.1 Use of farm machinery.

Disc and harrow machinery are normally used in the course of hay farming over 80 hectares (197 acres) on EBMUD property. These fields have been in continual use for the past 40-50 years. Discing is performed each year during late fall through early winter just prior to sowing seed. Hay is harvested in June when the soil surface and crop is dry, and seed is dry but still green.

BMPs for the use of farm machinery are:

- EBMUD will conduct classes and/or distribute educational material to educate the lessees on the identification of covered species.
- Farm machinery operators will be instructed to stop work if they encounter a covered species and to contact EBMUD Natural Resources staff.
- Follow land contours when discing to reduce erosion.
- Do not disc across stream channels.
- Avoid discing area adjacent and parallel to creek banks.
- Do not disc slopes greater than 15%.
- Avoid using ungraveled fire roads during wet periods.
- Manage erosion control features through periodic inspection and maintenance.
- Leave an undisturbed vegetated buffer of 24-30 meters (80-100 feet) between the farming activity and the center of the creek bank as described in the RRMP Section 3.4.4 (2001).

3.2.6 Fire and Fuels Program

The EBMUD Fire Management Plan (EBMUD 2000) includes activities conducted to protect human life and property, provide for public safety, protect and enhance water quality and other natural resources including watershed land uses on EBMUD land and adjacent properties.

All East Bay watershed lands except the Lafayette Reservoir watershed are State Responsibility Areas; the California Department of Forestry and Fire Protection (CDF) has primary responsibility for fire prevention and suppression. By formal agreement with

the Contra Costa County Local Agency Formation Commission (LAFCO) and the counties' fire agencies, EBMUD is required to maintain fuel breaks and fire roads, provide qualified wildland firefighters and fire suppression equipment, perform initial attack, and handle mop-up activities. Since wildfire suppression is a multi-agency activity, EBMUD does not have sufficient control over it to include it in this HCP (see Section 3.2 for criteria). Changed conditions resulting from wildfire are included in Section 9.

To ensure regional coordination in fire and fuels management planning, the program (WMP WQ23 1996) incorporates those elements of the Vegetation Management Consortium's (VMC's) Fire Hazard Mitigation Program and Fuel Management Plan for the East Bay Hills that are consistent with EBMUD's water quality and natural resource management goals. The objectives of the fire and fuels program are:

- Provide an appropriate level of fire protection for all EBMUD property and adjacent lands, and emphasize protection of life, public safety, and property values in wildland-urban interface areas.
- Implement measures to protect water quality from the impacts of a major wildfire including soil erosion and sedimentation.
- Use a strategic planning approach to fire management to ensure activities are consistent with other resource objectives.
- Recognize the importance of fire as a natural ecological process, and use prescribed burning and other techniques to reduce hazardous fuel loads to achieve long-term fire safety, water quality protection, and biological diversity.
- Cooperate with other agencies, adjacent property owners, and homeowner groups. And, participate actively in developing Coordinated Resource Management Plans and other cooperative multi-agency agreements for fire hazard reduction and fire incident management.
- Maintain fire management program funding that supports implementation of adopted Fire Management Plan elements (EBMUD 2000).
- Maintain fire-fighting equipment; perform training and routine patrols to retain the basic level of fire safety and necessary initial response.

Measures will be taken to restore vegetation post-fire (using native species when feasible) to minimize erosion, prevent the spread of non-native species, and enhance

habitat. The specific activities associated with the fire and fuels program that have the potential to result in the incidental take of covered species include:

3.2.6.1 Construct and manage fuel treatment areas, and fuel breaks.

Alameda and Contra Costa counties mandate discing for fire control. It is conducted by a tractor pulling a disc, typically in grassland areas of wildland/urban interfaces and public roadways from April through August to reduce the potential for wildfire to spread. The width of the discline depends on location, slope, and fuel type, and ranges from 6-18 meters (20-60 feet). It is estimated that 1,620 meters (53,150 linear feet) of existing discline are annually redisced.

Fuel break maintenance is conducted in specific areas (typically wildland/urban interfaces from June through October) by thinning and removing vegetation to reduce fuel density. Draft horses, bulldozers with brush rakes, goat and cattle grazing, manual labor, and mechanical mowing are all used to complete this task. Fuel breaks can be up to 91 meters (300 feet) in width.

The FMP (2000) summarizes environmental protections in Section 4 and Table 4-1.:

BMPs for construction and management of fuel treatment areas and fuel breaks are:

- Perform a biological survey of project area for covered species and develop site specific AMMs prior to project initiation.
- Follow land contours to reduce erosion.
- Provide equipment operator with map of area to be disced or mowed. Mow to a minimum height of four inches.
- Avoid discing area adjacent and parallel to creek banks.
- Avoid discing in riparian buffer zones, wetlands and/or springs unless essential for fuel break connectivity and can be done with minimal disturbance.
- Do not disc slopes greater than 35%.
- If new fuel areas are mowed or disced, such as for a prescribed burn, identify and protect covered plant species within the mower's swath or disclines.

3.2.6.2 Conduct prescribed burning.

Prescribed burning is incorporated in the Integrated Pest Management (IPM) program to reduce fuels that carry wildfire. Fall and summer burning is done in annual grassland habitat to control goat grass (*Aegilops triuncialis*), and may be expanded to treat other species such as medusa head (*Taeniatherum caput-medusae*) or other invasive or undesirable plants if they occur in the future. Prescribed fires in other vegetation habitats (including chaparral) may also occur during the life of this permit. EBMUD has met with USFWS regarding chaparral burns for Alameda whipsnake habitat improvement, and a joint-agency project may occur within the next 30-years under federal and state permits acquired for the burn project. EBMUD currently surveys and compiles data on mortality of Alameda whipsnakes after seasonal wildfires.

EBMUD biologists survey proposed burn sites prior to preparation for burning and project managers' schedule burns to specifically effect target species. Native plants are adapted to fire. So, native vegetation communities should be enhanced by this activity.

The area to be burned is surrounded by a discline, dozerline, black line or some natural impediment to fire. The fuel break width ranges from 1.8-6 meters (6-20 ft) depending on location and slope. Construction of fuel breaks has the potential to impact the Santa Cruz tarplant; however, the only currently known population is not in an area that will be burned except for tarplant enhancement. Six to ten fire-fighting vehicles typically gather at staging areas at the edge of areas to be burned.

During the life of the permit it is estimated that 20 prescribed burns may be conducted for the IPM program. Area and habitats covered by past burns are listed in Table 3-2.

Table 3-2.
Past controlled burns on the East Bay Watershed

Year	Acres Burned	Habitat type
1993	6	Grassland
1994	4	Grassland
1996	80	Grassland
1997	107	Grassland

Burns are performed during periods when red-legged frogs are typically in riparian habitats or are aestivating underground. BMPs for prescribed burning are:

- Perform a biological survey of project area for covered species and develop site specific AMMs prior to project initiation.
- Minimize heavy equipment use adjacent to and on creek banks.
- Burn riparian areas only for specific resource management goals and under tightly controlled conditions developed by interdisciplinary team planning.
- Wherever feasible, utilize black line control lines instead of dozer lines to protect potential covered species habitat during prescribed fires.

3.2.6.3 Maintain fire roads.

Approximately 258 kilometers (160 miles) of existing fire roads are maintained annually for fire suppression activities. These roads also provide access for other management activities. Roads are between 2.4 and 3.6 meters wide (8-12 feet). Maintenance of the roads is conducted from March through November and consists of surface mowing and/or grading with a motorgrader. Some road surfaces (typically less than 0.8 kilometer (0.5 mile) annually) are maintained by the addition of rock (road base) to minimize erosion and allow use during winter months. Some access roads are mowed annually to serve as fuel breaks. Mowing is done from March through November and includes mechanical mowing of grass or brush, and may be done to a distance of 3 meters (10 feet) from existing access roads.

BMPs for fire road maintenance are:

- Perform a biological survey for known covered species sites within the project area (road system).
- Review AMMs developed with the heavy equipment operator (HEO) before commencement of work.
- Avoid using fire roads during wet periods except with emergency or low-ground pressure equipment (LGPE).
- Manage erosion control features through periodic inspection and maintenance.
- Avoid cutting the toe of slopes when grading fire roads.
- Avoid cutting into or damaging rootcrowns of trees during grading.
- Avoid pushing graded material over creek bank top, into creeks and drainage channels.

- Leave a 3-30.4 meter (10-100 foot) buffer between the mowing or grading and the top of the creek bank.
- Plant and/or seed bare soil and bank disturbance as necessary to prevent erosion.

3.2.7 Developed Trails and Recreation Program

EBMUD's trails and recreation program provides the public with diverse recreational opportunities ranging from outdoor activities (angling, play structures, picnicking, etc.) in developed facilities, to hiking on developed trails on watershed lands.

San Pablo and Lafayette reservoirs provide a variety of recreational opportunities including boating, fishing, hiking, picnicking, wildlife viewing, and special events. The recreation areas are very popular during the summer. San Pablo Reservoir is closed between mid-November and mid-February; but Lafayette Reservoir, though less visited in winter, is open all year.

EBMUD also manages a 105 kilometer (65-mile) recreational trail system on its East Bay watershed lands. Recreational use of the District's undeveloped watershed land is limited compared to other public recreation opportunities because of EBMUD's primary goal of providing high-quality drinking water to its service area. Public access is allowed under a system of trail use and watershed entry permits. Allowable uses include hiking, horseback riding, and scientific studies by students from local colleges and universities including UC Berkeley, St. Mary's College, and Mills College. Motor vehicle and bicycle access to trails and fire roads by the public is not allowed. Only 34 kilometers (21 miles) of these trails are the narrow gauge type trails covered under this activity, and only five miles of these trails are maintained annually. These numbers will increase by about 5% if EBMUD assumes responsibility for maintenance of its portion of the Bay Area Ridge Trail (BART) that may one day pass through its property. Alternatively, maintenance of fire roads may increase 1% if the BART is limited only to fire roads. This activity would then be covered under Section 3.2.6.3 (above).

The objectives of the Recreation and Developed Trails Program are:

- Promote environmental values in recreational use and management.
- Provide a high quality recreational experience for users of the watershed lands that does not compromise the District's goals for high water quality and watershed management protection.

- Provide reasonable access routes between watershed lands and adjacent open space areas consistent with District resource management goals.
- Ensure that currently permitted or new recreational trail activities do not increase the potential for additional soil erosion, landscape modification or pollutant loading, or adversely affect other watershed or reservoir resources.
- Ensure that no net increase in adverse environmental effects will result from additions or modifications of EBMUD's trail management program.

The specific activities associated with the Recreation and Developed Trails Program with the potential to result in the incidental take of covered species include:

3.2.7.1 Construct and manage trails, access roads, and recreation facilities.

Facility maintenance is regularly performed for developed sections of the recreation areas. High public use irrigated lawns are normally mowed with power/heavy equipment. High pedestrian traffic areas may be mulched regularly. Surfaced parking lots, roads, and trails are repaired and repaved as required for maintenance and to protect public safety. Infrastructure (underground water/wastewater pipes, electrical and phone lines) is routinely maintained and/or upgraded to meet regulatory and safety standards. Shoreline docks are adjusted as reservoir levels change throughout the year. Installation of new, replacement, or failing facilities and/or infrastructure (i.e. restrooms and other buildings, benches, picnic tables, play grounds, drinking fountains, etc.) is ongoing within these areas. Management of the fisheries within both reservoirs includes a fish stocking program and occasional mechanical removal of vegetation to improve fish habitat or shoreline access. Additionally, activities from the Water Quality Program (3.2.1.2, 3.2.1.4, and 3.2.1.5), Forestry Program (3.2.3.1), and Fire and Fuels Program (3.2.6.1) can occur in the developed recreation areas. The BMP's are followed as listed for those activities.

BMP's for constructing and managing trails, access roads, and recreation facilities within developed recreation areas are:

- Update and maintain GIS species database for recreation areas to identify areas likely to sustain covered species.
- Annually review recreation facility maintenance activities with Supervising Ranger to identify where covered species may be encountered.

- Perform a biological survey of project areas for covered species where there is a potential for them to occur, and develop site specific AMMs prior to project initiation.

3.2.7.2 Construct and manage trails, access roads, and facilities on undeveloped lands.

Permits are required for EBMUD trail access. Approximately 4,500 trail permits are active in any given year. These permit regulations are enforced by police officers from the East Bay Regional Park District (EBRPD) who patrol the watershed through a Joint Powers Agreement (JPA). All trail users must carry their permits and identification and are subject to citation if they do not comply.

Hillside hiking trails are constructed to allow drainage at intervals during runoff. The trails are outsloped so runoff can flow across, to prevent elevated erosion rates that occur when water runs down the length of the trail. Causeways (elevated trails usually lined with ditches) are constructed in wetter areas to minimize erosion, provide year-round trail access, and to funnel user traffic to reduce other ecosystem impacts. Water is guided through culverts below the causeway.

Trail maintenance is performed annually on areas needing repair. Vegetation is pruned or mowed, the trail tread is graded, and damage repaired. Typically, trees and shrubs are pruned with loppers, handsaws, and/or chainsaws. Herbaceous plants are cut with hand tools, motorized weed-whips, and motorized lawn mowers. The trail tread is graded as necessary to remove gullies and berms; berms are pulled in towards the center of the trail to fill the gullies. Bridges are constructed or culverts installed to cross creeks. Riprapped low-water crossings may also be constructed as appropriate.

There are staging areas for the trail system on the East Bay watersheds. These staging areas may be paved, graveled, or dirt and require periodic maintenance. Dirt islands may be created within the staging areas and trees planted to enhance local habitat.

Approximately 914 meters (3,000 feet) of existing dirt fire road in the Upper San Leandro watershed will be upgraded to an all-weather road for the proposed Lindsey Wildlife Rehabilitation Center to be constructed and managed by the Lindsey Wildlife Museum. The conversion will require periodic maintenance, but the improved road condition should reduce the need for annual maintenance (i.e., road-blading).

BMPs for construction, maintenance of trails, access roads, and recreation facilities are listed below and in Section 3.2.6.3:

- Perform a biological survey of project area for covered species and develop site specific AMMs prior to project initiation.
- Construct temporary sediment retention devices as necessary to minimize potential erosion.
- Avoid construction during wet weather.

3.2.8 Trench Spoils Storage and Removal Program

EBMUD excavates trenches during its year-round operations for repair/replacement of water pipes throughout the service area, and stores the material, weather permitting, at two sites in the East Bay. Materials, otherwise known as trench spoils, are reused for fill or transported offsite once sites are filled to capacity. One site is located next to Miller Road below Upper San Leandro Reservoir and the other is on the west side of Briones Reservoir near the Dam and boat ramp (Figure 3-2). Access to the Miller Road site is via 2.9 kilometers (1.8 miles) of all-weather gravel road, while access to the Briones site is over 1.2 kilometers (0.8 mile) of paved and all-weather gravel road. Trench spoils are made of clean fill material that does not contain asphalt, oils, or other contaminants. Species awareness and site specific avoidance minimization measures used by equipment operators limit the chance for encroachment of the spoils site on covered species habitat. The objectives of the trench spoils storage and removal program include:

- Store clean trench spoils on EBMUD property with a minimum of erosion.
- Periodically remove spoils material to an offsite location.
- Minimize impact to EBMUD watershed lands and infrastructure.

The specific activities associated with the trench spoils storage and removal program that have the potential to result in the incidental take of covered species include:

3.2.8.1 Conduct trench spoils placement and maintenance.

Trench spoils are hauled to the Briones spoils site via Bear Creek Road and Briones Dam (Figure 3-2) by dump trucks (capacity of 7.6-15.3 cubic meters – 10-20 cubic yards). The trench spoils are stockpiled at the site for recycling or reuse. Once deposited on site the spoils are graded with a bulldozer. The Briones spoils site has rocked roads, graded relief ditches, and culverts to facilitate necessary year round access.

A second trench spoils site is located off Miller Road below Upper San Leandro Reservoir (Section 3.8, Figure 3-2). Trench spoils are hauled to the Miller Road site via Redwood Road; the trench spoils are stockpiled at the site for recycling or reuse. Similar equipment and erosion control procedures are implemented at the Miller Road spoils site. Access to the sites for trench spoils placement is covered under general vehicle access to the watershed (refer below to Section 3.2.9.1).

Both sites are maintained to mange the shape and structure of the spoils pile. If necessary, embankments are seeded and BMPs (refer to Section 3.2.1.4) are implemented to minimize erosion. Access routes are routinely altered to allow even deposits and removal of spoils material. Management of the site is done with the use of heavy equipment.

BMPs for trench spoil storage and removal are in sections covering Erosion Control (3.2.1.4), Operation of Farm Machinery (3.2.5.1), and Vehicular Access of Watershed Roads (3.2.9.1).

3.2.8.2 Conduct trench spoils removal.

A contractor removes trench spoils as necessary from Briones or Miller Road spoils sites. The contractor uses excavation equipment to dig and load material into trucks. Trench spoil removal occurs approximately every ten years at the Briones spoils site and approximately every six years at the Miller Road site. Truck traffic near the Briones and Miller Road spoils site may increase significantly during these operations, with up to eighty (round trip) truck-loads per day for a period of up to 45 calendar days for Briones and 80 days for Miller Road. Access to the sites for trench spoils removal is covered under general vehicle access to the watershed (refer below to Section 3.2.9.1).

BMPs for trench spoils removal are the same as for Trench spoils placement and maintenance (Section 3.2.8.1).

3.2.9 Multiple Program Activities

Multiple program activities are those common to many programs that have potential to impact covered species. Vehicle access to EBMUD fire roads and other private roads and trails is common to most programs.

3.2.9.1 Vehicular access on watershed roads and trails.

Take of covered species from a vehicle strike has never been documented on EBMUD watershed roads. However, it has twice occurred on high speed, high volume public roads adjacent to watershed lands. There are several watershed programs for which road-kills or injuries caused by vehicles on EBMUD land are the only identified potential incidental take.

Routinely sample water quality. Access by truck and boat occurs weekly at Briones, Lafayette, San Pablo, and Upper San Leandro reservoirs, and less frequently to tributary creeks. Vehicle access to all reservoirs is by paved or all-weather gravel roads.

Operation and maintenance of Upper San Leandro Reservoir hypolimnetic oxygenation system water treatment facilities. This activity includes access by staff in trucks, and delivery of liquid oxygen to the Upper San Leandro Reservoir dam for system maintenance and service.

Perform field studies and investigations. EBMUD conducts field studies and investigations in its water supply reservoirs. These studies include access to tributary streams and the reservoirs by vehicle. It is estimated that access to the streams and reservoirs for these field studies will be an average of 100 days per year.

Patrols for control of non-native animals. EBMUD contractors access the watershed fire roads by truck and by all-terrain-vehicle (ATV) to trap and remove feral pigs or other non-native animals. Access is also made via paved roads, depending on the location of the animals. Patrols may occur up to 100 days per year.

Conduct fire prevention patrols and other vehicle patrols. Fire patrols are conducted on a daily basis throughout the fire season (typically May through October). Depending on the fire-weather conditions, one to four fire-patrol vehicles may be deployed per day during the fire season. Similar vehicles are used for daily watershed patrol throughout the rest of the year.

Conduct environmental education programs. EBMUD staff access the watershed for interpretive and other environmental programs about sixty times per year.

Studies by outside researchers. An average of 25-35 studies annually occurs on watershed lands. EBMUD Watershed Management controls access for these studies through the issuance of conditional Watershed Entry Permits. All conditions necessary to

avoid incidental take of covered species, including species awareness training, are required of the researchers in the entry permits. Access frequency varies among researchers from one time to up to twenty times annually.

Lindsey Wildlife Rehabilitation Facility. Vehicle traffic will increase to three people/cars daily over an improved all-weather road to the proposed Lindsey Wildlife Rehabilitation Facility in the Brown Ranch area of Upper San Leandro Reservoir watershed.

Vehicular use of trails and access roads by the public and administrative personnel. Vehicle traffic unrelated to those programs occurs on a weekly basis by EBMUD administrative personnel and by the public. Watershed speed guidelines require drivers to not travel faster than allows for reasonable avoidance of snakes and other animals in the roadway.

Access to Briones trench spoils site and the Miller Road trench spoils site for spoils placement and removal. This activity occurs during the dry season (March through October). Typically, five to ten trucks access the Briones spoils site per day during good weather, and fewer than five trucks access the Miller Road site per day. Truck traffic near the Briones and Miller Road spoils sites may increase significantly during spoils removal operations, with up to eighty truck-loads per day for Briones; and up to one hundred truck-loads per day for Miller Road. The removal activity may be intermittent and can last in total more than a month at Briones and more than two months at Miller Road.

BMPs for vehicular access to the watershed are:

- Except in emergencies, drive slow enough to allow reasonable avoidance of animals in the road.
- Avoid using fire roads during wet periods.
- Make acknowledgement of vehicle speed guidelines and an agreement to follow road safety procedures a condition of watershed entry permits.
- Manage groups involved in “observation” education programs to minimize disturbance of covered species. Maximize the use of carpooling during group events.

4 IMPACTS AND INCIDENTAL TAKE

4.1 INTRODUCTION

Watershed activities described in Section 3 may result in incidental take as defined in Section 1.2. Anticipated incidental take is summarized for covered species known to occur on EBMUD watershed lands in Table 4-1 for each EBMUD program. Take described below includes take from the activities as well as take that may occur from avoidance and minimization measures done because of the activities (such as take from moving or confining species as described in Section 5.3).

Section 4.4 (below) describes the total incidental take requested for covered species. It is noted where habitat may be temporarily removed. It is also noted that watershed activities will also create small amounts of habitat, and that there should be no net permanent habitat loss over the course of the permit.

The use of BMPs and EBMUD standard practices as outlined in the management plans, and the implementation of the AMMs as described in Section 5 will minimize impacts to covered species populations and sensitive habitats.

4.2 INCIDENTAL TAKE FROM ACTIVITIES

Subject to the conditions and restrictions identified in this Plan, activities covered by the authorization for incidental take are listed below and described in Section 3:

- Water Quality Program
- Biodiversity Program
- Forestry Program
- Livestock Grazing Program
- Agricultural Operations Program
- Fire and Fuels Program
- Recreation and Trails Program
- Trench Spoils Storage and Removal Program
- Multiple Program Activities

4.2.1 Water Quality Program

The specific activities associated with the Water Quality Program, as described in Section 3, that may result in incidental take of covered species are listed below and shown in Table 4-1.

Table 4-1:
Potential Incidental Take of HCP Covered Species

	Activity	Rainbow trout	Red-legged frog	Western pond turtle	Alameda whipsnake	Pallid bat
	Water Quality Program					
4.2.1.1	Operation of reservoirs		x			
4.2.1.2	Manage creek beds	x	x			
4.2.1.3	Manage spillways		x	x		
4.2.1.4	Culvert installation and replacement	x	x	x		
4.2.1.5	Control invasive plants		x		x	
4.2.1.6	Construct and maintain boundary fences		x		x	
	Biodiversity Program					
4.2.2.1	EBMUD staff monitoring of species populations	x	x	x		
4.2.2.2	Conduct habitat restoration activities	x				
4.2.2.3	Control non-native animals			x		
	Forestry Program					
4.2.3.1	Remove diseased and hazard trees		x	x	x	
	Livestock Grazing Program					
4.2.4.1	Construct and maintain fences and corrals		x	x	x	
4.2.4.2	Construct and manage ponds, spring boxes, and troughs		x	x	x	
4.2.4.3	Conduct livestock grazing	x	x	x	x	
	Agricultural Operations Program					
4.2.5.1	Use farm machinery	x	x	x	x	
	Fire and Fuels Program					
4.2.6.1	Construct and maintain fuel treatment areas and fuel breaks	x	x	x	x	
4.2.6.2	Conduct prescribed burning	x	x		x	
4.2.6.3	Maintain fire roads	x	x	x	x	
	Developed Trails Program					
4.2.7.1	Construct and manage trails, access roads, and recreation facilities	x	x		x	
	Trench Spoils Storage and Removal Program					
4.2.8.1	Conduct trench spoils placement and maintenance		x	x	x	
4.2.8.2	Conduct trench spoils removal		x	x	x	
	Multiple Program Activities					
4.2.9.1	Vehicular access on watershed roads and trails		x	x	x	

4.2.1.1 Operation of reservoirs.

Reservoirs are managed when necessary through release of water to reduce the potential for spill events below the dams. Reservoir spills (when capacity is exceeded and water is discharged via the spillway) are beyond the control of EBMUD and do not fit the definition of activities needing incidental take coverage (see Section 4.1). However reservoir releases allow some control within the bounds of responsible reservoir operations, and red-legged frog egg masses may occur in January-February within the vegetated areas of the discharge channels immediately below San Pablo and Upper San Leandro dams. Initial controlled reservoir releases may dislodge egg masses in these channels. Incidental take may occur if frog egg masses are present within the 61 meter (200 ft) of channel below the blowoff valves during these releases. Western pond turtles are not likely to occur in the shallow channel at San Pablo Dam after the Seismic Upgrade, and near the USL spillway can easily escape the effects of increased flow by moving to side channel pools. Therefore, no incidental take is likely for western pond turtles from reservoir releases either from San Pablo Dam or USL. In the period from 1964 through 2006, reservoir releases during frog spawning in January and February occurred in 16 years (40%) from San Pablo Dam and 13 years (33%) from USL.

There is insufficient depth for red-legged frog breeding below Briones Dam, predators are abundant, and red-legged frog larva have never been recorded in Bear Creek between San Pablo Reservoir and Briones Dam. The Division of Safety of Dams (DSOD) requires that the Briones spillway be periodically cleaned out, thus preventing the development of usable habitat. No incidental take is expected at Briones Dam for covered species from reservoir releases.

There is no record of red-legged frogs or western pond turtles below Lafayette Reservoir (see Appendix A). No incidental take of covered species is expected from reservoir releases at Lafayette Reservoir.

EBMUD requests incidental take authorization for 5 red-legged frog egg masses during the course of the permit for the operation of reservoirs. No incidental take is expected for other covered species.

4.2.1.2 Manage creek beds.

These projects will occur annually during the course of the permit. However, severe winter storms with high winds may cause an increase in the frequency of channel-clearing projects. The maximum annual proposed creek area cleared will be up to 0.4 hectare (1 acre), or up to 12.1 hectares (30 acres) over the permit term.

Incidental take of red-legged frogs may occur, but project timing and AMMs will minimize impacts. Red-legged frogs may be temporarily held as described in Section 5.3 as a minimization measure during project activities and released on-site. Red-legged frogs hiding in vegetation or exposed tree roots may not be found and removed during preconstruction surveys. These frogs may be taken if trees are removed. Post-project siltation may contribute to poor water quality which can affect *O. mykiss* spawning gravel

and rearing juveniles on Pinole, San Leandro, Kaiser, Buckhorn, Redwood, and Moraga creeks.

EBMUD requests incidental take authorization for 10 *O. mykiss* and 5 red-legged frogs during the course of the permit to manage creek beds. No incidental take is expected for other covered species.

4.2.1.3 Manage spillways.

Vegetation may be removed in spillways annually as ordered by DSOD within 61 meters (200 feet) of the release valves. These projects may annually affect approximately 0.13 hectare (0.33 acre) of red-legged frog habitat and 0.13 hectare (0.33 acre) of western pond turtle habitat below San Pablo Spillway.

It will also affect a total of 0.25 hectares (0.62 acres) of red-legged frog and 0.25 hectares (0.62 acres) of western pond turtle habitat below the USL Spillway.

Red-legged frogs and/or western pond turtles that are not excluded or detected and removed prior to work commencing may be injured or killed through the use of hand tools, chainsaws, and heavy equipment such as excavators and backhoes. Incidental take is most likely to occur during the first clearing of the San Pablo and Upper San Leandro spillways as no clearing has been done since 1996. This first clearing will be done in these areas under incidental take coverage provided by separate Section 7 consultations for the San Pablo Dam Seismic Upgrade Project and the USL Spillway Channel

Restoration, respectively. The spillway vegetation will be removed on an annual basis at San Pablo Reservoir spillway after these projects. With this reduction of habitat value, the likelihood of encountering covered species and of subsequent incidental take will also be reduced. No incidental take is anticipated from covered species at Briones or Lafayette reservoir spillways.

EBMUD requests incidental take authorization for 5 red-legged frogs and 5 western pond turtles during the course of the permit to manage spillways. No incidental take is expected for other covered species.

4.2.1.4 Culvert installation and replacement.

In many years, no culverts are replaced at San Pablo and Lafayette recreation areas. However, up to ten culverts in one year may be replaced during rehabilitation projects at these sites. There will be a maximum of two such rehabilitation projects at each recreation site during the permit term. Up to three culverts are replaced each year elsewhere on the watershed. Total area of impact per culvert is up to 0.024 hectare (0.06 acre) annually or up to 2.2 hectares (5.4 acres) for the estimated 90 culverts replaced on the watershed and recreation areas during the permit term.

Incidental take may occur if frogs move into the area after pre-project surveys are completed. These frogs may be crushed or injured during the culvert removal process. Incidental take of *O. mykiss* may occur during capture and confinement.

EBMUD requests incidental take authorization for 5 *O. mykiss*, 5 red-legged frogs, and 3 western pond turtles during the course of the permit to for culvert installation and replacement. No incidental take is expected for other covered species.

4.2.1.5 Control invasive plants.

Historically, covered species have not been observed during this activity because of project timing and BMPs. The maximum area treated annually is 0.2 hectare (0.5 acre) or up to 6 hectares (15 acres) during the permit term.

Alameda whipsnake and red-legged frog may occur on the perimeters of these areas and may be harassed during these activities.

EBMUD requests incidental take authorization for 3 red-legged frogs and 2 Alameda whipsnakes during the course of the permit to control invasive plants. No incidental take is expected for other covered species.

4.2.1.6 Construct and maintain boundary fences.

Boundary fence may be constructed or repaired each year in all perimeter areas of EBMUD watershed property up to a total of 13.3 hectares (33 acres) for the permit term. Of this total, GIS analysis indicates that 0.29 hectare (0.73 acre) of Alameda whipsnake core habitat (chaparral and scrub communities) and 2.3 hectares (5.78 acres) of red-legged frog habitat will be affected by this activity.

Red-legged frogs may be injured or killed by off-road vehicle use in and adjacent to riparian areas. Alameda whipsnakes may be injured or killed by off-road vehicles use in grassland and chaparral. The EBMUD watershed fire road system is dense, roads are not far apart, and off-road access is limited to the shortest safe distance from the fire roads to the project area. Many boundary fences are along paved roads, and GIS analysis shows that access to boundary fences varies from 0 - 701 meters (0 – 2,300 feet).

EBMUD requests incidental take authorization for 3 red-legged frogs and 2 Alameda whipsnakes during the course of the permit to construct and maintain boundary fence. No incidental take is expected for other covered species.

4.2.1-T Incidental Take From Water Quality Program

EBMUD requests incidental take authorization over the permit term for its Water Quality Program for a total disturbance of up to 0.8 hectare (2 acres) annually or up to 24.3 total hectares (61 acres) over the term of the permit for incidental take of red-legged frog habitat. In addition, EBMUD requests incidental take authorization over the permit term for a total annual disturbance of up to 0.01 hectare (0.024 acre), or up to 0.29 total hectare (0.73 acre) over the term of the permit for incidental take from disturbance of Alameda whipsnake habitat, and 0.26 hectare (0.66 acre) annually or up to 7.9 hectares (19.8 acres) from incidental take of western pond turtle habitat. EBMUD also requests incidental take authorization due to effects of sedimentation (less than 1 acre over the permit term) on *O. mykiss* habitat from creek bed management activities.

EBMUD requests incidental take authorization over the permit term for take of red-legged frogs, *O. mykiss*, western pond turtles, and Alameda whipsnake incurred while conducting the above described activities for the Water Quality Program.

4.2.2 Biodiversity Program

The specific activities associated with the Biodiversity Program, as described in Section 3, that may result in incidental take of covered species are listed below and shown in Table 4-1.

4.2.2.1 EBMUD monitoring of species populations.

During monitoring, there will be incidental take of covered species. Most monitoring is visual with no incidental take, though there is harassment of red-legged frog larvae when they are dipnetted, seined, or trapped, or when *O. mykiss* are electrofished. With the exception of Pinole Creek, there are currently no electrofishing sites where red-legged frogs and *O. mykiss* are sympatric. But as they may occur together during the permit term, red-legged frogs may someday be impacted by electrofishing. General monitoring for projects throughout the watershed lands is done 1-10 times per month, but electrofishing is annual or biannual. Typically, up to 305 meters (1000 feet) of stream is electrofished in each watershed surveyed.

Incidental take from monitoring of *O. mykiss*, red-legged frogs, and western pond turtles is expected to occur. *O. mykiss*, western pond turtle and red-legged frog tadpoles and red-legged frogs may be harmed, harassed, and killed during seining, dipnetting, live trapping, and electrofishing activities.

EBMUD requests incidental take authorization for 20 *O. mykiss*, 3 red-legged frogs, and 2 western pond turtles during the course of the permit to monitor species populations. No incidental take is expected for other covered species.

4.2.2.2 Conduct habitat restoration activities.

These projects are designed specifically to improve the habitat for covered species as well as other native flora and fauna on EBMUD property. Restoration activities that may impact covered species are riparian restoration, and prescribed burning.

Up to 2 hectares (5 acres) of relatively denuded landscape may be affected annually by riparian restoration during access by volunteers. Impacts are limited to *O. mykiss* due to minimal sedimentation early in the project from the restored tributary into Pinole Creek.

Though incidental take authorization is requested for temporary impacts from habitat restoration, the goal is for these activities to be self-mitigating over the course of the permit. Incidental take of *O. mykiss* may occur due to increased sedimentation from these activities. However, sedimentation will be reduced over the course of the permit as these projects mature. Pre-project surveys and related AMMs will minimize near term impacts. The denuded channels do not provide habitat for California red-legged frogs or western pond turtles.

EBMUD requests incidental take authorization for habitat equivalent to 10 *O. mykiss* during the course of the permit to conduct habitat restoration activities. No incidental take is expected for other covered species.

Prescribed burning is addressed below under Section 4.2.6.2.

4.2.2.3 Control non-native animals.

EBMUD may contract annually with an animal control specialist or wildlife biologist to remove feral or non-native animals from the watershed. EBMUD contractors have trapped and removed feral pigs, Mississippi diamondback watersnakes (*Nerodea rhombifera*), and other non-native animals from the watershed as necessary each year since 1992. To date, no covered species have been inadvertently trapped or harmed during this activity. However, incidental take of western pond turtles may occur during trapping of aquatic animals such as watersnakes. Red-legged frogs are not known to occur in Lafayette Reservoir, but would be released unharmed if found.

EBMUD requests incidental take authorization for 5 western pond turtles during the course of the permit to control non-native animals. No incidental take is expected for other covered species.

Incidental take from this activity may also occur from watershed vehicle access and is identified below under Section 4.2.9.1.

4.2.2-T Incidental Take From Biodiversity Program

EBMUD requests incidental take authorization over the permit term for its Biodiversity Program for temporary annual disturbance of 2 hectares (5 acres) or up to 61 hectares (150 acres) of red-legged frog and western pond turtle habitats over the course of the permit. EBMUD requests incidental take authorization over the permit term for take of

red-legged frogs, *O. mykiss* and pond turtles incurred while conducting the above described activities for the Biodiversity Program.

4.2.3 Forestry Program

The specific activities associated with the Forestry Program, as described in Section 3, that may result in incidental take of covered species are listed below and shown in Table 4-1.

4.2.3.1 Remove diseased and hazard trees, and convert Monterey pine and Eucalyptus stands.

Extensive monitoring of these projects has shown no occurrence of whipsnakes within the affected areas.

This activity will result in the potential disturbance from selective thinning of up to 10 hectares (25 acres) annually of watershed over the course of this permit. Alameda whipsnakes and red-legged frogs are rare within these habitats, but may occur at the margins. Some incidental take may occur during project access as described under Section 4.2.9.1, and from sedimentation into ponds not under the canopy.

Therefore a small unknown amount of incidental take of red-legged frogs, western pond turtles, and Alameda whipsnake may occur in these non-native habitats. Because of selective thinning and AMMs (see Section 3.2.3.1), pallid bats or other bats have not been found roosting in tree cavities. Also, pallid bats are unlikely to day roost in the open canopy.

EBMUD requests incidental take authorization for 2 red-legged frogs, 2 western pond turtles, and 2 Alameda whipsnakes during the course of the permit to remove diseased and hazard trees, and convert Monterey pine and Eucalyptus stands. No incidental take is expected for other covered species.

4.2.3-T Incidental Take From Forestry Program

EBMUD requests incidental take authorization over the permit term for its Forestry Program as described above for incidental take authorization of California red-legged frogs, western pond turtles, and Alameda whipsnake on 303.5 hectares (750 acres) of watershed land.

4.2.4 Livestock Grazing Program

The specific activities associated with the Livestock Grazing Program, as described in Section 3, that may result in incidental take of covered species are listed below and shown in Table 4-1.

4.2.4.1 Construct and maintain fences and corrals.

This activity is mostly maintenance of existing fences, which has a smaller impact on covered species than construction of new fences. Based on the average of 12 projects per year, there is an annual potential for incidental take of red-legged frogs in up to 0.22 hectare (0.55 acre) and for Alameda whipsnakes in up to 0.22 hectare (0.55 acre) within corral areas that border their habitats. There is also annual potential for incidental take from vehicle access. GIS analysis shows that access to interior fences varies from 0 - 610 meters (0 - 2000 feet), and annual access would be through 0.1 hectare (12,000 square feet) of off road watershed land. Maintenance is done as needed and access would not occur every year.

Incidental take of red-legged frogs and western pond turtles may occur on the impact area of 0.63 hectare (1.5 acres) during the Pinole Creek riparian fencing project.

EBMUD requests incidental take authorization for 5 red-legged frogs, 2 western pond turtles, and 2 Alameda whipsnakes during the course of the permit to construct and maintain fences and corrals. No incidental take is expected for other covered species.

4.2.4.2 Construct maintain and repair ponds, spring boxes, and troughs.

Typically, maintenance is performed on 10-15 of approximately 115 ponds, 130 troughs, and 65 developed springs per year. Work is scheduled for periods when sensitive species are absent from the area.

Most pond repair on EBMUD watershed is done when ponds, spring boxes, or troughs are dry and potential incidental take is avoided or minimized. Ponds 11, 22, 28, 62 and 85 (Stebbins 1996) (Figure 3-1) which do not typically go dry, may need maintenance during the permit term. Within these five ponds, red-legged frogs and western pond turtles may be taken during refurbishment activities through moving animals, and through the use the use of heavy equipment such as backhoes and excavators. Pre-projects surveys will limit incidental take. Construction impacts may include: soil

disturbance, loss of vegetation, disruption of existing watercourses, temporarily decreased surface and groundwater downstream of the pond, and the creation of habitat for bullfrogs and other non-native species. Frogs and whipsnakes could be injured or killed through crushing when heavy equipment enters the pond area to remove excessive sediment and thin vegetation. Incidental take from temporary loss of red-legged frog breeding habitat is possible if hardpan is broken and the water holding capacity of the pond is reduced or eliminated

Incidental take of red-legged frogs, western pond turtles, and Alameda whipsnakes may occur for up to a total of 0.81 hectare (2 acres) of pond, spring box, and trough habitat.

EBMUD requests incidental take authorization for 10 red-legged frogs, 5 western pond turtles, and 3 Alameda whipsnakes during the course of the permit to construct, maintain, and repair ponds, spring boxes, and troughs. No incidental take is expected for other covered species.

4.2.4.3 Conduct livestock grazing.

EBMUD's grazing program is consistent with the listing rule for the red-legged frog which states "light to moderate carefully managed livestock grazing that prevents or minimizes the excessive trampling of riparian and wetland habitat" will not result in a violation of Section 9 (61 Federal Register 25832). Periodically, cows may escape to otherwise protected habitat or may impact ponds and other wetland areas beyond moderate levels. Cow dung may be deposited directly into unfenced pond habitats or during animal escapes and may affect water quality.

There will be incidental take from sedimentation into *O. mykiss* habitat on Pinole Creek and in the creeks draining into USL from erosion due to livestock grazing of 4,013.3 hectares (9,917 acres) of watershed; however existing fencing of the riparian corridor on the USL drainages and new fencing on Pinole Creek will exclude livestock from direct contact.

Incidental take from harassment of Alameda whipsnakes may occur mostly at the edge (about 1%) of the 1,740.1 hectares (4,300 acres) of whipsnake core habitat within the livestock pastures, or 17.4 hectares (43 acres). Incidental take of *O. mykiss* habitat from sedimentation may also occur.

EBMUD requests incidental take authorization for covered species habitat equivalent to 5 *O. mykiss*, 3 red-legged frogs and 2 Alameda whipsnakes during the course of the permit for livestock grazing. No incidental take is expected for other covered species.

4.2.4-T Incidental Take From Livestock Grazing Program

EBMUD requests incidental take authorization over the permit term for its Livestock Grazing Program for incidental take of *O. mykiss*, red-legged frogs, western pond turtles, and Alameda whipsnakes incurred while conducting the above described activities for the Livestock Grazing Program. EBMUD also requests incidental take authorization over the permit term for its Livestock Grazing Program of watershed land containing perennial *O. mykiss* streams.

4.2.5 Agricultural Operations Program

The specific activities associated with the Agricultural Operations Program, as described in Section 3, that may result in incidental take of covered species are listed below and shown in Table 4-1.

4.2.5.1 Use farm machinery.

Agricultural discing is done annually on 80 hectares (197 acres) of Pinole Valley. Impacts to *O. mykiss* spawning habitat in Pinole Creek may occur due to sediment runoff. Natural Pinole Watershed sediment sources and upstream sources constitute a greater impact than agricultural operations on EBMUD property (Pearce 2005). Red-legged frogs may be vulnerable to farm machinery if they move through the agriculture fields during late fall while discing is taking place. Western pond turtles are rarely seen in Pinole Creek near the agricultural fields, but may occur there. Turtle nests constructed in the agricultural fields may be destroyed during late fall or early winter discing. No coastal scrub or chaparral borders the agricultural fields in Pinole Valley, so the incidental take from mortality of Alameda whipsnakes will be unlikely. There is a potential of incidental take from displacement of foraging whipsnakes.

EBMUD requests authorization for incidental take habitat equivalent to 5 *O. mykiss*, and to impacts resulting in the take of 5 red-legged frogs, 5 western pond turtles, and 2 Alameda whipsnakes for the 197 acre area where farm machinery is used. No incidental take is expected for other covered species.

4.2.5-T Incidental Take From Agricultural Operations Program

EBMUD requests incidental take authorization over the permit term for take of red-legged frogs and western pond turtles, and for harassment of Alameda whipsnake and habitat impacts to downstream *O. mykiss* habitat resulting from the cultivation of agricultural land incurred while conducting the above described activities for the Agricultural Operations Program,

4.2.6 Fire and Fuels Program

The specific activities associated with the Fire and Fuels Program, as described in Section 3, that may result in incidental take of covered species are listed below and shown in Table 4-1.

4.2.6.1 Construct and manage fuel treatment areas, and fuel breaks.

Incidental take of Alameda whipsnakes during fuel break maintenance will be limited due to the poor quality of habitat within the maintained areas. A majority of the existing fuel breaks are maintained on a yearly basis and therefore are not able to develop the core habitat components preferred by Alameda whipsnakes. New fuel breaks will be evaluated for distance from coastal scrub or chaparral habitat and the likelihood the new fuel treatment areas may contain whipsnakes at some time. It is doubtful that fuel break maintenance in Lafayette Reservoir watershed will impact Alameda whipsnake (Swaim 2000) as whipsnakes were not found in the watershed after a 2000 protocol survey, and it is doubtful they could survive passing through the surrounding residential and urban area.

On the remainder of the watershed, incidental take of *O. mykiss* through habitat loss and harassment or harm of red-legged frogs and Alameda whipsnakes may occur from this activity. No incidental take is expected for other covered species.

A total of 9.9 hectares (24.5 acres) of watershed, unrelated to road or trail maintenance, is disced or mowed annually for fire control. Discing or mowing is performed for both the agricultural and the fire and fuels programs. Incidental take may result from crushing frogs during the discing process and an increase risk of predation when frogs, turtles, or whipsnakes cross open disclines. Though western pond turtles are rarely found adjacent to the agricultural leases, there is potential for incidental take from discing for fire control to turtle nests in non-agricultural areas. Mowing may cause incidental take of red-legged frogs, western pond turtles, and Alameda whipsnakes.

EBMUD requests incidental take authorization for 5 *O. mykiss*, 5 red-legged frogs, 3 western pond turtles, and 3 Alameda whipsnakes during the course of the permit to construct and manage fuel treatment areas, and fuel breaks. No incidental take is expected for other covered species.

As indicated in Section 3.2.6, wildfire suppression is not included as a specific activity in the HCP. A wildfire changed landscape is addressed in Section 9 (Assurances).

4.2.6.2 Conduct prescribed burning.

EBMUD has met with USFWS regarding chaparral burns for Alameda whipsnake habitat improvement, and joint-agency projects may occur within the next 30 years under other federal and state permits. EBMUD currently surveys for mortality of Alameda whipsnakes after seasonal wildfires.

Prescribed burns may be conducted for the Integrated Pest Management (IPM) program. Up to 10.1 hectares (25 acres) may be affected by each prescribed burn, and EBMUD requests incidental take authorization for a maximum of 20 burns over the course of the permit.

Prescribed burning may result in some incidental take through temporary loss of habitat for red-legged frog, Alameda whipsnake, and *O. mykiss.* An unknown amount of incidental take may occur through mortality of red-legged frogs or Alameda whipsnakes.

EBMUD requests incidental take authorization for 5 *O. mykiss*, 5 red-legged frogs, and 2 Alameda whipsnakes during the course of the permit to conduct prescribed burning. No incidental take is expected for other covered species.

4.2.6.3 Maintain fire roads.

A total of 258 kilometers (160 miles) of existing roads are maintained annually. When these roads are bladed for maintenance the total program area of potential displacement of Alameda whipsnakes using these bladed areas is 93.8 hectares (232 acres).

Maintenance of fire roads has the potential for increasing erosion into creeks where spawning *O. mykiss* may occur. Also, though mowing is limited to periods when the grass is dry and red-legged frogs are usually absent, there is potential for incidental take of red-legged frogs. Mowing of scrub habitat adjacent to roads (10 feet on both sides)

may result in take of Alameda whipsnakes through the temporary loss of up to 34 hectares (84 acres) of habitat.

Incidental take of *O. mykiss*, red-legged frogs, western pond turtles, and Alameda whipsnakes may occur during fire road maintenance. EBMUD requests incidental take authorization for 5 *O. mykiss*, 5 red-legged frogs, 5 western pond turtles, and 3 Alameda whipsnakes during the course of the permit to maintain fire roads. No incidental take is expected for other covered species.

4.2.6-T Incidental Take From Fire and Fuels Program

A maximum of 103 hectares (257 acres) of existing disclines, and existing roads may be temporarily disturbed by these activities. Up to 10 hectares (25 acres) may be disturbed through prescribed burning with an annual average of 0.6 hectare (1.5 acres) for the permit term.

EBMUD requests incidental take authorization over the permit term for take of red-legged frogs, western pond turtles, and Alameda whipsnakes as described above for the Fire and Fuels Program.

4.2.7 Developed Trails and Recreation Program

The specific activities associated with the Developed Trails and Recreation Program, as described in Section 3, that may result in incidental take of covered species are listed below and shown in Table 4-1.

4.2.7.1 Construct and manage trails, access roads, and recreation facilities.

Only 33.8 kilometers (21 miles) of narrow gauge trail of the 104 kilometers (65 miles) of total EBMUD watershed trail length are included in this activity. Only 8 kilometers (5 miles) of these trails are maintained annually. Maintaining these trails is largely done by hand, but may also be done using a bobcat (trail-wide tractor). A maximum potential annual disturbance for trail maintenance is 1.2 hectares (3 acres). Incidental take of *O. mykiss* through habitat degradation, and incidental take from harassment of red-legged frogs and Alameda whipsnakes may occur. Incidental take from harm and/or mortality of red-legged frogs and Alameda whipsnakes may also occur.

Recreation activities may affect covered species that occur in the recreation areas (San Pablo and Lafayette reservoirs). Despite a USFWS protocol trapping effort in 2000 for

Alameda whipsnakes as well as surveys for other species, the western pond turtle is the only HCP covered species found at Lafayette Reservoir. Whipsnakes may occur in proximity to recreational anglers at San Pablo Reservoir, but no impacts have been reported. Maintenance activities for recreational facilities such as border fencing, and road and trail maintenance are covered under other activities described in Section 3.

EBMUD requests incidental take authorization for 3 *O. mykiss*, 3 red-legged frogs and 3 Alameda whipsnakes during the course of the permit to construct and manage trails, access roads, and recreation facilities. No incidental take is expected for other covered species.

4.2.7-T Incidental Take From Developed Trails and Recreation Program

EBMUD requests incidental take authorization over the permit term for take of red-legged frogs and Alameda whipsnakes as described above for its Developed Trails and Recreation Program.

4.2.8 Trench Spoils Storage and Removal Program

The specific activities associated with the Trench Spoils Storage and Removal Program, as described in Section 3, that may result in incidental take of covered species are listed below and shown in Table 4-1.

4.2.8.1 Conduct trench spoils placement and maintenance.

Trench spoils placement, maintenance and recovery is done using BMPs within areas of ground disturbance. Both red-legged frogs and Alameda whipsnakes have been observed within a distance of the spoils access routes or sites that might normally include their annual range of movement. The Briones and USL spoil sites access roads are 1.29 and 1.93 kilometers (0.8 mile and 1.2 miles) long, respectively.

Because of the proximity of species records and the length of the permit term, incidental take of red-legged frogs, western pond turtles, and Alameda whipsnakes may occur from this activity.

EBMUD requests incidental take authorization for 3 red-legged frogs, 5 western pond turtles, and 3 Alameda whipsnakes during the course of the permit to conduct trench spoils placement and maintenance. No incidental take is expected for other covered species.

4.2.8.2 Conduct trench spoils removal.

Trench spoil removal occurs approximately every ten years at the Briones spoils site and approximately every six years at the Miller Road site as described in Section 3.2.8.

Incidental take of red-legged frogs, western pond turtles, and Alameda whipsnakes from vehicle strikes may occur at either site during site access and for red-legged frogs and western pond turtles at the Miller Road site because of stream habitat proximity.

EBMUD requests incidental take authorization for 3 red-legged frogs, 5 western pond turtles, and 3 Alameda whipsnakes during the course of the permit to conduct trench spoils removal. No incidental take is expected for other covered species.

4.2.8-T Incidental Take From Trench Spoils Storage and Removal Program

EBMUD requests incidental take authorization over the permit term for red-legged frogs, western pond turtles, and Alameda whipsnakes as described above for its Trench Spoils Storage and Removal Program.

4.2.9 Multiple Program Activities

Vehicular access on watershed roads and trails as described in Section 3.3.9 is associated with multiple programs, and may result in incidental take of covered species as listed below and shown in Table 4-1.

4.2.9.1 Vehicular access on watershed roads and trails.

There are several watershed programs for which road-kills or injuries caused by vehicles on EBMUD land are the only identified potential incidental take. EBMUD has no record of a vehicle strike of a covered species from any of these activities, however there are records of mortality of covered species on highly traveled public roads in these areas, and there are covered species records from these areas.

Incidental take of 5 red-legged frogs, 5 western pond turtles, and 3 Alameda whipsnakes may occur during the course of the permit. No incidental take is expected for other covered species.

4.2.9-T Incidental Take From Multiple Program Activities

EBMUD requests incidental take authorization over the permit term for its Multiple Program Activities from vehicle strikes to red-legged frogs, western pond turtles, and Alameda whipsnakes.

4.3 CURRENT STATUS OF COVERED SPECIES IN HCP AREA

The current status of the covered species is discussed below and in Appendix A by species. They are summarized here to facilitate the discussion of impacts.

4.3.1 ***Santa Cruz tarplant***: There is one potentially remaining experimental population of three experimental sites started in the San Pablo Reservoir watershed in 1983. No plants have been observed from this last remaining population since 1997.

4.3.2 ***Pallid Manzanita***: There is one small population high in the Upper San Leandro Reservoir watershed. The only EBMUD activities scheduled for this site are for habitat enhancement of pallid manzanita.

4.3.3 ***Rainbow trout***: Resident *O. mykiss* are known to occur in several year classes in Pinole Valley (see Appendix A). Eight redds were observed within the residential area of the City of Pinole in 2006. No redds or spawned fish have been observed on EBMUD property, despite repeated annual surveys.

"Salmo irideus" were described by Gibbons in 1855 from the San Leandro Creek watershed. This population still exists (now *Oncorhynchus mykiss irideus*), apparently un-hybridized with hatchery strains in this watershed above Upper San Leandro Reservoir. Allozyme studies showed a linkage with the Central California Coast Steelhead ESU (Gall 1990) (see Appendix A). These fish can be found in at least six creeks that drain into the reservoir: Redwood, San Leandro, Indian, Moraga, Kaiser, and Buckhorn creeks. The fish are monitored in Redwood Creek by East Bay Regional Park District (Alexander 2001).

There is a small population of *O. mykiss* within the few hundred feet of stream below Chabot Dam; the origin of these fish has not been determined.

4.3.4 ***California Red-legged frog:*** There are two main dynamic populations that occur on EBMUD land. One population in Pinole Valley has at least three sites where the animals were able to survive the 1987-1992 droughts. A second population in

the Upper San Leandro watershed is reduced, and only survives in Miller-San Leandro Creek and through the maintenance of livestock ponds. A third sub-population, perhaps related to the Pinole Valley population and associated with San Pablo Reservoir exists mostly in livestock and sediment ponds. Their numbers continue to vary with rainfall (Appendix A).

4.3.5 ***Western pond turtle***: Western pond turtles can be found in every EBMUD terminal reservoir, in several stockponds, and in some of the larger creek pools. It is a locally common species on the EBMUD watershed lands.

4.3.6 ***Alameda whipsnake:*** Alameda whipsnakes are not common animals, even where they occur regularly (Swaim 2000). Trapping for Alameda whipsnakes on watershed property has shown them to be in the north and south watersheds, but absent from Lafayette Reservoir which is surrounded by residences and where there is intense human use (>800,000 visitors annually). Habitat where whipsnakes were previously recorded has either not been impacted or has rarely been temporarily impacted by EBMUD activities, so it is likely that whipsnakes still occupy the same areas. The vegetation series and habitat components associated with Alameda whipsnake occur throughout the HCP area. To better focus restoration, research, and mitigation efforts, an analysis was performed to identify primary (core) whipsnake habitat on HCP lands. Using vegetation data in the EBMUD GIS community map (based on the Draft Recovery Plan for Chaparral and Scrub Community Species East of San Francisco Bay, California (USFWS 2002)) and historic whipsnake observations, it is estimated that approximately 3,400 hectares (8,400 acres) of primary (core) Alameda whipsnake habitat exist on EBMUD watershed lands (Figure A-6). The primary habitat is split into three areas, which cover three of the recovery units listed in the recovery plan.

4.3.8 ***Pallid Bat***: The April Creek barn in Pinole Valley is the only known location for pallid bats on EBMUD Watershed. The animals use it seasonally for a nursery. At least two other bats species share the site. The barn has been weakened by the theft of some of the side planks. Despite signage installed to educate and help prevent this problem, criminal activity remains the primary threat to this remote species site.

4.4 IMPACTS

Impacts of incidental take under EBMUD management actions on species' populations depend on population size and species' reproductive rates. The highest potential for impacts from EBMUD watershed activities is for *O. mykiss*, red-legged frogs, and Alameda whipsnakes. All of these species are limited on EBMUD watershed lands, but total population numbers for covered species are not known for the HCP area. Their status is discussed in detail in Appendix A and summarized above in Section 4.3.

EBMUD requests incidental take for these three species as described above (Sections 4.2.1 through 4.2.9). It is estimated that populations of Alameda whipsnakes and *O. mykiss* on EBMUD watershed lands, while they vary with the current weather patterns, are stable, and that estimated total annual incidental take is more than offset by EBMUD's management of the HCP area. Species records of California red-legged frogs on the watershed have become less frequent since the late 1990's, but there is insufficient data to quantify the likely change. Potential for incidental take of Santa Cruz tarplant and pallid manzanita is unlikely.

Although the western pond turtle and pallid bat are currently unlisted, EBMUD also requests authorization for incidental take of these species as described above.

5 AVOIDANCE AND MINIMIZATION MEASURES

5.1 INTRODUCTION

The activities identified in Section 3 have the potential to result in incidental take of individuals of plant and wildlife species covered by this HCP. Implementation of the avoidance and minimization measures (AMMs) identified in this section and the BMPs identified in Section 3 will substantially reduce or eliminate the potential for incidental take. Implementation of the mitigation measures described in Section 6 will protect the habitat and sustain populations of the species covered by this HCP.

5.2 GENERAL AVOIDANCE AND MINIMIZATION MEASURES

The following measures are designed to avoid or minimize incidental take of covered species on EBMUD watershed lands.

1. Education and public awareness are essential to the conservation and enhancement of the species covered by this HCP. Within one year of approval of this HCP, all EBMUD staff and contractors who conduct operations and maintenance activities on EBMUD watershed lands will participate in an education program. The program will include the following topics:
    - Distribution and general ecology of covered species
    - Recognition of covered species' habitats
    - Sensitivity of the covered species to human activities
    - Legal protection of covered species and penalties for violations
    - Reporting requirements
    - Protection measures for covered species
    - Emergency contact information for EBMUD Fisheries and Wildlife personnel
2. EBMUD Natural Resources staff in the East Bay will begin training in the HCP within one month of their date of hire or transfer to the area. HCP training of newly hired EBMUD East Bay biologists will be completed, along with USFWS approval, before they monitor listed species.
3. EBMUD vehicles, contractor vehicles, and vehicles used by those with a Watershed Entry Permit shall maintain an awareness of the roadway and travel no faster than the

posted speed limit, or will travel at a speed sufficient (5-15mph as appropriate on fire roads) to allow reasonable avoidance of animals in the roadways. These speed restrictions will be determined on a case-by-case basis for watershed entry permits, during pre-project classes, and during EBMUD HCP education classes.

4. The EBMUD policy of minimizing the construction of new access roads and fire roads (EBMUD 1996) will be continued.

5. Specific sensitive areas proposed for HCP covered activities will be surveyed by EBMUD biologists or other qualified biologists within 30 days prior to the start of a project, using NMFS protocols or other protective methods developed or approved by USFWS or NMFS. Populations of plant species covered by this HCP, western pond turtle nests, and any other covered species related features identified during the pre-activity survey will be suitably flagged to identify areas to avoid. Activities shall be conducted to minimize disturbance in the delineated sensitive areas. Should a covered species need to be relocated during a project, an EBMUD biologist will move the animal using methods as described below or as agreed upon with USFWS in the future.

5.3 SPECIFIC AVOIDANCE AND MINIMIZATION MEASURES

The East Bay Watershed Master Plan (WMP) and its affiliated documents provide general protection and mitigation measures that protect watershed biodiversity and the water quality of watershed runoff. In addition to these general measures, this HCP contains specific measures to protect covered species and their natural habitats. These measures include species-specific avoidance, minimization, rectification, reduction, and compensation directives to be followed throughout the term of the HCP. Species-specific avoidance and minimization measures are described in Table 5-1.

Wetland and Pond Surveys Biologists will perform pre-project surveys for covered species within 10 days of the project start date to determine if the project site has water and, if so, to allow for rescheduling, or to plan for clearing the area of covered species before the project starts. If the biologist determines that covered species presence is possible at the site, a biologist will again survey the area just prior to the project start. Animals present may be temporarily excluded from the work area by the biologist. Temporary exclusion may be done in two ways. A small project area may be blocked off with seines to prevent animal access for the few hours necessary to complete work; for a

larger project a biologist may capture and confine animals. Service-approved biologists will not use soaps, oils, creams, lotions, repellents, or solvents of any sort on their hands within two hours before and during periods when they are capturing and relocating red-legged frogs or tiger salamanders. If necessary, frogs or turtles will be held in temperature controlled (i.e., shaded or cooled as necessary with ice) buckets or tubs large enough to easily accommodate them during the project, but for no longer than 12 hours for frogs and 24 hours for turtles. Removal will be done by capturing by hand or net all observed frogs while the pond is drawn down in stages. Turtles will be trapped or captured by hand (such as by snorkeling). Wherever possible, frogs or turtles will be returned to the (still wetted) ponds after management activities are finished. In the event wetted ponds are dewatered, sequestered animals will be released in a sufficiently large nearby wetted habitat and USFWS will be notified.

Table 5-1.
Species-specific Avoidance and Minimization Measures

5.3.1 Santa Cruz Tarplant

Management Activity	Potential Impact	Avoidance and Minimization Measures	Status on HCP Lands
Prescribed burning	Ground disturbance may remove plants.	Identify current and historic locations of plants before project initiation. Flag individual plants for workers if project is proposed for known Santa Cruz Tarplant area. Schedule projects in Santa Cruz tarplant area when plants are visible and easily avoided during ground-disturbing procedures (April-June).	Federally threatened, State endangered, CNPS list C1b. Only successful experimental population was on San Pablo watershed. (Figure A-1). No plants observed since 1997.

Table 5-1. Species-specific Avoidance and Minimization Measures (continued)			
5.3.2 Pallid Manzanita			
Management Activity	**Potential Impact**	**Avoidance and Minimization Measures**	**Status on HCP Lands**
Conduct habitat restoration activities Control Invasive Plants	Ground disturbance may remove plants.	Identify current and historic locations of plants before project initiation. Flag individual plants for workers if project is proposed for known Pallid Manzanita area. Provide location maps to all EBMUD staff, lessees, and contractors that may conduct activities in area.	Federally threatened, State endangered, CNPS list C1b. One population high in San Leandro Canyon near Pinehurst Road and Skyline Blvd. No trails, roads, fences, or routine activities in area (Figure A-2).

Table 5-1. Species-specific Avoidance and Minimization Measures (continued)			
5.3.3 Rainbow Trout			
Management Activity	**Potential Impact**	**Avoidance and Minimization Measures**	**Status on HCP Lands**
Manage creek beds Habitat restoration	Removal of trees, stumps, logs, boulders, and/or gravel may disturb instream structures that are important for *O. mykiss* spawning, rearing, or cover.	Except in cases of road flooding, excessive erosion, or to improve fish passage, instream structures will be left in place to increase stream habitat complexity.	Populations in Pinole Creek and Upper San Leandro Reservoir and watershed (Figure A-3).
Culvert installation and replacement	Dewatering of creeks for culvert projects may require relocating *O. mykiss*. Handling *O. mykiss* can harm animals.	Electrofishing for relocations for the two known perennial creek culverts (see Section 3.2.1.4) will follow NMFS steelhead sampling protocols. Any bypass diversions will be screened. If necessary, block nets will be used to exclude fish from project area. If available, fish will be held in pools upstream of the project site. EBMUD biologists will clean hands before touching animals to prevent contamination from foreign matter such as sunscreen.	
EBMUD staff monitoring of species populations	Electrofishing may take *O. mykiss*.	Electrofishing of creeks will follow NMFS steelhead sampling protocols. Electrofishing of reservoirs will not be done near creek/reservoir confluences where *O. mykiss* may stage to ascend creeks.	

Table 5-1. Species-specific Avoidance and Minimization Measures (continued)			
5.3.3 Rainbow Trout (continued)			
Management Activity	**Potential Impact**	**Avoidance and Minimization Measures**	**Status on HCP Lands**
Livestock grazing Use Farm machinery Construct and manage fuel treatment areas and fuel breaks Prescribed burning Maintain fire roads Construct and manage trails, access roads, and recreation facilities	May cause increased sedimentation in creeks that can decrease survival of *O. mykiss* eggs and embryos.	Livestock grazing, discing, mowing, road grading, trail maintenance, and other potential sediment-producing activities will be conducted using BMPs (refer to Section 3) designed to limit these impacts. Fences will be maintained at Pinole Creek to provide a minimum 15.4 meters (50 ft) vegetation buffer, and an average 15.4 meters (50 ft) vegetation buffer will be maintained for new fencing at other creeks due to topographical variability as a biological goal of this HCP (Section 1.4.2.3), and as part of the RRMP.	Populations in Pinole Creek and Upper San Leandro Reservoir and watershed (Figure A-3).

Table 5-1. Species-specific Avoidance and Minimization Measures (continued)			
5.3.4 California Red-legged Frog			
Management Activity	**Potential Impact**	**Avoidance and Minimization Measures**	**Status on HCP Lands**
Operation of reservoirs	Release of winter storm water downstream of San Pablo and Upper San Leandro reservoirs may dislodge red-legged frog egg masses.	Upon notification of a planned January or February release, qualified biologists will perform surveys for egg masses in the path of the flow velocity increase. If necessary, egg masses will be moved to an unaffected area.	Federally Threatened. In perennial creeks and stockponds on watershed (Figure A-4).
Manage creek beds Manage spillways Culvert installation and replacement	Creek bed, spillway operation, and culvert maintenance projects may take red-legged frogs. Handling red-legged frogs can harm animals.	Qualified biologists will perform surveys within ten days prior to project initiation. Red-legged frogs found in the project area will be avoided through rescheduling the activity, or the frogs will be temporarily held (no more than 12 hours) at the project site or moved to an unaffected area. (see section 5.3) To avoid breeding and larval frogs, spillway projects will only be performed when stream channel is dry or when pre-project surveys determine red-legged frog larvae are not present. EBMUD biologists will clean hands before touching animals to prevent contamination from foreign matter such as sunscreen.	

Table 5-1. ***Species-specific Avoidance and Minimization Measures (continued)***			
5.3.4 California Red-legged Frog (continued)			
Management Activity	**Potential Impact**	**Avoidance and Minimization Measures**	**Status on HCP Lands**
Control invasive plants Construct and maintain boundary fences Construct and maintain livestock fences and corrals Habitat restoration	May take red-legged frogs as they move through wet, grassy areas, between sources of water, or as they aestivate in uplands adjacent to breeding sites.	Frogs found during pre-project surveys will be allowed to move out of project area on their own, or will be excluded from the project area, captured and confined during the project and re-released on site, or will be relocated within the distance of a typical home range.	Federally Threatened. In perennial creeks and stockponds on watershed (Figure A-4).
Control non-native animals	May take red-legged frogs.	Bullfrog removal is done only after the red-legged frog breeding season. Bullfrog egg masses are removed when encountered.	
Construct and manage ponds, spring boxes, and troughs for grazing activities.	Repair of dams or removal of sediment or emergent plant growth may result in take of red-legged frogs.	Structural problems will be repaired; excessive sedimentation and emergent plant growth will be addressed using USFWS recovery plan guidelines. See also Section 5.3.	

Table 5-1. ***Species-specific Avoidance and Minimization Measures (continued)***			
5.3.4 California Red-legged Frog (continued)			
Management Activity	**Potential Impact**	**Avoidance and Minimization Measures**	**Status on HCP Lands**
Use Farm machinery Construct and manage fuel treatment areas and fuel breaks Prescribed burning Maintain fire roads Construct and manage trails, access roads, and recreation facilities	Heavy equipment operation may take red-legged frogs as they move through wet, grassy areas, between sources of water, or as they aestivate in uplands adjacent to breeding sites.	Mowing, discing, and grading within habitat areas will be conducted when dry except in emergency response to fires and discing related to agricultural operations.	Federally Threatened. In perennial creeks and stockponds on watershed (Figure A-4).
Conduct trench spoils placement and maintenance Conduct trench spoils removal	May decrease the quality of red-legged frog habitat (pool depth) by increased sedimentation from Upper San Leandro Reservoir trench spoils site.	Manage erosion control features through weekly inspection and maintenance during periods of rain from November-April.	
Vehicular access on watershed roads and trails	Vehicles may strike red-legged frogs.	See Section 5.2.	

Table 5-1. Species-specific Avoidance and Minimization Measures (continued)			
5.3.5 Western Pond Turtle			
Management Activity	**Potential Impact**	**Avoidance and Minimization Measures**	**Status on HCP Lands**
Manage spillways Habitat restoration	May take western pond turtles.	Qualified biologists will perform surveys within ten days prior to project initiation. Western pond turtles found in the project area will be avoided through project rescheduling or temporarily held using methods described in Section 5.3. If repaired ponds are dewatered, turtles will be moved to a sufficiently large nearby wetted habitat.	Unlisted. Federal Species of Concern. Present in perennial ponds and reservoirs (Figure A-5).
Control non-native animals	May inadvertently trap western pond turtles.	Traps are set to capture all turtles alive; traps are checked twice daily.	
Manage ponds	Repair of dams, removal of sediment, or emergent plant growth may result in take of western pond turtles. Handling western pond turtles can harm animals.	Turtles will be avoided during minor repair work by project rescheduling, or removed and held temporarily near the project site until the minor repair is complete. EBMUD biologists will clean hands before touching animals to prevent contamination from foreign matter such as sunscreen.	

Table 5-1. ***Species-specific Avoidance and Minimization Measures (continued)***			
5.3.5 Western Pond Turtle (continued)			
Management Activity	**Potential Impact**	**Avoidance and Minimization Measures**	**Status on HCP Lands**
Conduct trench spoils placement and maintenance Conduct trench spoils removal	Operation of heavy equipment may result in take of western pond turtles.	See Section 5.2.	Unlisted. Federal Species of Concern. Present in perennial ponds and reservoirs (Figure A-5).
Vehicular access on watershed roads and trails	Vehicles may strike western pond turtles.	See Section 5.2.	

Table 5-1. ***Species-specific Avoidance and Minimization Measures (continued)***			
5.3.6 Alameda Whipsnake			
Management Activity	**Potential Impact**	**Avoidance and Minimization Measures**	**Status on HCP Lands**
Control invasive plants Construct and maintain boundary fences Construct and maintain livestock fences and corrals Habitat restoration (prescribed burning)	May take Alameda whipsnakes.	Projects within core habitat areas will be completed without using heavy equipment.	Federally Threatened, State Threatened. Present in shrub habitats and near rock outcrops. Also uses grassland, riparian, and woodland habitats (Figure A-6).
Manage ponds, spring boxes, and troughs Use Farm machinery Construct and maintain fuel treatment areas and fuel breaks Maintain fire roads Construct and manage trails, access roads, and recreation facilities	Heavy equipment operation may take Alameda whipsnakes.	See Section 5.2. Projects will be suspended if Alameda whipsnakes are observed in project areas.	

Table 5-1. Species-specific Avoidance and Minimization Measures (continued)			
5.3.6 Alameda Whipsnake (continued)			
Management Activity	**Potential Impact**	**Avoidance and Minimization Measures**	**Status on HCP Lands**
Conduct livestock grazing	Grazing lessees may encounter whipsnakes during watershed projects.	All livestock grazing lessees will be trained in identification and avoidance of Alameda whipsnakes.	Federally Threatened, State Threatened. Present in shrub habitats and near rock outcrops. Also uses grassland, riparian, and woodland habitats (Figure A-6).
Vehicular access on watershed roads and trails	Vehicles may strike basking or hunting Alameda whipsnakes.	See Section 5.2.	

Table 5-1. Species-specific Avoidance and Minimization Measures (continued)			
5.3.7 Pallid Bat			
Management Activity	**Potential Impact**	**Avoidance and Minimization Measures**	**Status on HCP Lands**
EBMUD staff monitoring of species populations	May take pallid bats.	Monitoring will be conducted using video or sonic techniques.	California Species of Special Concern. One known nursery colony in Pinole Valley. (Figure A-7)
Conduct livestock grazing	Maintenance activities on barn may result in take of breeding or sheltering pallid bats.	See Section 5.2. Restrict maintenance activities on barn to periods when bats are absent.	

6 MITIGATION

6.1 GENERAL MITIGATION

The HCP Handbook does not establish rules for mitigation for selected species or habitat, but instead directs mitigation to be "adequate and consistent" regardless of whether USFWS or NMFS is responsible for the covered species. Accordingly, the handbook notes that mitigation includes, in addition to avoidance and minimization measures (Section 5):

1. Rectification through restoration and revegetation of disturbed areas;
2. Reduction or elimination of impacts over time; and,
3. Compensation for impacts by habitat restoration.

1. Rectification through restoration and revegetation of disturbed areas. For example, for fire disturbed areas post suppression restoration may include:

- Re-grading and contouring of control lines (particularly if line was constructed with a bulldozer)
- Seeding, strawing, or mulching the burn area
- Construction or installation of stormwater runoff diversion devises
- Construction or installation of sediment retention systems

Rectification is accomplished through the Biodiversity and Forestry programs (refer to Section 3), is done as part of the Livestock Grazing Program, or is specific to particular project impacts such as streambank disturbance. The Biodiversity Program promotes revegetation of denuded drainages that have resulted from over 100 years of area use for livestock grazing at levels that exceeded the current target levels from the RRMP (base RDM level of 840-1,400lbs/acre, depending on slope). The Forestry Program includes the selected removal of non-native trees such as Monterey pine and eucalyptus to enhance growth of underlying native vegetation such as bay trees and valley oaks. The Grazing Program element from the RRMP requires the maintenance of fencelines to exclude illegal trespass and allow for better pasture rotation.

2. Reduction or elimination of impacts over time. The grazing program element of the RRMP, as based on the East Bay Watershed Master Plan, significantly reduces the level of impacts from livestock management that has long been in place in the East Bay. Through changed grazing levels and management of watershed land for higher amounts

of residual dry matter (RDM), the general health of the watershed is improved. Native species continue to flourish under the new program, and covered species such as the red-legged frog, Alameda whipsnake, and pallid bat benefit indirectly from the improved management.

3. Compensation for impacts by habitat restoration. Habitat for covered species may be lost, such as when a pond dam fails and the pond no longer holds water. Such failures are expected; however, annual biological monitoring followed by directed fall rehabilitation efforts will result in a near end-of-year habitat equilibrium as pond failures are offset by restoration and maintenance of other ponds. Similarly, minor impacts which may occur during non-native forest thinning are compensated by the replacement of the non-native trees with native species within the understory. The native species, especially oaks, provide food and shelter to far more species than non-native trees such as eucalyptus.

6.2 SPECIFIC MITIGATIONS

Incidental take will be offset by mitigation programs and normal watershed maintenance designed to protect biodiversity.

6.2.1 Santa Cruz tarplant

1. Rectification through restoration and revegetation of disturbed areas: Since the experimental population at the Sather Canyon site (see Figure A-1) has been extirpated, no revegetation will be conducted. Measures under adaptive management, Section 8.2.1, to stimulate growth from fire-adapted seeds will be implemented.

2. Reduction or elimination of impacts over time: EBMUD will change the grazing level at sites to benefit the tarplant through first five years of permit.

3. Compensation for impacts by habitat restoration: Species may be currently extirpated from the watershed. No compensation is required for the Sather Canyon site. Adaptive management measures will be implemented if species is not observed (Section 8.2.1).

6.2.2 Pallid manzanita

1. Rectification will not be necessary under watershed activities, which will not impact the area. Suppression of wildfires may impact the site, but the species is fire-adapted and recruitment should be enhanced by the occurrence of fire.

2. Reduction or elimination of impacts over time: Pallid manzanita should be helped by removal of overhanging vegetation (see below). Shading of existing plants by competing vegetation may impact their health. Removal of overhanging madrone trees, a single very large (non-native) Monterey pine and bay trees will improve the survival of the small known pallid manzanita population (7-14 plants). It is unknown if this action will promote propagation, but it will improve the health of existing plants so propagation can occur when possible.

3. Compensation for impacts by habitat restoration: No watershed activities are scheduled for the area where pallid manzanita is located; therefore EBMUD is not proposing any compensation for impacts.

6.2.3 Rainbow trout

1. Rectification through restoration and revegetation of disturbed areas: Measure 3 (below – fencing of perennial streams) will induce restoration and revegetation through reduced livestock impacts.

2. Reduction or elimination of impacts over time: EBMUD will fence the Pinole Creek riparian zone to reduce impacts to *O. mykiss* habitat from watershed grazing (e.g., removal or disturbance of the riparian zone, and sedimentation into creeks). However, impacts will be determined each fall. If damaged areas are identified (e.g., downed fence, exclusion is ineffective), they will be addressed at the damaged site(s) and mitigated by restoration (see below). Fencing along perennial streams in the Upper San Leandro Reservoir drainage, including Buckhorn, Indian, Kaiser, Moraga, San Leandro, and Redwood creeks is part of the grazing program under the WMP, and will be maintained in order to minimize sedimentation into the creeks and the future disturbance of *O. mykiss* spawning gravel.

3. Compensation for impacts by habitat restoration: Habitat restoration will occur as a result of fencing and, if necessary, measures from adaptive management (refer to Section 8.2.3). Loss of riparian vegetation due to covered EBMUD watershed activities will require revegetation of the impacted area or an area of equal size within 152 meters (approximately 500 feet) on the same stream.

6.2.4 California red-legged frog

1. Rectification through restoration and revegetation of disturbed areas: Annually in July/August, red-legged frog habitat will be compared with the previous year. Reduction of habitats due to watershed management activities will be addressed and mitigated. Ponds will be examined for habitat suitability and repaired or enhanced as needed to maintain their function as habitat for red-legged frogs (refer to Section 8.2.4).

2. Reduction or elimination of impacts over time: Fencing of perennial watershed creeks will improve habitat for red-legged frogs over time. Riparian vegetation may increase in fenced areas if no longer available to livestock.

3. Compensation for impacts by habitat restoration: Watershed pond monitoring and maintenance will result in continuation of red-legged frog habitat in spite of temporary losses due to dam failure, slumping, sedimentation, or other pond habitat loss.

6.2.5 Western pond turtle

1. Rectification through restoration and revegetation of disturbed areas: Enhancement Ponds 11, 22, 28, 62, and 85, (Simas Pond, Nunes Pond, Nunes Lagoon, Inspiration Pond, and Baby Bottle Pond respectively) (Stebbins 1996) will be inspected each year. Loss of pond integrity in these known key turtle habitats shall be addressed by EBMUD each fall during its annual pond maintenance activities.

2. Reduction or elimination of impacts over time: Boundary fencing (Section 3.2.1.6) will limit human impacts during the course of the permit.

3. Compensation for impacts by habitat restoration: If surveys of these five turtle ponds show that one or more are damaged or have lost their integrity, impacts will be rectified or compensated by constructing a similar pond within the same drainage with comparable wildlife habitat. If turtle basking sites are lost, new basking sites will be constructed and installed. Observation of two platforms filled with basking turtles on three occasions, or two full platforms with additional turtles in the water will require the installation of a third basking platform. No more than three basking platforms will be installed at any pond.

6.2.6 Alameda whipsnake

1. Rectification through restoration and revegetation of disturbed areas: primary Alameda whipsnake habitat (i.e., mature coastal scrub or chaparral: core habitat) will be tracked during the HCP using a Geographic Information System (GIS) program. Some natural variance will occur from year to year. However, a sustained three-year loss resulting in combined removal of 1% of Alameda whipsnake core habitat (cumulative 34 hectares or 84 acres) due to natural variation and watershed activities (other than approved prescribed burning) will be mitigated within three years of reported habitat loss. As mitigation, scrub and/or chaparral habitat will be allowed to encroach in areas away from urban interface until habitat volume has recovered. This rectification does not include damage from wildfires.

2. Reduction or elimination of impacts over time: Education programs and speed limits will reduce impacts to Alameda whipsnakes.

3. Compensation for impacts to coastal scrub and chaparral habitat: All impacts are anticipated to be temporary (1-3 years) and less than a total of 34 hectares (84 acres). Natural coastal scrub encroachment on grassland habitats as modified by the grazing program will compensate for these minor losses over time, therefore further compensation is not required.

6.2.7 Pallid bat

1. Rectification through restoration and revegetation of disturbed areas: None suggested other than maintenance of moderate grazing level as outlined in the RRMP (2001).

2. Reduction or elimination of impacts over time: Grazing lessees and Bay Area Ridge Trail Users will be prohibited from using the April Creek barn for storage or other activities. No other impacts currently identified.

3. Compensation for impacts by habitat restoration: The April Creek barn is abandoned, and may fail during the course of the permit. It will be braced as feasible to preserve it. A habitat structure designed for pallid bats will be placed within the area near the barn. If the barn fails or is destroyed more rapidly such as by fire, earthquake, or vandalism, the new habitat structure will already be available for use by the bats.

7 MONITORING

7.1 MONITORING

Monitoring for this HCP is comprised of *Compliance Monitoring*, monitoring to verify compliance with HCP agreement terms; and *Effectiveness Monitoring*, monitoring to determine if the HCP and its components are having the desired effects (achieving biological goals and objectives).

7.1.1 COMPLIANCE MONITORING

Compliance monitoring will ensure that the terms and conditions of the HCP are being followed. Anticipated terms and conditions fall under the general categories of funding, reporting, and policy implementation.

Implementation of the HCP will be funded through EBMUD's annual operating budget. The budget will be routinely monitored to ensure that individual mitigation and monitoring components covered by the agreement are adequately funded. Additionally, annual staffing plans will be developed and reviewed to ensure that adequate FTE (full time employee) support is available to comply with the terms and conditions of the HCP.

Annual review of reporting requirements and actions will be conducted to ensure that all reporting measures included in the HCP are being met. Reporting requirements include updates on incidental take, sightings of new ESA species or populations (covered or not by this HCP), and habitat measurements or estimations as required.

The HCP and associated agreements call for a number of programs (education, monitoring, regulatory) to be implemented. Annual review will be done for each of these programs to ensure they are implemented properly and are effective. Educational programs will be reviewed to confirm that up-to-date materials are available for all staff operating on covered watershed lands. Records will be kept and inspected to confirm that all staff required training as stipulated in the HCP is completed. Annual reviews of HCP related monitoring projects will be conducted to ensure all components are addressed as required. Regulatory aspects of the HCP will be reviewed annually to confirm their effectiveness. Examples include, but are not limited to, vehicle speed guidelines, implementation of appropriate BMPs and AMMs, and submission of sensitive species records to the California Natural Diversity Data Base (CNDDB).

7.1.2 EFFECTIVENESS MONITORING

Effectiveness monitoring is intended to evaluate the effects of the permitted action and to determine if the HCP is achieving the biological goals and objectives. The effectiveness monitoring program is designed to address and/or answer the following:

- Account for incidental take occurring in conjunction with permitted activities
- Species status (report of presence, reproduction)
- Habitat condition
- Changes in habitat availability
- Progress in achieving biological goals
- Fulfillment of mitigation objectives

The following sections describe the effectiveness monitoring plans for each of the covered species. This material is shown also in Table 7-1.

7.1.2.1 Santa Cruz tarplant

Determine Species Locations. There is one experimental stand of Santa Cruz tarplant in the HCP area (Figure A-1). From a peak of 3000 plants in 1988 five years after it was introduced, the high number for this stand during the 1990s was 100 in 1995 & 1996. Santa Cruz tarplants have not been observed on the watershed since 1997. This population site will be annually surveyed for the first three years of the ITP in June or, depending on weather patterns, during the period most favorable to discovery.

Report HCP species occurrences. The Santa Cruz tarplant site will be monitored and any plants found will be counted, their condition assessed, and adaptive management strategies developed if necessary. Results will be reported annually.

Determine change in total covered plant species numbers related to covered activities. The Santa Cruz tarplant grazed area will be monitored for residual dry matter to determine if there is excessive thatch that may prevent germination. Monitoring results will be reported monthly from March through June to EBMUD Natural Resources, and then annually to the Service for two years following a prescribed burn of the experimental population area.

Determine *efficacy of species specific enhancement measures.* Monitor Santa Cruz tarplant experimental sites during first three years of permit to determine the baseline population. Monitor annually to determine if Santa Cruz tarplant numbers are improved

under the HCP. Adaptively manage (i.e., burn area) if species not found (refer to Section 8.2.1). The six-year report to USFWS will contain results of adaptive management efforts. If at the six-year report Santa Cruz tarplant has not been found in the known area, the species will not have been observed for over 13-yrs and it will be presumed extirpated from the known 1983 experimental site.

TABLE 7-1. EBMUD HCP Effectiveness Monitoring Summary			
	Santa Cruz tarplant	**Pallid Manzanita**	***O. mykiss***
Determine Species Habitat	One experimental stand in HCP area (Figure A-1). Surveyed annually in June or period most favorable to discovery under RRMP for the first two years.	The EBMUD watersheds support one population of pallid manzanita (Figure A-2).	There is approximately 5.3 km (3.2 mi) of resident *O. mykiss* habitat in HCP area on Pinole Creek (Figure A-3) and approximately 25 km (15.5 mi) on EBMUD lands above USL.
Report HCP Species Occurrences	Experimental site will be monitored for presence, any plants counted, condition assessed, and adaptive management strategies developed if necessary. Results reported annually	Known location surveyed every two years in Oct-Nov and results reported. Plants counted, condition assessed, and management strategies adjusted. Six-year report with discussion PM population health within East Bay. Adaptive management suggested.	Monitoring on Pinole Creek will consist of: 1) ID extent of *O. mykiss* spawning, rearing, and holding habitat, including water temp, within Pinole creek within the first 3-yrs of implementation. Verify integrity of exclusion fencing; 2) Monitor again after 2-yrs & 5-yr intervals. Monitoring for irideus in streams above USL will consist of: 3) ID extent of O. m. irideus spawning, rearing, and holding habitat, including water temp, within Buckhorn, Indian, Kaiser, Moraga, and San Leandro creeks within first 3-yrs of implementation. Note integrity of riparian exclusion; 4) Monitor again after 2-yrs & 5yr intervals.
Determine Change in Total Species Habitat	The SCTP grazed area monitored RDMs to determine if thatch may prevent germination. Report results and adaptively manage to benefit species.	Report any impacts on PM from covered EBMUD watershed activities	Note and report unmaintained fences, siltation and sources (if known), and estimated change in habitat at three year intervals.
Determine Efficacy of Species Enhancement	Monitor experimental sites during first three permit years to determine baseline population. Monitor annually to determine if SCTP numbers improved under HCP. If no plants found during the first two years of permit, a control burn will be done to stimulate germination. Monitoring to continue for three years. Six-year report to have results of burn and subsequent SCTP recruitment. If SCTP not found by six years, population will be presumed extirpated.	If wildfire at the USL Big Burn peninsula area, introduce PM seeds or seedlings into burned site. Monitor new plants annually. Monitoring stopped if plants extirpated before flowering. Monitor after flowering through course of permit.	Monitor spawning trends of wild trout in EMBUD creeks.

TABLE 7-1. EBMUD HCP Effectiveness Monitoring Summary (Continued)				
	California Red-legged Frog	**Western Pond Turtle**	**Alameda whipsnake**	**Pallid Bat**
Determine Species Habitat	California red-legged frogs are found in the Pinole Valley, San Pablo, Briones and USL watersheds (Figure A-4).	WPT habitat on Lafayette, San Pablo, Briones, and Upper San Leandro reservoirs and in ponds with adequate habitat components throughout north watershed. Ponds include 11, 22, 28, 62, and 85 (as ID'd in Stebbins 1996) (Figure 3-1).	Monitoring to be habitat-based. Coordinate with USFWS approved biologist to assess AWS core, forage, and movement habitats in plan area. Results of assessment entered in GIS as baseline occurrence within two years. Dispersal cover annually measured in grazed pastures.	One pallid bat nursery colony (Figure A-7). Other pallid bat colonies discovered will be noted in the GIS species database and added to monitoring program when discovered.
Report HCP Species Occurrences	Monitor habitat and presence of CRLF populations prior to specific watershed activities using appropriate protective methods as shown in Sections 3 & 5, and annually monitor permanent ponds in Fig A-4.	Turtle counts done in habitat ponds (see Appendix A & Figure A-5). Potential habitats surveyed with project-related CRLF monitoring. Turtles counted, non-native species noted, habitat value determined based on known WPT habitat preferences.	Monitoring is habitat based to reduce incidental take from harassment. Results of pasture monitoring will report passage habitat annually. Whipsnake habitats adjacent to or within project areas also assessed, and results added to GIS.	Staff to monitor colony and others as discovered annually and within 30 days prior to any project within 152 meters (500 feet).
Determine Change in Total Species Habitat	Monitor CRLF habitat components, including pond integrity, fencing, and presence of non-natives in stockponds and other known sites every 2-yrs. Measure Residual Dry Matter (RDMs) on watershed to determine if grazing management is within goals.	Known WPT ponds surveyed for structural integrity.	EBMUD will obtain new aerial photographs every six years as available to compare whipsnake habitat total area to baseline habitat assessment, and vegetation coverage for AWS core habitat will be updated (five updates during 30-year permit).	Colony size estimated before and after planned mitigation (off-season structural reinforcement of existing barn), and reported during first subsequent annual report, then during five year reports.
Determine Efficacy of Species Enhancement	Monitor ponds after non-native species removal to determine use by CRLF. Determine if grazing management is within goals.	Monitor use of artificial WPT basking habitats. RRMP monitoring to record RDMs on watershed to determine if grazing management is within plan goals. Survey supplemental nesting substrate for WPT nests.	Perform GIS database modeling to determine extent of AWS core habitat. Obtain new aerial photos of HCP watershed area every six years throughout the permit, and update vegetation layer through available aerial photography to compare with previous data every six years. Report change in total core habitat and relate to management activities.	Record presence of pallid bats at know nursery colony for first 2-yrsof permit. Record pallid bat presence during breeding season and nursery period to determine effectiveness of the maintenance activities on April Creek Barn.

7.1.2.2 Pallid Manzanita

Determine Species Locations. Determine likely pallid manzanita sites on EBMUD east bay watershed property based on the species life history (Appendix A) and other known occurrences in the East Bay (Kanz 2004).

Report HCP species occurrences. The EBMUD watersheds support one population of pallid manzanita (Figure A-2). This population has been generally declining. A local creek group surveyed fifteen East Bay populations in 2004 and reported that pallid manzanita numbers at the EBMUD site has dropped from 25 in 1985 to 7 stunted adult plants in 2004. The poor health was attributed to shading from a maturing forest (Kanz 2004). EBMUD surveyed this location in June 2006 and found only 4 adult plants and four juvenile plants. All appeared stressed (Lake 2006). This location will be surveyed by EBMUD staff every two years during October-November and the results included in the annual report to USFWS. The plants will be counted, the condition of the plants assessed, and management strategies adjusted as necessary. The five-year report will contain a discussion of the health of the pallid manzanita population relative to its recent historical numbers and other East Bay populations, and suggested adaptive management.

Determine change in total covered plant species numbers related to covered activities. Report any impacts on pallid manzanita from covered EBMUD watershed activities.

Determine *efficacy of species specific enhancement measures.* During the biannual surveys of the pallid manzanita site, EBMUD will monitor the health of the plants and the efficacy of removing or trimming the surrounding vegetation.

7.1.2.3 Oncorhynchus mykiss

Determine Species Habitat. There are approximately 5.3 km (3.2 miles) of resident *O. mykiss* habitat in the HCP area on Pinole Creek (Figure A-3) and approximately 25 km (15.5 miles) of resident *O. mykiss* habitat on EBMUD lands above Upper San Leandro Reservoir. Habitat will continue to be monitored as outlined below.

Report HCP species occurrences.

Monitoring for species occurrence on Pinole Creek will consist of the following:

1. Identify the extent of *O. mykiss* spawning, rearing and holding habitat, including water temperature using thermographs from spring through fall within Pinole Creek on EBMUD land within the first three years of implementation of this

HCP. Habitat will be mapped using guidelines outlined in California Salmonid Stream Habitat Restoration Manual (Flossi and Reynolds 1994). Verify the integrity of the Pinole Creek exclusion fencing.

2. Habitat within the creek on EBMUD land will be remapped at five-year intervals.

3. Surveys to determine presence and/or absence of *O. mykiss* will be conducted yearly at fixed reference sites within Pinole Creek on EBMUD lands.

Monitoring for species occurrence in streams above Upper San Leandro Reservoir will consist of the following:

1. Identify the extent of *O. mykiss irideus* spawning, rearing, and holding habitat, including water temperature using thermographs from spring through fall, within Buckhorn, Indian, Kaiser, Moraga, Redwood, and San Leandro creeks on EBMUD property within the first three years of implementation of this HCP. Habitat will be mapped using guidelines outlined in California Salmonid Stream Habitat Restoration Manual (Flossi and Reynolds 1994). Verify the integrity of the riparian exclusion fencing.

2. Habitat within these creeks on EBMUD land will be remapped at five-year intervals.

3. Surveys to determine presence and/or absence of *O. mykiss* will be conducted yearly at fixed reference sites within the USL creeks on EBMUD lands.

Determine change in total species habitat related to covered activities. Note and report estimated change in habitat at three year intervals, paying particular attention to changes in riparian vegetation and spawning habitat.

Determine *efficacy of species specific enhancement measures*. Monitor *O. mykiss* spawning in Pinole Creek, and compare to *O. mykiss* spawning in Wildcat Creek (if data available).

7.1.2.4 California Red-legged Frog

Determine Species Habitat. California red-legged frogs are found in the Pinole Valley, San Pablo, Briones, and Upper San Leandro reservoir watersheds of the HCP area (Figure A-4). Other potential habitats will be determined based on the species life history (Appendix A).

Report HCP species occurrences. A qualified biologist will monitor for habitat and presence of the California red-legged frog populations prior to specific watershed activities using appropriate protective methods, including those outlined in Sections 3 and 5, and will annually monitor within perennial ponds as shown in Figure A-4.

Determine change in total species habitat related to covered activities. Qualified EBMUD staff will also monitor red-legged frog habitat components, including pond integrity, integrity of protection fencing, and the presence of non-native species in stockponds and other known red-legged frog sites every two years. RRMP monitoring will measure Residual Dry Matter (RDM) on watershed to determine if grazing management is within plan goals of light to moderate grazing levels.

Determine efficacy of species specific enhancement measures. Monitor ponds subsequent to complete bullfrog removal efforts to determine use by red-legged frogs. Use RRMP monitoring results (measure of RDM on watershed, see above) to determine if grazing management is within plan goals of light to moderate grazing levels.

7.1.2.5 Western Pond Turtle

Determine Species Habitat. Suitable western pond turtle habitat is found on Lafayette, San Pablo, Briones, and Upper San Leandro reservoirs and in ponds with adequate habitat components throughout the north watershed. These ponds include pond numbers 11, 22, 28, 62, and 85, (Simas Pond, Nunes Pond, Nunes Lagoon, Inspiration Pond, and Baby Bottle Pond respectively) (Figure A-5) (Stebbins 1996). Other potential habitats will be determined based on the species life history (Appendix A).

Report HCP species occurrences. Pre-project surveys (turtle counts) will be performed by a qualified biologist in western pond turtle habitat ponds (see Appendix A). Other potential habitats will be surveyed concurrent with project-related and biannual red-legged frog monitoring. Turtles will be counted, presence of non-native species noted, and habitat value will be determined based on the presence of known habitat components for western pond turtles.

Determine change in total species habitat related to covered activities. Known turtle ponds will be surveyed for structural integrity during red-legged frog surveys (refer to Section 7.1.2.4 above).

Determine *efficacy of species specific enhancement measures*. Monitor use of artificial western pond turtle basking habitats. Survey supplemental nesting substrate for western

pond turtle nests. Seven turtle basking habitats, designed for durability and to facilitate turtle access and escape, have been installed in perennial stockponds with great success. EBMUD will install additional habitats at the remaining potential sites and will maintain them to facilitate counting the animals.

7.1.2.6 Alameda whipsnake

Determine Species Habitat. Monitoring for whipsnakes will be habitat-based. EBMUD staff will coordinate with a qualified biologist to perform an assessment of Alameda whipsnake core habitats within the HCP area (Figure A-6). Results of this habitat assessment will be entered into the EBMUD GIS as a baseline whipsnake habitat/occurrence map, and provided to USFWS and CDFG within two years of the implementation of this HCP.

Determine quality of covered species habitat. Capture of whipsnakes will harass this covered species disproportionately to the expected level of incidental take. Habitat monitoring will therefore substitute for species numbers. Yearly monitoring (measuring residual dry matter (RDM)) will be used in grazed areas to assess the condition of California grassland habitat that may be used by Alameda whipsnake or its prey species. Depending on slope the goal RDM is between 800lbs and 1,400lbs. Whipsnake habitats adjacent to or within project areas will be assessed for habitat components, and the results will be added to the GIS.

Determine change in total species habitat related to covered activities. EBMUD will obtain new aerial photographs as available within six years of the analysis, or from contracted aerial photography, to compare whipsnake habitat total area as defined in the Draft Recovery Plan for Chaparral Species (USFWS 2002) to the baseline habitat assessment every six years; and vegetation coverage for Alameda whipsnake core habitat (USFWS 2002) will be updated (a total of five updates during the 30-year permit). Critical habitat as designated in 2006 lies within these areas and will be included in the assessments (71 Federal Register 26311).

Determine *efficacy of species specific enhancement measures*. Perform GIS database modeling to determine extent of Alameda whipsnake core habitat. Update vegetation layer through available aerial photography to compare with previous data every six years. Report change in total core habitat related to management activities.

7.1.2.7 Pallid Bat

Determine Species Habitat. One pallid bat nursery colony is known to occur in a barn located in Pinole Valley (Figure A-7). Other pallid bat colonies will be noted in the GIS species database and added to the monitoring program as they are discovered.

HCP species occurrences. Qualified biologists will visually monitor this colony and any other discovered pallid bat nursery sites annually and within 30 days prior to any project within 152 meters (500 feet). The colony(ies) will be video monitored every two years.

Determine change in total species habitat related to covered activities. Colony size will be estimated before and after planned mitigation (off-season structural reinforcement of existing barn or installation of bat boxes), and reported during first subsequent annual report, then during five year reports.

Determine efficacy of species specific enhancement measures. Record presence of pallid bats at known nursery colony for first two years of permit. Record pallid bat presence during breeding season and nursery period to determine effectiveness of mitigation measures on the April Creek Barn. Surveys will be continued every two years for permit term.

7.2 REPORTING

EBMUD reports to USFWS and CDFG will consist of the following:

1. Annual reports due in November that:
    a. update covered species status,
    b. summarize project monitoring (compliance monitoring),
    c. report on effectiveness of protection measures (effectiveness monitoring),
    d. report on incidental take of species, if applicable,
    e. report on adaptive management, where applicable.
2. Three year (due June 2011) and six year (due June 2014) HCP status reports, followed by reports every five years (due June of each of the following years; 2019, 2024, 2029, 2034) that:
    a. summarize annual reports;
    b. update GIS species location maps;
    c. report on effectiveness of protection measures;

d. measure HCP species habitat;

e. report on incidental take of species, if applicable;

f. report on adaptive management, where applicable;

g. report on covered species habitat enhancement efforts.

8 ADAPTIVE MANAGEMENT

8.1 ADAPTIVE MANAGEMENT

An adaptive management process that follows species progress and the effectiveness of various avoidance, minimization, and mitigation measures is an important element of any watershed management plan. The USFWS HCP five-point policy suggests adaptive management where species may benefit as a strategy to assure HCP effectiveness. An adaptive management approach allows for up-front, mutually agreed-upon changes in operating conservation plans that may be necessary for the species in light of new information. In order to be successfully implemented, adaptive management provisions are linked to measurable biological goals and monitoring. EBMUD personnel responsible for monitoring and research will continually evaluate, and if necessary recommend necessary modifications to management practices. Resource management personnel will review results of ongoing monitoring programs and revise management practices as needed to meet or exceed the goals of watershed management implementation plans.

The EBMUD-HCP adaptive management plan incorporates the four elements USFWS recommends for adaptive management strategies in an HCP (65 FR 35252):

- Identify uncertainties and the questions that need to be addressed to resolve the uncertainties.
- Develop alternative strategies and determine which experimental strategies to implement.
- Integrate a monitoring program that is able to detect the necessary information for strategy evaluation.
- Incorporate feedback loops that link implementation and monitoring to a decision-making process.

EBMUD will implement the following adaptive management practices:

- All adaptive management practices including monitoring, reporting as described in Section 7, and remedial provisions as described in Sections 3, 5, and 6 will be observed.
- To ensure effectiveness of the HCP, adaptive management prescriptions will be revised and incorporated into the HCP based on biannual evaluations. The evaluations will review the HCP status and make recommendations regarding the various HCP components and covered species. Trigger points are shown below.

8.2 SPECIES ADAPTIVE PROTECTION MEASURES

The effectiveness of protection measures for covered species based on monitoring results will be summarized and reviewed. If needed, recommendations for adjustments to species protection measures will be developed. The following table shows situations and trigger points that will require a response from EBMUD. Cost estimates will be adjusted for each budget cycle based on the SF Bay Area average Consumer Price Index.

Table 8-1.
EAST BAY HCP ADAPTIVE MANAGEMENT

SPECIES	CIRCUMSTANCE TO TRIGGER ADAPTIVE MANAGEMENT	RESPONSE ACTION	SCHEDULE AND PRELIMINARY COST ESTIMATES
8.2.1 Santa Cruz Tarplant	Monitoring germination of Santa Cruz tarplant. Fails to germinate within 3 years (i.e., no plants found by three year report). (See Appendix A for discussion of Santa Cruz tarplant seed germination.)	Explore germination enhancement - Area within 61 meters (200 feet) of known experimental site of introduction (1.8 hectares or 4.5 acres) will be burned to stimulate germination. Adjust management of area to reduce potential competition with other species.	Burn within two years of deadline. Cost: $150.00, plus labor and use of equipment. If no plants germinate after two years, the population will be presumed extirpated.

Table 8-1. EAST BAY HCP ADAPTIVE MANAGEMENT (continued)			
SPECIES	**CIRCUMSTANCE TO TRIGGER ADAPTIVE MANAGEMENT**	**RESPONSE ACTION**	**SCHEDULE AND PRELIMINARY COST ESTIMATES**
8.2.2 Pallid Manzanita	Population at known site continues to deteriorate (two years consecutive population count) by more than 50% from start of HCP. No new sites are found on watershed.	Introduce pallid manzanita seeds or seedlings into the Big Burn peninsula area of Upper San Leandro Reservoir following a watershed fire. Identify other areas on watershed where pallid manzanita may be introduced successfully.	Enhancement sites planted within one year after wildfire at cost of materials and labor. Success of enhancement site reported to USFWS and CNPS.
8.2.3 Rainbow trout	No *O. mykiss* spawning observed in USL drainages on EBMUD watershed lands.	Install up to 10 cubic meters of spawning gravel as necessary on USL drainages to provide *O. mykiss* spawning habitat. If no *O. mykiss* spawning observed after treatment during a five year period containing normal and above normal water year types based on rainfall, EBMUD is not required to repeat the action.	Compete within two years. Cost: $ 5,000 for materials and additional labor cost for permitting and gravel placement.

Table 8-1. EAST BAY HCP ADAPTIVE MANAGEMENT (continued)			
SPECIES	**CIRCUMSTANCE TO TRIGGER ADAPTIVE MANAGEMENT**	**RESPONSE ACTION**	**SCHEDULE AND PRELIMINARY COST ESTIMATES**
8.2.4 California Red-legged Frog	California red-legged frog available habitat drops 10% in three successive years for a total of 27% of total known habitat at start of HCP (i.e., a total of 10% of ponds or other habitat is lost for three years, despite adjusting for water year type).	Review EBMUD operations to determine if EBMUD permitted activities are the cause (as reviewed from annual report by USFWS). If yes, adjust identified EBMUD operations to limit impacts and implement the following: 1. Restore damaged stock ponds as necessary to recover lost habitat. 2. Monitor new ponds for presence of red-legged frog habitat components. 3. Monitor frog presence in new and existing ponds. 4. Include element in educational program addressing new information or policy.	Finish half within one year and complete within two years of identification of adaptive management trigger. Restoration done at cost of labor and materials for review, implementation, and monitoring. New educational materials printed at cost of development and production.

Table 8-1. EAST BAY HCP ADAPTIVE MANAGEMENT (continued)			
SPECIES	**CIRCUMSTANCE TO TRIGGER ADAPTIVE MANAGEMENT**	**RESPONSE ACTION**	**SCHEDULE AND PRELIMINARY COST ESTIMATES**
8.2.5 Western Pond Turtle	A) Turtle population within the local watershed as measured by largest turtle basking counts falls by 20% within three years.	Evaluate predation during turtle nesting. Provide nesting substrate at up to three sites where reproduction not observed.	Within two years. Cost: $3,000 for labor. Within six months of determination. Cost: $2,500 for materials. Two days of staff time for substrate placement.
	B) Overall turtle population within the local watershed as measured by maximum basking counts falls by 20% within five years due to natural causes	Install fencing and signage at turtle ponds accessible to public. Investigate for disease or other cause for decline in local turtle population. If dead turtles are found, a representative sample will be analyzed for disease. Control measures will be developed and implemented.	Within one year at cost of materials and labor. Study done at cost of analysis, staff labor, and development of control measures up to $2,500. Control measures implemented at cost of materials and staff education.
	C) Illegal turtle harvest identified.	Report to CDFG and EBRPD enforcement. EBMUD will coordinate with agencies as necessary to limit further illegal activity.	Additional staff labor for agency coordination and within ongoing Joint Powers Agreement with EPRPD Police

Table 8-1. EAST BAY HCP ADAPTIVE MANAGEMENT (continued)			
SPECIES	**CIRCUMSTANCE TO TRIGGER ADAPTIVE MANAGEMENT**	**RESPONSE ACTION**	**SCHEDULE AND PRELIMINARY COST ESTIMATES**
8.2.6 Alameda Whipsnake	Alameda whipsnake habitat as defined in the Draft Recovery Plan for Chaparral Species (2002) falls by more than 1% of original acreage identified in initial watershed mapping due to EBMUD activities.	Contact with USFWS to review management to recover lost habitat. Develop improved minimization measures and recovery plan. New information on Alameda whipsnake and other species will be included in the species education program.	Contact within one year of reaching trigger point. Improved AMMs incorporated in education program and Natural Resource Supervisors notified to inform staff within one month. Cost of staff time to complete management tasks.
8.2.7 Pallid Bat	Known nursery colony not observed for two years within extant structure(s).	Examination of nursery colony area to determine possible causes. Extirpation of non-indigenous predator species such as opossum, or black or Norway rats from nursery colony.	Implement before following expected seasonal occurrence of bats. Contract labor cost not exceeding $3,000.00.

9 CHANGED/UNFORSEEN CIRCUMSTANCES

9.1 INTRODUCTION

This section discusses the procedures to be used to deal with changed circumstances and unforeseen circumstances that may arise during the implementation of the HCP. It also discusses and outlines processes for changing or amending the HCP as required, and discusses assurances to be provided to EBMUD.

9.2 ASSURANCES REQUESTED BY EBMUD

9.2.1 Regulatory Assurances

Pursuant to section 10(a)(1)(B) and the implementing regulations, the USFWS provides assurances to HCP participants and subsequent ITP permit holders that no additional mitigation will be required once the permit is final for unforeseen circumstances that might occur and otherwise require such actions absent the consent of the permittee. These assurances are available if a permittee is properly implementing an approved HCP, and ensure that no further financial or resource commitments will be required by the federal agencies in the event of unforeseen circumstances. *Properly implemented*, means that the commitments of the HCP have been carried out.

Each covered species in the HCP has been treated as if it were listed under the ESA. EBMUD requests that all the covered species addressed in this HCP are included on the ITP. Take of listed plants is not prohibited under the ESA and cannot be authorized under a Section 10(a)(1)(B) permit. The pallid manzanita and Santa Cruz tarplant are proposed to be included on the ITP in recognition of the conservation benefits provided for them under the HCP. These plants would receive no surprises assurances under the “No Surprises” regulation (63 FR 8859).

The No Surprises Regulation requires potential changed circumstances to be identified in the HCP along with measures that would be taken by EBMUD to respond to these changes. EBMUD requests regulatory assurances for all covered species in this HCP.

9.2.2 Changed Circumstances

Changed circumstances are defined as those circumstances affecting a species or geographic area covered by the HCP that can be reasonably anticipated by EBMUD or the permitting agencies and to which the parties can plan a response. Potential changed

circumstances are identified in the HCP along with remediation measures to be taken by the permittee. The changed circumstances that could occur during the course of the permit have been identified and listed below.

9.2.2.1 Changed Circumstances Relevant to Listing of Species

1. Circumstance

A species found in the HCP area is federally listed as threatened or endangered and is added to the covered species.

2. Actions to Minimize Circumstance/Hazard

EBMUD will research and implement take avoidance measures for the newly listed species, including educating staff and others of the change.

3. Response Action

EBMUD will apply for an amendment to the HCP. If there is potential incidental take from EBMUD watershed activities and the species is not already addressed, EBMUD will request to add the organism as a covered species.

4. Schedule and Preliminary Cost Estimate

Within 1 month of listing. Cost estimate: $15,000 of staff time.

9.2.1.2 Changed Circumstances Relevant to Non-Native Plant and Animal Species.

1. Circumstance

A detrimental non-native species (i.e., Mississippi diamondback watersnake *Nerodia rhombifera*) is documented in known covered species habitat (e.g., bass found in Simas Pond).

2. Actions to Minimize Circumstance/Hazard

EBMUD surveyors will note the presence of non-native or feral species during all pond, riparian, or aquatic species monitoring. They will implement a non-native species removal program at the most effective period within one year.

3. Response Action

EBMUD will develop, fund, and implement a control plan for the non-native species.

4. Schedule and Preliminary Cost Estimate

EBMUD will develop a plan within one month of documented covered species predation. The plan will be implemented at a time judged to be most efficacious for removing the non-native species. Cost estimate: $5,000 per occurrence.

9.2.1.3-A Changed Circumstances as a Result of Wildfire

1. Circumstance

The watershed is denuded of vegetation when wildfire burns landscape area smaller than 33.4 hectares (100 acres) (see Table 9.1 for fire history).

2. Actions to Minimize Circumstance/Hazard

EBMUD will perform an immediate survey of wildlife mortality from fire and report covered species mortality to USFWS.

3. Response Action

EBMUD will monitor for effects of wildfire on covered species. EBMUD will remap the vegetation layer within the area burned by the fire for their GIS database to show change in seral stage and habitat.

4. Schedule and Preliminary Cost Estimate

EBMUD will remap and implement the other measures within 1 year of a wildfire. Time estimate: 50-100 hours for botanist or equivalent worker.

9.2.1.3-B Changed Circumstances as a Result of Wildfire

1. Circumstance

Wildfire results in denuded landscape.

2. Actions to Minimize Circumstance/Hazard

EBMUD will immediately implement erosion control measures specific to a wildfire denuded landscape, including reseeding. EBMUD will adjust their watershed activities to minimize erosion until vegetation has become re-established.

3. Response Action

EBMUD will review its long-term use of the affected landscape to minimize erosion and promote increased biodiversity.

4. Schedule and Preliminary Cost Estimate

These actions will occur within 1 year of a wildfire.

Cost estimate: $25,000 for labor and materials.

9.2.1.3-C Changed Circumstances as a Result of Wildfire

1 Circumstance

Pond habitats lost during wildfire

2. Actions to Minimize Circumstance/Hazard

EBMUD will perform a post-fire analysis of pond structural integrity within five working days of the conclusion of the wildfire.

3. Response Action

EBMUD will schedule and repair damaged ponds as necessary before the succeeding rainy season.

4. Schedule and Preliminary Cost Estimate

EBMUD will do damage repair before subsequent November at cost of labor, machinery rental, and materials.

9.2.1.3-D Changed Circumstances as a Result of Wildfire

1. Circumstance

April Creek Barn with pallid bat roost is destroyed by fire.

2. Actions to Minimize Circumstance/Hazard

EBMUD will research bat house designs to determine one that may work for pallid bats. EBMUD will order construction of bat houses from their carpenter shop.

3. Response Action

EBMUD will install bat houses sufficient to hold 200 bats within 75 feet of the April Creek barn site. EBMUD will monitor the site and report annually to USFWS. If artificial bat habitats are used, bat houses may be increased in size or number as necessary up to a capacity of 500 bats.

4. Schedule and Preliminary Cost Estimate

EBMUD will construct, install, and monitor bat houses at estimated materials cost of $1,000. Installation will be done by EBMUD.

9.2.1.4-A Changed Circumstances in Habitat Relevant to Storms, Drought, and Earthquake

1. Circumstance

EBMUD may remove trees that are dead or damaged due to cold (eucalyptus), or disease (pitch canker, Sudden Oak Death, etc.).

2 Actions to Minimize Circumstance/Hazard

EBMUD will identify the cause of the tree die-off. EBMUD will determine if selected tree removal will help the area (relative to public safety, covered species habitat, biodiversity), then implement a program as necessary. EBMUD will harvest dead trees, if necessary, as they occur to limit fire danger for the watershed and to preserve the surrounding habitats. If feasible, dead trees will be left for wildlife habitat.

3. Response Action

EBMUD may log large areas of dead trees as per activity 3.2.3.1. If the local die off of trees exceeds 25% for one species, it will be addressed as an unforeseen circumstance (see below).

4. Schedule and Preliminary Cost Estimate

A program will be developed within six-months of an EBMUD determination that the dead trees pose threat to public safety or are an environmental hazard, Cost estimate: $50,000 nominal removal costs.

9.2.1.4-B Changed Circumstances in Habitat Relevant to Storms, Drought, and Earthquake

1. Circumstance

A prolonged drought (e.g., >5 years) resulting in unseasonable fire danger, desiccation of frog and western pond turtle habitats. See Section 9.2.5 for rationale for an unforeseen prolonged drought.

2. Actions to Minimize Circumstance/Hazard

During the 6th drought year, EBMUD will take actions to minimize effects of a possible prolonged drought including fire and fuels management, grazing management, and potential supplemental watering of selected critical ponds as determined by the EBMUD biologists in coordination with the USFWS. These designated ponds will vary with annual circumstances. EBMUD's supplemental pond watering will be concentrated on no more than two critical ponds in a watershed.

3. Response Action

A two-to-five year drought is to be expected in California's Mediterranean climate. Within the 6th year of a drought with excessive desiccation of pond habitat, EBMUD in consultation with USFWS and CDFG will assess the extent of potential covered species impacts. The reports of this EBMUD assessment will include a remediation program to be implemented when the drought breaks

4. Schedule and Preliminary Cost Estimate

EBMUD will implement this program after the fifth year of a prolonged drought. The report cost will be up to $3,000 EBMUD's cost for pond damage repair and maintenance will be at the cost of labor and materials.

9.2.1.4-C Changed Circumstances in Habitat Relevant to Storms, Drought, and Earthquake

1. Circumstance

Heavy rains, landslides, earthquake, or other circumstances result in the failure of five or more ponds, compromising habitat for WPT and CRLF.

2. Actions to Minimize Circumstance/Hazard

EBMUD will inspect these identified ponds during a wet year within two weeks of a Bay Area 50-year storm event or at the beginning of March (average Moraga/Orinda/Lafayette rainfall>110% of normal-to-date by February). EBMUD will inspect all known covered species habitat ponds within two months of a strong earthquake (Richter scale 6.0-6.9).

3. Response Action

EBMUD will repair ponds and replant vegetation as necessary to reconstruct previous habitat.

4. Schedule and Preliminary Cost Estimate

EBMUD will complete repairs for the ponds within one year. Cost estimate for labor and materials is up to $10,000.

9.2.1.5 Changed Circumstances in Animal Population From Disease

1. Circumstance

Mortality of many birds or other animals from disease on watershed (e.g., West Nile Virus, Avian Flu, chytrid fungus).

2. Actions to Minimize Circumstance/Hazard

EBMUD biologists will meet with USFWS to discuss control measures (pick up dead animals, procedures for disinfecting equipment, etc.). EBMUD will draft a plan to minimize impacts on covered species.

3. Response Action

EBMUD will implement control plan as soon as possible and will include the results from that plan in their annual report to USFWS.

4. Schedule and Preliminary Cost Estimate

EBMUD will implement a control plan within one year of an observation of an infected covered species. The ongoing HCP educational program will be amended to include material relevant to this changed circumstance. Cost will be for labor up to $5,000.

9.2.3 Changes in the Status of Plan Species or Acquisition of New Information about Species and Habitat Management

An unlisted species will be deemed to be "adequately covered" by a HCP and subject to the provisions set forth above when the species is addressed in the HCP as if it were already listed, and the conservation measures in the HCP for that species would satisfy permit issuance criteria.

The Section 10(a)(1)(B) permit and HCP will cover four federally listed species and three unlisted species. Listed species will be covered by this HCP as of its effective date. Should USFWS list a covered species during the permit term, take coverage will become effective for that species at the time of listing provided the HCP is being properly implemented. No changed to the terms and conditions of the HCP is required. USFWS shall evaluate and consider protections and conservation measures afforded such species by this HCP and any other affected HCPs as part of the listing process.

If a species not covered by this HCP is subsequently listed, proposed, or petitioned for listing, EBMUD may request that USFWS amend the permits and plan as appropriate to add that species. EBMUD may apply for an amendment to the existing HCP or for separate coverage for a species not previously included under a new Section 10(a)(1)(B) permit (See Amendment Procedure, Section 9.3.2, below). The decision to add the species will be based on the same criteria used to create the original list: presence of the species within the HCP area, likelihood of affect to the species from EBMUD activities, and that these lawful actions could result in incidental take.

9.2.4 Changed Circumstances – Natural Disasters and Accidents

Changed Circumstances may include certain changes to the landscape resulting from emergencies. An "Emergency" is defined as a sudden, unexpected occurrence involving a clear and imminent danger, demanding immediate action to prevent or mitigate loss of, or damage to, life, health, property, or essential public services. "Emergency" includes such occurrences as wildfire, flood, earthquake, or other soil or geologic movements, as well as such occurrences as riot, accident, or sabotage (from the definition in CEQA, Public Resources Code Section 21060.3).

Some emergencies may be anticipated but all are unpredictable and could occur at any time. Surface disturbance could result in the incidental take of individuals and damage to habitat.

In the event of an emergency (i.e., fire, flood, and earthquake) where it is necessary to deviate from the operational commitments under this HCP, EMBUD shall contact USFWS within 1 month to provide information regarding the actions EBMUD has taken to address the event. At that time, EBMUD and USFWS shall coordinate on any actions that may reasonably be undertaken to minimize impacts to covered species while EBMUD handles the disaster and works to restore normal operations.

Emergencies require personnel to take actions necessary to provide an appropriate level of protection for all watershed lands, emphasizing the protections of life and public safety, and property values in interface areas (EBMUD FMP 2000). It also may be necessary to ignore time of day or season constraints when conducting emergency repairs. Environmental personnel shall be called immediately to the site and, whenever possible shall assist with implementing measures to avoid or minimize impacts to covered species. Once the emergency has been stabilized, the action will be halted and USFWS contacted for review in the development of a restoration plan.

9.2.5 Unforeseen Circumstances

Section 10(a)(1)(B) states that a HCP must detail "procedures to be used to deal with unforeseen circumstances." Unforeseen circumstances are defined by federal regulation (17 CFG § 17.3):

> "…changes in circumstances affecting a species or geographic area covered by a conservation plan that could not reasonably have been anticipated by plan developers and the USFWS at the time of the conservation plan's negotiation and development, and that result in a substantial and adverse change in the status of the covered species."

These changes in circumstances affecting populations of HCP species or their habitats would occur independently of EBMUD′s activities within the HCP area. USFWS will have the burden of demonstrating that unforeseen circumstances exist, using the best scientific and commercial data available. Except where there is substantial threat of imminent, significant, adverse impacts to covered species, the Services will provide EBMUD at least sixty (60) calendar days written notice of a proposed finding of unforeseen circumstances. Where the HCP is being properly implemented and an unforeseen circumstance has occurred, the additional measures required of EBMUD must be as close as possible to the terms of this HCP and must be limited to modifications within a conserved habitat area or to adjustments within the proposed conservation

measures. Additional conservation and mitigation measures shall not involve the commitment of additional land or financial compensation or restrictions on the use of land or other natural resources otherwise available for development or use under the original terms of the HCP without the consent of EBMUD.

An example of an unforeseen circumstance that cannot be reasonably anticipated at this time would be the spread of an unknown disease affecting one of the covered species, an increase in ambient ultraviolet radiation, the effect of climate change on vegetation patterns or water flow within the HCP Area, or a wildfire of unforeseeable proportions. Table 9-1 lists all watershed fires from 1980-2005. The 208 fires during the 26-year period range from 0.1-0.4 hectare (0.25-1 acre) (46 fires) to 60 acres, but only two of these fires were between 20 and 24 hectares (50 and 60 acres), and only 8 were from 4 to 20 (10-49 acres). An amount of 57% of the fires were classified as spot fires <0.1 hectare (<0.25 acre).

Table 9-1.
Fire Sizes on EBMUD East Bay Watershed from 1980-2005

Acres	**60-50**	**49-10**	**9 to 5**	**4 to 2**	**1 to 0.25**	**Spot**	**Total Fires**
Total Fires	2	8	18	16	46	118	208

With these data on fire size, EBMUD will consider fires in excess of 33.4 hectares (100 acres) to be unforeseeable at this time. As discussed previously, landscape changes resulting from all smaller fires are treated as changed circumstances. These will be addressed, and given the nature of past events and the benefits provided by EBMUD on its lands, it is unlikely that foreseeable fire events would affect a significant portion of the habitat provided for species at any single point in time.

Changed circumstances from diseases are addressed above, but for the purpose of this HCP an infestation of a new or existing diseases or invasive non-native species that effects covered or dominant species in the watershed vegetation communities, or the spread of existing invasive species beyond 25% of the baseline condition of the covered species vegetation community habitats are considered unforeseen circumstances. The monitoring program will identify the extent of disease and existing non-native species on the watershed so that new non-native species can be identified quickly and removed.

Earthquakes also are frequent in the Bay Area, but strong Earthquakes ("strong" defined as Richter measurement of 6.0-6.9) are rare. An earthquake measuring 6.7 on the Richter scale has the shortest recurrence rate (232 years) of the major Bay Area faults on the Hayward-Rodgers Creek Fault, which runs through the HCP area. The chance of such an earthquake is estimated at 32% by the year 2030 (USGS, 1999). This HCP is written for 30 years, to about 2037. Therefore there are contingencies under changed circumstances for earthquake damage on the watershed from a strong earthquake on the Hayward fault. An earthquake with a Richter measurement of >7.0 is considered unforeseeable and is treated as an unforeseen circumstance in this HCP.

Prolonged droughts may occur in California, and local rainfall records show they range from two to five years in length. EBMUD reviewed 52 years of rainfall data for three East Bay sites (Lafayette, Orinda, and Walnut Creek). Using 75% of average rainfall to define a "drought" year, there has been an average of three 2-year droughts in the 52-year period and one 5-year drought. As there have been no instances of a 6-year drought, EBMUD will use a 6-year period of drought to define a rainfall pattern that is an unforeseen circumstance.

Unforeseen circumstances such as these are impossible to plan for with certainty and are an example of where it is justifiable to ensure that no additional mitigation, including restorative activities such as channel clearing of earth slumps, additional restrictions on the restoration of watershed facilities, or other resources would be required beyond that which is agreed to elsewhere in this HCP.

9.3 AMENDMENT PROCEDURE

The HCP can be amended under USFWS regulations and the terms of the permit agreement. This process can be divided into modifications and minor amendments, and major amendments. Either EBMUD or the permitting agencies can request an amendment to the Plan.

9.3.1 Minor Permit Modifications and Amendments

9.3.1.1 Administrative Changes

Administrative changes are internal changes to the HCP that do not require preauthorization from USFWS. Examples are given below:

- Annual Cost of Living Adjustment (COLA) for mitigation costs to account for inflation;

- Minor surveying protocol changes, improvements, or adjustments that are not delineated in the Plan;
- Edits to the Plan during reprints that do not affect the intended meaning;
- Changes in staffing provided the staff is trained in the covered species and to implement the HCP as outlined in the Plan.

9.3.1.2 Minor Changes in the HCP

Minor modifications are changes in the HCP that do not affect the ability of EBMUD to fulfill the biological goals and objectives of the Plan, and do not change the impact assessment or general strategy for achieving the desired conservation results. These minor changes do not require an amendment to the permit, but they do require pre-approval by USFWS before implementation:

- minor map and habitat adjustment based updated aerial photogrammetry, vegetation growth, changes in seral stage, and new species information;
- minor changes in the biological goals or objectives in response to adaptive management; and
- minor changes in reporting protocol.

9.3.2 Major Modifications - Permit Amendments

The permit can be amended or modified in accordance with USFWS regulations. Amendments to the permits would be required for any change in the following:

- the listing under the ESA of a new species not currently addressed in the HCP that may be taken by EBMUD activities;
- occurrence of an already listed species not included in the HCP that may be disturbed by EBMUD activities;
- changes to the permit-area boundary that are at least 5% of the original plan area or which does not otherwise qualify for a minor modification;
- modification of any project action or mitigation component under the HCP, including funding, that may significantly affect authorized incidental take levels, effects of the project, or the nature or scope of the mitigation program, with the exception of those HCP modifications specifically addressed in the original HCP and permit applications;
- extending the permit term beyond 30 years, and

- any other modifications of EBMUD operations likely to result in incidental take of covered species not addressed in the original HCP and permit applications.

9.3.2.1 HCP Amendment Process

The amendment process will be initiated when EBMUD submits the appropriate application to USFWS. The application must include a revised HCP, permit application form, required fees, and the required documents under NEPA. The revised HCP will include a description of the unforeseen event or activity and an assessment of its impacts (including quantification of expected incidental take of covered species). The impact assessment may be in terms of "sensitive habitats affected" if the impacts are similar to those previously described, or in terms of "impacts to populations" of particular species if the information is available. Finally, the amendment will describe appropriate changes to the mitigation measures and habitat enhancement to protect species covered by the HCP.

The appropriate related NEPA documentation will depend on the nature of the proposed amendment.

9.4 Potential to Include Pinole Valley Lands for Conservation Easements or Mitigation Bank

EBMUD has discussed with the Service the potential to undertake measures on the Pinole Valley lands that would provide further benefits for species and allow for compensatory mitigation for resource impacts experienced elsewhere. It is intended that the inclusion of these lands within this HCP will not preclude the ability to manage these lands as a conservation bank or otherwise use measures undertaken on these lands in the future to provide compensatory mitigation. Lands and measures or projects that have been used as mitigation or compensation for HCP impacts would not be included as part of potential conservation banks.

10 FUNDING

10.1 INTRODUCTION

Under Section 10(a)(2)(A) of the ESA and the ESA implementing regulations (50 CFR §§ 17.22(b)(1), 17.32(b)(1), and 222.22), a HCP submitted in support of an incidental take permit must detail "the funding that will be available to implement such steps" [the steps an applicant will take to monitor, minimize, and mitigate the impacts from incidental take].

Sections 5 through 8 present measures to avoid, minimize, mitigate, monitor, and adaptively manage the potential impacts associated with this HCP. This section describes the funding that will be required for the performance of these measures.

EBMUD is committed to implementing the HCP throughout the 30-year term of the permit. EBMUD's financial condition continues to be sound, with a stable revenue base and rates that compare favorably with other Bay Area water and wastewater agencies. Responsible fiscal management and planning, as confirmed by external auditor's reports, give EBMUD the financial means to ensure reliable water and wastewater system operations, while consistently meeting its principal and interest payments on bond debt (EBMUD 2005a). One of the top priorities in EBMUD's Strategic Plan is to "Manage the Mokelumne and East Bay watersheds in a way that ensures a high quality water supply and protect natural resources." Top-priority tasks include: Continue to implement the District's East Bay Watershed Master Plan and improved standards for endangered species management; complete East Bay HCP and coordinated data collection and review (Goal: Water Quality and Environmental Protection; from EBMUD 2005b).

The costs to implement the HCP will be funded through EBMUD's biennial budget. As required, EBMUD will notify the USFWS if EBMUD is unable to fund this work. If EBMUD is unable to fund this work it will work with the Federal agencies to resolve funding issues. The agencies may suspend the permit while these issues are resolved. At the agencies discretion and according to regulation, the agencies may revoke the permit.

10.2 HCP IMPLEMENTATION COSTS

Costs for habitat and species avoidance, take minimization, mitigation, monitoring, and adaptive management measures have been totaled and listed below based on Sections 5 through 8. Budgeting for EBMUD's commitment will be based on these figures.

Through implementation of the WMP, EBMUD already performs many of the task requirements for the HCP. EBMUD labor costs for existing and new efforts to implement the HCP (existing, annual, biennial, and the one time costs) are estimated at 1.06 full time employees (FTE = 2080 hours/year) divided as follows:

Table 10-1.
Summarized Total Annual Implementation Hours

Total Annual Implementation Hours	HCP Hours	FTE*
Existing EBMUD Biol. Hours	1100	0.36
Existing HCP Contractor Hours	250	0.12
New EBMUD Biologists Hours	1450	0.70
Total Hours	**2447**	**1.18**

* FTE = full time employee equivalent.

A total of 0.70 FTE is for new efforts (refer to Table 10-2). The required reporting and additional field work will be performed by reallocating resources and reprioritizing work. EBMUD Biologists and contractors currently perform 0.48 FTEs of WMP (HCP-related) work, comprising most of the additional hours. Annual costs, including FTE labor costs, are adjusted for inflation in each biennial budget.

Table 10-2.
Summarized Implementation Costs

EBMUD Costs	Labor (Hrs)	FTE[1]	Annual Labor ($'s)	Services/ Supplies
Annual New HCP Costs	1063	0.51	$101,000	$1,000
Biennial New HCP Costs	706	0.17	$67,000	$10,000
One-time Costs	1003	0.02	$4,000	$45,000
New Annual HCP Costs Subtotal	1450	0.70	$138,000	$7,500
Existing Annual EBMUD WMP Labor Cost	997	0.48	$95,000	$70,000
HCP Total Costs[2]	**2447**	**1.18**	**$233,000**	**$77,500**

[1] Full Time Employee.

[2] Total annual HCP cost does not include changed circumstances ($23,000) or unforeseen circumstances ($111,000), which may be implemented in amounts varying from $150-$50,000 depending on specific conditions (non-native species impacts, earthquake, wildfire, etc. – see sections 8 & 9).

10.3 HCP MITIGATION COSTS FOR SPECIES INCIDENTAL TAKE

As described in Sections 10.1 and 10.2, EBMUD will budget for and operationally fund species' avoidance, impact minimization, monitoring, enhancement, and reporting mechanisms. Incidental take from mortality of covered species, while not expected should be anticipated. EBMUD plans to prevent further mortality caused through the activities covered by improving AMMs and BMPs on a case by case basis. Incidental take and adjustments to EBMUD activities will be addressed in annual reports and adaptive management where applicable.

11 ALTERNATIVES

11.1 INTRODUCTION

The goal of this HCP is to implement a program to avoid, minimize, and mitigate for incidental take of sensitive plant and wildlife species on EBMUD watershed lands by implementing practices and procedures that eliminate or reduce impacts of EBMUD's watershed operation and maintenance activities on covered species. This goal will be partially accomplished by operating under guidelines that avoid or minimize contact with covered species, provide the greatest protection in areas of potential unavoidable contact, and monitor the efficacy of these operation procedures.

Alternatives to the HCP include:

Alternative 1. No Action. EBMUD would continue to operate and maintain its watersheds without a Federal Section 10(a)(1)(B) permit issued by the USFWS or a Section 2080.1 or 2081 incidental take authorization from the CDFG. Under this alternative, EBMUD would not implement the protection measures as described in the HCP. Instead, EBMUD would address projects that may impact endangered and threatened species on a case-by-case basis.

EBMUD watershed lands subject to impacts from operation and maintenance activities are widely distributed throughout the East Bay. A significant portion of the value of these lands results from their connectivity to other watershed habitats. EBMUD watershed lands also represent a substantial portion of three of the seven units designated as critical habitat for Chaparral Species which includes Alameda whipsnake. These species would not benefit as much under a case-by-case approach to incidental take as under a watershed-wide HCP that encompasses cumulative effects. In addition to these positive HCP effects, the status of covered species is currently less well known due to more limited monitoring. Species and habitat monitoring activities will equal 25% of EBMUD's HCP funding commitment.

Activities that would occur within suitable habitats and involve the covered species would also be subject to separate Section 7 consultation with federal agencies as to appropriate species' protection and mitigation. This approach would affect EBMUD's ability to plan and schedule appropriate operation and maintenance activities. Without implementation of an HCP, the overall cost to the resource agencies and EBMUD for protection and monitoring of listed species on EBMUD watershed lands would increase

above current levels. The combined cost of the many individual reviews of watershed programs and projects would far exceed an HCP approach. Also, the certainty of watershed management the agencies will have regarding EBMUD activities as described in Section 3 would be gone.

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APPENDIX A:
SPECIES ACCOUNTS FOR EAST BAY MUNICIPAL UTILITY DISTRICT'S EAST BAY WATERSHED HABITAT CONSERVATION PLAN

Santa Cruz Tarplant (*Holocarpha macradenia*)

Description: Santa Cruz tarplant is an aromatic, glandular annual herb in the sunflower family (Asteraceae). It is one of four species in the genus *Holocarpha*, which is endemic to California. Unlike the other three species, which prefer hot, dry, inland valley-foothill grasslands, the Santa Cruz tarplant was historically found on the clay soils of grassy coastal, or near coastal, terraces and mesic grasslands and coastal prairie surrounding the San Francisco Bay. These cool, sometimes foggy habitats reduce exposure to severe heat and dryness (Boersig and Norris 1988).

Seeds produced in the ray flowers have a thick seedcoat that requires scarification for germination, while seeds produced by disc flowers do not have a thick seedcoat requiring scarification, are less fertile than ray flower seeds, and usually germinate in the first year. Ray flower seeds comprise about 90% of the total seed production (Boersig and Norris 1988).

Santa Cruz tarplant flowers during the summer. During the late winter and spring, while most other annual grassland species are rapidly growing upwards and reaching maturity, the tarplant remains relatively low to the ground, concentrating its energy into deeper root formation. About the time the other grassland annuals begin dying, the tarplant stem grows rapidly, using nutrients tapped from the deeper soil sources. Then during summer, after most of the grassland has turned brown, the Santa Cruz tarplant flowers. Researchers believe that the glandular exudates produced by tarplants help protect them against desiccation, predation, and excessive solar radiation during a long, dry summer (Boersig and Norris 1988).

Distribution: Santa Cruz tarplant was once found in most San Francisco Bay area counties south to Monterey. The species has been extirpated from Marin and Alameda counties, and all wild populations have been extirpated from Contra Costa County. All existing Contra Costa County populations were established from seeds taken from Pinole (Diablo clay) and Richmond (Tierra loam) sites prior to commercial development. The

last known wild Contra Costa County population was extirpated in Pinole in the mid 1990's

Threats: This species is threatened by urbanization, agriculture, non-native plants, and lack of appropriate ecological disturbance.

Status: The USFWS listed the Santa Cruz tarplant as a threatened species on March 20, 2000 (65 Federal Register 14898). It is listed by the CDFG as "endangered" and the CNPS as "1b" (endangered in California and elsewhere; nearly extinct). A final Critical Habitat designation was made on October 16, 2002 for 2,902 acres in Contra Costa, Santa Cruz, and Monterey counties. No portion of the HCP covered area was included in the designation.

Recovery Plan: USFWS has not produced a recovery plan. CDFG has determined that a habitat conservation plan is needed for the Santa Cruz tarplant that should include reintroduction of the species into protected, historic habitat in Marin, Alameda, and Contra Costa Counties (CDFG 1995).

Status on HCP Lands: There is one known stand of Santa Cruz tarplant in the HCP area (Figure A-1). The site is a gentle, southeast-facing slope of Diablo clay managed by moderate cattle grazing. It is one of three sites where seeds were sown in an attempt to establish this species on the watershed during 1983. All sites were chosen for their favorable aspect and soil type; however, a reduced exposure to fog may make the San Pablo Reservoir watershed a marginal habitat. Other native grassland species growing at the current known site include hayfield tarplant, (*Hemizonia hermannii*), scattered blue lupine (*Lupinus formosus*,) and purple needlegrass. According to the CDFG database cited above, 850 plants were estimated at the HCP site in 1987. In 1988, an estimated 3,000 plants comprised the stand. No data was reported between 1989 and 1994. In 1995 and 1996, about 100 plants were counted. Despite annual surveys, no plants have been found since 1997.

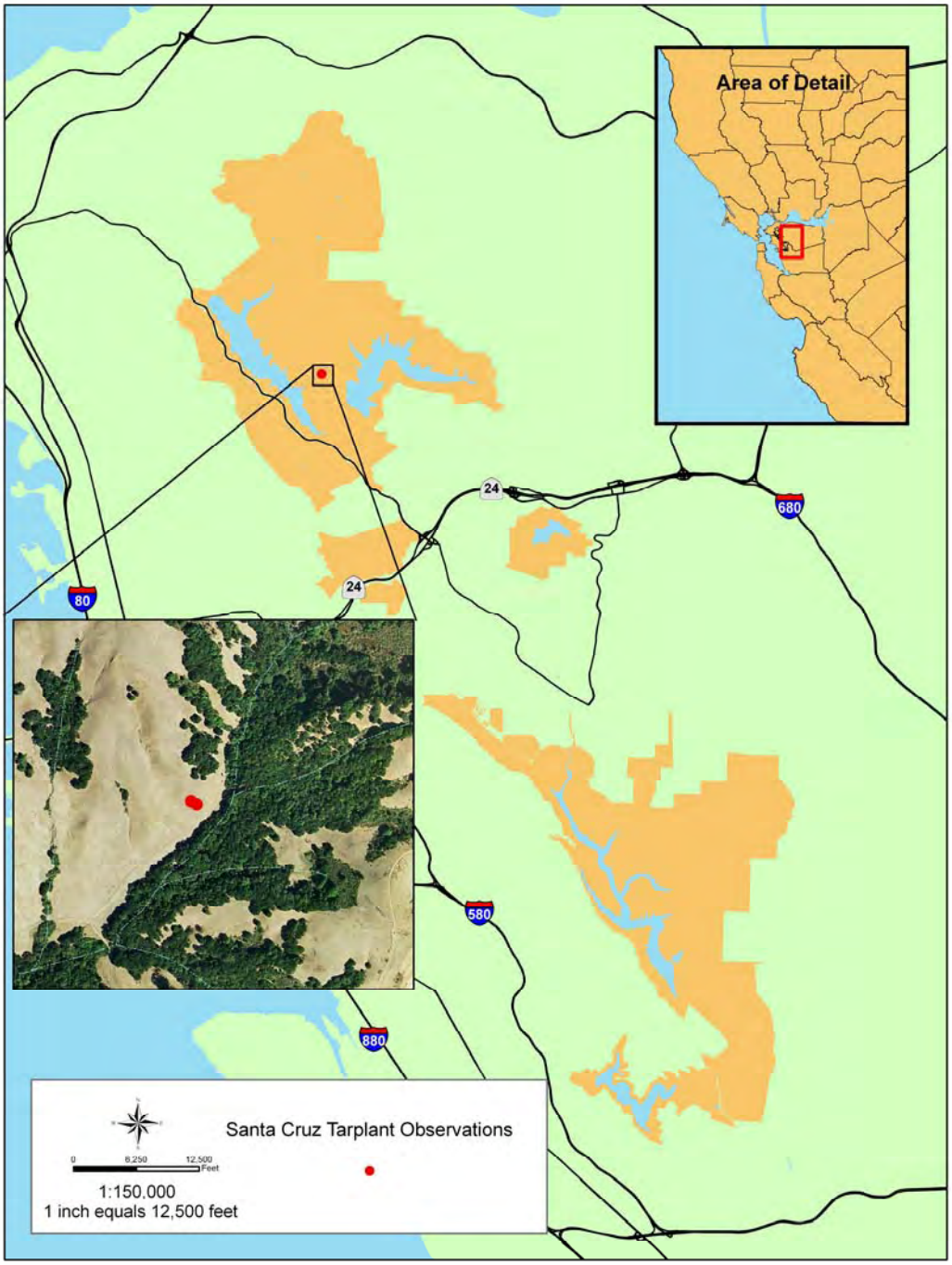

Figure A-1. Santa Cruz tarplant observation location on EBMUD lands, Contra Costa County, California.

Pallid Manzanita (*Arctostaphylos pallida*)

Description: Pallid manzanita is a shrub in the heath family (Ericaceae) that grows to a height of 4 m or more and flowers from January through March. According to Amme et al. (1986) pallid manzanita is a fire-adapted plant found in chaparral communities that grow on sterile acid soils such as sandstone and shale and are influenced by summer fog. Soils in the area where pallid manzanita is found are relatively moist throughout much of the summer. Adjacent soils on the same slope and aspect (Felton series) support vegetation such as redwood and are moist through most of the year. Portions of chaparral that support pallid manzanita grow on the shady side of ridges. Regeneration of pallid manzanita following a burn depends on scarification of the seed by fire (or other disturbance) in order for germination to occur. Also, this species is capable of reproduction by layering, as when stems come into contact with the soil and root, resulting in a clone of the original plant.

Distribution: Pallid manzanita has a very limited known distribution. The largest population is found on Sobrante Ridge, in Sobrante Ridge Regional Park in El Sobrante, Contra Costa County. This population is about one mile north of the San Pablo Reservoir dam. Another large population is found on Huckleberry Ridge, in Huckleberry Botanic Regional Preserve (EBRPD), Contra Costa County (just east of the town of Montclair). This area is slightly less than one mile north of the HCP area stand. Several small stands and individual plants are located along Skyline Blvd. Many of these are associated with homes, home-building activities, and road building and maintenance activities.

Threats: This species is threatened by urbanization, alteration of fire regimes, invasion and replacement by non-native plants, and fungal infection.

Status: The USFWS designated the pallid manzanita as a proposed threatened species in 1997. It is listed by the CDFG as endangered and the California Native Plant Society (CNPS) as 1b (endangered in California and elsewhere; nearly extinct).

Recovery Plan: The pallid manzanita is included in the 2002 USFWS Recovery Plan for Chaparral and Scrub Community Species East of San Francisco Bay, California. Priorities for this plan are 1) to preserve existing populations through management, including fire (where feasible); 2) reintroduction of pallid manzanita to historical sites; and 3)

introduction to new sites within the species' historical range. On public lands a 460 meter (500 yard) buffer is suggested around each existing population. Because the species populations are fragmented and kept small by necessary fire control in an area near urban development, USFWS suggests that populations on public lands will need to be protected in perpetuity (USFWS 2002).

Status on HCP Lands: The EBMUD watersheds support one population of pallid manzanita (Figure A-2). A survey in 1997 (Dunne) found 14 adults (10-14 feet tall), 7 seedlings (± 4 inches tall), and 4 post-seedlings (<7 inches tall and multiple stemmed). A survey in 2001 (Lake 2001) found 8 adults and 10 seedlings, as well as 2 dead adults. Most seedlings looked young and only one was post-seedling stage. It is assumed that the other 3 post-seedlings seen in 1997 have died. No plants between post-seedling and adult stage were seen in 1997 or 2001. Though the USFWS (2002) lists the EBMUD population at 25 plants, a survey of the area in 2004 showed 7 plants (Kanz 2004), and an EBMUD survey in 2006 counted 14 plants (6 adult and 8 juvenile) (Setka 2006). Other species present include madrone, coast live oak, Monterey pine, California bay, bush monkeyflower, huckleberry, silver bush lupine, yerba buena, blue wildrye, dogtail grass, and a single plant of brittleleaf manzanita. Seedlings and saplings of coast live oak, madrone, and Monterey pine are also present.

The HCP population of pallid manzanita grows in a long, narrow stand that had become over-topped by relatively young madrones (Figure A-2). A road cut may have generated this stand. The presence of brittleleaf manzanita and deerweed within the stand suggest the probability that chaparral once was more prevalent in this area.

Lack of fire and the resulting effect of over-topping woodland vegetation may have resulted in a decline in the extent of chaparral at the EBMUD HCP site. The influence of these woodland trees on the soil surface, bark stripping and pathogens may also be impacting this population (Amme et al. 1986).

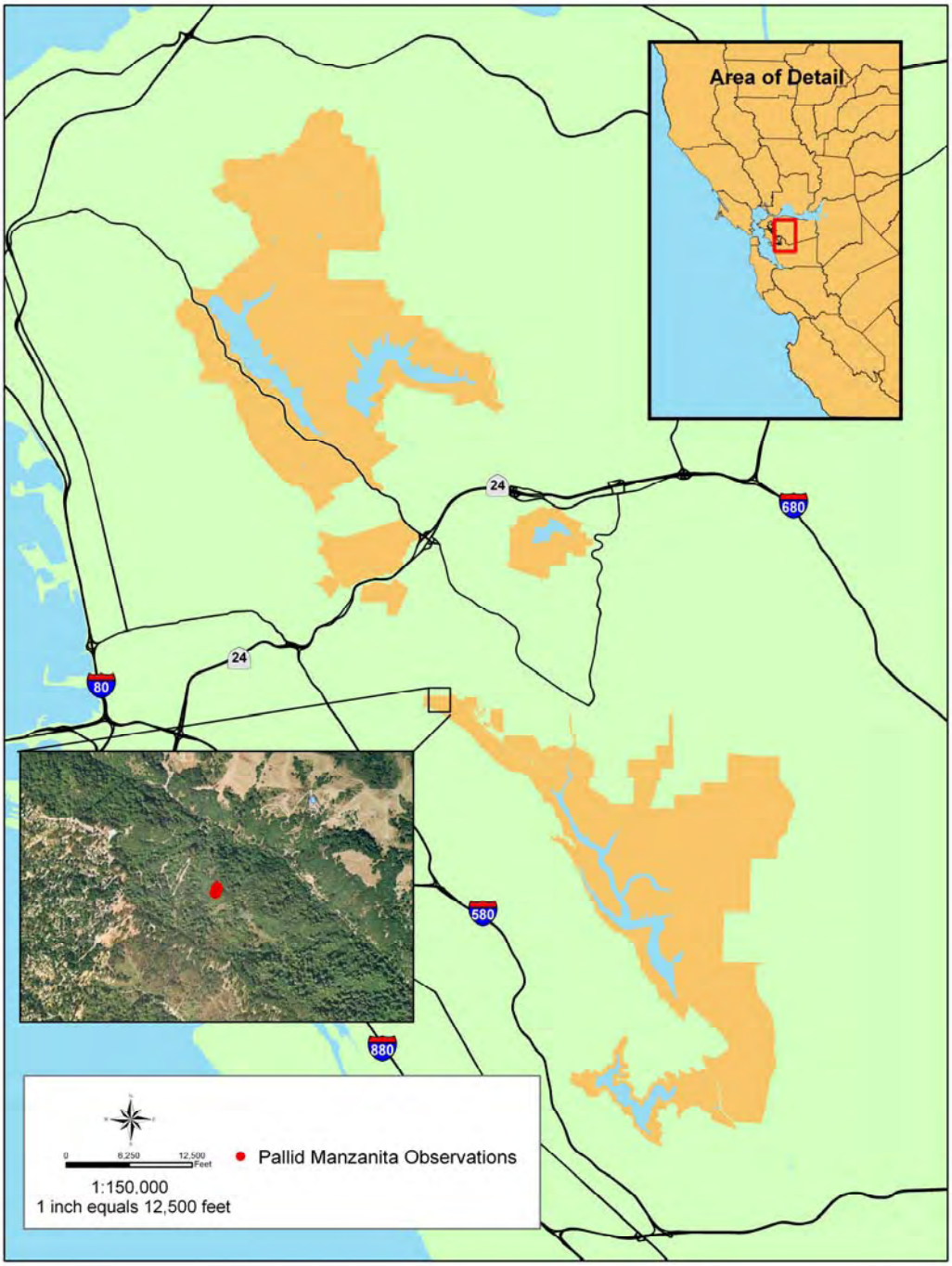

Figure A-2. Pallid manzanita observation location on EBMUD land, Contra Costa County, California.

Resident Wild Rainbow Trout (*Oncorhynchus mykiss*)

Description: This HCP covers only resident wild rainbow trout (*O. mykiss*) that exist in the drainages above Upper San Leandro Reservoir and in Pinole Creek. Pinole Creek also has an anadromous *O. mykiss* (steelhead) population. To better differentiate the life history of the resident form of *O. mykiss*, some of the anadromous *O. mykiss* life history is included below.

O. mykiss exhibit one of the most complex suites of life history traits of any salmonid species. *O. mykiss* may exhibit anadromy (i.e., they migrate as juveniles from fresh water to the ocean and then return to spawn in fresh water) or freshwater residency (i.e., they reside their entire life in fresh water). Resident forms are usually referred to as ”rainbow“ or ”redband“ trout, while anadromous life forms are termed ”steelhead.” *O. mykiss* typically migrate to marine waters after spending two years in fresh water. They then reside in marine waters for typically two or three years prior to returning to their natal stream to spawn as four- or five-year-olds. Unlike Pacific salmon, *O. mykiss* are iteroparous, (i.e., they are capable of spawning more than once before they die). However, it is rare for *O. mykiss* to spawn more than twice before dying; most that do so are females. Both *O. mykiss* residents and steelhead adults typically spawn between December and June (Bell 1990, Busby et al. 1996). Depending on water temperature, *O. mykiss* eggs may incubate in “redds” (nesting gravels) for 1.5 to 4 months before hatching as “alevins” (a larval life stage dependent on food stored in a yolk sac). Following yolk sac absorption, young juveniles or ”fry” emerge from the gravel and begin actively feeding. Juveniles rear in fresh water from 1 to 4 years, and then migrate to the ocean as “smolts.” Resident fish remain in their natal stream or drainage throughout their lives. Fish in Upper San Leandro Reservoir (USL) may remain resident or may emigrate to USL (as if it were the ocean) to rear for several years before returning to their natal stream. It is unknown if *O. mykiss* that emigrate to USL ever migrate and spawn in a stream other than their natal water (e.g., if *O. mykiss* originating in San Leandro Creek ever migrate and spawn in Redwood Creek).

Distribution: *O. mykiss* are presently distributed from the Kamchatka Peninsula, east and south along the Pacific coast of North America, to at least Malibu Creek in southern California. This species occupies a wide variety of habitats and may migrate through corridors of water unlike those in which they spawn and grow before emigrating to the ocean. Spawning and rearing areas may be roughly equivalent in riffle and pool habitats,

with high levels of dissolved oxygen. These habitats have well shaded banks, fast water rarely exceeding 23°C, instream woody debris, and cobble substrates (Moyle 2002).

Threats: Threats to *O. mykiss* include land-use activities such as logging, grazing, farming, road construction in riparian areas and other activities that may cause mass-wasting and surface erosion into waterways. Such erosion may reduce intergravel flow in *O. mykiss* nesting areas, thus reducing egg and larval viability. Destruction or alteration of *O. mykiss* habitat such as removal of large woody debris or riparian shade canopy is also a negative impact. Discharge or dumping of toxic chemicals or other pollutants (e.g., sewage, oil, gasoline) into waters or riparian areas supporting listed *O. mykiss*, violation of discharge permits, pesticide applications, and unauthorized moving and planting of *O. mykiss* are all contributors to the decline of this species. Infectious disease is one of many factors that can influence adult and juvenile *O. mykiss* survival. The introduction of non-native pisciverous species, such as brown trout and striped bass, likely to prey on *O. mykiss* or displace them from their habitat has been especially bad because established non-native species can be difficult to extirpate. *O. mykiss* have supported an important recreational fishery throughout their range; however, during stressful periods recreational fishing may significantly impact native anadromous stocks (62 Federal Register 43942).

Status: There have been a number of federal actions regarding the status and habitat of *O. mykiss*, however the final listing determination was published in January 2006 (71 Federal Register 052104F). The determination stated that only the anadromous distinct population segment (DPS) within each of the ESUs was covered by the ESA listing. Resident trout are not included in the NMFS listing and are the responsibility of USFWS.

Recovery Plan: No plan developed.

Presence in the HCP Area: *O. mykiss* (rainbow trout/steelhead) are known to occur in the Pinole and USL watersheds located in the HCP area (Figure A-3). Lafayette, Chabot and San Pablo Reservoirs are stocked with hatchery-reared rainbow trout in a put-and-take fishery. These populations are non-native and are not anadromous.

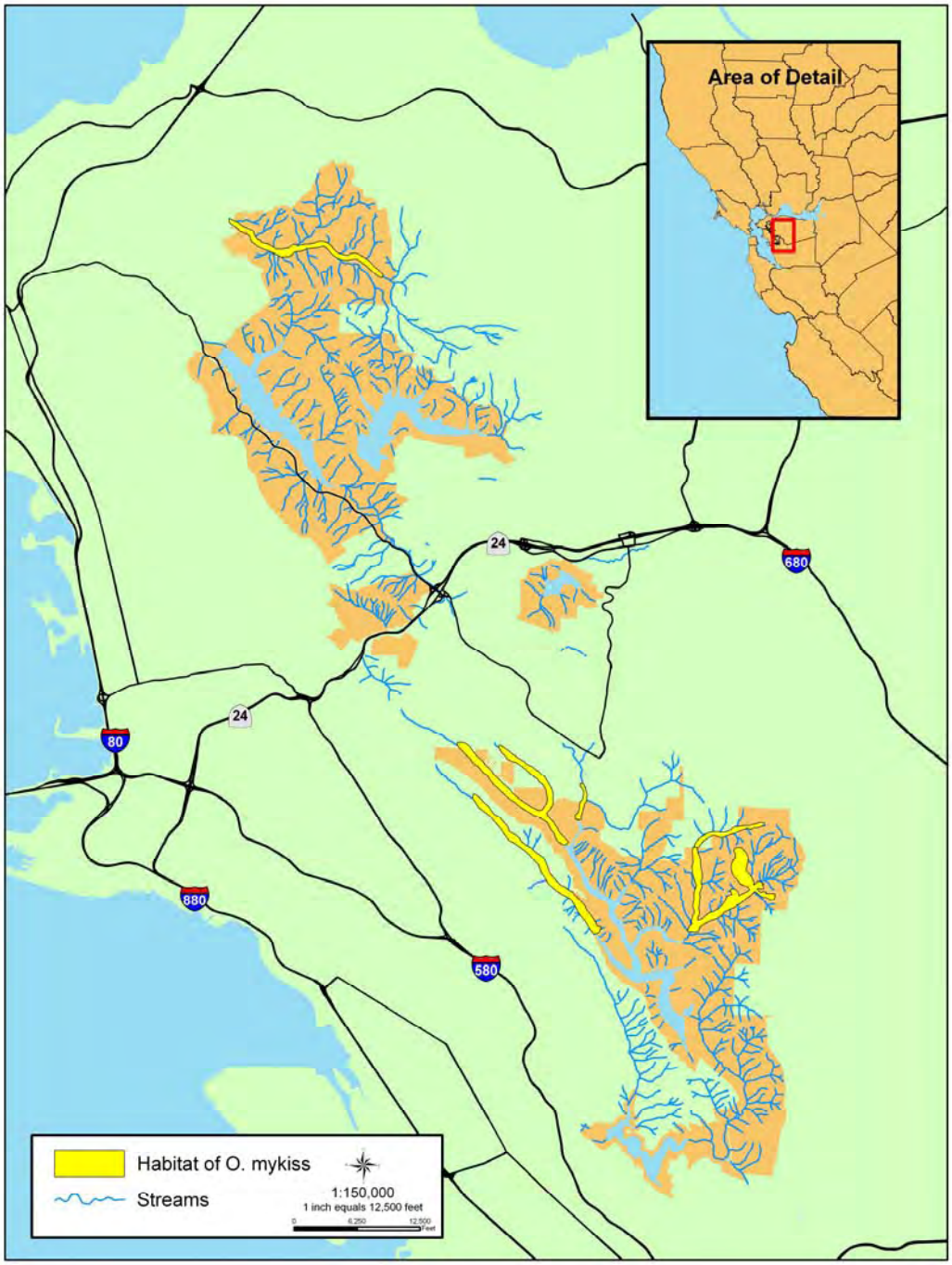

Figure A-3. Resident rainbow trout habitat on EBMUD lands, Contra Costa and Alameda counties, California.

An approximate 6 km stretch of Pinole Creek runs through EBMUD lands to San Pablo Bay. A total of 5.3 km of this area may be inhabited by trout during some portion of the year. A natural falls (location noted in Figure A-3) likely blocks access to upper portions of the watershed by *O. mykiss* at most flows. Records of *O. mykiss* sightings in Pinole Creek date back to the mid-seventies (Leidy 1984), and EBMUD personnel have conducted periodic surveys since that time.

Reviews of CDFG records located at its Region 3 Headquarters (Yountville, CA) indicate that various plants of *O. mykiss* have occurred in the Pinole Creek Basin. During electrofishing surveys, trout of various age classes have been captured. The presence of juvenile trout indicates that spawning occurs in Pinole Creek; however spawning locations and habitat characteristics of the area are largely unknown. An unspawned female of 600mm was found in Simas Creek, a tributary to Pinole Creek. Two large steelhead redds (fish estimated > 24") were observed downstream of the Highway 80 after the fish were observed holding in the area for more than a week because flows at the time were insufficient to allow passage upstream of the highway. EBMUD F&W staff has observed spawning *O. mykiss* downstream of EBMUD property within the city limits of Pinole. It is unknown if these redds were from resident or anadromous *O. mykiss*.

San Pablo, Lafayette, and Chabot reservoirs are all heavily planted fisheries, with no native *O. mykiss* in the reservoirs or upstream tributaries. *O. mykiss* has not been observed in Briones Reservoir since shortly after the dam was completed in the 1964. Upper San Leandro Reservoir contains an important population of native rainbow trout (*O. m. irideus)* that spawns in five of the tributary creeks. This population provided the type specimens for rainbow trout (then named *Salmo irideus*, now *O. m. irideus*), first collected and described on the west coast by Dr. W. P. Gibbons in 1855. The creeks draining into Upper San Leandro are thus a type-locality for an early description of "rainbow trout" (*Salmo* sp.), and the population is historically important. There has been no known planting of hatchery trout into Upper San Leandro Reservoir, and the population has been shown to be genetically related to the Central California Coastal Steelhead ESU (Gall et al. 1990). These fish were landlocked when Chabot Dam (downstream) was constructed in 1875, and have survived within USL through the droughts of 1976-77 and 1987-92 when the deepest portion of the lakes was reduced to 87 feet and 102 feet, respectively (normal mean maximum depth is 116+ feet) (EBMUD 1999 bathymetric survey, R. Jung, pers. comm.). Because *O. mykiss* populations have persisted within USL, even through the intense droughts mentioned above, it is apparent

that a range of reservoir operations do not jeopardize this landlocked population. Also since 2003 a hypolimnetic oxygenation system (HOS) to inject dissolved oxygen into the summer-depleted lower levels of the reservoir was installed in Upper San Leandro Reservoir, and this HOS has increased available trout habitat as shown by telemetry studies and seasonal water quality profiles (Jose Setka, personal communication). There are no planted or native *O. mykiss* trout known to reproduce below Lafayette, Upper San Leandro, and San Pablo reservoirs. Planted trout have spilled over the San Pablo and Chabot dams, or have been observed to swim upstream from Chabot Reservoir to Upper San Leandro Reservoir spillway, but spawning has not been observed and the reproductive status of these hatchery fish within the creek is unknown. There is a small population of *O. mykiss* within a few hundred feet of San Leandro Creek below Chabot Dam; the origin of these fish has not been determined.

California Red-legged Frog (*Rana aurora draytonii*)

Description: The California red-legged frog is one of two subspecies of the red-legged frog (*Rana aurora*) found on the Pacific Coast, and is the largest native frog in the western United States (Wright and Wright 1949), ranging from 4 to 13 cm in length (Stebbins 1985). All red-legged frogs in the San Francisco Bay Area are this subspecies.

The abdomen and hind legs of adults are largely red; the skin on the animal's back is characterized by small black flecks and larger irregular dark blotches with indistinct outlines on a brown, gray, olive or reddish background color. These dorsal spots usually have light centers (Stebbins 1985). Dorsolateral folds are prominent on the back. Larvae (tadpoles) range from 14 to 80 mm in length and the background color of the body is dark brown and yellow with darker spots (Storer 1925) (61 Federal Register 25813).

California red-legged frogs in the San Francisco Bay region breed from January through February (Jennings 1996). Egg masses that contain about 2,000 to 5,000 moderate-sized (2.0 to 2.8 mm in diameter), dark reddish brown eggs are typically attached to vertical emergent vegetation, such as bulrushes or cattails (Jennings et al. 1992). California red-legged frogs are often prolific breeders, laying their eggs during or shortly after large rainfall events (Hayes and Miyamoto 1984). Eggs hatch in 6 to 14 days (Jennings 1988). Larvae undergo metamorphosis 3.5 to 7 months after hatching (Storer 1925, Wright and Wright 1949, Jennings and Hayes 1990). Of the various life stages, larvae probably experience the highest mortality rates, with less than 1 percent of eggs laid reaching metamorphosis (Jennings et al. 1992). Sexual maturity normally is reached at 3 to 4 years

of age (Storer 1925, Jennings and Hayes 1985), and California red-legged frogs may live 8 to 10 years (Jennings et al. 1992) (61 Federal Register 25814).

Range: The historical range of the California red-legged frog extended coastally from the vicinity of Point Reyes National Seashore, Marin County, California, and inland from the vicinity of Redding, Shasta County, California, southward to northwestern Baja California, Mexico (Jennings and Hayes 1985, Hayes and Krempels 1986). The Navarro River represents the approximate dividing line between *R. a. draytonii* and a fifteen-mile intergraded zone with the northern red-legged frog (R.a.aurora) (B. Shaffer, 2002).

Habitat: The California red-legged frog occupies a fairly distinct habitat, combining both specific aquatic and riparian components (Hayes and Jennings 1988, Jennings 1988). The adults require dense, shrubby or emergent riparian vegetation closely associated with deep (>0.7 m) still or slow moving water (Hayes and Jennings 1988). The largest densities of California red-legged frogs are associated with deep-water pools with dense stands of overhanging willows and an intermixed fringe of cattails (*Typha latifolia*) (Jennings 1988). Well-vegetated terrestrial areas within the riparian corridor may provide important sheltering habitat during winter (61 Federal Register 25813).

California red-legged frogs estivate in small mammal burrows and moist leaf litter (Jennings and Hayes 1994). California red-legged frogs have been found up to 30 m from water in adjacent dense riparian vegetation for up to 77 days (Rathbun et al. 1993, Galen Rathbun, National Biological Service 1994). Rathbun (1994) found that the use of the adjacent riparian corridor was most often associated with drying of coastal creeks in mid to late summer (61 Federal Register 25814).

Migration/Seasonal Requirements: California red-legged frogs disperse upstream and downstream of their breeding habitat to forage and seek estivation habitat. Estivation habitat is essential for the survival of California red-legged frogs within a watershed. This species may occupy all aquatic and riparian areas within its range and estivation habitat may include any landscape features within 300 feet of a riparian area that provide cover and moisture during the dry season. Such habitat could include boulders or rocks and organic debris such as downed trees or logs; industrial debris; and agricultural features, such as drains, watering troughs, spring boxes, abandoned sheds, or hay-racks. Incised stream channels with portions narrower than 18 inches and depths greater than 18 inches may also provide estivation habitat (61 Federal Register 25814).

Threats: The California red-legged frog has sustained a 75 percent reduction in its geographic range in California as a result of several factors acting singly or in combination (Stebbins 2003). Habitat loss and alteration, overexploitation and introduction of non-native predators were significant factors in the California red-legged frog's decline in the early- to mid-1900s.

Water diversions, groundwater well development and stock pond or small reservoir construction projects can degrade or eliminate habitat (USFWS 1995) (61 Federal Register 25825). Storm damage repair, flood control maintenance on streams and management of water bodies for flood control are current threats to California red-legged frogs (61 Federal Register 25825).

Road-killed California red-legged frogs have been documented at several locations in San Mateo and Santa Cruz Counties (Coyote Creek Riparian Station, in litt., 1993; Westphal, Coyote Creek Riparian Station 1995). Road kills may deplete frog aggregations in borderline habitat and otherwise protected areas. Where roads cross or lie adjacent to California red-legged frog habitat, they may act as barriers to seasonal movement and dispersal (61 Federal Register 25825)

Heavy livestock grazing is another form of habitat alteration that is contributing to declines in the California red-legged frog. Studies, summarized in Behnke and Raleigh (1978) and Kauffman and Krueger (1984), have shown that heavy livestock grazing negatively affects riparian habitat. Livestock disturb and destroy vegetative cover, trample plants and seedlings and cause erosion (61 Federal Register 25827)

Status: The California red-legged frog was listed by the USFWS as threatened on June 24, 1996. It is a California state Species of Special Concern. A designation of proposed critical habitat for California red-legged frog was finalized in March 2001. A final designation of critical habitat was published in the Federal Register on April 13, 2006 (71 Federal Register, 19244). The critical habitat area covers approximately 182,255 hectares (450,288 acres). In addition, it contains a 4(d) rule pertaining to ranching activities that could impact red-legged frogs. Exempted is incidental take from are routine ranching activities such as maintenance and management of stock ponds and discing of ground squirrel burrows. None of the HCP area is included in the designation.

Recovery Plan: A formal recovery plan for red-legged frogs was proposed in March 2000 and finalized in September 2002. Actions identified in the proposed recovery plan to assist in the recovery of the California red-legged frog are:

1. Protect known populations and reestablish populations.
2. Protect suitable habitat, corridors and core areas.
3. Develop and implement management plans for preserved habitat, occupied watersheds, and core areas.
4. Develop land use guidelines.
5. Gather biological and ecological data necessary for conservation of the species.
6. Monitor existing populations and conduct surveys for new populations.
7. Establish an outreach program.

The plan estimated that delisting could occur by 2025 if recovery criteria have been met.

Presence in the HCP Area: California red-legged frogs are found in the Pinole Valley, San Pablo, Briones and USL watersheds of the HCP area (Figure A-4) (Dunne 1994). Habitat where California red-legged frogs have been observed includes active stock ponds with dense emergent and bank vegetation, active relatively large stock ponds with little or no emergent or bank vegetation, stream glides and pools on first order streams protected and unprotected from livestock impacts.

Pinole Valley contains the largest of the California red-legged frog populations within the HCP area. Surveys in the Simas Valley watershed (a sub-watershed of Pinole Valley) and along Pinole Creek have documented numerous areas inhabited by California red-legged frogs. The Pinole Valley population of the California red-legged frog has expanded and contracted over time in response to consecutive wet or dry years. In 1989 after 3 years of drought the population shrunk to only two stock ponds but expanded greatly during the wet period from 1995-1999 to occupy most of the newly wetted ponds and creek pools in Pinole Valley. The population again trended downward following lower rainfall years and results from USFWS protocol survey in 2002 showed the fewest red-legged frogs in Pinole Valley since 1989. The current California red-legged frog population in Pinole Valley has expanded since 2002 with several stock ponds and creek pools occupied.

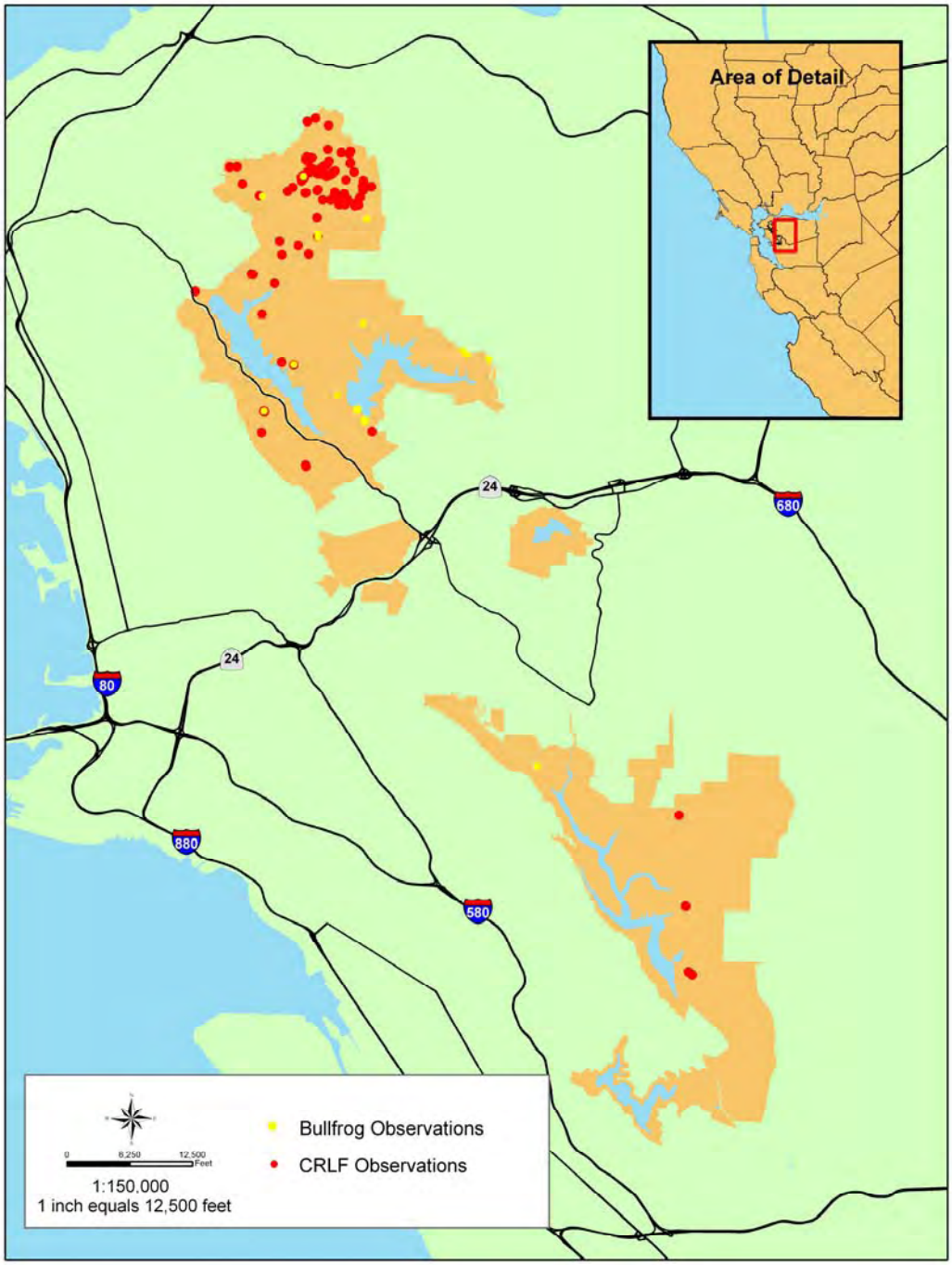

Figure A-4. California Red-legged frog observation locations on EBMUD lands, Contra Costa and Alameda counties, California.

The second largest density of California red-legged frogs in the HCP area occurs along the Oursan Creek drainage, north of the Scow Canyon arm of San Pablo Reservoir watershed. California red-legged frogs have been found in sediment pools in the Oursan drainage at the reservoir's edge upstream to Lagoon Pond, a stock pond located at the headwaters of Oursan Creek. The creek has a mix of protected and unprotected habitats. Lagoon Pond is the largest stock pond (1.3 hectares) in the HCP Area, and water usually persists during drought periods. While non-native predators, such as bullfrogs and largemouth black bass, inhabit the San Pablo Reservoir and nearby Nunes Pond, none have been observed in Oursan Creek or Lagoon Pond.

California red-legged frog populations within the EBMUD's Briones Reservoir Watershed occur sporadically and may suffer from competition with and predation from bullfrogs. The upper portion of the watershed is occupied by EBRPD's Briones Regional Park that has stock ponds with populations of California red-legged frogs.

The USL Watershed Basin contains three known areas inhabited by California red-legged frogs: Riley Cove Pond, Callahan Pond, and San Leandro Creek below USL Dam. The first documentation of red-legged frogs at Riley Cove Pond was in 1995. Whether this is a relic population that is self-sustaining, or part of a larger population is unknown. Red-legged frogs were observed in Riley Cove Pond every year from 1995-2001, but have not been seen since that time. Red-legged frogs were first seen in Callahan Pond in 2007. California red-legged frogs have been observed within the channel and rarely along tributaries of San Leandro Creek between USL and Chabot Reservoirs since 1994.

There are no known instances where California red-legged frogs have been identified in the Lafayette Reservoir Watershed Basin. (Beeman pers. com.)

In June 2004 EBMUD biologists, in conjunction with a permitted biologist, began a long-term telemetry project in order to track movements of California red-legged frogs on watershed lands. Over 64 individual frogs have been tagged with a passive integrated transponder (PIT) and/or radio tagged through February 2008 in the north and south watersheds. Although the project is ongoing, early results show that habitat occupancy varies from year to year.

Western Pond Turtle (*Clemmys marmorata*)

Description: The western pond turtle is a medium-sized olive green, brown, or blackish turtle, lacking distinct carapace markings. Males typically develop a light-colored throat

through sexual maturity; this contrast relative to darker body parts becomes more distinct with age. Females retain a dark or mottled throat typical of juvenile turtles. Plastron coloration varies considerably among individuals, ranging from entirely light to dark, or patterned with light or dark markings (Jennings and Hayes 1994).

In California, reproductive maturity occurs between 7 and 11 years of age. Mating typically occurs in late April to early May, but may occur year-round (Holland 1985, 1991; Jennings and Hayes 1994). Females move 1,300 feet or more from aquatic sites to upland nesting sites (see Habitat), and lay from 1 to 13 thin-shelled eggs in a 25- to 30-inch deep dry nest (Holland 1991, Rathbun et al. 1993). The young overwinter in the nest, emerge in early spring, and migrate to the aquatic site.

Range: Historically, the western pond turtle occurred in most Pacific slope drainages from Washington south through California to Baja, California (Slater 1962, Stebbins 1985, Jennings and Hayes 1994). The known elevation range of the western pond turtle extends from sea level to 1432 meters (4,700 feet) (Jennings and Hayes 1994). The species has been observed at higher elevations (2042 meters - 6,700 feet), but turtles are known to have been introduced at all of these higher-elevation sites (Holland 1991).

Habitat: The western pond turtle is an aquatic species that leaves aquatic habitats only to reproduce and, in some cases, overwinter. Turtles require ponds, lakes, or slow-water aquatic habitat, although they can occur at low densities along higher-order streams (Jennings and Hayes 1994). One of the most important determinants of aquatic habitat quality is the availability of basking sites such as logs, rocks, or dense aquatic vegetation mats (Holland 1991), and turtle abundance is often positively correlated with the amount of basking area. Western pond turtles normally get 2-4 hours of atmospheric basking per day (Bettaso 2005). In addition to aquatic sites, turtles require an upland oviposition site near aquatic habitat (Holland 1991). Nest sites must support the thermal and hydric requirements of the incubating eggs, and dry, unshaded areas are typically considered suitable nesting sites. Nesting sites have been found up to 400 m from basking sites, although most nests are located within 200 m of basking areas (Holland 1991), and often closer (Shafer 2005).

Migration/Seasonal Requirements: In a study on Waddell Creek, Smith (2005) found that turtles moved upland or onto island in response to flooding, and back to the water in response to increased seasonal temperatures. Males have home ranges of up to 350 meters in length while female home ranges may be half as large (Bury 2005). Movement

away from aquatic habitat, except to nest, was rare in a pond environment noted by Rathbun et al. (1993). In another case, turtles showed high variation in movement patterns adjacent to stream habitat. Some individuals remained close to the watercourse to aestivate, nest, or overwinter, while others moved relatively long distances. Adults can tolerate up to 7 days without water, and turtles will move considerable distances in response to changes in local habitat. Little is known about juvenile dispersal abilities or site recolonization after local population extirpation (Jennings and Hayes 1994).

Threats: Western pond turtle populations lose about 10% of the animals per year (Bury 2005). Besides predation, land use practices that involve frequent ground disturbance, such as cattle grazing and farming, can result in nesting failures. These impacts can lead to increasingly adult-biased populations (Holland 1991, Jennings and Hayes 1994). Upland nesting sites can be destroyed by farming activities (including plowing and irrigation) (Smith 2005), or by predation from raccoons and skunks after eggs have been deposited (Jennings and Hayes 1994). This species also suffers from competition with several introduced species, including other turtle species such as the red-eared slider (*Trachemys scripta elegans*) and the soft-shelled turtle (*Apalone sp*). Other factors affecting pond turtle populations include juvenile predation by introduced bullfrogs (Holland 1991, Jennings and Hayes 1994) and introduced fish (Holland 1991, Jennings and Hayes 1994). Pond turtles have been heavily exploited for food in parts of the species' range (Holland 1991); they are also incidentally captured by bait fisherman and released without hook removal, which can significantly impair their foraging ability (Mader 1988, Holland 1991, Jennings and Hayes 1994).

Status: The western pond turtle has no federal or state listing or sensitive species designation.

Recovery Plan: The western pond turtle is not listed as Threatened or Endangered by the USFWS; therefore no recovery plan has been developed.

Presence in the HCP Area: The western pond turtle is known to inhabit reservoirs, creeks and ponds throughout the East Bay Municipal Utility District East Bay watershed (Figure A-5). Suitable habitat is found on Lafayette, San Pablo, Briones, and Upper San Leandro reservoirs and in ponds with adequate habitat components throughout the north watershed. Ponds 11, 22, 28, 62, and 85, (Simas Pond, Nunes Pond, Nunes Lagoon, Inspiration Pond, and Baby Bottle Pond respectively) all contain populations of western pond turtles (Stebbins 1996).

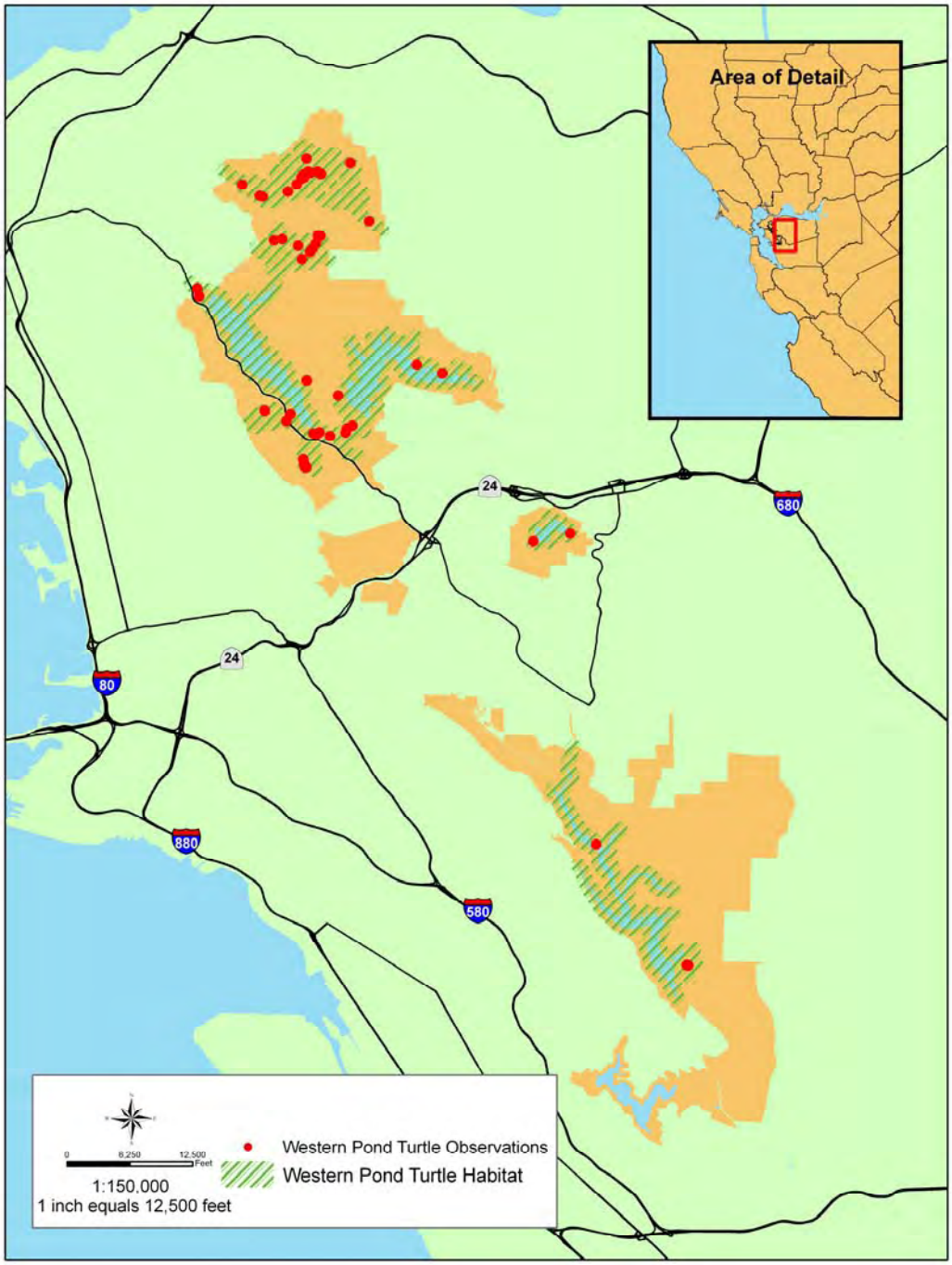

Figure A-5. Western pond turtle observation and habitat locations on EBMUD lands, Contra Costa and Alameda counties, California.

This species suffers from competition in Lafayette Reservoir with the non-native red-eared slider (*Trachemys scripta elegans*), and in San Pablo Reservoir from competition with sliders, non-native spiny softshell turtles (*Trionyx spiniferus*), and non-native snapping turtles (*Chelydra serpentina*).

Alameda Whipsnake (*Masticophis lateralis euryxanthus*)

Description: The Alameda whipsnake was described by William Reimer (1954) from six specimens collected in the Berkeley Hills, Alameda County, California, and near Somersville, Contra Costa County, California. It is a slender, fast moving diurnal snake with a narrow neck and a relatively broad head with large eyes. The dorsal surface is colored sooty black or dark brown with a distinct yellow-orange stripe down each side. The anterior portions of the ventral surface are orange-rufous colored, the midsection is cream colored, and the tail is pinkish. The adults reach a length of 91 to 122 cm. This subspecies is distinguished from the more common California whipsnake (M. l. lateralis) by its sooty black dorsum, its comparatively wide orange stripes that run laterally down each side, the lack of a dark line across the rostral, an uninterrupted light stripe between the rostral and eye, and the virtual absence of spotting on the venter of the head and neck (62 Federal Register 64308).

Breeding occurs from March through June. A clutch of 6–11 eggs are laid from May through July (Stebbins 1985). The young hatch and emerge in the late-summer to early fall (Swaim 1994) (62 Federal Register 64308). The diet of the Alameda whipsnake includes lizards, small mammals, snakes and nesting birds (62 Federal Register 64308).

Range: The Alameda whipsnake inhabits the inner Coast Range in western and central Contra Costa and Alameda Counties (McGinnis 1992, Swaim 1994). Due to extensive urban development within its historical range, the population has been fragmented into five populations: 1) Sobrante Ridge, Tilden/Wildcat Regional Parks area to the Briones Hills, in Contra Costa County (Tilden-Briones population); 2) Oakland Hills, Anthony Chabot area to Las Trampas Ridge, in Contra Costa County (Oakland-Las Trampas population); 3) Hayward Hills, Palomares area to Pleasanton Ridge, in Alameda County (Hayward-Pleasanton Ridge population); 4) Mount Diablo vicinity and the Black Hills, in Contra Costa County (Mount Diablo-Black Hills population); and 5) Wauhab Ridge, Del Valle areas to the Cedar Mountain Ridge, in Alameda County (Sunol-Cedar Mountain population) (62 Federal Register 64308). Much of these areas are owned by public utilities, are in private ownership, or are parks (62 Federal Register 64308).

Habitat: The Alameda whipsnake usually is found in northern coastal scrub or chaparral, but may also occur in adjacent habitats, including grassland and oak and oak/bay woodlands (Swaim 1994).

Threats: The primary cause of the decline of the Alameda whipsnake is the loss of habitat from human activities. The fragmentation of habitats resulting from development makes some populations of this species more vulnerable to extinction. The Tilden-Briones and Oakland-Las Trampas populations occur in a relatively narrow band of ridgetop chaparral between Oakland and Berkeley on the west and the Highway 680 corridor to the east. Habitats in these areas may have a high proportion of edge-to-interior, making them less valuable for whipsnakes. The Tilden-Briones habitats may be less than 1.6 km wide in some places, imposing a significant constraint to an animal whose home range may be as large as 9 ha. Also, trapping studies have produced few animals, suggesting that these snakes may be relatively scarce, even in suitable habitats (Swaim 1994) (62 Federal Register 64313).

A number of native and non-native animals are known to prey on the Alameda whipsnake including California kingsnake (L*ampropeltis getula californiae*) (Swaim 1994), raccoon (*Procyon lotor),* striped skunk *(Mephitis mephitis),* opossum *(Didelphis virginianus*), coyote (*Canis latrans*), gray fox (*Vulpes cinereoargenteus*), and various hawks (*Buteo* spp.) (Goodrich and Buskirk 1995). The introduced red fox (*Vulpes vulpes*), feral pigs (*Sus scrofa*), feral cats (*Felis domestica*) and dogs (*Canis familiaris*) all prey on the whipsnake, particularly where urban development brings them into more frequent contact with whipsnake habitat (62 Federal Register 64313). In the past seven years, EBMUD Natural Resource staff and others in the East Bay have noted an increase in the frequency of encounters with wild turkeys. Single encounters were often described in the 1990s, whereas in 2005 there were many EBMUD watershed sighting of wild turkey flock of over 100 birds. They are particularly numerous in Siesta Valley, a key portion of the Tilden-Briones population; and in the watershed East of Upper San Leandro Reservoir in the Oakland-Las Trampas population. There are records for road kills of dispersing juvenile whipsnakes during June in theses areas (EBMUD 2005) (CNDDB 2004). It is unknown if the increasing turkey population will threaten these small snakes, but juvenile turkeys eat a high percentage of animal material (mostly invertebrates) (Bent 1938) and the possibility cannot be discounted.

Status: The federal listing for the Alameda whipsnake as a threatened species became final on December 5, 1997 (62 Federal Register 64306). The State of California also lists

it as a threatened species. In October 2006 a final critical habitat designation was published (71 Federal Register 58219). The critical habitat is divided into seven units of which three; Tilden-Briones, Oakland-Las Trampas and the Caldecott Tunnel Unit include EBMUD HCP lands.

Recovery Plan: The Alameda whipsnake was is one of six species included in the "Draft Recovery Plan for Chaparral and Shrub Community Species East of San Francisco Bay" (USFWS 2002). The recovery strategy for the whipsnake includes:

1. Long-term protection of identified lands within the five major recovery units
2. Protection in perpetuity of strategically situated focus areas.

Also identified was protection of essential connectivity between recovery units, including lands in public ownership. Although the focus of the recovery plan for whipsnakes is on specific areas, the plan also stresses the importance of the habitat surrounding the recovery units (USFWS 2002).

Presence in HCP Area: Alameda whipsnakes have been found in the Upper San Leandro Reservoir (USL) (EIP 1991), Briones, and Pinole watersheds (Beeman 1990), in Siesta Valley, and near San Pablo Dam in the HCP area (EBMUD 2006). Habitat for this species has been identified in Gateway Valley (Swaim 1994). The CNPS vegetation communities in the HCP area where snake can potentially be found include, arroyo willow, coast live oak, knobcone pine, mixed oak, valley oak, red willow, chamise chaparral, chamise-black sage chaparral, coyote brush scrub, California sagebrush scrub, mule fat scrub, California annual grassland, California oatgrass grassland, creeping ryegrass grassland, foothill needlegrass grassland, Idaho fescue grassland, one-sided bluegrass grassland, introduced perennial grassland, purple needlegrass grassland, and sedge riparian grassland. Specific site locations are shown in Figure A-6. This species is closely associated with soil type and vegetation.

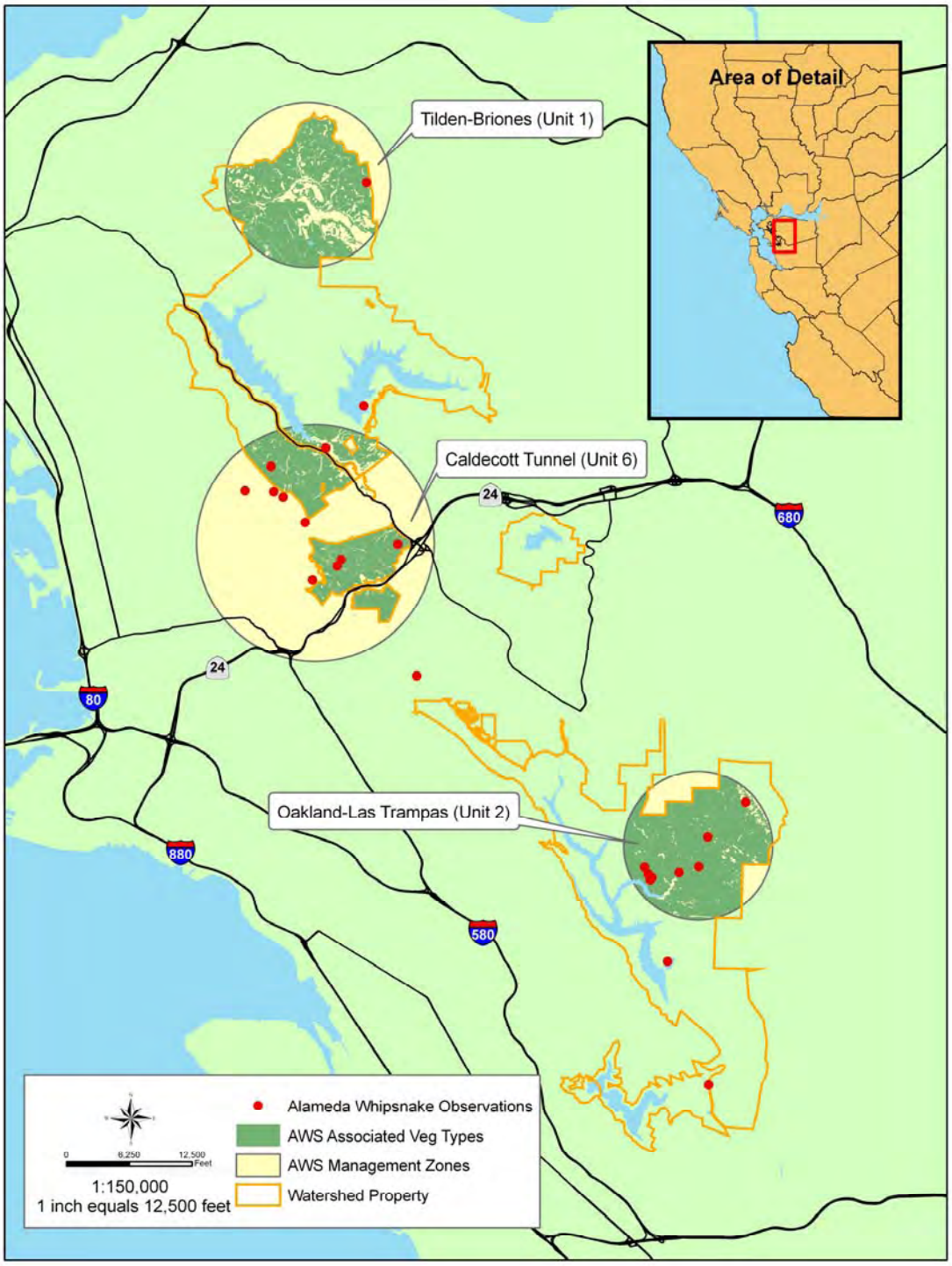

Figure A-6. Alameda whipsnake observation and management zone locations, Contra Costa and Alameda counties, California.

Pallid Bat (*Antrozous pallidus*)

Description: The pallid bat is a relatively large, pale, and yellowish bat in the family Vespertilionidae. Desert forms of this species are palest, while the darkest members occur in the Pacific Northwest (Burt and Grossenheider 1980). Its ears are large and not joined, naked, and crossed by 9 or 11 transverse lines; the bases of its hairs are nearly white with dusky tips. Pallid bats show a large light spot between their shoulders, and their underparts are paler and lack dusky-tipped hairs (Davis and Schmidly 1994).

This species mates between late October and February, and females typically mate in their first year while males delay until their second year. Gestation lasts 53-71 days, and maternity colonies of up to 100 individuals form in early April. Young are born from April to July and are weaned after 7 weeks. Average litter size is 2 and ranges from 1 to 3; females reproducing for the first time typically rear 1 young. Males may or may not roost with the maternity colony in summer.

Range: The pallid bat is a locally common bat found at low elevations in California (Zeiner et al. 1990). Its range includes most of California, excluding the Sierra Nevada range from Shasta to Kern Counties, and the northwest corner. Roost sites have been reported along the coast from Sonoma south to San Diego County; in the arid regions of southern and eastern California, including Kern, Inyo, Mono, Imperial, Riverside, and San Bernardino Counties; in the Sierra foothills of Tuolumne and Mariposa Counties; and in the San Joaquin Valley (Natural Diversity Database 1999).

Habitat: The pallid bat uses a wide variety of habitats including grasslands, shrublands, woodlands, and forests, but prefers open dry areas for foraging near roosting sites (Zeiner et al. 1990, Natural Diversity Database 1999). Small colonies use both day and nighttime roosts, sometimes shared with other bat species. Daytime roosts may be in rock crevices, cliffs, mines, caves, and hollow trees; night roosts are in the open and include highway bridges, open buildings, porches, and rock shelters (Barbour and Davis 1969).

Migration/Seasonal Requirements: The pallid bat is a winter and summer resident throughout its range in California. This species exhibits post-breeding dispersal and moves locally to hibernation sites in winter (Zeiner et al. 1990); however, little is known about specific movement patterns.

Threats: Pallid bats are highly sensitive to human disturbances; if harassed, they may abandon a roost and not return for several years (Barbour and Davis 1969). Mining

operations and development also threaten pallid bat populations (Natural Diversity Database 1999).

Status: The pallid bat is designated as a California species of special concern by the Department of Fish and Game.

Recovery Plan: The U. S. Fish and Wildlife Service does not list the pallid bat as Threatened or Endangered; therefore no recovery plan has been developed.

Presence in the HCP Area: One pallid bat nursery colony is known to occur in a barn located in Pinole Valley (Figure A-7). Adult and juvenile bats are usually present from late winter to late spring. The colony is located behind one of two large hayloft doors. Estimates place the number of bats from 100 to 150 (E. Pierson, and W. Rainey 2001). The amount of available habitat at the barn was doubled in 2001 by volunteer enhancement efforts (Bob Wisecarver, pers. comm.) when the second hayloft door was "repaired" to the specifications of the door currently being used. This second door has received little use, though configuration, spacing, and aspect all duplicate the current habitat. The colony is shared with the free-tail bat (*Tadarida brasiliensis*) (E Pierson and W. Rainey 2001). A supplemental colony structure placed within 75' of the April Creek barn may cause some spill over from the original barn colony. However, it is unlikely that this colony will exceed 300 bats, whether in the current silo door, a supplemental colony structure, or both (G. Tartarian, pers.comm.).

Figure A-7. Pallid bat colony location on EBMUD lands, Contra Costa County, California.

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Appendix B:

Integrated Pest Management

Taken from: 2003 EBMUD Environmental Compliance Manual

Appendix B:

7.0 INTEGRATED PEST MANAGEMENT

7.1 Introduction

The District is responsible for implementing pest control management practices within much of the 28,000 acres of East Bay watershed lands, recreation areas, right-of-ways, facility grounds and other areas located throughout the District. The District is committed to using the most environmentally safe practices for pest control to ensure the protection of the public and District employees, and to protect potable water sources, other aquatic resources, and public and private property.

The District has established an Integrated Pest Management (IPM) Committee to develop a consistent approach toward pesticide usage and management throughout the District, and to monitor the use of herbicides and pesticides. The IPM Committee has developed an IPM Program for use throughout the District that provides written guidance for determining the most appropriate pest control methods for a particular application, including the use of chemicals. Pests include a wide range of both plant and animal species capable of creating a nuisance.

The District's IPM Committee meets on a quarterly basis and develops annual reports summarizing the types, quantities, and locations of pesticide and herbicide usage throughout the District. IPM procedures and practices that have been developed by the IPM Committee are provided to managers and supervisors of work units having pest management responsibilities.

The District does not handle or use any restricted use pesticides. The IPM Committee reviews the use of pesticides on new projects, and is responsible for ensuring that pesticides are used in an appropriate manner, and that alternatives to chemical applications are used to the extent possible. Pesticides are applied in a 1% solution, and consist primarily of Roundup Pro, Surflan, and smaller amounts of other Class 3 pesticides.

District practice on watersheds is to use chemical controls to achieve an acceptable maintenance level for the identified pest, and then to use a combination of chemicals and physical methods to keep the pests under control. Physical methods include using brush rakes, chain saws, disking, and in the case of controlling star thistle, actual removal by hand. The District continues to use horse, cattle, and occasionally goat grazing as a means of pest control, including the use of draft horses for removing eucalyptus trees. In addition, controlled burns are conducted for both weed control and fire fighting training.

7.2 Definitions of Key Terms

Integrated Pest Management (IPM) is a pest management strategy that focuses on long-term prevention of pests with minimum impact on human health, the environment, and non-target organisms. A pest management strategy may include one or more of the following elements:

- No controls;
- Physical/mechanical controls (e.g., hand labor, soil tilling, mowing);
- Biological controls (e.g., animal grazing, use of predators or parasites);
- Chemical controls (preferably low toxicity materials such as soaps and oils); and
- Other controls (e.g., mulching, alternative vegetation, prescribed burns).

Pests are: (1) any insect, rodent, nematode, fungus, weed; or (2) any other form of terrestrial or aquatic plant or animal life or virus, bacteria, or other micro-organism (except viruses, bacteria, or other micro-organisms on or in living man or other living animals) that are declared to be a pest under the Federal, Insecticide, Fungicide, and Rodenticide Act.

Pest Problem means a pest infestation and its consequences, or any condition for which the use of plant regulators, defoliants, or desiccants would be appropriate.

Herbicides are substances or mixtures of substances intended to prevent or inhibit the growth of, kill or destroy plants and plant parts that are declared to be pests. Herbicides include, but are not limited to:

- *Direct contact herbicides* intended to kill or destroy weeds, unwanted brush and trees, or unwanted plant parts, or to mitigate their adverse effects on desirable plants;
- *Soil treatment herbicides* intended to kill or destroy weeds, unwanted brush and trees, or unwanted plant parts, or to prevent the establishment of any or all plants;
- *Pre-emergence herbicides* intended to prevent or inhibit the germination or growth of weed seeds or seedlings;
- *Root control herbicides* intended to prevent the growth of, or kill roots in certain sites such as sewer lines and drainage tiles;
- *Aquatic herbicides* intended to prevent, inhibit, or control the growth of, or kill aquatic weeds;

- *Algaecides*, except slimicides, intended to prevent or inhibit the multiplication of, or destroy algae in ponds, swimming pools, aquaria or similar confined sites;

- *Debarking agents* intended to kill trees by treatment of bark on trunks; and

- *Biological weed-control agents* such as specific pathogenic organisms or entities prepared and utilized by man.

Pesticides are any substances or mixtures of substances that are intended prevent, destroy, repel, or mitigate any pest, or intended for use as a plant regulator, defoliant, or desiccant. Pesticides are classified as being for either general use or restricted use.

- *General Use Pesticides* are pesticides that may be used without creating unreasonable adverse effects on the environment.

- *Restricted Use Pesticides* are pesticides that may have unreasonable adverse effects on the environment, including injury to the applicator. The use or possession of restricted pesticides requires a written permit from the local agricultural commissioner, and the commissioner has the authority to deny a permit for use if the commissioner finds that the proposed use will have adverse environmental effects that outweigh the benefits.

Signal Words: The following definitions apply to signage associated with the use of pesticides:

- *"Caution"*: Least Hazardous to Human Health

- *"Warning"*: Intermediate Hazard to Human Health

- *"Danger"*: Requires Pesticide Applicator

7.3 Roles and Responsibilities

7.3.1 IPM Committee

The responsibilities of the IPM Committee include the following:

- Review IPM practices on an annual basis to ensure consistency among District work groups;

- Review pesticide usage requests and plans for the use of new chemicals or for pesticide applications within environmentally sensitive areas, as needed;

- Provide guidance and consistency on District-wide pest management practices in accordance with District Policy 71; and

- Meet quarterly to discuss IPM practices and issues that arise concerning pesticide usage.

Current representation on the IPM Committee includes the following District staff:

Manager, Watershed and Recreation
Maintenance Manager
Water Systems Production Manager
Aqueduct Maintenance Foreman
Fisheries and Wildlife Manager
Grounds Foreman
Director, Natural Resources
Environmental Compliance Manager
Environmental Compliance Specialist

7.3.2 District Work Units

All District work units that practice pest management on District property (including watershed lands, recreation areas, aqueducts, and other rights-of-way, facility grounds, etc.) are responsible for implementing Best Management Practices (BMPs) that have been developed by the IPM Committee. These work units include:

Water Production – Pardee
Natural Resources – Pardee
Water Production – Stockton
Water Production – Bixler
Water Production – Walnut Creek
Natural Resources – East Bay
Grounds Maintenance, East and West of the Hills

Each work unit is responsible for developing pest control strategies, documenting pest control activities, complying with regulatory requirements, and maintaining records in accordance with the document titled *East Bay Municipal Utility District Integrated Pest Management Program*. Additional work unit responsibilities include meeting applicable license requirements for appropriate staff, and maintaining effective working relationships with local regulators.

7.3.3 ECS Staff

ECS staff responsibilities include leading IPM Committee meetings, providing staff support to the IPM Committee, preparing written documents for review by the IPM Committee, reviewing all pesticide and herbicide use requests before presenting them to the IPM Committee, maintaining files concerning pesticide

usage request reports, and maintaining information concerning various pesticides used throughout the District.

7.4 Summary of Applicable Regulations

7.4.1 Federal Regulations

Title 7, United States Code, Section 136 –136y, and 40 Code of Federal Regulations, Parts 152 – 186 established the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA), which provides the federal regulatory framework governing pesticides and herbicides. FIFRA requires that all pesticides must be registered, and that no one can use a pesticide unless it has been registered. FIFRA further specifies whether a pesticide is classified as a restricted use or general use pesticide.

7.4.2 State Regulations

The Pest Control Operations Laws are located in Title 3, California Code of Regulations, Section 300 *et seq*, and in the Food and Agricultural Code, Section 11401 *et seq*. These laws establish the Department of Pesticide Regulations (DPR) as the agency responsible for oversight of state regulation of pesticides. The California pesticide program parallels FIFRA. The DPR enforces federal and state-defined pesticide laws and regulations, and certifies applicators that use restricted use pesticides.

7.4.3 Jurisdiction of Local Agencies

County agricultural commissioners are employees of the California Department of Food and Agriculture, having responsibility for local pesticide regulation under the direction of the DPR. The DPR enforces state and federal requirements, and the commissioners enforce local standards. The commissioners have the authority to adopt regulations governing pest control operations upon approval of the DPR.

7.4.4 Additional Regulations

Additional regulations concerning pesticides include the following:

- Clean Water Act, for spills to a receiving water, sanitary sewer, or storm sewer;
- Hazardous Materials Business Plan/Community Right to Know Laws, which require inclusion of pesticides in Hazardous Materials Business Plans, if the quantities stored exceed 55 gallons or 500 pounds;

- Hazardous Waste Control Laws, under which pesticide wastes (with the exception of empty containers) are considered to be hazardous wastes in the state of California, and subject to regulation by the Department of Toxic Substances Control (DTSC);

- Safe Drinking Water Act, which establishes Maximum Contaminant Levels (MCLs) for certain chemicals that are components of pesticides; and

- Clean Air Act, which classifies certain pesticides as Hazardous Air Pollutants (HAPs).

7.5 General IPM Best Management Practices at EBMUD

The BMPs described in this section are to be implemented by all District work units that practice pest management on District property.

7.5.1 Identify Potential Pests within Management Area

All personnel having pest management responsibilities for pest management shall be trained to accurately identify major pests and the damage that such pests may cause. Field manuals and other resources shall be made available to staff to assist in pest identification, as necessary.

7.5.2 Establish Injury Levels and Action Thresholds for Individual Pest Species

An injury level is the pest population size or density associated with intolerable damage (e.g., height and thickness of grasses under aqueducts or number of ground squirrels burrowing in an earthen dam). An action threshold is the set of conditions required to trigger a control action (e.g., emergence of Bermuda grass along a right of way).

District staff shall determine the infestation levels that will be intolerable or that will cause unacceptable damage at different times of the year, during various plant growth stages, and for other situations. At the same time, a monitoring plan must be devised for detecting these pest infestation levels and determining when to implement control actions. Action thresholds are usually reached when:

- Monitoring results indicate that the pest population will reach the injury level, if left untreated;

- Biological or environmental factors cannot be expected to reduce the pest problem within a reasonable amount of time; and

- Pest management costs (including any environmental or health impacts) are considered to be lower than costs associated with potential pest damage.

7.5.3 Establish Monitoring Guidelines

Pest monitoring programs have two primary objectives:

- To identify where and when pest problems become intolerable; and
- To determine the effectiveness of treatment actions.

Monitoring methods may vary from site to site, and from pest to pest, but all monitoring methods must involve regular inspections for pests and/or damage symptoms.

Written monitoring reports shall be prepared by each of the work units performing IPM activities so that management strategies can be reliably evaluated. All reports shall include date, time, location, observed pest species, and degree of the pest problem.

Develop a List of Acceptable Management Strategies for Individual Sites, Types of Sites, and Pests

Each work unit practicing IPM shall develop a list of acceptable management strategies for the areas under which it has authority and responsibility. The criteria listed below should be used in developing these management strategies. Since these criteria may not be met in every case, or met to varying degrees, judgment must be exercised to maximize the benefits associated with each strategy.

- Least damaging to the general environment;
- Least hazardous to human health;
- Least toxic to non-target organisms;
- Absence of listed species or known listed species habitats;
- Most likely to produce permanent reduction of the pest;
- Easiest to carry out effectively; and
- Most cost-effective in the short and long term.

As strategies are developed, they may include a combination of various management alternatives. The preferred methods in an IPM program are those that permanently prevent pest problems, thereby eliminating the potential for pest

damage. Pest management strategy may include one or more of the following elements:

- No controls;
- Physical/mechanical controls (e.g., hand labor, soil tilling, mowing);
- Biological controls (e.g., animal grazing, use of predators or parasites);
- Chemical controls (preferably low toxicity materials such as soaps and oils); and
- Other controls (e.g., mulching, alternative vegetation, prescribed burns).

7.5.4 Establish a Recordkeeping System

Accurate recordkeeping is essential for evaluating and improving an IPM program, as well as for reference purposes in the event that District management, the Board of Directors, or the public requests information on measures taken by the District to control certain types of pests. Each work unit is responsible for maintaining written records that include the following information, which should be reviewed and updated annually:

- A list of pests identified in a given management area (see 7.5.1 above);
- A description of unacceptable injury levels and action thresholds for a given management area (see 7.5.2 above); and

A list of acceptable management strategies for a given management area (see 7.5.4 above).

In addition, written records shall be kept of observations of the management area based on the monitoring guidelines established in Section 7.5.3 above. These observations should include:

- The degree of pest infestation using density, distribution, or other appropriate parameters (a map of the management area is useful);
- Information concerning the treatment method used for the pest problem, including a description of the treatment method, area treated, time(s) and date(s) of treatment, location of treatment, personnel performing treatment, and the cost of treatment;
- An assessment of the effectiveness of the treatment method in minimizing or eradicating the pest problem, in both the short and long term;

- A description of side-effects of the treatment on non-target organisms; and
- A summary of any citizen complaints and/or positive comments received, and a description of any other issues that arise.

7.6 Specific IPM Procedures and Practices at EBMUD

7.6.1 Pesticide Usage Practices

In many cases, District work units applying IPM include pesticide use (primarily herbicides) as an element of their management strategies. The District's pesticide usage practices are summarized as follows:

- If chemical pesticides/herbicides are used, use the least toxic pesticide/herbicide that will adequately achieve IPM goals. Take into consideration overall risk to the applicator and impact to the environment.
- Comply with all federal, state and local laws and regulations. Key regulatory contacts are as follows:

Table 7-1: Key IPM Regulatory Contacts

Agency Type	Regulatory Agency Name	Telephone No.
Federal	USEPA Air and Toxics Division, Pesticides	(415) 744-1087
State	Cal-EPA Department of Pesticide Regulation	(916) 445-4300
State	Cal-EPA Department of Pesticide Regulation – Regional Office, Richmond	(510) 669-0295
Local	Alameda County Agricultural Commissioner	(510) 670-5232
Local	Amador County Agricultural Commissioner	(209) 223-6487
Local	Calaveras County Agricultural Commissioner	(209) 754-6504
Local	Contra Costa County Agricultural Commissioner – Brentwood Office	(510) 634-5682
Local	Contra Costa County Agricultural Commissioner – Concord Office	(510) 646-5250
Local	San Joaquin County Agricultural Commissioner	(209) 468-3300

- Read and follow all chemical product label instructions.
- Review the history of a site and determine pest conditions. Monitor problem areas periodically in order to identify the level of pest condition. Establish an action threshold for each pest species or pest type as part of a pesticide use decision. This action threshold should be consistent with the work unit's IPM strategy.

- Apply pesticides at the appropriate time and under adequate weather conditions to maximize their effectiveness on the target organism and minimize the likelihood of discharging non-degraded pesticides in storm water runoff.

- Do not mix pesticides adjacent to a storm drain inlet, culvert, watercourse, or filter bed. Mix in an area where spillage, if it occurs, can be easily contained.

- Select pesticides and application techniques along roadsides that will retain some vegetative cover, if possible. This will help prevent soil erosion, slow the rate of storm water runoff and minimize potential for contaminated runoff.

- Calibrate field equipment regularly to ensure the desired application rate.

- Mix only as much material as necessary for the application.

- Maintain a record of pesticide usage for each site. This record shall include the type and quantity of pesticide used.

- If there is likely to be public contact within the area to be sprayed with a pesticide, adequate notification or posting must be provided.

- At District filter plants, pesticides shall not be used within 25 feet of the filter beds or sedimentation basins. On watershed lands, pesticides shall not be used within 1,000 feet of reservoirs or tributary creeks, except for spot treatment of pest plant species only. Work units that propose to use pesticides within this 1,000-foot zone shall gain approval of such use from the IPM Committee. Currently, the following pesticide uses within the 1,000-foot zone are approved:

    - Use of Rodeo or Accord for vegetation control in the Pardee spillway expansion joints.

    - Use of Rodeo or Accord for vegetation control on the downstream faces of the Camanche Reservoir dikes.

    - Use of Rodeo or Accord along rights of way, including Briones Aqueduct Road.

  Work units shall annually review pesticide use within the 1,000-foot zone to ensure that the practice is still required and that there are no impacts to non-target organisms.

- Monitor success of the pesticide treatment and adjust usage based on monitoring. This monitoring shall be consistent with the program established under Section 7.5.3.

7.6.2 District-Approved Pesticide List

The following pesticides are approved for use for application by District staff and contractors on District property, rights of ways or other areas where chemical pest control is necessary.

Table 7-2: Approved Pesticide List

Product Name	EPA Registration No. *
Accord	524-326
Diquat	Multiple products, multiple registration numbers
Direx	Multiple products, multiple registration numbers
Expedite	524-432-66435
Garlon	62719-40
Karmex DF	352-508
Krovar	352-505
Oust	352-401
Rodeo	524-343
Ronstar	Multiple products, multiple registration numbers
Roundup Pro	524-475
Roundup Drypak	524-436
Simtrol 90 DF	35915-12-60063
Surflan A.S.	62719-113-AA
Telar	342-404
Diazinon 4E	655-457
Diazinon (Knox out 2FM ant spray)	Multiple products, multiple registration numbers
Pyrethrin based wasp & hornet sprays	
Demon TC	10182-107-AA
Tempo 20WP	3125-380-AA
Combat	64240-25-AA
Dragnet	279-3062-AA

* EPA Registration Numbers are listed on the pesticide containers and are specific to the formulation of the pesticide. These numbers will change if a manufacturer changes a formulation, regardless of any change in the product name. Always check EPA Registration Number to confirm that the product is consistent with the above list.

Rodenticides with 0.01% Diphain or p-Chlorophenyl Phenylacetyl 1, 3-Indandlone as active ingredients are also approved for use.

7.6.3 Pesticide Storage

Pesticides shall be stored in locked buildings. All pesticide containers shall be labeled. The label shall include the name of the pesticide, signal word, owner's company name and section (e.g., EBMUD, Aqueduct Section).

7.6.4 Pesticide Disposal

Triple rinse empty pesticide containers immediately upon emptying contents. Place rinse water in spray tank incorporating it into the pesticide mixture. Dispose of the container rinse water or spray tank rinse water as a product over a targeted area within the application site

Dispose of triple-rinsed empty pesticide containers according to County Agricultural Commission and manufacturer's recommendations. For containers larger than five gallons and for work units that produce more than six empty pesticide containers per year, the triple-rinsed containers shall be rendered unusable. These containers shall be stored in a secure area until such time that the County Agricultural Commission can inspect them and certify them as being safe for disposal. At that time, they shall be disposed of in an appropriate landfill. For work units that produce fewer than six empty containers (five gallon size or smaller) per year, the triple-rinsed containers should be rendered unusable and can then be disposed of with other non-hazardous trash produced at the site.

If possible, unwanted or unused pesticides should be returned. Procedures for unwanted pesticides are as follows:

- Contact other District work units or one or more of the District warehouses to determine if they can use the pesticide in their operations;
- Return unopened containers to the manufacturer; or
- Find a qualified buyer for the pesticide and sell it using the District Material Sale Form (form 5-014).

If reusing or returning unwanted pesticides is not feasible, contact the Regulatory Compliance Office at extension 1669 to arrange for disposal.

7.6.5 Pesticide Spill Response

Spill kits shall be prepared and maintained at pesticide storage areas and on all application equipment having a tank capacity of 50 gallons or more.

Spill kits shall include the following: an instruction sheet with a contact notification list and phone numbers, absorbent material capable of absorbing up to

five gallons of liquid, shovel, broom, dustpan, gloves, and warning tape to secure the area in case clean-up cannot be accomplished immediately. Appendix 7-A summarizes the District's emergency notification procedure for pesticide/herbicide spills.

Employees that apply pesticides will be trained in the use of the spill kits. Work units shall maintain a written pesticide spill response and notification procedure and all employees that apply pesticides shall be familiar with the procedure.

7.6.6 Annual Pesticide Usage Reports

Each District Division or Department that uses pesticides shall produce an Annual Pesticide Usage Report. The report shall contain the following information, at a minimum:

- Type of pesticide used (product name is acceptable);
- Quantity of each pesticide used; and
- Locations where pesticides were used.

Reports shall be submitted to the IPM Committee, which will compile and maintain the information.

7.7 Fines and Penalties

There are three levels of penalties: Administrative, Civil, and Criminal. Under an administrative action, the DPR may issue Cease and Desist Orders, or deny, revoke, or suspend licenses and permits.

Civil penalties can range from $1,000 to $25,000 per violation. Criminal penalties include fines ranging from $500 to $5,000 and up to six months in jail.

7.8 Fees

Applicator licenses cost $30, and expire annually on December 31.

7.9 Training and Certification

Pesticide applicators shall obtain a state pesticide applicator certification or work under the direction of an employee who has obtained the state certification.

As a general rule, the District does not use Restricted Pesticides. The use or possession of restricted materials requires a written permit from the County Agricultural

Commissioner. The commissioner may elect to be present at the time the restricted material is being used.

Pesticide applicators shall be trained in general IPM practices, the safe use of pesticides and proper inspection of applicator equipment to prevent accidental pesticide leaks, spills, and potential hazards to applicators and the environment. Training shall be conducted annually. The work unit shall maintain records of staff that received the training for at least three years. New employees shall not apply pesticides until they have received the appropriate training or until their supervisor confirms that they have skills and knowledge equivalent to the training.

7.10 Recordkeeping

The monitoring and observation records for a given management area should be kept for a minimum of five years and filed with the work units conducting IPM.

Each District Division or Department that uses pesticides shall produce an Annual Pesticide Usage Report. The report shall contain the information listed in Section 7.6.6, at a minimum.

Reports shall be submitted to the IPM Committee, which will compile and maintain the information.

State law requires that a Restricted Pesticide use report be submitted to the County Agricultural Commissioner within seven days after each use of a restricted material.

Appendix C:
EBMUD/CDFG 1601
Memorandum of Understanding

STATE OF CALIFORNIA THE RESOURCES AGENCY
DEPARTMENT OF FISH AND GAME
CENTRAL COAST REGION
(707) 944-5520
Mailing address:
POST OFFICE BOX 47
YOUNTVILLE CALIFORNIA 94599
Street address:
7329 SILVERADO TRAIL
NAPA CALIFORNIA 94558

GRAY DAVIS, GOVERNOR

RECEIVED
APR 29 2003

April 23, 2003

Notification Number: R3-2002-0160

Mr. Steven Abbors / East Bay Municipal Utilities District
Natural Resources Department/Watershed and Recreation Division
500 San Pablo Dam Road
Orinda, California 94563

1601 LAKE AND STREAMBED ALTERATION AGREEMENT

This agreement is issued by the Department of Fish and Game pursuant to Division 2, Chapter 6 of the California Fish and Game Code:

WHEREAS, the applicant Mr. Steven Abbors / East Bay Municipal Utilities District, Natural Resources Division, hereafter called the Operator, submitted a signed NOTIFICATION proposing to substantially divert or obstruct the natural flow of, or substantially change the bed, channel, or bank of, or use material from the streambed or lake of the following water: Upper San Leandro, Pinole Creek, Lafayette, and San Pablo watershed tributaries, channels, ponds, & reservoirs, located in East Bay Municipal Utility District Watershed lands, in the Counties of Alameda and Contra Costa, State of California; and

WHEREAS, the Department has determined that such operations may substantially adversely affect existing fish and wildlife resources including water quality, hydrology, aquatic or terrestrial plant or animal species; and

WHEREAS, the project has undergone the appropriate review under the California Environmental Quality Act; and

WHEREAS, the Operator shall undertake the project as proposed in the signed PROJECT DESCRIPTION and PROJECT CONDITIONS (attached). If the Operator changes the project from that described in the PROJECT DESCRIPTION and does not include the PROJECT CONDITIONS, this agreement is no longer valid; and

WHEREAS, the agreement shall expire on December 31, 2007; with the work to occur between April 15 and October 15; and

WHEREAS, nothing in this agreement authorizes the Operator to trespass on any land or property, nor does it relieve the Operator of the responsibility for compliance with applicable Federal, State, or local laws or ordinances. Placement, or removal, of any material below the level of ordinary high water may come under the jurisdiction of the U. S. Army Corps of Engineers pursuant to Section 404 of the Clean Water Act;

THEREFORE, the Operator may proceed with the project as described in the PROJECT DESCRIPTION and PROJECT CONDITIONS. A copy of this agreement, with attached PROJECT DESCRIPTION and PROJECT CONDITIONS, shall be provided to contractors and subcontractors and shall be in their possession at the work site.

Failure to comply with all conditions of this agreement may result in legal action.

This agreement is approved by:

Rick Parrish for

Robert W. Floerke
Regional Manager
Central Coast Region

cc: Warden Kozicki
Lieutenant Young
Kristine Atkinson

FISH & GAME
YOUNTVILLE
2003 APR 23 AM 9:13

STATE OF CALIFORNIA THE RESOURCES AGENCY GRAY DAVIS, GOVERNOR
DEPARTMENT OF FISH AND GAME
CENTRAL COAST REGION
(707) 944-5520
Mailing address:
POST OFFICE BOX 47
YOUNTVILLE, CALIFORNIA 94599
Street address:
7329 SILVERADO TRAIL
NAPA, CALIFORNIA 94558

1601 RMA Notification Number: R3-2002-0160
East Bay Municipal Utility District, Alameda and Contra Costa Counties

Stephen Abbors
EBMUD, Natural Resources Department
Watershed and Recreation Division
500 San Pablo Dam Road
Orinda, California 94563

PROJECT DESCRIPTION and PROJECT CONDITIONS

Description

East Bay Municipal Utility District (EBMUD) (Operator) proposes to conduct routine maintenance activities that are subject to Fish and Game Code Section 1601 in numerous creeks, channels, ponds and reservoirs within Alameda and Contra Costa Counties. Routine maintenance shall be defined as those periodically scheduled and implemented activities necessary to maintain the water transport capacity of stream channels and maintain the structural and functioning integrity of existing stock ponds and water detention structures on or affecting streams.

Maintenance activities which both parties agree may be considered "routine" are listed on Attachment A and are hereby made a part of this 1601 Routine Maintenance Agreement (RMA). In brief summary, these activities include, clearing of debris from existing culverts, minor vegetation removal, culvert replacement, debris removal in streams sufficient to restore water flow, routine maintenance dredging of stock ponds, bank stabilization and erosion control using bio-engineered techniques, maintenance and repair of existing roads and trails, and removal of hazardous man-made structures from water bodies for public safety and habitat improvement. Routine maintenance is understood not to include any new work other than described in attachment A. Routine maintenance does not include the removal of or damage to living riparian vegetation other than that specified in Attachment A.

This 1601 RMA consists of the Agreement and Attachment A (list of routine activities), and Attachment B (map of the creeks and reservoirs).

1601 Agreement Conditions

The Department of Fish and Game (Department) has determined that the creeks within the EBMUD district boundaries provide habitat for some fish and wildlife in the area and these resources may be impacted by project activities. The following measures to reduce, avoid, and minimize impacts to fish and wildlife resources and watercourses shall be implemented:

1. Only those activities specifically mentioned in Attachment A to this Agreement may be conducted under this 1601 RMA.

2. EBMUD shall submit separate written notification pursuant to Code Section 1601 (Form FG 2023), together with the required fee prescribed in the Department's Streambed Alteration Agreement fee schedule, and otherwise follow the normal notification process prior to the commencement of work activities in all cases where:

   (a) The proposed work does not meet the criteria established for routine maintenance in Attachment A,
   (b) The proposed work was not included in the annual notification required by Condition 3,
   (c) The nature of the proposed work is substantially modified from that described in the annual notification and this Agreement,
   (d) work will occur at a location where the Department advises EBMUD that conditions affecting fish and wildlife resources on the site have substantially changed or such resources would be adversely affected by the proposed activity, or
   (e) The proposed work will adversely impact a State of California Species of Special Concern or State of California (State) or federally listed rare, threatened, endangered or candidate species or its habitat.

3. EBMUD shall provide to the Department of Fish and Game Central Coast Region written notification of proposed routine maintenance activities to be performed that year by May 1 of each year. The written notification of proposed routine maintenance activities shall describe the project location, length and width of impact area, sizing of roads, culverts, rip rap, and other materials. Each annual notification of proposed routine maintenance activities shall be added to this 1601 RMA as Attachment C-Year (e.g. C-2002, C-2003, etc.)

4. The Department may review in the field any project submitted and/or may require that additional conditions be applied to specific activities and amended into this 1601 RMA or that certain projects may require separate notification and development of a separate 1601 Agreement.

5. EBMUD shall provide to the Department of Fish and Game Central Coast Region written notification of maintenance projects completed within the preceding quarter (quarterly reports). Quarterly reports shall be submitted whether or not maintenance projects were conducted in that quarter. The Department may terminate this Agreement immediately if late reports are not submitted within 30 days of a written request from the Department. Due dates for submitting quarterly reports shall be as follows:

May 15	for first quarter projects (January through March)
August 15	for second quarter projects (April through June)
November 15	for third quarter projects (July through September)
February 15	for fourth quarter projects (October through December)

6. A fee payable to the Department shall accompany each quarterly report. The fee amount shall be in accordance with the current fee schedule, as published by the Department for work performed under a MOU (memorandum of understanding) based on the number of maintenance projects completed within each quarter. The Department may terminate this Agreement immediately if late fees are not paid within 30 days of a written request from the Department.

7. All written notifications herein provided to be given or which may be given by either party to the other, shall be deemed to have been fully given when made in writing and deposited in United States mail postage prepaid and addressed as follows:

To EBMUD at:
Manager of Watershed and Recreation
Natural Resources Department
East Bay Municipal Utility District
500 San Pablo Dam Road
Orinda, California 94563

To Department at:
Regional Manager
Department of Fish and Game
Central Coast Region
Post Office Box 47
Yountville, California 94599

8. If the Operator finds more time is needed to complete the authorized activity, the work period may be extended on a day-to-day basis by a local Department of Fish and Game representative.

9. Work in all creeks, ponds, and reservoirs may be conducted only when the area is at its driest but no earlier then April 15 and no later then October 15. Work within creeks and ponds known to support populations of CA red-legged frog (RLF) shall take place after August 1, work in ponds known to support populations of California Tiger Salamander (CTS) shall be conducted after June 15. Debris removal ***immediately*** necessary to prevent flooding may be conducted at any time.

10. For all projects within creeks and ponds known to support habitat for RLF, CTS, and/or western pond turtle (WPT), a qualified biologist shall conduct pre-construction surveys. If listed species or species of concern are located during pre-construction surveys at a project site, EBMUD shall not conduct the project under this 1601 RMA and shall notify the Department for a separate 1601 Agreement. Capture and relocation of Endangered, Threatened, or Species of Special Concern is not authorized by this 1601 RMA.

11. EBMUD is not authorized to take any California Species of Special Concern, State or federally listed threatened or endangered species. If the Department determines that a federally-listed threatened, endangered, proposed or candidate species or its habitat is present at any of the proposed work sites, the Department shall immediately notify EBMUD, the United States Army Corps of Engineers (USACE), and the United States Fish and Wildlife Service (FWS) as appropriate. EBMUD shall immediately cease all operations at that location until the USACE, FWS, or NMFS has notified EBMUD and the Department in writing that the endangered species concerns have been resolved and the proposed work may commence.

12. A silt filter barrier shall be constructed immediately downstream of the work area prior to the beginning of any work. The barrier shall consist of either hay bales or clean river rock (less then 15% fines).

13. No equipment shall be operated in a live stream channel.

14. In ephemeral streams, all construction will be done while the work site is dry. Vehicles will not be driven or equipment operated in water covered portions of the stream, or where wetland vegetation, riparian vegetation, or aquatic organisms may be destroyed, except as otherwise provided for in the agreement. If the stream is flowing at the time work is to be done, the Contractor shall implement a water diversion plan which allows stream flows to gravity flow around or through the work site using temporary culverts. In lieu of a gravity flow diversion system, stream flow may be pumped around the work site using pumps and hoses. Cofferdams shall be constructed no more than 20' up or downstream from the project area. Flows shall be diverted only when construction of the diversion is completed. Cofferdams constructed shall only be built from materials such as clean gravel, sandbags or sheet piling, which will cause little or no siltation. Cofferdams shall be installed both upstream and downstream of the work site. Cofferdam construction shall be adequate to prevent seepage into or from the work area. The entire work area shall be dewatered. Aquatic life stranded in the dewatered area shall be relocated up or down stream. Sandbags shall be filled with clean sand. The cofferdam dewatering system shall remain in place until all creek work is complete. Normal flows will be restored to the affected stream immediately upon completion of work at that location by removing the dewatering system.

15. No trees over 4 inches diameter at breast height (dbh) may be removed from the riparian corridor, or pond or reservoir margins. Exceptions require the prior approval of a Department representative. All disturbed slopes around and on the banks shall be seeded,

mulched and fertilized with a blend of a minimum of three local native grass species from the following list: Meadow Barley (Hordeum brachyantherum ssp. californicum) Blue Wildrye (Elymus glucus) California Brome (Bromus carinatus) Creeping Wildrye (Leymus triticoides) California Oatgrass (Danthonia Californica), California melic (Melica californica). One or two nonnative grass species may be added to the seed mix provided that amount does exceed 25% of the total seed mix by count. Locally native wildflower and/or shrub seeds may also be included in the seed mix. Seeding shall be completed between October 1 and October 31 of the year construction begins.

16. No concrete shall be placed or poured on-site in a location that may contact creek water within 30 days of pouring unless the concrete is isolated from the creek water through appropriate wrapping, water barrier implemented, or commercial sealants in consultation with the Department.

17. Culvert replacement shall not increase culvert size by more than 12 inches or overall length.

18. Department personnel or its agents may inspect the work site at any time. A copy of this agreement must be provided to the Contractor and all subcontractors who work within the stream zone and must be in their possession at the work site.

19. Building materials and/or construction equipment shall not be stockpiled or stored where they could be washed into the water or where they will cover aquatic or riparian vegetation.

20. Debris, soil, silt, bark, rubbish, creosote-treated wood, raw cement/concrete or washings thereof, asphalt, paint or other coating material, oil or other petroleum products, or any other substances which could be hazardous to aquatic life, removed from the channel banks, channel bottom, deltas and sediment catch basins, resulting from project related activities, shall be prevented from contaminating the soil and/or entering the waters of the state. These materials shall be removed to a location where they shall not re-enter the waters of the State. Any of these materials, placed within or where they may enter a stream or lake, by Operator or any party working under contract, or with the permission of the Operator, shall be removed immediately.

21. The contractor shall not dump any litter or construction debris within the riparian/stream zone. All such debris and waste shall be picked up daily and properly disposed of at an appropriate site.

22. If, in the opinion of the Department, conditions arise, or change, in such a manner as to be considered deleterious to the stream or wildlife, operations shall cease until corrective measures approved by the Department are taken.

Amendments, Renewals and Termination

23. The Operator shall notify the Department before any modifications are made in the project plans submitted to the Department. Project modifications may require an amendment or a new notification.

24. The terms and conditions of this Agreement may be amended at any time provided such amendments are agreed to in writing by both parties to this Agreement. If EBMUD would like to modify this Agreement or projects submitted under this Agreement, a written request for an amendment must be submitted to the Department (1600 Program, Post Office Box 47, Yountville, California 94599). The fee for an amendment is half (½) the original notification fee. Amendments to the original agreement are issued at the discretion of the Department.

25. This 1601 RMA may be terminated by either party at any time with 60 days prior written notification.

26. This agreement is NOT transferable to subsequent owners of the project property.

27. This 1601 RMA shall expire on December 31, 2007. If requested by EBMUD prior to expiration, the Department may review the 1601 RMA and determine whether to amend and renew this Agreement or develop a new Agreement.

28. If the Operator would like to renew the agreement beyond the expiration date, a written request for a renewal must be submitted to the Department (1600 Program, Post Office Box 47, Yountville, California 94599) for consideration at least 30 days before the agreement expiration date. A renewal requires a fee. The Fee Schedule can be obtained at www.dfg.ca.gov/1600 or by phone at (707) 944-5520. Renewals of the original agreement are issued at the discretion of the Department.

Please note that you may not proceed with your project until after the Department has received the Project Description and Conditions signed by the Operator, the proposed project has undergone CEQA review, and the Department Regional Manager signs and returns the Agreement to the Operator.

I, the undersigned, state that the above is the final description of the project I am submitting to the Department for CEQA review, leading to an Agreement, and agree to implement the above project conditions developed by the Department as part of my project. I will not proceed with this project until the Department signs the Agreement. I also understand that CEQA review may result in the addition of measures to the project to avoid, minimize, or compensate for significant environmental impacts.

Operator's name (Print): STEPHEN E. ABBORS

Operator's signature: Stephen E. Abbors

Signed the 21st **day of** April, **2003**

ATTACHMENT A
Authorized Activities

1. Removal of parts of woody and herbaceous plants and/or urban obstructions, causing flow restrictions, or logged in the bed or bank shall be cutoff at the bed or bank invert, with hand tools in that portion of the stream identified as the stream bottom. Root structures are not disturbed, and debris is removed to a place where it cannot reenter state waters.

2. Removal of fallen trees, branches, associated debris, nonliving rubbish and litter from blocking flows of channels and banks. This activity may only occur by hand or by winch and cable or equivalent non-disruptive equipment from top of bank. No heavy equipment may be used in the streambed.

3. Removal, placement, or repair of, fencing, posts, gates, locks, signs and other related hardware.

4. Physical removal of soil, silt, debris, rubbish, algae, and other nonliving materials from concrete lined channels. These activities are to be conducted during periods of minimal flows, and following construction of effective sediment traps at the downstream end of the operation, or complete water diversion. Heavy equipment may be used from the top of bank to remove the above items in a dry concrete lined channel.

5. Cleaning, repairs and replacement of existing functioning flap gates or other existing water control devices such as dams and spillways. Heavy equipment may not be used in the streambed without prior approval and in accordance with conditions recommended by the Department.

6. Repair of concrete lined channels in kind, repair of natural channel bank minor washouts and erosion with non hardscape materials such as turf reinforcement mats, or other approved bio-engineering repair. Replenishment of rock riprap with clean, rock riprap, in previously rip rapped areas to maintain bank stability. Placement of material shall be accomplished without using heavy equipment in the streambed.

7. Repairs of culverts consisting of replacement of deteriorating or collapsed culverts, unplugging of culverts, and headwall reinforcement with compacted fill and loose clean riprap.

8. Control of weeds and grasses on channel banks and access roads or shoulders on channel banks, by mowing, or disking, between July 1 and October 1 of any year. Fire access roads and firebreaks along the top of the banks may be mowed, disked or sprayed after April 1. Nesting birds shall not be disturbed.

9. Control of herbaceous vegetation by chemical methods such as Rodeo, when used in accordance with the manufacturer's directions, as part of an overall Creek Management Plan, and in a manner which minimizes drip and drift into the water (adverse effects on non-target organisms) shall be authorized for use in the creek, however no chemical application is allowed for vegetation on the banks.

10. Maintenance of existing shoreline facilities (including but not limited to boat docks, boat houses, fishing docks, boat launches, debris booms, access restriction booms, and gauging stations) at San Pablo Reservoir, Briones Reservoir, Lafayette Reservoir, and Upper San Leandro Reservoir.

11. Removal of non-native, invasive vegetation (Giant Reed (*Arundo donax*), Pampas Grass (*Cortaderia selloana*), *Eucalyptus* sp., *Acacia* sp., Broom (*Cytisus* sp.). Eucalyptus up to 8 inches dbh may be removed from the riparian corridor, or pond or reservoir margins.

MOU REQUEST

For Department Use Only					
Notification Number:		Date Received:		Date Completed:	
Fees Enclosed?	~ Yes $ _____		~ No		
Action Taken/Notes:					

CK#2200722
CK Amt $154
East Bay Municipal Utility District

R3.2002-0160
CK Rec'd 3-18-02
Kozicki/Christensen
Young
Atkinson

STATE OF CALIFORNIA
THE RESOURCES AGENCY
DEPARTMENT OF FISH AND GAME

NOTIFICATION OF LAKE OR STREAMBED ALTERATION

(See attachment/enclosure for instructions)

Notification Type

☑ 1601 (Public)	☐ Timber Harvest Plan	(No. _____)
☐ 1603 (Private)	☐ Commercial Gravel Extraction	(No. _____)
	☐ Water Application	(No. _____)

Applicant Information

	Name	Address	Telephone/FAX
Applicant:	East Bay Municipal Utility District Natural Resources Department Watershed and Recreation Division	500 San Pablo Dam Road Orinda, California 94563	Business: 510-287-0459 Fax: 925-254-8320
Operator:	Stephen Abbors, Manager of Watershed and Recreation	500 San Pablo Dam Road Orinda, California 94563	Business: Fax:
Contractor: *(if known)*	Determined yearly, on a project-by-project basis.	n/a	Business: n/a Fax:
Contact Person: *(if not applicant)*			Business: Fax:
Property Owner:	East Bay Municipal Utility District Natural Resources Department Watershed and Recreation Division	500 San Pablo Dam Road Orinda, California 94563	Business: 510-287-0459 Fax: 925-254-8320

Project Location

Location Description:	East Bay Municipal Utility District Watershed Lands				
County			Assessor's Parcel Number		
Alameda and Contra Costa Counties			See attachment A: Site Map		
USGS Map		Township	Range	Section	Latitude/Longitude
See attachment A: Site Map					
Name of River, Stream, or Lake:	See attachment B and C: North and South Watershed Maps				
Tributary To?	Upper San Leandro, Pinole Creek, Lafayette and San Pablo watersheds.				

(Revised 11/18/99)

East Bay Watershed Master Plan

Prepared for:

EAST BAY MUNICIPAL UTILITY DISTRICT

Prepared by:

Jones & Stokes Associates, Inc.
Brady and Associates
Dillingham Associates
REM & Associates
Merritt Smith Consulting
Reza Ghezelbash, GIS Consultant
Montgomery Watson

EAST BAY WATERSHED MASTER PLAN

East Bay Municipal Utility District Board of Directors

John M. Gioia, President	Frank Mellon
Kenneth H. Simmons, Vice President	Nancy J. Nadel
John A. Coleman	Mary Selkirk
Katy Foulkes	

Community Advisory Committee

Mr. Ron Brown	Greenbelt Alliance
Ms. Helen Burke	Sierra Club
Ms. Rosemary Cambra	Muwekma Ohlone Indian Tribe
Ms. Sara Conner	Castro Valley Municipal Advisory Council (August 1993-June 1995)
Mr. Glenn Coppe	California Native Plant Society
Mr. Jim Cutler	Contra Costa County Community Development Department (Nov. 1991-March 1994)
Mr. Robert Davis	Contra Costa County Fire Protection District
Mr. Eric Edgerly	Math, Engineering, Science Association
Ms. Gloria Escoto-Etzler	Spanish Speaking Citizens' Foundation (Nov. 1991-July 1993)
Mr. John Fazel	City of Orinda
Mr. Steve Fiala	East Bay Area Trails Council
Mr. Saul Germanas	Diablo Valley Flyfishers
Ms. Roberta Goulart	Contra Costa County Community Development Department (Mar. 1994-June 1995)
Mr. Wayne Hall	Oakland Chinatown Chamber of Commerce
Mr. Alan La Pointe	El Sobrante Valley Coalition Council
Ms. Cynthia Landy	The League of Women Voters of Diablo Valley
Mr. Al McNabney	Mt. Diablo Audubon Society
Mr. Willard Morgan	Contra Costa Resource Conservation District
Ms. Sue Noe	Town of Moraga
Ms. Sara Pandl	Alameda County Planning Department
Mr. Frank Pereira	Cattle Grazing Out-Lease Program
Ms. Kay Petersen	City of Lafayette
Ms. Jocelyn Real	East Bay Regional Park District (Nov. 1991-Mar. 1995)
Ms. Maxine Terner	East Bay Regional Park District (April-June 1995)
Mr. Guy Thomas	Center for Independent Living
Ms. Joan Villa	Ione Band of the Miwok Tribe
Mr. George Wagnon	Community Horse Pasture Association
Ms. Jan Zimmerman	Castro Valley Municipal Advisory Council (Nov. 1991-Feb. 1993)

District Personnel

Dennis M. Diemer	General Manager
Cheryl A. Farr	Assistant General Manager
Robert C. Nuzum	Director of Natural Resources
Stephen E. Abbors	Manager of Watershed and Recreation, Master Plan Project Manager
Cathy Daley	Project staff
Rick Leong	Project staff
Pat Solo	Project staff
Doug Wallace	Community Affairs
Terry Powell	Community Affairs
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East Bay Watershed Master Plan

Prepared by:

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with Technical Assistance from:

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February 29, 1996
Revised March 15, 1999
Changes are indicated by underlined text

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TABLE OF CONTENTS

Page

Section 1. INTRODUCTION 1
Purpose of the East Bay Watershed Master Plan 1
Plan Terminology 3
Board of Directors' Policy Direction 4
History of East Bay Watershed Land Use Planning 5
Scope of the East Bay Watershed Master Plan 5
Public Involvement 5
Organization and Use of the Plan 6

Section 2. DISTRICT LANDS AND RESOURCES 11
Introduction 11
Overview of District Lands 11
General Description of District Watershed Lands 12
District-owned Nonreservoir Watershed Lands 15
Description of Watershed Resources 16
Description of Watershed Planning Zones 31

Section 3. GENERAL MANAGEMENT DIRECTION 45
Introduction 45
Natural Resource Management Programs 46
Water Quality 46
Biodiversity 52
Forestry 56
Livestock Grazing 59
Fire and Fuels 62
Community Use Management Programs 71
Developed Recreation and Trails 71
Environmental Education 78
Cultural Resources 81
Visual Resources 83
Assets Management Programs 86
Land Ownership 86
Entitlements 89
Geographic Information System 91

Section 4. WATERSHED MANAGEMENT AREA DIRECTION 93
Introduction 93
San Pablo Reservoir Watershed 95
Briones Reservoir Watershed 99
Upper San Leandro Reservoir Watershed 102

TABLE OF CONTENTS

Page

Chabot Reservoir Watershed 105
Lafayette Reservoir Watershed 107
Pinole Watershed 109

Section 5. MANAGEMENT DIRECTION FOR INTERJURISDICTIONAL COORDINATION 111
Introduction 111
Major Management Issues 111
Summary of Land Use Conditions on Adjacent Lands 114
General Management Direction 126
Area-Specific Management Direction 128

Section 6. CITATIONS 133

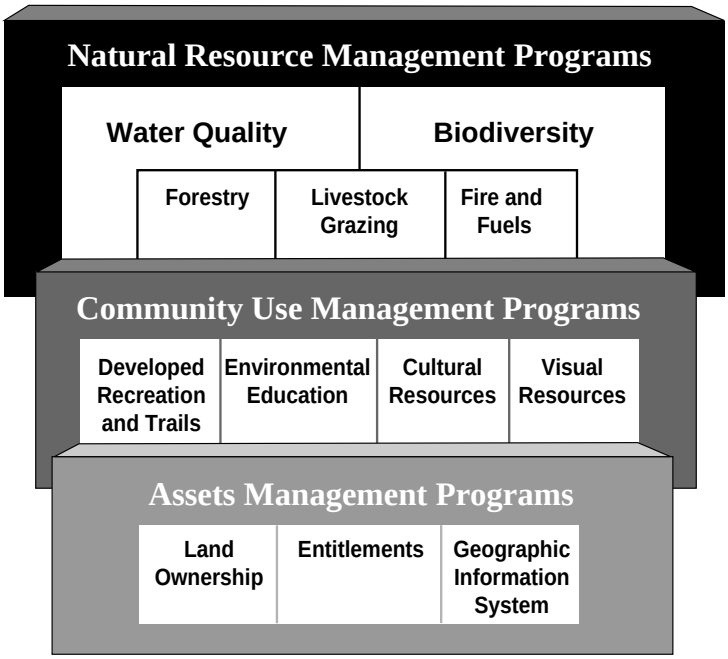
ADA	Americans with Disabilities Act
AUMs	animal unit-months
BHAPA	Briones Hills Agricultural Preservation Area
BMP	best management practice
Board	East Bay Municipal Utility District Board of Directors
CAC	Community Advisory Committee
Caltrans	California Department of Transportation
CCCFPD	Contra Costa County Fire Protection District
CDF	California Department of Forestry and Fire Protection
CEQA	California Environmental Quality Act
CRMP	coordinated resource management plan
DBPs	disinfection byproducts
DFG	California Department of Fish and Game
District	East Bay Municipal Utility District
EBRPD	East Bay Regional Park District
EBWMP	East Bay Watershed Master Plan
EIR	environmental impact report
FMU	fire management unit
GIS	geographic information system
IPM	integrated pest management
PAHs	polynuclear aromatic hydrocarbons
TAC	Trails Adjunct Committee
THMs	trihalomethanes
USFWS	U.S. Fish and Wildlife Service
VOCs	volatile organic compounds

Purpose of the East Bay Watershed Master Plan

The East Bay Municipal Utility District (District) owns and manages approximately 28,000 acres of land and water surface in the East Bay area **(Figure 1-1)**. These lands surround five reservoirs (Briones, San Pablo, Upper San Leandro, Chabot, and Lafayette) and one basin area that does not contain a reservoir (Pinole Valley). The District's reservoirs store high-quality drinking water and emergency water supplies for approximately 1.2 million water users in Alameda and Contra Costa Counties. Protecting water quality is primary in importance to the District. Additionally, the District is committed to preserving and protecting the natural resources that exist on its lands and its reservoirs. Because these lands have been largely protected from development and human disturbance, they support important and high-quality habitats and resources for a wide variety of plant and animal species.

The District has determined that managing lands and reservoirs to protect water quality and important, high-quality biological resources can best be achieved by promoting biological diversity (biodiversity). Biodiversity is defined here as "the variety and variability among living organisms and the ecological complexes in which they occur" (Office of Technology Assessment 1987).

Focus of the East Bay Watershed Master Plan



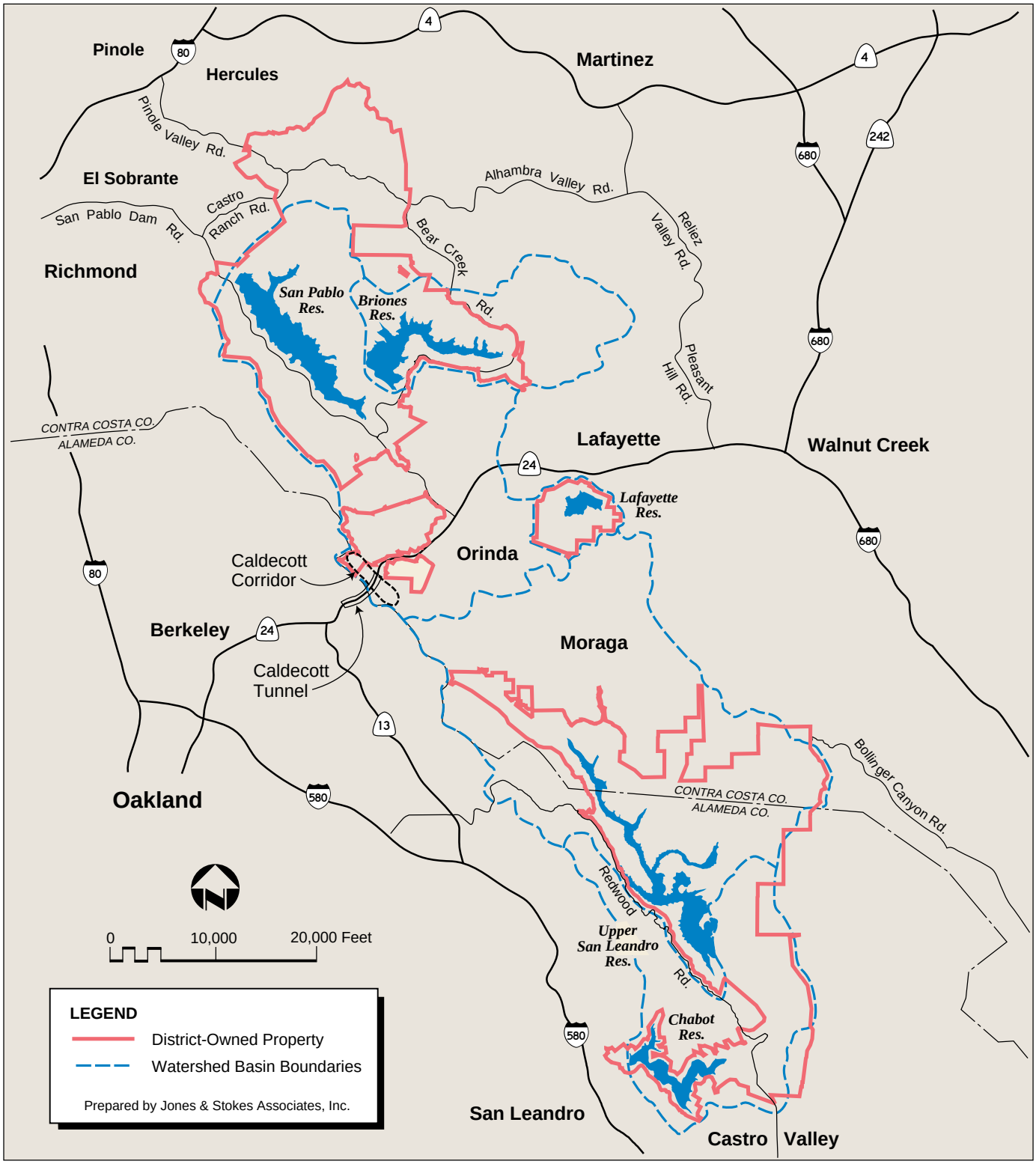


Figure 1-1
East Bay Municipal Utility District Property Boundary

The purpose of the East Bay Watershed Master Plan (EBWMP) is to establish long-term management direction for District-owned lands and reservoirs that will ensure the protection of the District's water resources and preserve environmental resources on District-owned lands. The plan also identifies public uses considered compatible or potentially compatible with the primary water quality and biodiversity goals.

The EBWMP provides clear guidance regarding the management direction on East Bay watershed lands. It is important to note that the EBWMP is not intended to require the implementation of any specific management actions and that approval of the plan by the Board of Directors (Board) does not imply or create a future commitment to fund any programs or program elements. Implementation of such actions will be determined by the Board through the annual budgeting process. If funding is approved for a specific program or program element, the EBWMP will provide the direction on how that program or program element will be implemented.

Plan Terminology

For purposes of this plan, the term "watershed" is typically used to describe District-owned lands that are the subject of the EBWMP. These areas include the:

San Pablo Reservoir watershed,
Briones Reservoir watershed,
Pinole watershed,*
Lafayette Reservoir watershed,
Upper San Leandro Reservoir watershed, and
Chabot Reservoir watershed.

References to "non-District watershed lands" are to those lands that are tributary to District reservoirs and lands but that are not owned by the District. When this document addresses the entire land area that is tributary to a District reservoir, including both District-owned and non-District-owned lands, the terms "hydrologic watershed" and "basin" are used.

*District-owned nonreservoir watershed (see page 15 for further description).

Board of Directors' Policy Direction

The mission statement of the District represents general management guidance regarding all lands and reservoirs owned by the District. The guiding principles, developed from the mission statement, have provided direction for the master planning process.

Mission Statement

In 1992, the Board adopted the following District mission statement for management of lands and resources:

To manage the natural resources with which the District is entrusted, to provide high-quality water and wastewater services for the people of the East Bay, and to preserve and protect the environment for future generations.

Implicit in the District's mission statement is the commitment to exercise responsible financial management, ensure fair rates and charges, provide responsive customer service, and promote environmental responsibility. The EBWMP reflects the District's mission by using it as the basis for a plan that protects reservoir water quality for future generations through prudent management of District watershed natural resources.

Guiding Principles

In 1993, the District's Board provided seven guiding principles for the EBWMP. These principles have guided an integrated planning process that identifies resource and land use management goals, objectives, and implementation guidelines. These guiding principles are as follows:

1. Protect water quality through sensitive natural resource and recreation management.

2. Ensure protection of the natural, cultural, and historical resources of the watershed on a long-term basis.

3. Respect natural resources; sustain and restore populations of native plants and animals and their environments.

4. Provide for appropriate public access to the watershed consistent with the protection of natural resources and water quality.

5. Maintain an open process with full public involvement in development of the master plan.

6. Provide for public safety for those who utilize the watershed and reside adjacent to it.

7. Exercise financial responsibility in the development and implementation of land use policies and minimize costs to ratepayers.

History of East Bay Watershed Land Use Planning

The purpose of the EBWMP is to establish long-term management direction for District-owned lands and reservoirs that will ensure the protection of the District's water resources and preserve environmental resources on District-owned lands.

In 1969, the District began work on its first master plan to address the various possible uses of District-owned lands and provide a framework for reservoir and watershed management. The District adopted a Land Use Master Plan in 1970 and has been using that plan and two subsequent amendments for guidance since its adoption. District Policy Statement 21, which implemented the *Land Use Master Plan*, called for an approach to multiple uses of watershed lands that recognized their importance as open space as second only to the primary purpose of watershed protection.

Because of changes in drinking water regulations, demographics, recreation demand, and residential development adjacent to and near District watershed lands, it became increasingly important to revisit the land use policies for watershed lands. The District has prepared this EBWMP to update the 1970 *Land Use Master Plan* and to reaffirm the District's commitment to water quality and environmental protection. This EBWMP supersedes and replaces the 1970 *Land Use Master Plan*.

Scope of the East Bay Watershed Master Plan

The District's lands in Alameda and Contra Costa Counties include approximately 50% of the total basin area that contains the five reservoirs and Pinole Valley; the remaining lands within the hydrologic watersheds are owned by the East Bay Regional Park District or local municipalities or are privately owned.

The EBWMP addresses the present and possible future uses of District-owned lands in the local counties and the District's responsibilities and management direction regarding appropriate land uses. The EBWMP also addresses management issues for lands within the hydrologic watersheds that are not owned by the District.

Public Involvement

The EBWMP was developed using a public involvement program that included scoping meetings, project newsletters, a water bill insert to all of the District's customers, and workshops and presentations before the District Board of Directors. Additionally, the District established a Community Advisory Committee (CAC), comprising 24 individuals appointed by the Board.

The purpose of the CAC was to review issues, address current land use policies, and explore recommendations to be incorporated into the EBWMP. The committee met approximately monthly over a 4-year period; in addition, numerous field trips were provided to familiarize the CAC with District-owned lands, reservoirs, and recreation areas. The members of the CAC represented a variety of interests, including grazing, fire protection, outdoor recreation, city and county planning, environmental conservation, Native American interests, and other citizens' coalitions.

General Public Involvement

Members of the general public were encouraged to comment or ask questions regarding the EBWMP during three public scoping meetings and nine public issue workshops. The scoping meetings, which were conducted in July 1993, began the California Environmental Quality Act (CEQA) process. During these meetings, information about the project was provided and an opportunity was given to solicit information from the District about the proposed scope of work and to identify issues.

Several project newsletters and a water bill insert have been used to inform the public of the planning process and management issues and to provide opportunities to make additional comments, either directly to District staff or during issue workshops.

Management Recommendations from Community Advisory Committee

The District sought ongoing community involvement by establishing a CAC. The CAC brought together 24 individuals appointed by the Board to represent a variety of public interests, such as grazing, fire protection, outdoor recreation, city and county planning, environmental conservation, Native American interests, and other citizens' coalitions.

The CAC met with the District's watershed management staff approximately monthly since its formation in November 1991 and took numerous field trips. Members became familiar with the watershed lands, existing policy and management objectives, controversial issues, and the views of a broad segment of the public and District staff. The CAC reviewed and discussed issues, considered the consistency of current and proposed policies with the guiding principles adopted by the Board, and evaluated recommendations for consideration by the Board. The committee also held workshops on key issues identified during the public scoping process. Panels of subject matter experts, including a Trails Adjunct Committee (TAC), provided testimony for consideration by the CAC.

Specifically, CAC workshops addressed issues of concern, comments regarding current land use practices and policies, feedback from different viewpoints, and reaction to new ideas. The general public was invited to all CAC meetings, and attendees were given the opportunity to comment on any topic. On the basis of the CAC's analysis and discussion, policy ideas were forwarded to the Board for consideration.

Organization and Use of the Plan

Sections 1 and 2 of this plan are introductory sections that describe the overall purpose of developing the EBWMP and summarize watershed resources. The remaining chapters of the EBWMP contain substantive provisions that guide the District's day-to-day management of and long-term planning for its East Bay land and water holdings. The contents of each subsequent section are discussed on the following pages.

Section 3, "General Management Direction"

Section 3 contains objectives and management guidelines that apply to all of the District's East Bay lands and management guidelines that apply to particular planning zones throughout the watershed. The management guidance is divided into three broad categories comprising 12 separate management programs, as follows:

- ***Natural resource management programs*** encompass all of the District's actions that involve management of the watershed's natural resources. These programs are:

  Water Quality,
  Biodiversity,
  Forestry,
  Fire and Fuels, and
  Livestock Grazing.

- ***Community use management programs*** address District actions involving management of the following human-oriented resources on the watershed:

  Developed Recreation and Trails,
  Environmental Education,
  Cultural Resources, and
  Visual Resources.

- ***Assets management programs*** are all of the District's activities that involve management of District property, including leases, and information about the watershed. These programs are:

  Land Ownership,
  Entitlements, and
  Geographic Information System (GIS).

The discussion of each program includes a brief description of the program, the activities conducted under the program, and lists of objectives, management guidelines, and coordination needs with other programs. The discussion about coordination will then inform watershed managers of other program considerations that need to be taken into account when carrying out management activities.

Section 4, "Watershed Management Area Direction"

The organization of this section is similar to that of Section 3 but contains management guidelines that relate only to specific District watershed areas. For example, fire and fuels management program guidelines that apply only to the San Pablo Reservoir watershed are included in Section 4. Management zone guidelines that are specific to a particular watershed are also included in Section 4.

Section 5, "Management Direction for Interjurisdictional Coordination"

Section 5 contains management guidelines for lands that are within the hydrologic watersheds of District reservoirs but are not owned by the District. The primary purpose of this chapter is to provide District staff with guidance regarding interaction with other land use agencies to ensure that the District's interests in water quality protection, fire and fuels management, and biodiversity are represented in local land use planning efforts. For example, Section 5 directs District staff to work closely with local land use authorities to ensure that fire and fuels management activities are incorporated into projects that would be located adjacent to the District's watershed lands. In the past, many developments abutting the District's property boundary were approved with no provisions for fire and fuels management, and the District has been forced to maintain plowed control lines in these locations at ratepayer expense.

Section 5 is intended to be used primarily by the District's watershed management staff in coordination with District planning staff when working with outside agencies and landowners.

Use of the East Bay Watershed Master Plan

To use the plan, watershed managers must first determine under which program or programs a proposed activity falls. Once that determination is made, watershed managers will then review the objectives and guidelines contained in Section 3 to determine if the proposed activity is consistent with the management guidance contained in the plan and what conditions apply. In addition, District staff must carefully review the section "Coordination Requirements for Other Resource Management Programs" to determine which other programs contain guidance that must be applied to the activity.

Staff must also determine whether the activity is contained within a single watershed or involves portions of several watersheds. The management guidance contained in Section 4 for the appropriate watershed or watersheds must then be examined to determine whether any watershed-specific guidance given there applies to the activity.

Section 5 is to be used primarily by District staff in its coordination activities with other land use jurisdictions. These coordination activities include both proactive communication with other agencies (e.g., involvement in the initial land use planning process for a development) and reactive communication (e.g., commenting on an environmental impact report for a land use proposal that is within a reservoir basin or is adjacent to District property).

Required Coordination with Other Resource Management Professionals

Because this master plan addresses a wide range of programs and disciplines, it is intended that those who use it will consult with the appropriate professionals where protection of resources may be an issue. During the early planning stages of resource management activities and where such activities can be reasonably anticipated to have an impact on sensitive resources (including rare, threatened, or endangered species, aquatic resources, and Native American sites), District staff will seek technical input from the appropriate District, regulatory, or consultant specialists. The information thus obtained will be incorporated into the plans for management activities and used to minimize resource impacts.

Compliance with the California Environmental Quality Act

The programmatic environmental impact report (EIR) for the EBWMP addresses the potential environmental impacts of implementing the EBWMP at a programwide level. However, implementing many of the programs and activities described in the EBWMP may require further review under CEQA. Compliance with CEQA is required whenever a public agency proposes to undertake a project that requires discretionary approval.

CEQA defines a project as any activity undertaken directly or indirectly, supported, or permitted by a public agency that may result in a direct or reasonably foreseeable indirect physical change in the environment. Therefore, as detailed implementation plans for individual programs or actions become available, they need to be evaluated to determine the need for additional CEQA compliance. If the potential environmental impacts of the action are adequately described and disclosed in the programmatic EIR, and if adequate mitigation measures are described to avoid or reduce any significant environmental impacts of the action, no additional CEQA documentation may be needed. If new site-specific impacts would be possible, however, the appropriate CEQA document (exemption, negative declaration, or EIR) should be prepared.

Requests for New Watershed Uses

The EBWMP has been designed to be a dynamic management tool that will allow the District to evaluate current watershed management practices and respond to requests for new uses. As part of the EBWMP, the District intends to implement a detailed project evaluation review process to facilitate consideration of new uses that were not explicitly identified under management guidelines. The District intends the internal review process to be initiated by detailed requests for new uses and to involve:

- a formal application process and initial use compatibility evaluation,
- review by District committee,
- an EBWMP guideline consistency evaluation involving responses to an evaluation checklist,
- CEQA review and permitting processes, and
- a Board approval process.

The evaluation process will recognize the future need to amend management programs to reflect the District's priorities at that time and to accommodate uses or priorities that could not have been anticipated during the master planning process. The District will implement this process in a timely manner once the Board has adopted the EBWMP.

Introduction

The District's East Bay watershed is a large and unique resource of semiwild, open land that is located in one of the most densely populated areas in the country.

The District owns approximately 28,000 acres of land and reservoir surface areas in the East Bay area, comprising portions of the hydrologic watersheds of five reservoirs and a portion of one hydrologic watershed area that does not currently contain a reservoir. This section describes the District's lands and discusses some of the resource issues that are addressed in the EBWMP.

Overview of District Lands

History

In 1928, 5 years after the District was formed, the proceeds of a $26 million bond issue were used to purchase the existing system of the East Bay Water Company. With the facilities came 40,000 acres of land in Alameda and Contra Costa Counties. A 1930 study of District lands indicated that 7,000-10,000 acres were not needed for watershed protection purposes and were suitable for parks and recreation use.

In 1934, the East Bay Regional Park District (EBRPD) was created to negotiate for, acquire, and manage District lands not needed for water quality protection. In 1936, the District agreed to sell approximately 2,000 acres of Wildcat Canyon, Roundtop Peak, and Temescal Reservoir to EBRPD. The park district has continued to acquire lands near and adjacent to District lands.

In 1966, the District opened Lafayette Reservoir to the public. Lake Chabot, which was leased to EBRPD in 1964, was opened for public use shortly thereafter. San Pablo Reservoir was opened to recreation in 1973, 65 miles of trails were opened in 1974, and 4,000 acres of property was set aside for environmental education purposes in 1976. Briones Reservoir is used for local university crew rowing practice which is strictly controlled. Upper San Leandro Reservoir remains closed to public access except for the trail system. In accordance with a comprehensive set of use rules and conditions designed to protect water quality, public access to most other District-owned lands is limited to use by permit only.

General Description of Watershed Lands

San Pablo Reservoir and Watershed

San Pablo Reservoir covers 834 acres. It is owned and operated by the District for the storage of untreated water. The District owns 8,376 acres surrounding San Pablo Reservoir, or 55% of the basin **(Figure 2-1)**. The entire basin encompasses approximately 15,200 acres, of which 80% is open space, 19% is residential development, and less than 1% each is commercial development and freeway. District lands within the San Pablo Reservoir basin are divided into three separate land units that are discussed below.

San Pablo Reservoir Watershed Lands

The watershed area contiguous with San Pablo Reservoir comprises coastal foothills 300-1,600 feet in elevation, interspersed with flat to gently rolling valley floors and a few level, mid-elevation benches. Vegetation consists of grassland, hardwood forest, coastal scrub, Monterey pine, riparian woodland, and eucalyptus. Monterey pines were planted on portions of the reservoir shoreline to control erosion. The area owned by the District covers 7,022 acres.

Siesta Valley

Siesta Valley, located north of Highway 24 between the Caldecott Tunnel and Orinda (Figure 2-1), is an area of slightly more than 1,000 acres in the headwaters of the San Pablo Reservoir basin. The central section of the property is a valley between steep, U-shaped ridges of volcanic strata that dip beneath the valley floor on one side and reappear on the opposite ridge. The valley floor has gently sloping benches and covers a total area of about 40 acres. Soils on the slopes are thin and of limited value for grazing; those on the valley floor are deeper. The valley floor and western slopes support stands of eucalyptus and cypress that were planted in 1912-1915.

The soil instability of Siesta Valley, based on the geology and soils, make it an area of high erosion hazard and unsuitable for most uses. The valley does, however, have geological significance and has been used for many years as an outdoor geology laboratory by various colleges and universities.

Gateway Area

The Gateway area is an isolated 245-acre parcel located south of Siesta Valley and Highway 24 (Figure 2-1), also within the upper portion of the San Pablo Reservoir basin. The land consists of moderate slopes rising abruptly to a ridge that carries over from Siesta Valley. Relatively level areas are present where two ravines were filled as a byproduct of Bay Area Rapid Transit District work and freeway

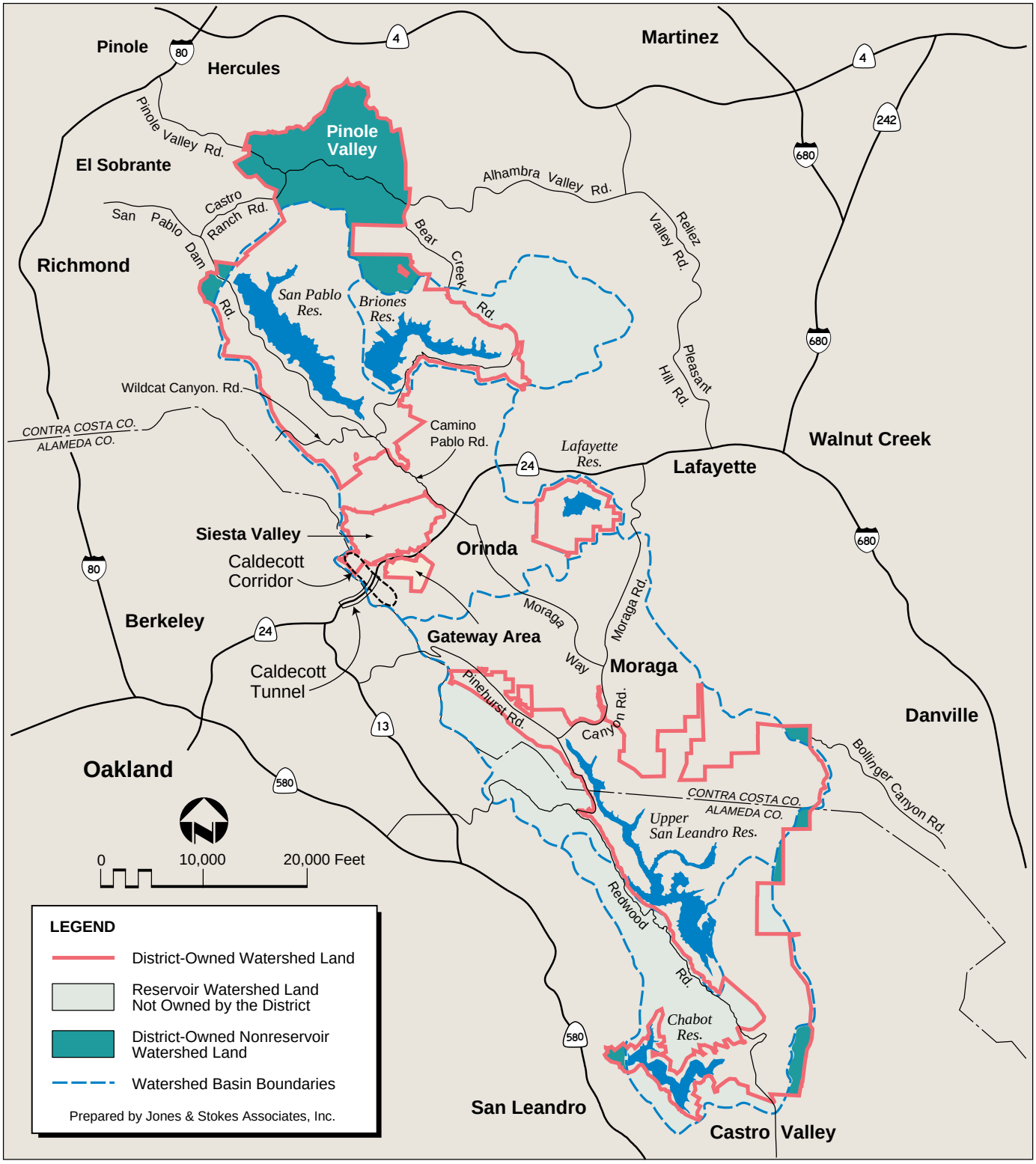


Figure 2-1
District Property and Watershed Boundaries

expansion in the area. Grasslands cover the lower slopes of the interchange side and the west side of the ridge, near the east entrance to the Caldecott Tunnel. Upper slopes are covered with extensive stands of coyote brush, poison oak, and laurel. These slopes also contain some of the best examples of native grasses and forbs found on the District's lands.

Briones Reservoir and Watershed

Briones Reservoir covers 725 acres. The reservoir is owned and operated by the District for raw water storage. Briones Reservoir watershed lands in District ownership encompass 2,642 acres, or 50% of the entire basin area (5,280 acres) (Figure 2-1).

These lands range in elevation from approximately 275 feet at the base of the dam to about 1,500 feet. Primary vegetation types are grasslands, coastal scrub, and oak/bay woodland.

Lafayette Reservoir and Watershed

Lafayette Reservoir covers 126 acres. Water is stored in Lafayette Reservoir for emergency purposes only. Lafayette Reservoir and surrounding lands are managed by the District primarily for recreation. The District owns the entire basin, which comprises 760 acres, including the reservoir (Figure 2-1).

Watershed lands range in elevation from about 350 feet to more than 1,000 feet. Primary vegetation types are oak/bay woodland, coastal scrub, and grassland habitats.

Upper San Leandro Reservoir and Watershed

Upper San Leandro Reservoir covers 794 acres and is enclosed, for the most part, in seven narrow, steep-walled canyons. The reservoir is owned and operated by the District for raw water storage.

The watershed lands in District ownership amount to 8,117 acres, which comprises 43% of the entire basin (Figure 2-1). These lands, ranging in elevation from 460 feet to 2,000 feet, are generally the most rugged and ecologically diverse of the District's East Bay land holdings. Primary vegetation types are hardwood forest, grassland, coastal scrub, riparian woodland, redwood forest, and chamise-black sage chaparral. This watershed also contains the only occurrence of knobcone pine forest on District lands.

The Upper San Leandro Reservoir basin contains 18,680 acres, of which 89% is open space, 9% is residential development, and 2% is commercial development.

Chabot Reservoir and Watershed

Chabot Reservoir covers 340 acres. Water is stored in Chabot Reservoir for emergency purposes only. The reservoir is located in EBRPD's Anthony Chabot Park, and the reservoir and a portion of District watershed land surrounding the reservoir is leased to EBRPD. Management guidance presented in this plan that applies to Chabot Reservoir watershed lands will guide future coordination between the District and EBRPD and, where appropriate, should be incorporated into future amendments to the Lake Chabot Recreation and Park Lease. The watershed lands owned by the District encompass approximately 3,920 acres, 51% of the entire basin (Figure 2-1).

Watershed lands range in elevation from about 60 feet to approximately 1,100 feet. Primary vegetation types are hardwood forest, grassland, and coastal scrub habitat.

The Chabot Reservoir basin, including lands owned by the District, covers approximately 7,720 acres, of which 97% is open space, 2% is golf course, and 1% is residential development.

District-Owned Nonreservoir Watershed Lands

Pinole Valley

Pinole Valley is located 4 miles from Pinole and 2 miles from San Pablo Reservoir. The valley is an 8,262-acre area in the northernmost planning units of the District's East Bay lands (Figure 2-1). Pinole Valley was purchased as a potential reservoir site, but currently does not contain a reservoir and is not tributary to any of the District's other reservoirs. The District owns 45% of the valley, or 3,681 acres. About 380 acres in the valley floor area are flat; much of the flat land is cultivated for hay farming under lease. The rest of the area, with slopes of 30%-70%, rises to elevations as high as 1,000 feet. Vegetation ranges from grasslands over most of the valley to densely wooded slopes of oak and laurel on the southern rim.

Other Areas Not Tributary to District Reservoirs

The District owns approximately 633 acres that are not tributary to the reservoirs or part of the Pinole Valley. In general, these are small areas below dams or on ridges where runoff would not contribute to one of the five District reservoirs. Many of these buffer lands are essential to the District's land holdings to preserve the ridgetops and scenic values in addition to maintaining lands to protect water quality.

Description of Watershed Resources

Hydrology and Water Quality

The District's East Bay reservoirs receive water from Pardee Reservoir on the Mokelumne River through the Mokelumne Aqueduct and from local basin runoff. The 30-year average contribution of local runoff to the total reservoir inflow is shown in **Table 2-1**. On the average, however, only 10% of the total system input comes from local runoff because most Mokelumne River water in the system goes directly to the treatment plants and into the distribution system, bypassing storage in local reservoirs. Mokelumne River water is regularly delivered via aqueducts to San Pablo, Briones, and Upper San Leandro Reservoirs. When water gets released from Briones and Upper San Leandro Reservoirs, it becomes blended and is received by San Pablo and Chabot Reservoirs, respectively. Lafayette Reservoir receives water from the local basin only. Briones, San Pablo, and Upper San Leandro Reservoirs are all used to store water for ongoing domestic use, whereas Lafayette and Chabot Reservoirs would be used only in an emergency.

Table 2-1
Thirty-Year Average Contribution of Local Runoff to Total Reservoir Inflow

Reservoir	Watershed Area (acres)[a]	Local Runoff		Local Rainfall		Mokelumne Flow	
		Acre-feet	% Inflow	Acre-feet	% Inflow	Acre-feet	% Inflow
Briones	5,280	1,720	22	1,520	18	4,860[b]	60
San Pablo	15,140	16,470	44	1,570	4	19,110[c]	52
Lafayette	760	440	58	270	36	50[d]	6
Upper San Leandro	18,680	15,100	59	1,340	5	8,990[b]	35
Chabot	7,720	2,960	36	610	7	4,550[e]	56

[a] Including reservoir and rounded to the nearest 10-acre increment.
[b] From Moraga Aqueduct.
[c] Combined Mokelumne Aqueduct and Briones Reservoir.
[d] No input from Mokelumne aqueduct since April 1977.
[e] From Upper San Leandro Reservoir.

The quality of water in the District's East Bay reservoirs varies. The water quality in Briones Reservoir is very high, primarily because the basin is small and relatively undeveloped. Consequently, runoff from this basin, as compared to more developed basins, has less negative impact on reservoir water quality. However, because Briones is the largest of the District's East Bay reservoirs and has the strategic ability to directly or indirectly gravity feed all the filter plants, any activities in the basin that have the potential to compromise water quality are of the highest concern to the District.

The water quality of Upper San Leandro and San Pablo Reservoirs is affected to a greater degree by runoff from developed basin lands, and these effects are mitigated to some degree by nearly continuous delivery of water from the Mokelumne River. The Town of Moraga and the City of Orinda are dominant features of the Upper San Leandro and San Pablo basins, respectively. Chabot Reservoir water quality, while still acceptable, is less pristine because this reservoir is not used as an on-line supply. Recreational use of the reservoir and developed recreation in the watershed are relatively high and may affect water quality. Stagnation (poor mixing) is also believed to be a significant water quality problem.

Table 2-2
Constituents of Concern in San Pablo and Upper San Leandro Watersheds

Constituent	Basis for Concern
Disinfection byproducts (DBPs)	Trihalomethanes (THMs) and other DBPs are formed when dissolved organic matter is oxidized in the presence of halogens, such as occurs in the chlorination process to disinfect reservoir water. District water supplies are in compliance with existing DBP regulations. The U.S. Environmental Protection Agency has identified an intent to promulgate DBP regulations that will require modification to the treatment processes for continued compliance. Immediate improvements planned include the conversion of disinfection practice to chloramination. Further improvements may be required after 2000 pending further changes in regulations. Specifically, ozonation of all source water may be required.
Pesticides	Drinking water goals for most routinely used pesticides are less than the analytical detection limit. However, pesticides have been detected in District reservoirs. These pesticides have not been detected in treated drinking water.
Pathogens	Runoff samples have extremely high amounts of fecal bacteria, as is typical of developed watersheds. Other pathogens have been detected, including giardia and cryptosporidium. Although these pathogens have been detected, the District is in compliance with all regulations. Future regulations are anticipated that may require further controls.
Polynuclear aromatic hydrocarbons (PAHs)	PAHs are carcinogens for which drinking water standards have been established. Those standards are being attained in District reservoirs. Runoff from developed areas exceeds drinking water regulations, although final treated water meets all current regulations.
Nutrients	Nutrients produce algae, which leads to taste and odor problems, potential THM formation, and fish kills. Taste and odor control requires treatment using ozone, which is very expensive.
Metals	Aquatic life and drinking water standards for copper, chromium, lead, nickel, and zinc are exceeded in runoff to reservoirs, but no exceedances in the reservoirs have been noted.
Solids	Solids must be removed from drinking water supplies, which increases operating costs. Some eroded material is deposited in the reservoir and reduces storage volume. Solids in runoff can also cause runoff to “short circuit” through the reservoir to the treatment plant intake structure.

Water is stored in Lafayette Reservoir for emergency use only. Lafayette Reservoir water quality is relatively poor compared to the District's other reservoirs because all water entering this reservoir comes from the surrounding basin. Stagnation and a high level of recreational use may also influence water quality in Lafayette Reservoir.

The effect of land use and management on the quality of runoff and reservoir supply has been documented in District studies, including those summarized in the *Upper San Pablo Creek Watershed Non-Point Source Monitoring Program 1988-89 Project Report* and *Non-Point Source Monitoring Program for the San Pablo, Briones and Upper San Leandro Watersheds 1990-91 Project Report*. **Table 2-2** describes the water quality constituents of concern that have been evaluated in these studies. The following summaries of specific study results illustrate the strong influence of local watershed runoff on water quality.

Although local basin runoff contributes only a portion of the total inflow into East Bay reservoirs, it contributes most of the total contaminant load entering these reservoirs. For example, the estimated load of nitrogen to Upper San Leandro Reservoir from local runoff (76,779 pounds) was 760 times that from the Mokelumne Aqueduct (105 pounds) in 1990-91. In the same water year, local

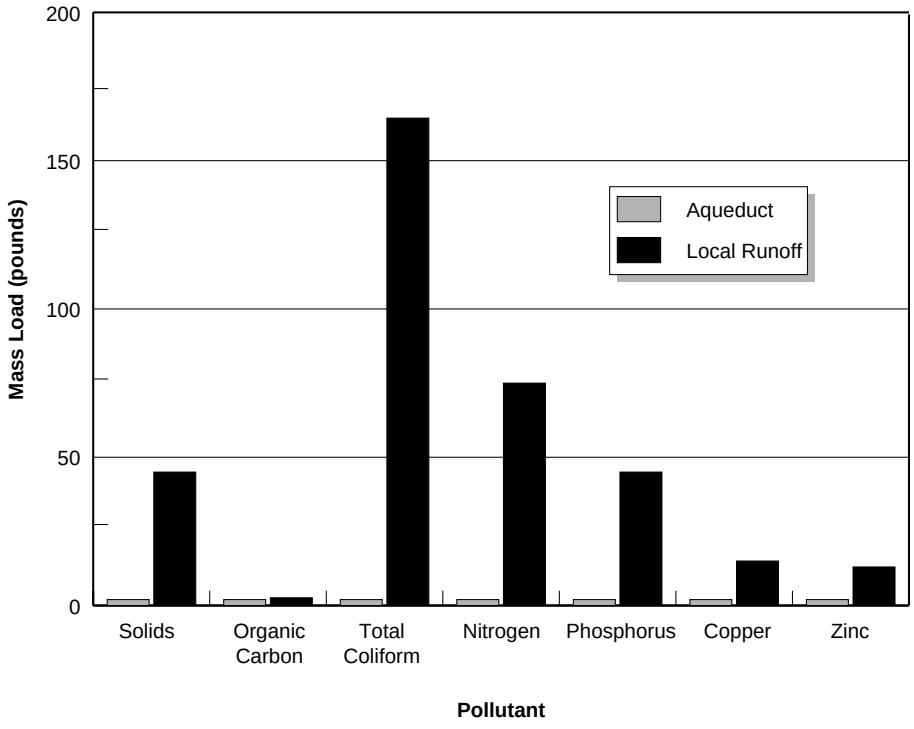


Figure 2-2
Annual Aqueduct Pollutant Mass Load Relative to Local Runoff in San Pablo Reservoir

runoff contributed only about 40% of the water to the reservoir, with the balance from the aqueduct. Nitrogen is important because it can stimulate the growth of algae, which has been documented to cause taste and odor problems in District reservoirs. **Figure 2-2** illustrates the relative contribution of local runoff and aqueduct inputs from San Pablo Reservoir.

Developed portions of the basins contribute more contamination per acre than undeveloped portions. For example, undeveloped land in the San Pablo Reservoir basin was estimated to produce 120 pounds of sediment per acre per year, whereas a residential area in the same basin was estimated to produce 1,480 pounds per acre per year. Developed areas are typically controlled by land use management agencies other than the District, whereas the District manages a substantial portion of the relatively undeveloped lands in East Bay basins.

Undeveloped land (such as that managed by the District) contributes the greatest quantity of contaminants because this is the dominant land classification. For example, undeveloped land generates about 14,400 pounds of phosphorus per year in the Upper San Leandro Reservoir basin, whereas residential land produces about 5,700 pounds per year, even though residential areas produce phosphorus at a rate per acre that is three to 10 times that of undeveloped land.

The types of pollutants that accumulate on land (and thus in runoff) typically reflect the types of activities that occur in the area. For example, petroleum-based hydrocarbons (which include some carcinogens) accumulate on roadway surface, such as parking lots, gas stations, roads, and freeways, as a result of crankcase oil drips and fuel handling.

Runoff can flow directly across the reservoir with virtually no dilution when the density of the runoff (because of suspended solids, dissolved solids, and temperature) is greater than the density of the surface layer but less than that of the lower layer in a stratified reservoir. Under such conditions, the plume of runoff plunges to the thermocline separating the two layers, then travels quickly across the reservoir. If the withdrawals are occurring at the approximate elevation of the runoff plume, then the plume with its contaminants will be withdrawn with relatively little dilution.

Soils and Geology

The geology of the District's East Bay watershed lands is quite varied. The topography of the area ranges from broad valleys and low rounded hills to steep, narrow drainages and ridge tops. Several faults have been mapped through the area. Some of these are geologically young thrust faults, but most are likely part of the regional fault system. Some may be active. The primary geologic hazards on District lands are landslides and seismic hazards that could potentially affect District facilities. Sediments from landslides and debris slides may enter the reservoirs (thereby affecting water quality) and, to a lesser extent, affect roads, trails, and recreational areas.

Most of the District's East Bay lands lie within the Millsholm-Los Gatos-Los Osos soils association. This association is characterized by steeply sloping and eroding soils. Approximately 55% of District lands have soil erosion hazard ratings of high or very high **(Figure 2-3)**.

Issues related to soils and geologic resources on District lands involve the potential for water quality degradation in District reservoirs (particularly Briones, San Pablo, and Upper San Leandro Reservoirs) from landslides, debris slides, and soil erosion.

Vegetation and Wildlife

Vegetation and wildlife habitat types of the watershed lands include native and non-native forests and woodlands, shrublands, grasslands, riparian woodland and scrub, and wetlands. These habitats support special-status plants that are known or have potential to occur on watershed lands. A detailed description of the acreage and location of vegetation and wildlife of watershed lands is contained in the Natural Resources Inventory (EA Engineering, Science, and Technology 1994a). The distribution of vegetation and wildlife habitats throughout the watershed is shown in **Figure 2-4**.

Native Forest and Woodland

Native forest and woodlands on District lands include redwood, knobcone pine, mixed hardwood, composed of coast live oak, mixed oak, and black oak woodlands, and oak savanna, composed of mixed oak and valley oak.

The redwood forest and knobcone pine forest are both located in the Upper San Leandro Reservoir watershed. The ***redwood forest*** (269 acres) is considered a locally uncommon plant community because of its limited range in the East Bay area. Although this forest was logged more than a century ago, it has recovered and displays many characteristics of a mature forest that are important to wildlife. Large trees, moderate to dense canopy cover, and snags provide nesting habitat for raptors, woodpeckers, and cavity-nesting birds. A thick litter layer provides cover for amphibians and small mammals.

The ***knobcone pine forest*** (56 acres) is unique in that it is one of only two stands located in the East Bay area. Knobcone pine communities require periodic fire for regeneration. The stand is mature and has not burned in several decades. Dense manzanita chaparral forms the understory. The knobcone pines in this stand are of varied size and form a sparse to open canopy. Knobcone pines produce closed cones that are used by some bird and mammal species. Snags provide nest cavities, and the dense chaparral understory and a thick litter layer offer cover to shrub-nesting birds and small animals.

Hardwood forest (9,533 acres) is the predominant forest type of the watershed lands, covering approximately one-third of the area owned by the District. The mixed hardwood forest (comprising coast live oak, California bay, and ma-drone) is the most common subtype. Mixed oak woodland is less common, occurring mostly around the margins of San Pablo and Briones Reservoirs. Black oak woodland is the least common subtype. Hardwood forests provide habitat for approximately 175 species of wildlife. These forests provide snags and cavities for nesting birds, a food supply of acorns used by many birds and mammals, a litter layer ranging from small leaves and twigs to large downed logs, and, in damp sites, a lush herbaceous understory. Hardwood forests on watershed lands often encompass the riparian zones of intermittent and perennial creeks.

Oak savanna (418 acres) consists of patches of widely spaced oak trees growing on rolling, grassy hillsides. It is dominated by coast live oak and valley oak. Oak savanna is distributed throughout the watershed but is most common in Alhambra Valley. Oak savanna provides nesting and roosting sites in a relatively open landscape for birds that forage in the open. Oak trees provide snags and cavities for cavity-nesting birds, downed logs for small mammals and reptiles, and an acorn crop used by many species. Many wildlife species associated with hardwood forest or open grassland also use oak savannas.

Non-Native Forest

Non-native forest on District watershed lands consists mostly of Monterey pine and eucalyptus plantations.

The largest acreage of ***Monterey pine*** (513 acres) is in the northern portion of the watershed around San Pablo Reservoir. These stands exhibit little natural regeneration. Monterey pine plantations support a wildlife community similar to that occurring in hardwood and native conifer stands.

Eucalyptus plantations are found scattered throughout the watershed, with the largest acreages being in the San Pablo Reservoir (135 acres) and Chabot Reservoir (81 acres) watersheds. These stands are now naturalized communities that maintain their populations through natural regeneration. Eucalyptus trees provide a source of nectar and pollen that attracts insects, which in turn serve as a prey base for birds and other animals. Hummingbirds and many migratory bird species feed extensively on the nectar. In addition, eucalyptus trees produce an abundant seed crop. These tall trees are used as roosting sites for birds. Bald eagles have roosted in eucalyptus groves in the San Pablo Reservoir watershed, and a great blue heron rookery exists in the eucalyptus trees at Watershed Headquarters in Orinda. A great blue heron and great egret rookery was active near the northern arm of Chabot Reservoir in the recent past.

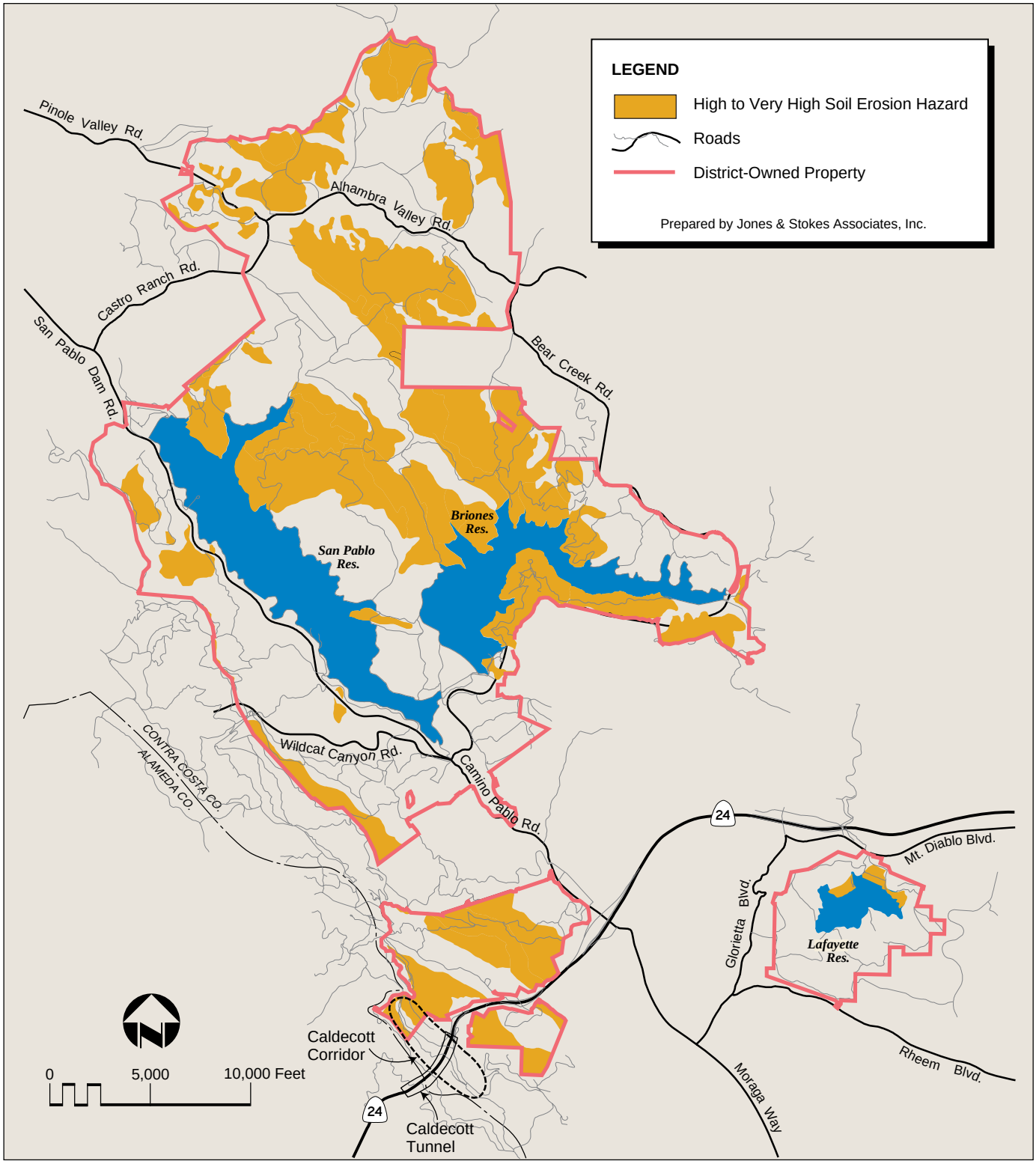


Figure 2-3 (North)
Areas of High to Very High Soil Erosion Hazard

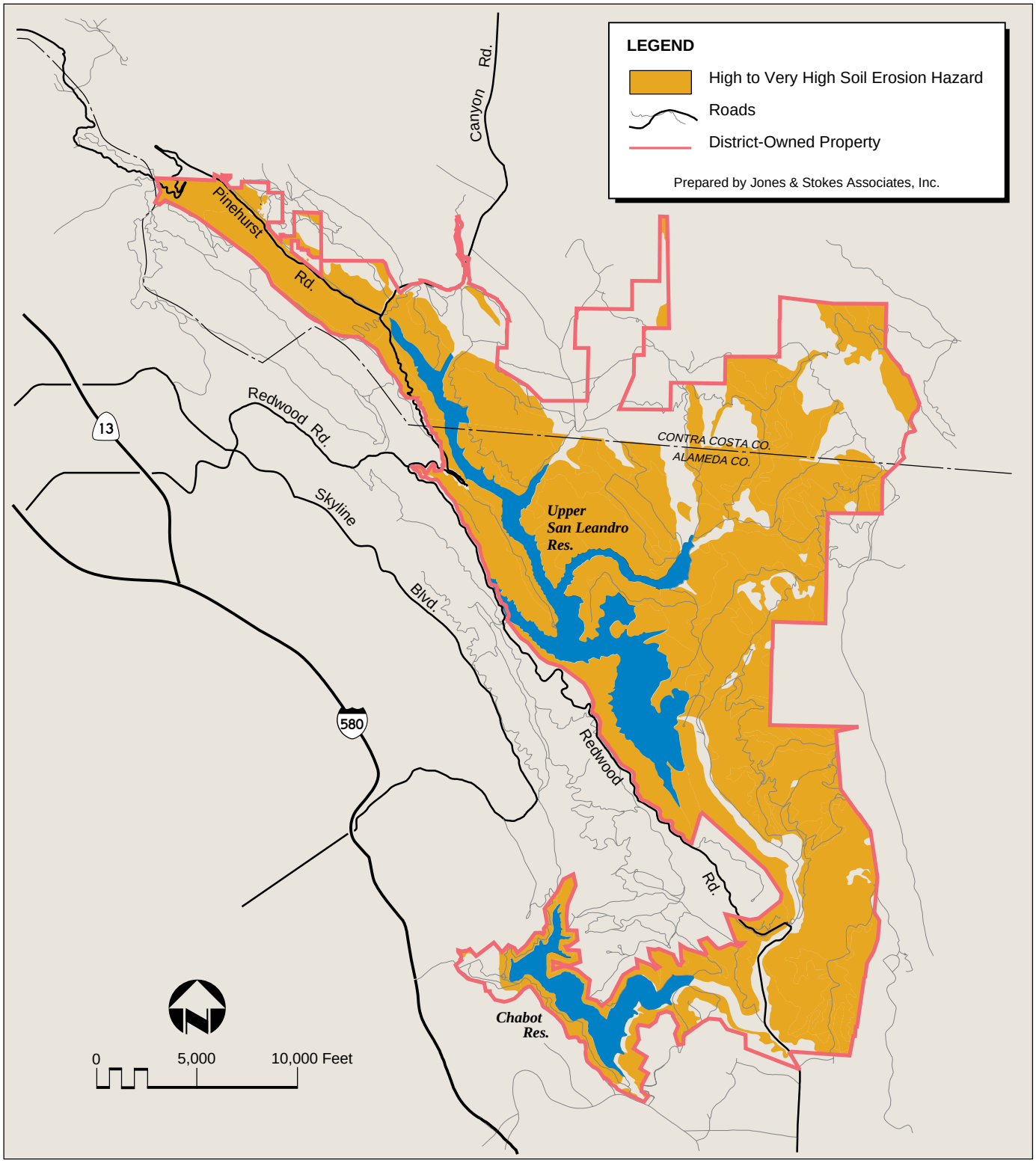


Figure 2-3 (South)
Areas of High to Very High Soil Erosion Hazard

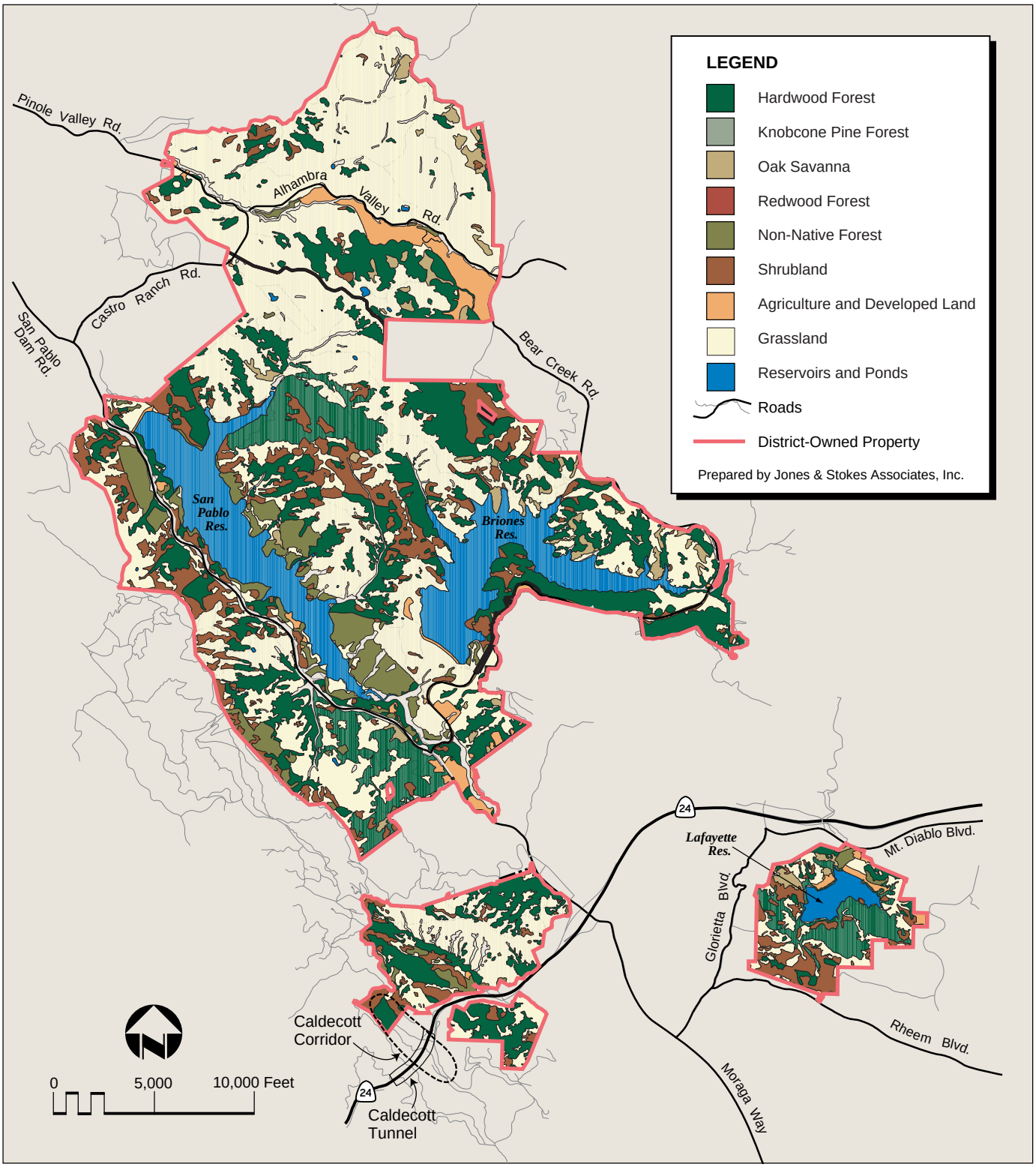


Figure 2-4 (North)
Distribution of Vegetation on East Bay Watershed Lands

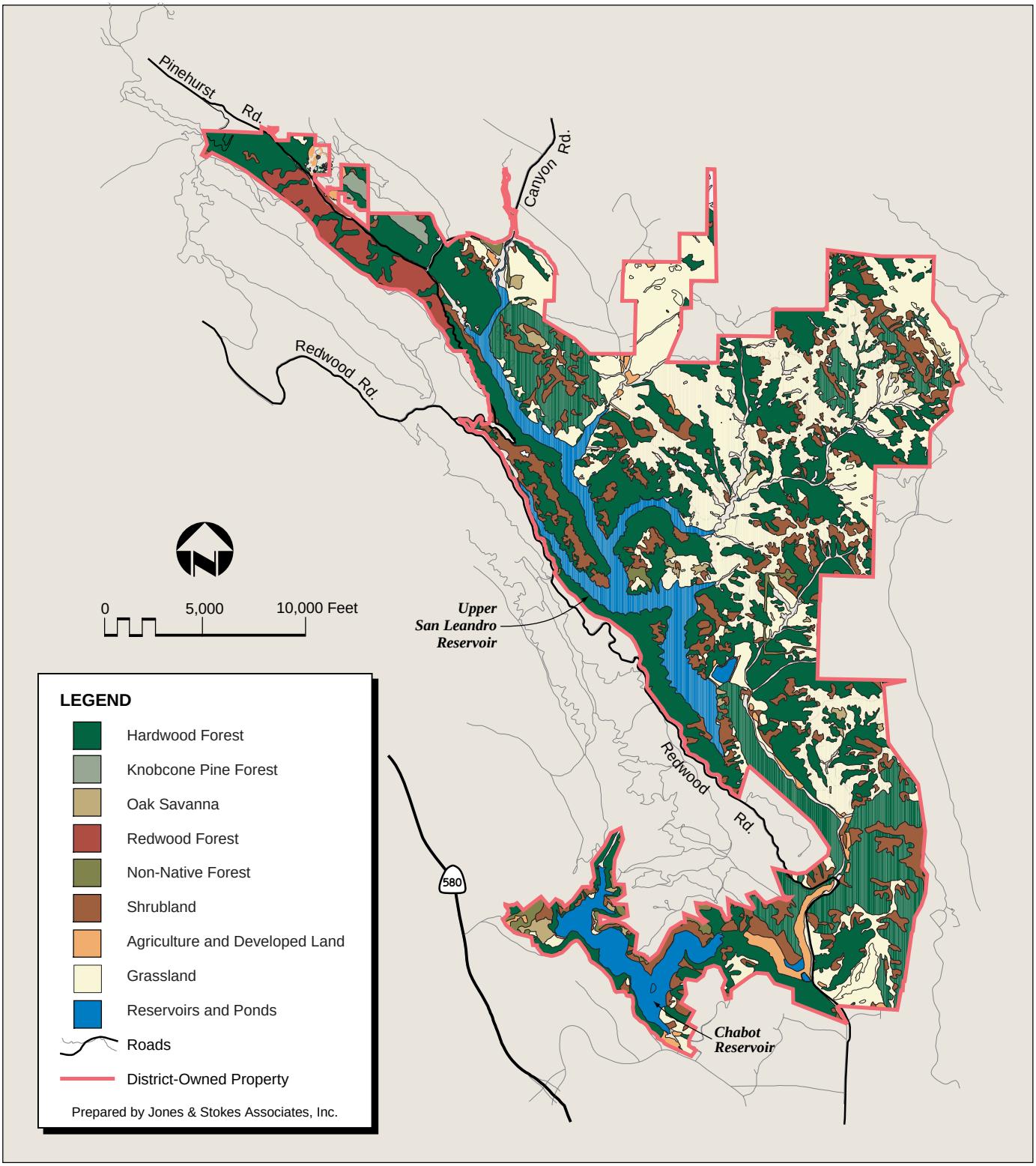


Figure 2-4 (South)
Distribution of Vegetation on East Bay Watershed Lands

Shrublands

A wide variety of natural shrub types occur on watershed lands. The three major types of shrubland are coastal scrub, chamise-black sage chaparral, and manzanita chaparral.

Coastal scrub covers approximately 2,825 acres of watershed lands. This plant community is composed of coyote brush scrub, California sagebrush, and bitter cherry scrub. Coyote brush is the most common subtype in the watershed. California sagebrush is less common but supports the highest biological diversity of the coastal shrub subtypes. Bitter cherry is the most limited subtype and has developed to a substantial degree on only one site in the Upper San Leandro Reservoir watershed.

Chamise-black sage chaparral covers approximately 145 acres of watershed lands. Most of this community is found in the Upper San Leandro Reservoir watershed along Rocky Ridge, but it is also found in the Pinole watershed.

Manzanita chaparral is distributed irregularly throughout the watershed lands and covers a total area of approximately 21 acres. The largest stands are located in the Briones and Upper San Leandro Reservoir watersheds.

Shrubland habitats provide nesting sites for shrub-nesting birds and a dense substrate for small mammals and reptiles.

Grasslands

Three types of grassland, covering approximately 9,800 acres, are found on watershed lands: non-native grassland, coastal prairie, and perennial bunchgrass.

Non-native grassland is the dominant annual plant species on watershed lands. Most of these species are native to the Mediterranean region.

Coastal prairie is found in areas where the influence of coastal fog is strong. Most known localities of coastal prairie are along San Pablo Ridge.

Native perennial bunchgrass is scattered throughout the annual grasslands and as understory patches in shrublands and woodlands. Most of these patches are only a few meters in diameter. Several dozen locations in the watershed that have geographical protection from disturbance, such as cliffs, some roadsides, and ravines, support larger patches of this community.

Grasslands are used by a variety of wildlife species. Small mammals and birds forage on grass seeds and find cover in the denser grass stands. Carnivores such as coyotes, foxes and bobcats, and hawks and owls prey on these small mammals. Insects inhabiting grasslands are eaten by birds, including shrikes and swallows. Scavengers, such as turkey vultures, forage in open grasslands.

Riparian and Wetland Vegetation

Riparian and wetland vegetation are important components of watershed lands and account for approximately 800 acres of that area. This vegetation community is composed of mixed deciduous riparian woodland, coast live oak, California bay, and willow riparian woodland, willow riparian scrub, herbaceous and bare cover, freshwater marsh, and seep and spring wetlands.

Mixed deciduous riparian woodland covers approximately 220 acres and is scattered throughout the watershed. This riparian woodland type occurs along minimally disturbed segments of perennial streams in the Pinole, San Pablo, Upper San Leandro, and Chabot Reservoir watersheds. Streamside woodlands consist of broadleaved deciduous trees, especially white alder and black cottonwood. This community typically occurs as a narrow ribbon winding through upland communities. The presence of water, moist soils, and a moist litter layer provided by this habitat type is important for amphibians such as frogs and newts.

Coast live oak, California bay, and willow riparian woodland occurs along small, intermittent tributaries on moderate to steep slopes. This community covers 377 acres and is found in all watersheds except that of Lafayette Reservoir, with the greatest acreage found in the San Pablo and Upper San Leandro Reservoir watersheds.

Willow riparian scrub occurs on 59 acres in scattered patches throughout the watershed area. This community occurs along perennial and intermittent streams and is characterized by streamside thickets. It occurs in all watersheds, with the greatest concentration being in the San Pablo and Upper San Leandro Reservoir and Pinole watersheds.

Herbaceous and bare (unvegetated) riparian areas account for nearly 140 acres and encompass all riparian areas not dominated by trees or shrubs. These areas are found in all the watersheds except that of Lafayette Reservoir. The community occurs naturally along small intermittent and ephemeral streams. In some cases, herbaceous and bare riparian areas are created as a result of disturbance by livestock grazing.

Freshwater marsh is uncommon on watershed lands and is found primarily around the five reservoirs. The largest freshwater marsh (18 acres) occurs along the edges of Upper San Leandro Reservoir. Dense emergent vegetation provides nesting habitat and cover for waterfowl, wading birds, and passerine birds. Standing water and saturated soils provide drinking water and moist habitat for various mammals, reptiles, and amphibians.

Seep and spring wetlands are scattered throughout the watershed, covering approximately 180 acres. Vegetation typically occurs in small patches around water sources and consists of freshwater marsh, herbaceous or bare riparian areas, and willow scrub. More than 130 herbaceous plant species and 20 species of woody plants have been identified in these areas.

Riparian habitats provide nesting sites for specialist birds such as the warbling vireo. Trees produce crops of cones and berries, and the abundant foliage serves as a foraging substrate for insectivorous birds. Aquatic vegetation and invertebrates also provide food sources.

Special-Status Species

The watershed supports many plant and animal species that have been identified by state and federal agencies and scientific organizations as uncommon or declining regionally or statewide (**Table 2-3**, on pages 38-42). Collectively, these species are referred to as special-status species.

Six species known to occur on watershed lands are formally listed as threatened or endangered under the state or federal Endangered Species Act. Listed are four wildlife species (Aleutian Canada goose, bald eagle, American peregrine falcon, and Alameda whipsnake) and two plants (pallid manzanita and Santa Cruz tarplant).

Thirty-two other special-status species (comprising eight plants and 24 animals) have been identified on watershed lands, and an additional 31 special-status species (17 plants and 14 animals) have potential to occur but are not documented.

The East Bay Watershed Master Plan Natural Resources Inventory (EA Engineering, Science, and Technology 1994a) contains additional information about special-status species that occur or have the potential to occur on watershed lands.

Visual Resources

The visual environment of the District's East Bay watershed lands is defined primarily by the five reservoirs and the surrounding uplands, which provide the central visual element in each reservoir watershed. Visual resources in Pinole Valley are distinguished by the valley floor and its surrounding uplands. The water levels of three of the five reservoirs do not fluctuate substantially (Chabot, Lafayette, and, to a lesser extent, Briones), so their shorelines maintain a more natural character than is typical at most reservoirs. San Pablo and Upper San Leandro Reservoirs experience substantial annual drawdown.

The visual character of the watershed lands changes dramatically throughout the year. In winter and early spring, they are green and lush as annual grasses grow in response to seasonal rains and cool temperatures. During spring, wildflowers cover portions of watershed lands, providing a colorful display. In summer, the annual grasses dry and turn golden brown until seasonal rainfall begins in late fall and winter.

Watershed lands are primarily steep to rolling hillsides that contrast sharply with the level water surfaces of the reservoirs themselves. The expanse of these lands is visually impressive, particularly when combined with the substantial

parklands that adjoin a large portion of the watershed, including EBRPD lands, the open space areas outside nearby cities, and the public open space and undeveloped areas within adjoining communities. This landscape stretches across a significant portion of the East Bay area and forms a unified, high-quality visual landscape.

Cultural Resources

A total of 47 archaeologic and historic resource sites have been mapped within the District's East Bay watershed lands (EA Engineering, Science, and Technology 1994a). The primary issues related to cultural resources on District lands are:

- the potential for disturbance of presently unknown cultural resources during the implementation of management activities and
- the need for close coordination with representatives of the Native American community regarding implementation of the EBWMP.

The San Pablo Reservoir watershed has 19 known cultural resource sites. Nine are prehistoric archaeologic sites, of which five also have a historic component. Nine are historic archaeologic sites, two of which also have associated structures, and one of which is a historic structure with no known or suspected archaeologic component. This historic structure is the Orinda Filter Plant and has been identified as a significant historic resource. In addition to this significant site, eight archaeologic sites (both prehistoric and historic) have been determined not to be significant resources, and the significance of 10 sites is unknown.

Three known cultural resources are located in the Briones Reservoir watershed. One is a prehistoric archaeologic site that appears to have little research potential and is not considered significant. Another site is the historic Hampton's Grave site, the significance of which has not been determined. The third site is the Felipe Briones Adobe, a historic archaeologic site that is considered a significant resource.

Five cultural resources are located in the Pinole watershed. Three are prehistoric sites: One is a well-documented midden site with good depositional integrity and research potential, the second consists of isolated artifacts, and the third is a possible site where shell fragments have been observed. The significance of these resources has not been determined. The other two resources (Mohring Homestead and Tormey Homestead) are historic sites.

One cultural resource is known to be present in the Lafayette Reservoir watershed. The Lafayette Reservoir dam is a historic feature but is not considered to be a significant resource.

A total of 12 known cultural resource sites are located in the Upper San Leandro Reservoir watershed. Nine are historic archaeologic sites, one of which has a prehistoric component. Eight of the sites have associated structures or

features. Two sites are historic structures and one is a prehistoric site. Four of the sites are considered not to be significant, and the significance of eight sites is unknown.

Seven known cultural resources are present in the Chabot Reservoir watershed. One is a prehistoric archaeologic site, the significance of which is unknown. Four of the sites are historic structures or features, one of which has a historic archaeologic component. One of the sites is considered not to be significant, and the significance of the other sites is unknown.

Recreation and Facilities

The District's East Bay watershed is a large and unique resource of semiwild, open land that is located in one of the most densely populated areas in the country. District lands provide wildland recreational opportunities for Bay Area residents while serving as a biological preserve containing rich and diverse plant and animal habitats. The proximity of this semiwilderness to a major urban area is rare.

Watershed lands and reservoirs are an important recreation resource because they provide opportunities for appropriate use of unique terrestrial features, reservoir water bodies, and open space areas adjacent to District property **(Figure 2-5)**. Watershed lands offer recreation that is oriented toward enjoyment of a natural landscape with few artificial artifacts and a sense of remoteness. The lands provide expansive open space views, wildlife viewing opportunities, hiking and equestrian trails, and limited vehicular access.

District-owned reservoirs also provide varying degrees of water-dependent and water-enhanced recreational opportunities. San Pablo Reservoir provides opportunities for shoreline and boat fishing and other forms of motorized and nonmotorized boating. Briones Reservoir allows only limited water-dependent use for college crew team practice. Lafayette Reservoir allows only use of "cartop" boats (sailboats, canoes, row boats, paddle boats, and electric motor boats) and fishing from docks and the shoreline. The Upper San Leandro Reservoir is located in a pristine setting with no water-dependent use allowed on or near the reservoir. Lake Chabot is located in the Anthony Chabot Regional Park and is operated by EBRPD under a long-term lease with the District. Water-dependent uses allowed at the lake include fishing and many types of nonmotorized boating.

District lands also offer a unique regional recreational opportunity by virtue of their geographic position. They are surrounded by large land parcels belonging to EBRPD and are reached from paved roads and trails that connect regional open space lands. The watershed provides experiences that complement those of adjacent regional parks where more general access and a wider variety of recreational oppportunities are available.

Within District lands, three developed regional recreation areas were designed to serve large numbers of people at San Pablo, Lafayette, and Chabot

Reservoirs. Although facilities vary at each recreation area, they generally include marinas, boat docks, boat launch ramps, fishing docks, picnic areas, informal play areas, parking, and supporting facilities (e.g., restrooms, bait and tackle shops, and food services). Substantial facilities exist at all of these recreation areas to serve the disabled community. A recreational trail system also provides controlled public access to a large portion of the watershed. A detailed description of recreation facilities on East Bay watershed lands is provided in the East Bay Watershed Master Plan Recreation Inventory (EA Engineering, Science, and Technology 1994b).

Description of Watershed Planning Zones

Five watershed planning zones are used to identify District lands that have similar site conditions and require similar management direction **(Figure 2-6)**. Planning zones are designated only for watershed property and are intended to help watershed staff implement management guidelines and watershed land use programs.

Conditions Used to Define Watershed Planning Zones

Specific conditions used to define and map planning zones are watershed status, development status of adjacent lands, and development status of District property.

Watershed Status of District Lands

The location of District-owned watershed lands in relation to the basin boundaries for each District reservoir is the primary consideration in designating planning zones. District property outside a reservoir basin is recognized as a separate zone because water quality protection is not as high a priority for that property.

Development Status of Adjacent Basin Lands

The land use and development status of land adjacent to District property is used to identify interface zones, in which public safety (especially fire protection), water quality management (including urban runoff problems), and urban encroachment are high-priority issues. Two levels of interface zones are recognized where adjacent lands are developed. These zones differ based on whether adjacent lands are within or outside District reservoir basins.

Development Status of Watershed Property

Watershed lands contain a variety of facilities for water service operations, recreation, and maintenance. The operation and management requirements of these differ from those of undeveloped, open space lands. Therefore, these developed watershed assets are recognized as a separate zone.

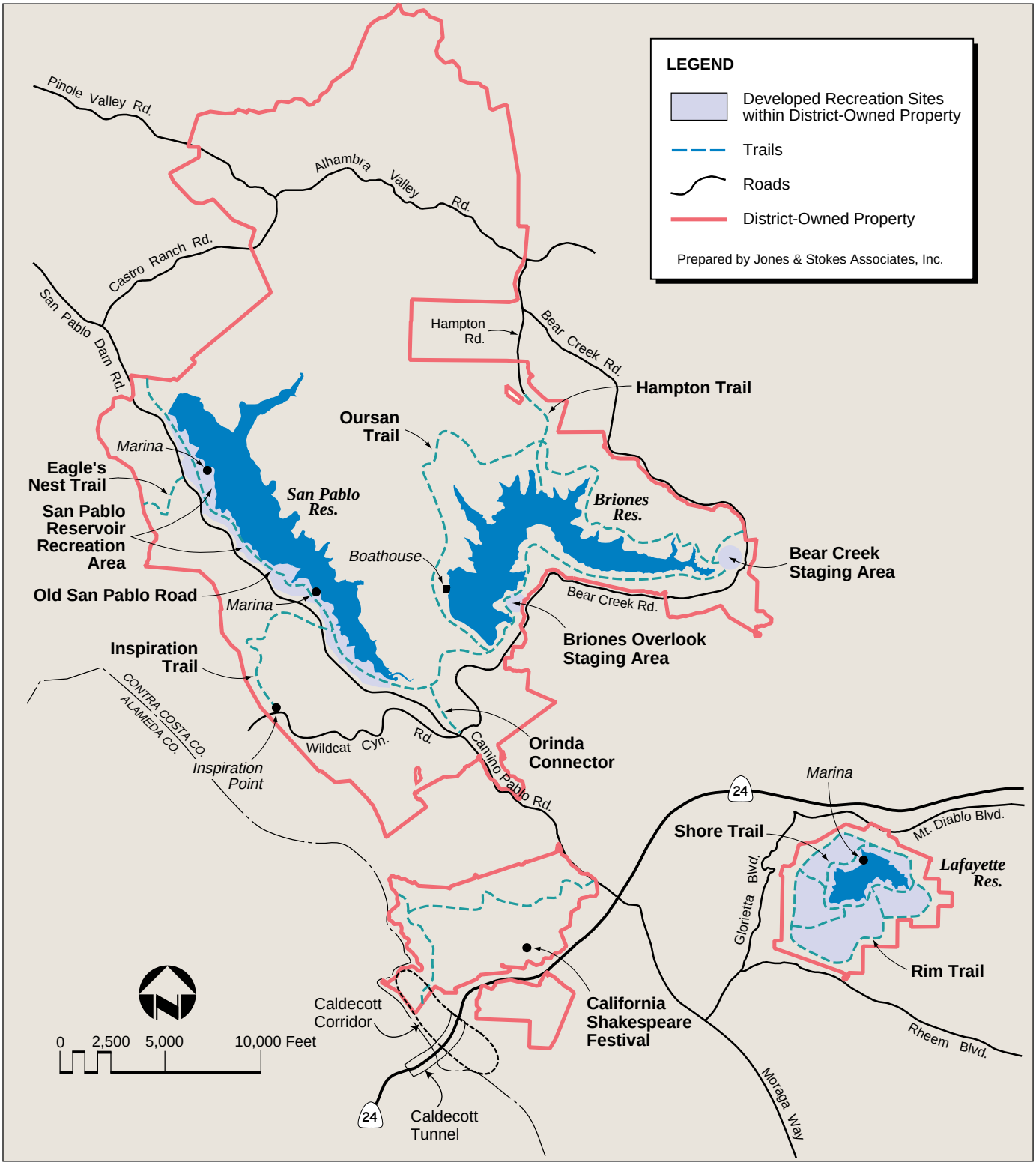


Figure 2-5 (North)
Major Recreation Sites and Trails

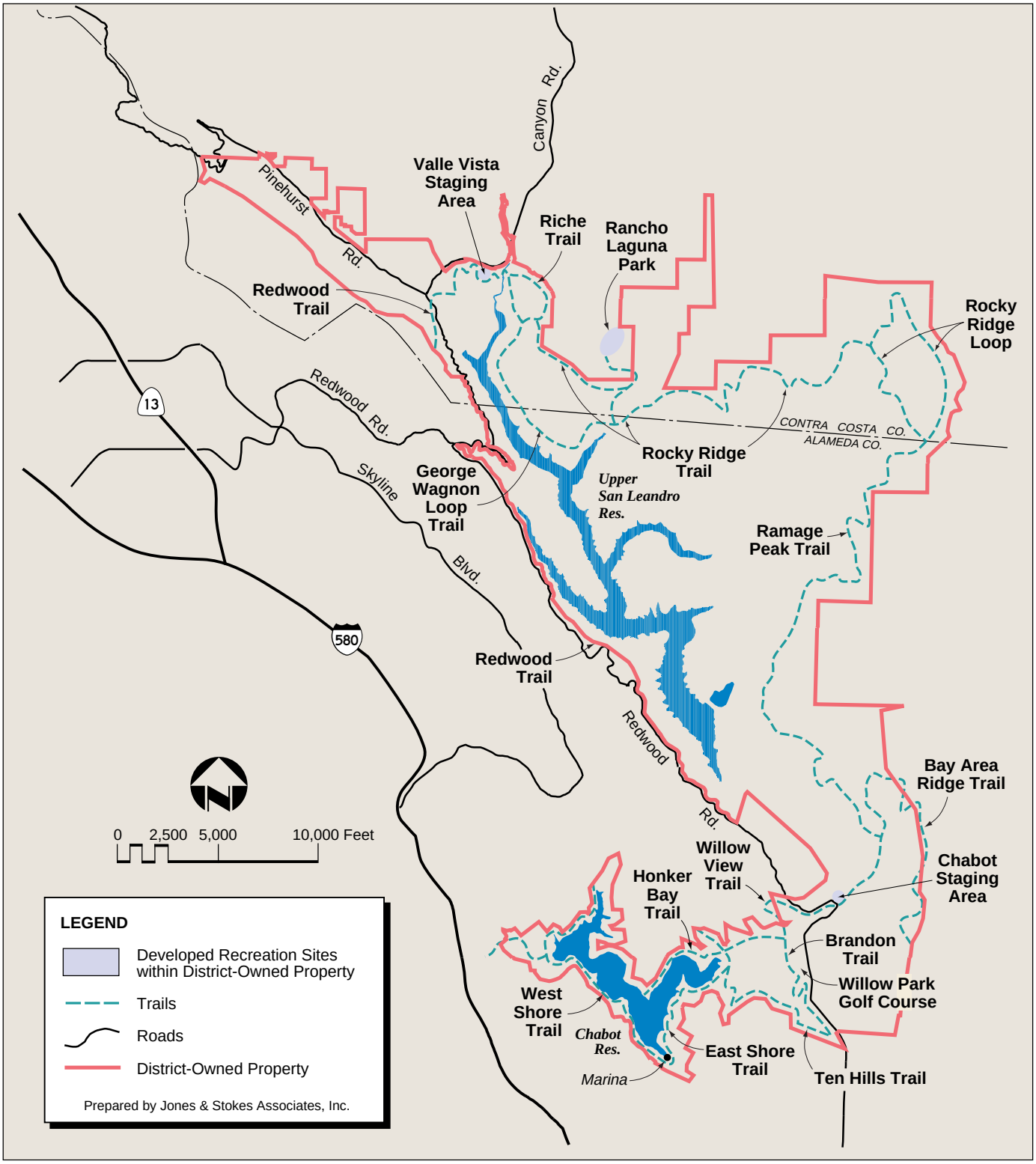


Figure 2-5 (South)
Major Recreation Sites and Trails

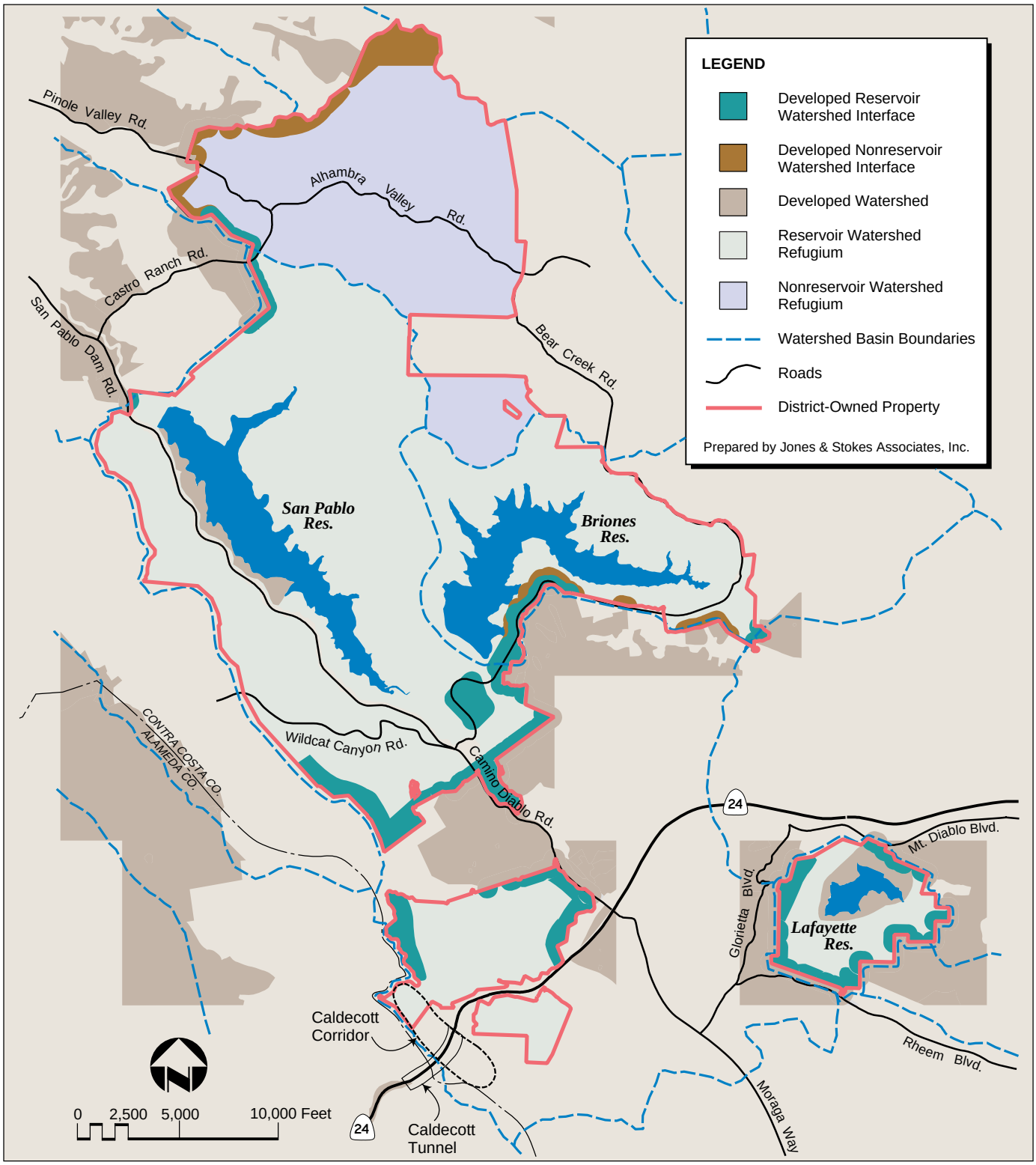


Figure 2-6 (North)
Watershed Planning Zones

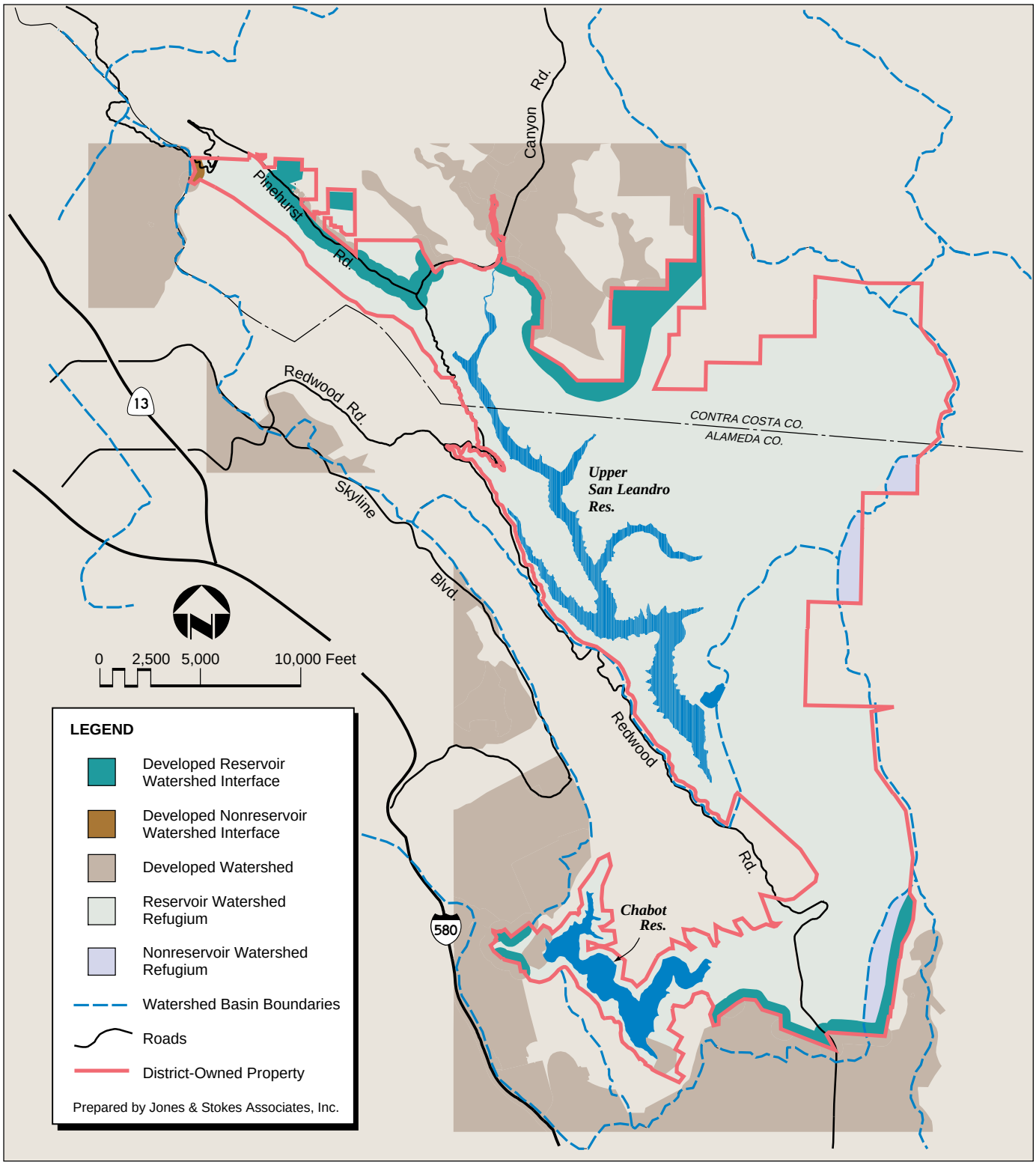
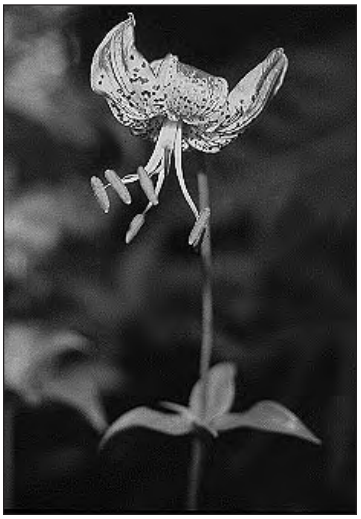


Figure 2-6 (South)
Watershed Planning Zones



Definition of Watershed Planning Zones

The characteristics of the five watershed planning zones are described below.

Developed Watershed Interface

Reservoir. The developed reservoir watershed interface zone is a buffer zone designated to protect District property in watershed areas that are bounded by urban development, where that development occurs within the reservoir basin boundary. The management priorities in this zone are to:

- mitigate fire hazard and water quality degradation at the urban interface and
- monitor urban encroachment with particular attention to public safety considerations, water quality degradation, recreation conflicts, and trespass issues.

Nonreservoir. The developed nonreservoir watershed interface zone is a buffer zone designated to protect District property in watershed areas that are bounded by urban development, where that development occurs outside the reservoir basin boundary. The management priorities in this zone are to:

- mitigate fire hazard and
- monitor urban encroachment with particular attention to safety considerations, recreation conflicts, and trespass issues.

Watershed Refugium

Reservoir. The reservoir watershed refugium zone consists of all land owned by the District within the physical basin boundary of a District reservoir, except for areas identified as interface zones or developed District watershed lands. The management priority in the watershed refugium zone is to:

- protect reservoir water quality and watershed natural resources (i.e., maintain biodiversity).

Nonreservoir. The nonreservoir watershed refugium zone consists of District property, primarily in Pinole Valley and small portions of the Upper San Leandro, San Pablo, and Chabot Reservoir watersheds, that is located outside the basin boundary of existing reservoirs and adjacent to undeveloped land. The management priorities for this land are to:

- protect natural resources,
- provide a buffer for watershed refugium lands, and
- monitor District property for urban encroachment, safety considerations, recreation conflicts, and trespass issues.

Developed Watershed

The developed watershed zone consists of property that is developed or designated for recreation or water service operations. The management priorities for developed land within District-owned property are to provide recreation opportunities for the general public that are consistent with the District's water quality protection and resource management goals and to provide for the operational needs of District reservoirs. Management of developed facilities includes assessing impacts on the watershed from existing and anticipated operational functions. Management direction will assist in identifying practices to reduce impacts on adjacent watershed resources and reservoir water quality.

Figure 2-6 identifies developed areas adjacent to District property that are within the reservoir watershed.

Table 2-3
Special-Status Plant and Animal Species Known to Occur on East Bay Watershed Lands

Species	Status[a] Federal/State/CNPS	Preferred Habitat	Occurrence on Watershed[b]
Plants			
Bent-flowered fiddleneck *Amsinckia lunaris*	--/--/4	Open woods and valley and foothill grasslands; 50-100 m	Grows near Briones Reservoir (B)
Pallid manzanita *Arctostaphylos pallida*	C1/SE/1B	Broadleaved upland forest, chaparral, and open woods on siliceous shales of slopes and ridges in the Berkeley-Oakland Hills; 200-350 m	One population on former Goldberg property in Canyon adjacent to Pinehurst Road (USL)
Mt. Diablo fairy lantern *Calochortus pulchellus*	--/--/1B	Wooded slopes, chaparral, and valley and foothill grasslands; 200-800 m	Grows on Rocky Ridge, Cull Hill Ridge, and Mendonca Ranch (USL)
Oakland star-tulip *Calochortus umbellatus*	--/--/4	Chaparral, broadleaved upland forests, and valley and foothill grasslands; 100-700 m	Grows on Rocky Ridge (USL)
Franciscan thistle *Cirsium andrewsii*	--/--/4	Broadleaved upland forests and coastal scrub; < 100 m	Grows at Lily Spring on San Pablo Ridge (SP)
Western leatherwood *Dirca occidentalis*	--/--/1B	Moist, partially shaded slopes; broadleaved upland forests, closed-cone conifer forests, riparian habitats, and chaparral; 50-300 m	Grows near San Pablo Creek and in Gateway Valley (SP)
Diablo sunflower, or helianthella *Helianthella castanea*	C2/--/1B	Open, grassy areas, often associated with broadleaved upland forests, riparian woodland, chaparral, and coastal scrub; 200-1,300 m	Grows at several locations on San Pablo Ridge, Rocky Ridge, and in Pinole Valley (P, SP, USL)
Santa Cruz tarplant *Holocarpha macradenia*	C1/SE/1B	Coastal prairie and valley and foothill grasslands; prefers sandy clay soil; < 100 m	A planted species on the watershed; no plants located in 1991 and 1992 surveys
Northern California black walnut *Juglans californica* var. *hindsii*	C2/--/1B	Riparian forests and woodlands; requires deep alluvial soil associated with a creek or stream; 50-200 m	Known at Kaiser Creek just upstream of Upper San Leandro Reservoir (USL)
San Antonio monardella *Monardella antonina* ssp. *antonina*	C3C/--/3	Open rocky slopes in chaparral and open woods; 500-900 m	Reported from South Hampton Road on the watershed (R)

Table 2-3. Continued

Species	Status[a] Federal/State/CNPS	Preferred Habitat	Occurrence on Watershed[b]
Mammals			
Ringtail *Bassariscus astutus*	--/SP/--	Inhabits chaparral and foothill canyons, preferring riparian areas	Occurs on the watershed (SP, USL)
Mountain lion *Felis concolor*	--/SP/--	Inhabits forested and brushy regions; tends to avoid open areas	Recent sightings on the watershed (SP, B, L, USL, C)
Birds			
Common loon *Gavia immer*	--/CSC/--	Requires deep freshwater lakes with sufficient food; needs at least 18 m (60 ft) of water for running take-off from water	A winter migrant on the watershed (SP, B, USL, C)
American white pelican *Pelecanus erythrorhynchos*	--/CSC/--	Winters on salt ponds, large lakes, and estuaries; loafs on open water during the day; roosts at night along the water's edge on beaches, sandbars, or driftwood	A winter migrant on the watershed (P, SP, B, USL)
Double-crested cormorant *Phalacrocorax auritus*	--/CSC/--	Found along the coast in estuaries and salt ponds; also frequents reservoirs and lacustrine habitats in the coastal slope lowlands and Central Valley	Occurs on the watershed (SP, B, L, USL, C)
Aleutian Canada goose *Branta canadensis leucopareia*	FT/--/--	Winters on lakes and inland prairie; forages on natural pasture or that cultivated to grain; feeds and roosts on lakes, reservoirs, and ponds	Occurs on the watershed as a winter resident (P, SP)
Osprey *Pandion haliaetus*	--/CSC/--	Requires snags or living trees adjacent to or over water for nesting; also will nest on poles or cliffs	Occurs on the watershed (SP, B, L, USL, C); possible nest located at Briones Reservoir
White-tailed kite *Elanus leucurus*	--/SP/--	Inhabits herbaceous lowlands with variable tree growth	Occurs on the watershed (B)
Bald eagle *Haliaeetus leucocephalus*	FT/SE, SP/--	Nests and winters along ocean shorelines, lake margins, and river courses; roosts communally in winter	A winter resident on the watershed (SP, B, L, USL)
Northern harrier *Circus cyaneus*	--/CSC/--	Inhabits coastal and freshwater marshes; nests on ground in shrubby vegetation and grasslands; forages in grasslands	Occurs on the watershed (P, SP, B, USL)

Species	Status[a] Federal/State/CNPS	Preferred Habitat	Occurrence on Watershed[b]
Sharp-shinned hawk *Accipiter striatus*	--/CSC/--	Inhabits open deciduous woodlands, mixed or coniferous forests, and thickets	Breeds and winters on the watershed (P, SP, B, USL, C)
Cooper's hawk *Accipiter cooperii*	--/CSC/--	Nests in forests or woodlands; prefers broad-leafed trees in riparian areas	Breeds and winters on the watershed (P, SP, B, USL)
Ferruginous hawk *Buteo regalis*	C2/CSC/--	Inhabits western plains and prairies, nesting in trees along streamcourses; in treeless areas, nests on low cliffs or on the ground	Winters on the watershed (P)
Golden eagle *Aquila chrysaetos*	--/CSC, SP/--	Nests usually found on cliff ledges; prefers nesting in trees in hilly areas	Breeds and winters on the watershed (P, SP, B, USL)
Merlin *Falco columbarius*	--/CSC/--	Frequents coastlines, open grasslands, savannas, woodlands, lakes, and wetlands	Observed in winter on the watershed (USL)
American peregrine falcon *Falco peregrinus anatum*	FE/SE, SP/--	Inhabits riparian areas and coastal and inland wetlands throughout the year	Occurs as a migrant on the watershed (SP, B, USL)
Prairie falcon *Falco mexicanus*	--/-CSC/--	Inhabits perennial grasslands, savannas, rangeland, agricultural fields, and desert scrub areas	Breeds and winters on the watershed (P, SP, USL); observed in the Simas Valley area (1992); nested on Rocky Ridge 1959-1989
California gull *Larus californicus*	--/CSC/--	Frequents coastal and interior lowlands in winter, often roosting in large concentrations along shorelines, landfills, pastures, and on islands; needs undisturbed, isolated islands for nesting	Winters on the watershed (SP, B, L, USL, C)
Long-eared owl *Asio otus*	--/CSC/--	Frequents dense, riparian and live oak thickets near meadows; requires riparian or other thickets with small, densely canopied trees for nesting and roosting	Winters on the watershed (SP, B)
Short-eared owl *Asio flammeus*	--/CSC/--	Frequents open, treeless areas with elevated perches and dense vegetation for roosting and nesting	Winters on the watershed (B)
California horned lark *Eremophila alpestris actia*	C2/CSC/--	Inhabits prairies, fields, and open grasslands	Occurs on the watershed (P, SP, B, USL); possibly breeds

Species	Status[a] Federal/State/CNPS	Preferred Habitat	Occurrence on Watershed[b]
Loggerhead shrike *Lanius ludovicianus*	--/CSC/--	Inhabits open brushy areas with lookout posts (e.g., wires, trees, and scrub)	Breeds and winters on the watershed (P, SP, B, L, USL, C)
Yellow warbler *Dendroica petechia*	--/CSC/--	In breeding season, frequents open to medium-density riparian zones, woodlands, and forests with a brushy understory; in migration, found in a variety of sparse to dense woodland and forest habitats	Occurs on the watershed during migration (SP, USL); may breed; migratory habitat available; breeding habitat limited
Tricolored blackbird *Agelaius tricolor*	--/CSC/--	Frequents fresh emergent wetlands; roosts in large flocks in emergent vegetation or trees	Winters on watershed (P, SP); limited marginal breeding habitat available
Reptiles			
Southwestern pond turtle *Clemmys marmorata pallida*	C1/CSC/--	Inhabits permanent or nearly permanent bodies of water in many habitat types at <6,000 feet elevation; requires basking sites such as partially submerged logs, vegetation mats, or open mud banks	Western pond turtle known to breed on the watershed; northwestern and southwestern subspecies intergrade in the watershed region (P, SP, B, L, USL, C)
California horned lizard *Phrynosoma coronatum frontale*	--/CSC/--	Frequents a wide variety of habitats; most common in lowlands along sandy washes with scattered low bushes; requires open areas for sunning, bushes for cover, patches of loose soil for burial, and abundant supply of ants and other insects	Collected on Hampton Road in 1992 by R. Nuzum; occurred in the late 1960s in the Berkeley Hills (B)
Alameda whipsnake *Masticophis lateralis euryxanthus*	FPE/ST/--	Restricted to valley-foothill hardwood habitat of the Coast Ranges; inhabits south-facing slopes and ravines where shrubs form a vegetative mosaic with oak trees and grasses	Many documented occurrences on the watershed (P, SP, USL)
Amphibians			
California red-legged frog *Rana aurora draytonii*	FPE/CSC/--	Inhabits marshes, ponds, streams, lakes, and reservoirs; prefers permanent sources of water with cattails or other plants to provide cover	Breeds on the watershed (P, SP, USL); several documented occurrences

[a] Status explanations:

Federal

FE = listed as endangered under the federal Endangered Species Act.
FT = listed as threatened under the federal Endangered Species Act.
FPE = proposed for listing as endangered under the federal Endangered Species Act.
C1 = Category 1 candidate for federal listing. Category 1 includes species for which the U.S. Fish and Wildlife Service (USFWS) has on file enough substantial information on biological vulnerability and threat to support proposals to list them.
C2 = Category 2 candidate for federal listing. Category 2 includes species for which USFWS has some biological information indicating that listing may be appropriate but for which further biological research and field study are usually needed to clarify the most appropriate status. Category 2 species are not necessarily less rare, threatened, or endangered than Category 1 species or listed species; the distinction relates to the amount of data available and is therefore administrative, not biological.
C3C = no longer a candidate for federal listing. Category 3C species have been dropped from the candidate list because they are too widespread or not threatened at this time.

State

SE = listed as endangered under the California Endangered Species Act.
ST = listed as threatened under the California Endangered Species Act.
SP = fully protected under the California Fish and Game Code.
CSC = species of special concern.

California Native Plant Society

1B = List 1B species: rare, threatened, or endangered in California and elsewhere.
4 = List 4 species: plants of limited distribution.
3 = List 3 species: more information needed to determine status.

[b] Watersheds:

P = Pinole
SP = San Pablo
B = Briones
L = Lafayette
USL = Upper San Leandro
C = Chabot

Source: EA Engineering, Science, and Technology 1994a; updated based on Federal Register 219: 58982-59028.

Introduction

This section provides a general level of management guidance for the EBWMP. The goals, objectives, and guidelines listed below for each watershed management program describe management practices that are generally applicable to all watershed lands. In addition, this section describes the needs for coordination with other management programs that may affect the same resources or have overlapping goals.

Table 3-1 shows the program categories included in this plan, the management programs in each category, and the page on which each management program can be found.

Table 3-1
Management Program Categories Discussed in the EBWMP

Program	Issue Areas	Guideline Acronym	Page
Natural Resource Management Programs	Water Quality	WQ	46
	Biodiversity	BIO	52
	Forestry	FOR	56
	Livestock Grazing	LG	59
	Fire and Fuels	FF	62
Community Use Management Programs	Developed Recreation and Trails	DRT	71
	Environmental Education	EE	78
	Cultural Resources	CR	81
	Visual Resources	VR	83
Assets Management Programs	Land Ownership	LO	86
	Entitlements	ENT	89
	Geographic Information System	GIS	91

The District's water quality goal is to maximize reservoir water quality to comply with current and anticipated future drinking water regulations.

Natural Resource Management Programs

Water Quality

The water quality management program involves activities that the District will undertake to maximize drinking water quality by encouraging natural sediment control, biofiltration processes, and source control. Key elements of this program are identification and prompt repair of erosion problems related to land use activities and coordination with other agencies.

Drinking water quality is affected by the quality of original supply, how the geographic basin is managed, and what treatment techniques are used. Aggressive protection and management of water quality is necessary to control treatment costs and to comply with drinking water regulations. The water quality management program includes assessing how human activities and land and water uses may affect water quality, and implementing measures, when necessary, to maintain water quality.

Program Direction

Goal

Maximize reservoir water quality to comply with current and anticipated future drinking water regulations.

Objectives

- Maintain the high quality of water stored in District reservoirs.
- Ensure that surface runoff from District lands meets state water quality standards.
- Restore degraded areas on the watershed that are a source of excessive sediment.
- Address existing and potential water quality impacts for lands within the reservoir basins that are not owned by the District.

Management Guidelines

General Guidelines

WQ.1 Identify and quantify contaminant sources before developing management and control strategies and prioritizing implementation. Monitoring programs should identify sources of the following water quality constituents: particulates, microorganisms, general minerals, metals, DBP precursors, nutrients, and synthetic organic compounds (including volatile organic compounds [VOCs], pesticides, and herbicides). The District should expand its nonpoint-source monitoring programs to fill gaps in existing information.

WQ.2 Assess water quality impacts of various management practices before developing comprehensive management strategies (e.g., water quality impacts of different grazing regimes or vegetation management/fuel reduction techniques).

WQ.3 Establish or continue the following prohibitions to protect public water supplies:

- Prohibit body-contact recreation in reservoirs and tributary streams.
- Prohibit untreated sewage from entering reservoirs or tributary streams, through either surface or subsurface flow.
- Prohibit new easements or rights-of-way for pipelines and/or conveyances transmitting hazardous substances through District watershed lands.
- Prohibit the use of high emission motorboat engines on San Pablo Reservoir, effective January 1, 2000; and prohibit the use of motorboat engines at San Pablo Reservoir that discharge any fuel pollutent into the water, effective January 1, 2002 in accordance with Resolution No. 33088-98, effective March 10, 1998.

WQ.4 Develop design criteria, standard plans and specifications, and best management practices (BMPs) as appropriate for land uses, activities, and District watershed control and management techniques that provide water quality protection guidelines for livestock grazing, equestrian stables, and other concentrated animal facilities, fishing, boating, and marina management, golf courses, residential neighborhoods, onsite waste systems, stormwater runoff from roads and parking lots, commercial zones, hazardous materials storage and transfer facilities, erosion control, fire road and hiking trail routing, construction, and maintenance, vegetation management, forestry, and fire and fuels management.

WQ.5 Identify and prioritize parcels for water quality protection (e.g., potential sites for stormwater management, wetland treatment) that are candidates for protection or land acquisition because of the soils, slope, and/or location within the hydrologic system.

WQ.6 Review pet access policy and conditions on watershed trails to ensure that they are consistent with livestock and equestrian management practices related to water quality protection.

Erosion Control

WQ.7 Develop and implement erosion control standards and BMPs to reduce soil erosion, sedimentation, and nutrient impacts throughout the watershed. Standards and BMPs should be adhered to by all staff, contractors, researchers, recreationists, visitors, and others performing construction, maintenance, or other activities on watershed lands.

WQ.8 Conduct erosion control analysis and planning before initiating construction or other land disturbance activities.

WQ.9 Identify sediment sources and their contribution to the reservoirs and watercourses on District lands (e.g., active landslides and debris flows). Prepare a sediment budget, develop BMPs, set priorities for remediation, and implement measures. Give priority to Briones, San Pablo, and Upper San Leandro Reservoirs and their tributaries, and then Chabot and Lafayette Reservoirs. Identify management strategies and BMPs to minimize pollutant loading to tributary streams and reservoirs.

WQ.10 Inspect erosion-prone sites within the watershed annually and implement erosion control measures when and where necessary. Locate existing landslides, gullies, trail damage, or other sources of excessive sediment. Stabilize and vegetate streambanks and floodplains. Use drainage structures, grading, planting, or other site-specific methods to control erosion when needed.

WQ.11 Prevent construction-related water quality impacts such as erosion from exposed soil and pollutants from equipment.

Nonpoint-Source Pollution Control

WQ.12 Evaluate the impacts of stormwater runoff from paved roads, vehicle facilities, and parking lots on water quality and implement measures for nonpoint-source pollution prevention.

WQ.13 Evaluate and implement methods for controlling nonpoint-source pollution on District lands. Investigate the feasibility of implementing traditional (e.g., physical and chemical) controls and nontraditional methods (e.g., establishing riparian vegetation and aquatic organisms).

WQ.14 Evaluate the potential for stormwater runoff to adversely affect District reservoirs. Continue to conduct stormwater monitoring programs to quantify pollutant loading and identify sources of contaminants. Of particular concern are pollutants such as particulates and sediments, animal and human wastes and related pathogens, DBP precursors, synthetic organic chemicals (such as pesticides and herbicides), metals, oil and grease, petroleum hydrocarbons, and fertilizers and nutrients.

WQ.15 Evaluate the potential for surface water and groundwater pollution from developed areas within the watershed and implement pollution control measures.

WQ.16 Coordinate with other land use management agencies, the National Pollution Discharge Elimination System stormwater permittee, and the Regional Water Quality Control Board to ensure proper selection and implementation of nonpoint-source control management practices on non-District lands in reservoir basins.

Grazing

WQ.17 Require annual grazing plans and specific BMPs for all livestock leases, including horse pastures, that include provisions for protection of water quality and supply. Integrate equestrian use practices with other range management practices. Conduct a census of the number of horses stabled in the watershed and the number of equestrian users.

WQ.18 Eliminate livestock grazing from unstable streambanks and protect unstable streambanks from other land-disturbing activities.

WQ.19 Ensure, where the watershed interface zones are grazed (e.g., for fire management), that animal waste and erosion control measures are implemented to prevent water quality impacts.

WQ.20 Ensure that grazing animals (e.g., cattle, horses, goats, and llamas) are managed to prevent overgrazing, direct access to water bodies, and erosion.

Fire and Fuels

WQ.21 Evaluate water quality impacts of fire and fuels management practices such as prescribed burning, equipment use, and firebreaks. Identify BMPs to minimize and mitigate water quality impacts. Prioritize and implement selected measures and include a water quality specialist in fire and fuels management planning.

WQ.22 Consider alternatives to plowing firebreaks, including use of existing roads, mowing, spot-grazing, controlled burning, or natural firebreaks. Firebreak lines will be plowed along, rather than across, contour lines where feasible, and drainage structures will be installed where necessary to prevent gully formation.

WQ.23 Restore vegetation (using native vegetation where feasible) whenever possible in burn areas and timber harvest areas throughout the reservoir watershed to provide erosion control and habitat enhancement.

Recreation, Roads, and Trails

WQ.24 Identify and evaluate the effects of recreational activities such as hiking, horseback riding, boating, shoreline fishing, and water-based recreation on water quality. Implement measures to reduce water quality impacts.

WQ.25 Provide adequate safeguards to reduce water quality impacts from facilities developed for recreational users of the watershed. Appropriate monitoring and pollution prevention measures should be implemented at parking areas, picnic grounds, restrooms, boat launches, stables, and other facilities.

WQ.26 Inventory and evaluate unsurfaced fire roads and trails and eliminate those that are not necessary to management objectives or requirements. Develop design criteria for fire roads, trails, and stream crossings, and implement BMPs and standard maintenance practices to minimize erosion and other water quality impacts.

WQ.27 Evaluate stream crossings with respect to water quality. Identify and implement measures to control sediment, pollutants, or other sources of water quality degradation from entering watercourses.

WQ.28 Design and construct roads, trails, and fire roads to minimize disruption of natural hydrology.

WQ.29 Revegetate permanently closed roads with ecologically suitable vegetation.

WQ.30 Implement management practices on trails to minimize erosion and runoff containing animal waste. Curtail access to trails during wet weather and in areas vulnerable to erosion and runoff.

WQ.31 Monitor water quality impacts from trail use. Erosion may result on trails from use by hikers and horses. Sediment loads from trail erosion are greatest during the first rains of the wet season and continue to impair water quality throughout the season.

Buffer Areas

WQ.32 Establish buffer zones or setbacks from watershed margins along sensitive urban interface areas to ease the encroaching development pressures on the watershed core and to protect the watershed, tributary streams, and reservoirs. Identify areas that are likely to be developed and consider alternative protection strategies.

WQ.33 Review alternatives and establish standards to protect land/water interface areas. Develop a program for protecting riparian corridors, wetlands, seeps, springs, ponds, banks of reservoirs, tributary streams and corridors, and other water bodies.

WQ.34 Identify activities adjacent to the developed watershed interface that may affect water quality, such as agriculture, construction, recreation, and rights-of-way. Implement pollution prevention practices (e.g., improving the vegetative buffer between District lands and urban development).

WQ.35 Protect riparian corridors from direct and indirect water quality impacts. Direct impacts include cattle access, trail crossings, and loss of vegetation. Indirect impacts may include overgrazing, runoff from prescribed burns, animal waste, and runoff from trails and roads.

Reservoirs

WQ.36 Evaluate the effectiveness of installing debris booms for all major tributaries to remove large volumes of floating debris that are carried into the reservoirs during and following storm events.

WQ.37 Stabilize and vegetate shoreline areas and drawdown zones, where necessary and feasible. Use drainage structures, grading, planting, or other site-specific methods to control erosion as needed. Implement BMPs when conducting land-disturbing activities.

Coordination Requirements for Other Resource Management Programs

Ensure that the following coordination guidelines for other resource programs are met during project planning and implementation under the water quality management program:

Program	Guideline
Biodiversity	BIO.19, 21, 22, 23, and 24
Fire and Fuels	FF.5, 7, 8, and 13
Environmental Education	EE.2
Cultural Resources	CR.5, 6, 7, 10, and 11
Visual Resources	VR.1
Geographic Information System	GIS.4

The District's biodiversity goal is to maintain and enhance biological resource values on District lands through active management and careful coordination with other resource management programs.

Biodiversity

The biodiversity management program involves activities that the District will undertake to protect and enhance habitats and species. The District's commitment to maintain and enhance biodiversity will be achieved by actively maintaining natural ecosystem processes, especially those that also protect or enhance water quality.

Program Direction

Goal

Maintain and enhance biological resource values on District lands through active management and careful coordination with other resource management programs.

Objectives

- Maintain, enhance and where feasible restore plant and animal communities, populations, and species.
- Implement an ecosystem management approach that maintains and enhances natural ecological processes.
- Apply an adaptive management strategy using inventory, management, monitoring, and research.
- Coordinate all resource management programs to ensure that biological resources are protected.

Guidelines

Threatened, Endangered, and Other Special-Status Species

BIO.1 Enhance habitat for threatened and endangered species as financially feasible.

BIO.2 Regularly update Table 2-3 to incorporate new information from monitoring and legal status changes for use in project planning.

BIO.3 Monitor listed species populations and conduct site surveys using monitoring methods identified in the District's *Biological Survey Studies* program (Stebbins 1996). Incorporate survey results into the District's GIS database.

Habitats and Vegetation Types of High Biological Value

BIO.4 Design and control management activities to limit fragmentation of common vegetation types.

BIO.5 Designate and protect heritage native trees and trees with outstanding characteristics.

BIO.6 Maintain and, where necessary, enhance habitat suitability for wildlife movement in key corridors.

BIO.7 Participate in coordinated resource management planning efforts with other local land management agencies to conserve regional biodiversity by maintaining regional movement corridors (e.g., the Caldecott Tunnel corridor) and management of large landscape units. Include a water quality specialist during coordinated resource management planning.

BIO.8 Identify high-priority sites for habitat restoration based primarily on water quality protection and on the value of restored habitats and location relative to important wildlife use areas and corridors.

BIO.9 Identify key habitat areas necessary for protection and management of special-status plants and animals. Provide buffer areas to reduce disruption of nesting and roosting areas for raptors, herons, egrets, and other sensitive wildlife species.

BIO.10 Recognize the ecological value and likely permanence of certain non-native species and habitats (e.g., annual grassland), and incorporate the management of these species and habitats into biodiversity planning efforts.

BIO.11 Where annual grazing has been eliminated from grassland habitats and grassland retention is a biodiversity priority, use prescribed fire, periodic grazing, or other means to discourage shrub encroachment and maintain grassland conditions.

BIO.12 Introduce prescribed fire under carefully controlled conditions to maintain and enhance biodiversity values in fire-dependent plant communities (e.g., knobcone pine, chamise-black sage chaparral, and manzanita chaparral).

BIO.13 During revegetation of areas burned by wildfire or prescribed fire, emphasize maintenance and enhancement of biodiversity, commensurate with other critical resource needs (e.g., water quality protection).

Noxious Weeds, Invasive Plants, and Feral Animals

BIO.14 As required by law, control noxious weeds and pest animal species using the most conservative, least toxic, but effective methods available (BIO.17).

BIO.15 Prepare and periodically update a list of noxious weeds, other invasive, non-native plant species, and feral animals that warrant control on District lands.

BIO.16 Emphasize control of noxious weeds, invasive plants, and feral animals in or near important wildlife areas, corridors, or other sensitive habitats.

BIO.17 Apply integrated pest management (IPM) strategies that have negligible impacts on water quality, biodiversity, and other resources and do not increase fire risk.

BIO.18 Control rodent populations at dams, recreation facilities, and other areas where burrowing and disease could pose threats to human safety or contaminate the water supply or where control is mandated by a regulating agency.

BIO.19 Avoid use of non-native species for erosion control and other revegetation that are invasive or that inhibit recovery of native habitats.

BIO.20 Identify and cooperatively obtain change in those procedures implemented by other agencies on District land that have a known deleterious effect on biodiversity (e.g., introduction of mosquito fish by mosquito abatement districts).

Management Coordination Procedures

BIO.21 While planning and implementing resource management actions, apply the following coordination guidelines to meet state and federal legal requirements for threatened and endangered species:

- if listed species are likely to be affected, consult with the U.S. Fish and Wildlife Service (USFWS) and the California Department of Fish and Game (DFG) as required and

- implement measures required by USFWS and DFG to avoid take and other financially feasible measures to protect other special-status species.

BIO.22 In conducting management activities, evaluate effects on species (prioritized according to guideline BIO.1) of proposed management activities

(e.g., changes to water system operations, watershed management activities, construction of new facilities and public access) according to the following guidelines:

- query GIS for information on known occurrences of listed and other special-status species and special communities and general habitat types in the project area,
- identify potential species that could be affected by the proposed action based on known species' occurrences, the habitat type within which the project occurs, and the habitats used by the species (see Table 2-3 for habitat occurrences of species),
- assess impact occurrence using the District's Biological Survey Studies protocols (Stebbins 1996), and
- evaluate project impacts and identify opportunities to avoid, mitigate, or compensate for impacts, including species- and project-specific buffers to protect plant and animal species from adverse effects of management activities; evaluate consistency with other EBWMP direction.

BIO.23 Ensure that all District projects that affect wetlands or waters of the United States as defined under Section 404 of the Clean Water Act receive appropriate permits prior to disturbance.

BIO.24 Ensure that all District projects that directly impinge on blue line streams, as defined under California Fish and Game Code Sections 1601 and 1603, receive appropriate permits from DFG prior to disturbance.

Coordination Requirements for Other Resource Management Programs

Ensure that the following coordination guidelines for other resource programs are met during project planning and implementation under the biodiversity program:

Program	Guideline
Water Quality	WQ.2, 7, 8, 23, and 33
Cultural Resources	CR.5, 6, 7, 10, and 11
Visual Resources	VR.1
Geographic Information System	GIS.4

The District's forestry goal is to develop and implement a long-term management program for non-native forests to maintain and enhance other environmental resources, including water quality, fire protection, biodiversity, visual quality, and recreation use.

Forestry

The District's lands support a substantial area of native and non-native forest habitats. Native forest communities include redwood, knobcone pine, and several hardwood-dominated forest types. Most of the non-native forest stands consist of monocultures (i.e., even-aged, single-species stands) of Monterey pines and eucalyptus planted during the 1930s and 1940s to provide stability to watershed soils.

Forest management is defined in this plan as activity undertaken to manage vegetation in non-native forest stands (i.e., Monterey pine and eucalyptus) on District watershed lands.

Forest management will be achieved through selective management of the non-native forests, where necessary and financially feasible, to maintain and increase the vigor of the stands and to encourage the replacement of non-native forests over the long term. This conversion is anticipated to take place within the next 10-30 years, with priorities for conversion based on the need to reduce fire risks, maintain and enhance biological values, and protect water quality. Native forests will be managed to encourage natural regeneration processes and maintain and enhance biological values. Management for native forests is provided under "Biodiversity".

Program Direction

Goal

Develop and implement a long-term management program for non-native forests to maintain and enhance other environmental resources, including water quality, fire protection, biodiversity, visual quality, and recreational use.

Objectives

- Develop and implement a long-term plan for managing non-native forest species that includes maintenance of stand health and vigor and phased conversion of selected stands of non-native forests to native forests or other ecologically suitable habitats.
- Use forest management as a tool to achieve strategic fire management goals, biodiversity goals, and other resource goals.
- Protect water quality, biodiversity, and other resource values during forest management program implementation.

- Manage trees in areas of high public use to ensure visitor safety and maintain aesthetic values.

Guidelines

FOR.1 Discourage or prevent establishment of new stands of non-native woody vegetation and the expansion of existing stands.

FOR.2 Establish priorities for implementing non-native forest management based on fire risk to public safety and water quality degradation, stand vigor, opportunities for habitat enhancement, and visual impacts.

FOR.3 Avoid clear-cutting and other even-aged harvest techniques for areas greater than 2 acres in size to reduce impacts on water quality and other resources.

FOR.4 Develop standard practices and BMPs for forest management to reduce resource damage during harvest and subsequent management and to protect water quality (i.e., minimize sediments, nutrients, and organic matter in runoff).

FOR.5 Identify key non-native forest areas that support special-status wildlife species and manage these areas to avoid disturbing associated special-status species.

FOR.6 Develop minimum management prescriptions, including retaining non-native forests, in areas where stands cannot be removed without significant impacts on water quality, biodiversity, visual quality, or other resource values.

FOR.7 Where replacement of non-native forest (Monterey pine and eucalyptus) with native forest is not feasible because of site conditions, habitat value, impacts on water quality or biodiversity, or fire risk, establish site-specific management objectives to restore other native habitats or continue managing non-native forest.

FOR.8 Evaluate the fire risk of immediate harvest and resulting long-term stand modifications when developing silvicultural prescriptions and management plans for individual forest stands. Ensure consistency with management directions for other resources in forest management plans.

FOR.9 Retain dead and downed material for use by special-status wildlife species, except where removal is required for strategic fuels management, fire control, water quality protection, habitat regeneration, public safety, or for other justified reasons.

Eucalyptus Management

FOR.10 Develop and implement a long-term phased program to remove eucalyptus stands and restore native woodland or other natural habitats to reduce fire hazards in areas where eucalyptus poses a significant fire risk.

FOR.11 Prior to any harvest activities, ensure that adequate stump-sprouting control methods are available to reduce fire hazards and protect water quality.

Monterey Pine Management

FOR.12 Plan and implement silvicultural treatments necessary to maintain the short-term vigor of Monterey pine forest stands and to meet long-term stand management objectives.

FOR.13 Where feasible and appropriate, implement long-term management to replace Monterey pine forest with native species to improve fire protection, enhance biological values, and maintain water quality.

Coordination Requirements for Other Resource Management Programs

Ensure that the following coordination guidelines for other resource programs are met during project planning and implementation under the forest management program:

Program	Guideline
Water Quality	WQ.4, 7, 8, 11, 23, 33, and 35
Biodiversity	BIO.5, 10, 21, 22, 23, and 24
Cultural Resources	CR.5, 6, 7, 10, and 11
Visual Resources	VR.1 and 7
Geographic Information System	GIS.4

Livestock Grazing

Conducting livestock grazing to help achieve other resource management goals is a goal of the District.

Much of the District's land supports annual grassland vegetation. Grasslands stabilize soils from erosion that can degrade water quality and reduce reservoir capacity. They provide important habitat for wildlife and plant species. Grasslands also produce more runoff than any other vegetation type.

Many District grasslands have been grazed by livestock for 100 years or more. Grazing has been managed to prevent brush encroachment, reduce fire hazard, provide leasing revenue to the District, and increase runoff. Grazing on watershed lands has raised concern regarding introduction of pathogens (e.g., cryptosporidium and giardia), nutrients, and sediment into reservoir water above baseline amounts. Also, continuous, year-round grazing has degraded biological resource values by damaging wetland, riparian, and other sensitive habitats; eliminating sensitive plant species; and encouraging the spread of noxious weeds.

The livestock grazing program will be refocused to reduce impacts on water quality and biodiversity and use grazing selectively to reduce fire risk, promote biodiversity, increase runoff, and provide revenues to the District. Overall livestock numbers will be reduced from historical levels to protect water quality and enhance biodiversity on watershed lands.

Program Direction

Goal

Conduct livestock grazing to help achieve other resource management goals.

Objectives

- Use grazing by domestic livestock (e.g., horses, cattle, llamas, and goats) as a tool to manage vegetation for other resource needs.
- Eliminate or restrict grazing in areas where substantial impacts on water quality, biodiversity, fire control, or other management objectives may result.
- Retain current levels of runoff.
- Generate livestock grazing revenue for the District where consistent with other resource values.

Guidelines

LG.1 Establish grazing units to exclude use within buffer zones established around sensitive species locations, riparian zones, other sensitive habitats, reservoirs, and sensitive cultural resource areas. Grazing should occur in these areas only when fully compatible with management priorities for each area.

LG.2 Over time and as funding and staff resources are available, modify the grazing program to reduce the grazing extent over the watershed as a whole, while ensuring continued use where needed to meet fire and fuels, biodiversity, and other resource management objectives.

LG.3 Preferentially use controlled grazing as a cost-effective technique to reduce fuels in the urban/watershed interface.

LG.4 Prepare annual grazing plans for each lease area to ensure that land will be grazed consistent with EBWMP goals. The grazing plans should specify annual stocking rates, required management actions, and monitoring to evaluate adherence to lease conditions.

LG.5 As a general standard, establish livestock stocking rates (in animal unit-months [AUMs]) to maintain approximately 140% of minimal residual dry-matter standards (modified U.S. Soil Conservation Service Standards). Stocking rates for individual areas may vary significantly from this standard to meet site-specific management objectives and may need to be higher or lower in strategic fuels management areas.

LG.6 Monitor effects of different grazing regimes on water quality and biodiversity and adjust grazing intensity, timing, and species as needed to meet resource objectives.

LG.7 Reduce grazing levels or eliminate grazing from areas that generate acute water quality impacts, including elevated levels of sediments, pathogens, nutrients, or other contaminants.

LG.8 Designate “banked” (i.e., typically ungrazed) areas available for use during years of low forage production to relieve pressure on areas that are grazed annually.

LG.9 Maintain leases on a 5-year renewable basis to allow the District flexibility in modifying grazing to meet watershed management objectives. Incorporate substantial penalties, including remediation, into leases for violations of lease terms.

LG.10 Maintain the prohibition against sheep and pig grazing on local District lands due to fecal contamination until data are collected and methods are available to fully mitigate impacts.

LG.11 Identify standard practices, BMPs, and other measures in annual grazing plans to resolve grazing conflicts with other resources, such as:

- erosion on highly erodible sites,
- discharge of nutrients, pathogens, sediments, and other contaminants into reservoirs and tributaries,
- interference with vegetation recovery following prescribed fire or wildfire,
- damage to or destruction of sensitive plant species and communities,
- excessive removal of wildlife cover, and
- damage to roads, trails, and recreation areas.

LG.12 Ensure that developed water sources are designed or modified to permit use by wildlife.

LG.13 Develop BMPs for concentrated animal facilities such as paddocks, corrals, and riding arenas and incorporate them into annual grazing plans or leases as appropriate.

Coordination Requirements for Other Resource Management Programs

Ensure that the following coordination guidelines for other resource programs are met during project planning and implementation under the livestock grazing management program:

Program	Guideline
Water Quality	WQ.4, 7, 8, 17, 18, 19, 20, 33, and 35
Biodiversity	BIO.10, 11, 21, 22, 23, and 24
Fire and Fuels	FF.7 and 8
Cultural Resources	CR.5, 6, 7, 10, and 11
Visual Resources	VR.1
Geographic Information System	GIS.4

Fire and Fuels

The District's goal for fire and fuels management is to protect human life and property and provide for public safety, and protect and enhance water quality, other natural resources, and watershed land uses.

The fire and fuels management program involves activities conducted to protect lives and property on and adjacent to District lands and to manage natural resources. The District has a wide range of land management responsibilities and must make decisions that balance fire prevention considerations with water quality, natural resource, and recreation program considerations on a case-by-case basis. To ensure regional coordination in fire and fuels management planning, the EBWMP program incorporates those elements of the Vegetation Management Consortium's (VMC's) Fire Hazard Mitigation Program and Fuel Management Plan for the East Bay Hills (Amphion Environmental 1995) that are consistent with the District's water quality and natural resource management goals. Fire management activities to be undertaken in the EBWMP include:

- conducting fire management planning,
- treating vegetative fuels to reduce fire hazards,
- conducting fire prevention and suppression activities, and
- using prescribed fire to manage other resources.

The following key assumptions were used in developing fire and fuels management direction:

- Fire hazards occur throughout the watershed area; therefore, the primary fire management strategy is to locate fires as soon as possible after ignition and suppress and contain wildfire within designated fire management units.

- Although wildfire can occur and cause damage anywhere, the risk is highest in interface areas **(Figure 3-1)** during periods of extreme fire danger and hazardous weather conditions (e.g., dry, windy summer and fall days, particularly from hot east winds).

- Fire and fuels must be managed strategically to provide adequate fire protection while reducing impacts of fire prevention, fuels management, and fire suppression activities.

- Firefighting response times and effectiveness can be improved by establishing "firesafe" access routes associated with strategic fuelbreak networks and managing areas to provide defensible open space.

The District alone cannot feasibly prevent all wildfires that occur on or spread through watershed lands from reaching adjacent properties. Providing adequate fire protection, therefore, depends on implementing prevention activities to contain fires within watershed boundaries. The spread of wildfire across shared property boundaries can be minimized through cooperative planning and issues in the interface area are considered in local land use planning

implementation with other landowners in each reservoir watershed. This strategic planning approach will improve fire management efficiency and effectiveness by setting priorities that reflect key fire management goals and available fire suppression resources.

In many areas, urban encroachment near the District's property boundary is occurring without adequate consideration for fire risks and fire protection needs. These conditions have placed a substantial burden on the District and must be corrected. Protecting life, public safety, and property at this interface requires a combination of coordinated resource management and planning, public education, and strategic fuel management. Increased communication between the District and local planning agencies is required to ensure that fire management issues in the interface area are considered in local land use planning.

Program Direction

Goal

Protect human life and property and provide for public safety, and protect and enhance water quality, other natural resources, and watershed land uses.

Objectives

- Provide an appropriate level of fire protection for all watershed lands, emphasizing protection of life, public safety, and property values in interface areas.
- Implement measures to reduce fire hazard to protect water quality from wildfire-related soil erosion, sedimentation, and nutrient impacts.
- Use a strategic planning approach to fire management that ensures fire and fuels management activities are consistent with the objectives for other resources to the extent practicable.
- Recognize the importance of fire as a natural ecological process and use prescribed burning and other techniques to reduce hazardous fuel loads under carefully selected conditions to achieve long-term fire safety, water quality protection, and biodiversity management objectives.
- Cooperate with other agencies, adjacent property owners, and homeowner groups and participate actively in planning processes to develop coordinated resource management plans (CRMPs) and other cooperative multiagency agreements for fire hazard reduction and fire incident management.

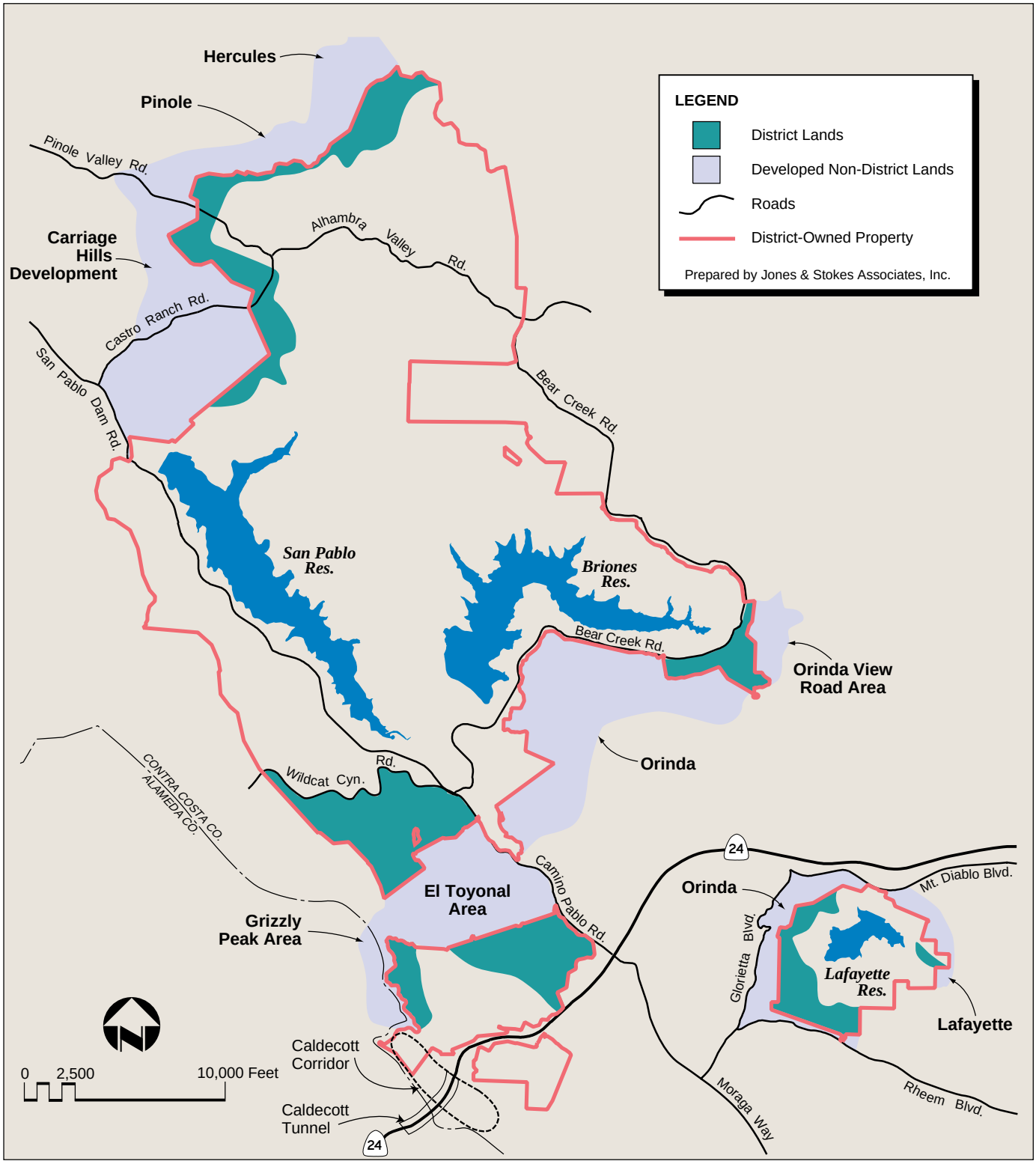


Figure 3-1 (North)
Interface Lands with High Priority for Fires and Fuels Management

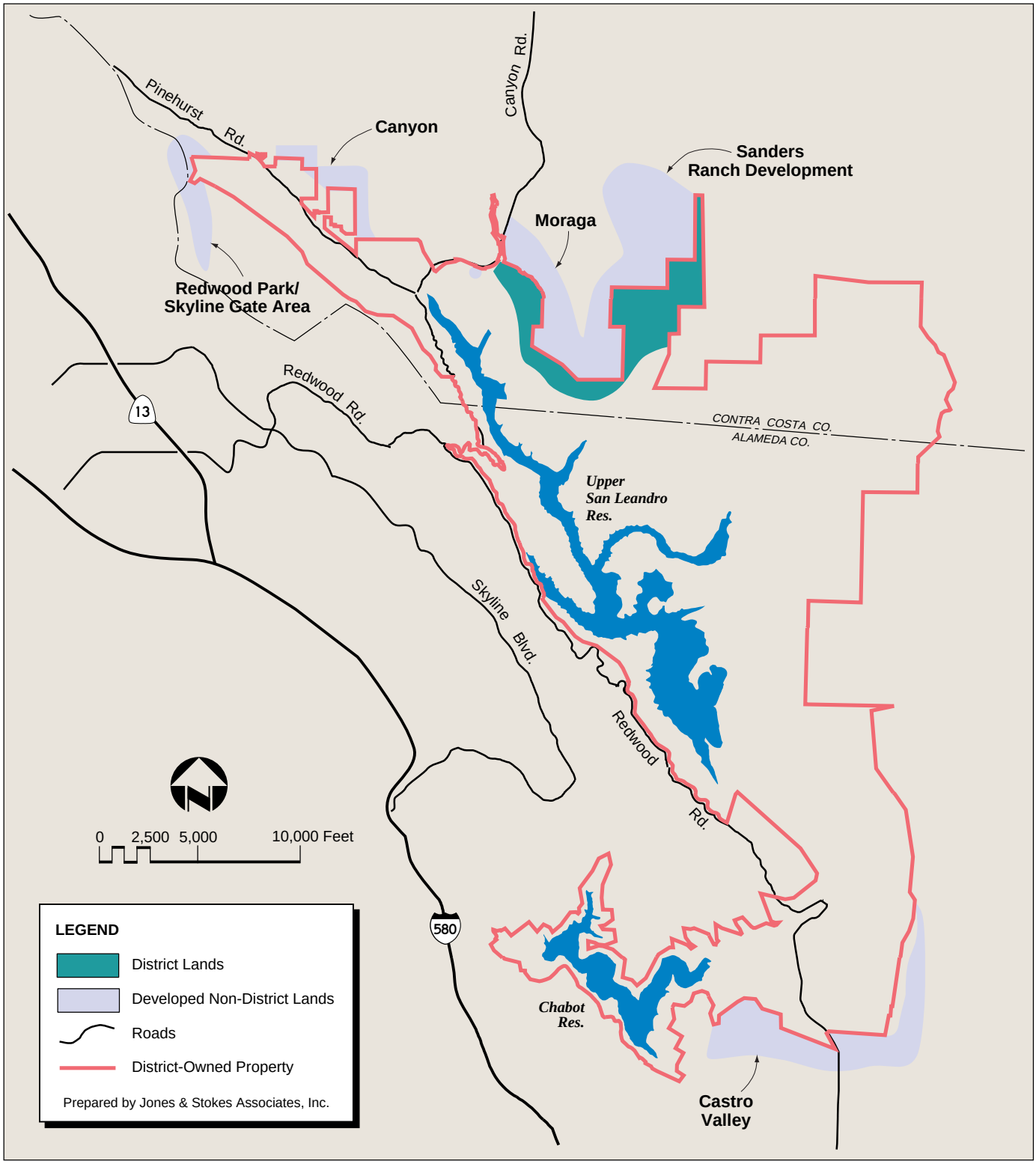


Figure 3-1 (South)
Interface Lands with High Priority for Fires and Fuels Management

Providing adequate fire protection depends on implementing prevention activities to contain fires within watershed boundaries.

- Maintain fire management program funding that supports implementation of adopted plan elements.
- Maintain firefighting capability, equipment, and patrols to retain the basic level of fire safety and initial response necessary.

Guidelines

Prescribed Burning

FF.1 Continue to develope and implement appropriate prescribed burning procedures to safely and cost-effectively meet fuel reduction and other management objectives. Test approaches such as burning during the growing and nongrowing seasons, varying fire intensities, and using varied prescription cycles, and follow California Department of Forestry and Fire Protection (CDF) regulations and standards for prescribed burning when and where applicable.

FF.2 Conduct site-specific interdisciplinary resource planning and prepare an environmental analysis document for all prescribed burns. Involve appropriate watershed, recreation, and fisheries and wildlife management staff in these planning efforts.

FF.3 As part of the annual fire management plan update (see FF.32), prepare a description of the annual burn program including individual plans for each proposed prescribed burn.

FF.4 Comply with federal, state, and local air pollution laws and regulations in developing and implementing fire management plans.

FF.5 Develop and implement a monitoring program to evaluate impacts of prescribed burning on water quality and other resources.

Fuels Management

FF.6 Establish fire management units (FMUs) for presuppression fire and fuels management planning. Identify strategic fuelbreak networks, firebreaks, road access, and predicted containment areas for wildfires that may ignite in each FMU.

FF.7 Continue to use livestock in all grassland interface areas where fuel reduction is necessary. In areas of natural resource conflict, construct additional fencing to confine grazing to key fuel reduction areas.

FF.8 Identify barriers (e.g., reservoirs, grazed areas, greenbelts, roadways, trails, oak woodlands, and riparian areas) that help retard wildfire spread and use them as baselines in establishing a strategic fuelbreak network to protect water quality and reduce environmental impacts and fuel treatment costs. Incorporate information in the GIS database.

FF.9 Design and construct new fuel modification areas of the strategic fuelbreak network to meet other resource constraints.

FF.10 Recognize prescribed fire, vegetation management, grazing, manual and mechanical fuels treatments, and possibly minimal or limited chemical treatment of vegetation as effective tools for reducing fire hazards. The most appropriate method or combination of methods will be selected based on consistency with public safety, natural resource management objectives, priorities for each land management zone, and cost. Utilize appropriate guidelines from the *VMC's Fuel Management Plan* (Amphion Environmental 1995).

FF.11 Maintain strategic fuel treatment areas, fuelbreaks, firebreaks, and other vegetative manipulations in high-risk areas where funding is available.

FF.12 Identify environmentally sensitive areas and develop site-specific fuel treatments to address fire hazard and wildfire risk in these areas. Identify areas where mechanical treatments (e.g., bulldozing, plowing, disking, and mowing) are inappropriate.

FF.13 Based on the fire management strategy presented in the EBWMP, modify or seek a variance from the Contra Costa County Fire Protection District's 5-acre firebreak grid pattern concept for all grassland and light brush areas not currently being grazed. Work with the Contra Costa County Board of Supervisors to modify the 5-acre plowing requirements. Implement a strategic grazing and plowing program that addresses the need to protect sensitive wetlands and wildlife refugia.

*Plowed Control Line*s

FF.14 Evaluate the strategic value of plowed control lines and firebreaks for fire suppression activity and fire control. Strategic value is higher when plowed control lines are linked with the fuelbreak network and areas with firesafe road access. Balance strategic value with environmental sensitivity of the surrounding area in determining use of this technique.

FF.15 Locate plowed control lines where they can function effectively in fire control and reduce surface disturbance and erosion potential. Existing plowed control lines should be retained unless substantial water quality or other resource damage is occurring.

FF.16 Existing trails and fire roads should be maintained and used as control lines whenever possible to reduce the need for additional site disturbance.

FF.17 Coordinate with the District's Fisheries and Wildlife Division and other qualified District staff for sensitive species before constructing and maintaining plowed fire lines within 300 feet of sensitive habitats or species.

FF.18 Avoid locating plowed fire lines within cultural or archaeologic sites. Relocate plowed lines outside designated sites or use alternative methods of securing control (e.g., handline construction or hose lays).

FF.19 Locate plowed fire lines outside riparian buffer zones around streams, wetlands, or springs and seeps unless connecting to such areas at designated points is essential and can be done with minimal disturbance.

Fire Prevention

FF.20 Actively address arson on watershed lands (through direct District watershed fire patrols) and continued coordination with the East Bay Fire Chiefs' Consortium.

FF.21 Implement strategic firesafe treatments along roadways, public access routes, and trails in areas of high fuel hazard to reduce the potential for wildfires to ignite and spread.

FF.22 Develop and adopt a fire danger rating system based on weather and fuel moisture conditions and implement use restrictions on roadways, trails, and other District facilities during extreme hazard conditions. Work with adjacent jurisdictions to plan strategic closures of public roadways and trails during periods of extreme fire hazard.

Fire Protection

FF.23 Participate in cooperative multiagency education programs (with EBRPD, local fire departments and districts, and homeowner associations) to educate homeowners in the urban/wildland interface on how to reduce fire hazard and risk in those areas. Provide the District's booklet "Firescape - Landscaping to Reduce Fire Hazard" to interested landowners.

FF.24 In conjunction with the Water Planning Department, evaluate the feasibility of developing dedicated water supply systems for fire suppression in urban/watershed interface areas.

FF.25 Continue annual maintenance of all necessary fire roads (refer also to guideline FF.6). Assign strategic values to roads based on linkage with the strategic fuelbreak network, and base the annual road maintenance schedule on these strategic values. Consider firesafe vegetation treatments along the highest priority fire roads.

FF.26 Annually assess the safety program for staff participating in prescribed burning and wildland fire suppression and revise as necessary.

Cooperative Fire Protection and Presuppression Planning

FF.27 Coordinate with other local fire suppression organizations, especially in areas of mutual jurisdiction. Continue District participation in the Hills Emergency Forum, VMC, and East Bay Fire Chiefs' Consortium.

FF.28 Review and update, as necessary, memoranda of agreement for cooperative wildland fire suppression with CDF and local fire control agencies.

FF.29 Annually review the training program for the District's Natural Resource Department field staff regarding response to wildland fire incidents, and continue active participation in emergency interagency wildfire suppression assistance (mutual aid).

FF.30 Continue to develop and implement cross-training with cooperative fire suppression organizations (i.e., CDF, EBRPD, and local fire control agencies).

FF.31 Annually provide a fire response plan for all East Bay watershed lands and operational units. Coordinate with participating fire suppression organizations to select and adopt design criteria, standards, and BMPs for strategic fuelbreak networks, firebreaks, road access, and predicted containment areas for wildfire to minimize erosion and protect water quality.

Fire Suppression

FF.32 Maintain District watershed headquarters access to regional fire information sources, annually review and update, as needed, a comprehensive fire management plan including the procedures for red flag operation and fire response. Annually review and update, if needed, a comprehensive fire management plan.

FF.33 Use contain-and-control strategies to suppress wildfires consistent with personnel safety, land and resource management objectives, and fire and fuels management objectives.

FF.34 During fire suppression activities, emphasize indirect attack strategies that use existing breaks, barriers, and burn-out procedures when feasible. Use automatic, direct attack, and plow operations for fire suppression when required by specific burning conditions.

FF.35 Achieve appropriate mop-up standards and patrol procedures as established by the Incident Commander before a wildfire is declared out and suppression crews are permitted to leave the site.

FF.36 Coordinate with other resource programs to ensure that fire and fuels management program direction is achieved during project work (e.g., fuels treatment in forest management, achieving required fuels reduction through livestock grazing).

FF.37 Coordinate closely with District resource staff to ensure that water quality and resource values are protected during planning and implementation of fire and fuels management strategies.

FF.38 Review any chemicals used in fire suppression for ultimate impacts on water quality. Substitute fire suppression chemicals that minimize water quality impacts, if possible.

Coordination Requirements for Other Resource Management Programs

Ensure that the following coordination guidelines for other resource programs are met during project planning and implementation under the fire and fuels management program:

Program	Guideline
Water Quality	WQ.4, 7, 8, 11, 15, 21, 22, 23, and 35
Biodiversity	BIO.4, 6, 7, 11, 12, 13, 19, 21, 22, 23, and 24
Forestry	FOR.11
Environmental Education	EE.6 and 7
Cultural Resources	CR.5, 6, 7, 10, and 11
Visual Resources	VR.1, 7, 8, and 9
Geographic Information System	GIS.4

Community Use Management Programs

Developed Recreation and Trails

The District's goal for developed recreation and trails is to provide a high-quality recreation experience to users of watershed lands that does not compromise the District's goals for water quality and watershed management protection.

Recreation on East Bay watershed lands is provided at developed recreation areas and on the recreational trail system. Recreation areas serve large numbers of people and are used extensively. Trail use occurs at a low intensity, and user numbers are relatively small (currently, there are approximately 4,500 trail permit holders).

The District's developed recreation and trails management program addresses recreational uses of watershed lands that are consistent with the District's water quality protection goals. The program defines the types of recreational experiences that are compatible with watershed resources and describes the ongoing uses that will be allowed to continue as well as the types of new uses that the District will consider.

Developed recreation under this program includes all activities associated with developed facilities and use areas currently operated by the District or its concessionaires. Trails management applies only to established or proposed trails and staging areas on District-owned property.

Program Direction

Goals

Continue to provide a high-quality recreational experience to users of watershed lands that does not compromise the District's goals for water quality and watershed management protection. Provide reasonable access routes between watershed lands and adjacent open space areas consistent with all District resource management goals. Provide equal access to recreational opportunities for users from a wide range of socioeconomic backgrounds and physical abilities where feasible and practical. Ensure that the continuation or modification of recreational use creates as little financial burden on the District and its ratepayers as is practical.

Objectives

- Offer recreational experiences that complement and are consistent with the protection of District watershed lands and water bodies. Provide opportunities for reasonable use of natural watershed attributes.

- Ensure a high quality of recreational experience on District lands by reducing user conflicts, promoting safety and courtesy, and controlling overcrowding.

- Promote environmental values in recreational use and management.
- Ensure that currently permitted or new recreational activities do not increase the potential for additional soil erosion, landscape modification, or pollutant loading, or adversely affect other watershed or reservoir resources.
- Where feasible, provide trail links to the surrounding regional open space network that do not conflict with resource protection priorities.
- Give priority to those recreational uses that serve the broadest spectrum of the population while maintaining consistency with water quality, biodiversity, fiscal responsibility, and public safety goals.
- Assess the comprehensive financial consequences associated with recreational proposals. Evaluate cost parameters related to initial capital expenditure, District staffing and administration requirements, initial program development costs, and long-term operation and maintenance costs.
- Ensure that no net increase in adverse environmental effects will result from additions to or modifications of District recreation management programs.

General Recreation and Trails Guidelines

DRT.1 Maintain consistency in evaluating recreational proposals. Reject uses that require undesirable or sustantial visible alteration of the natural character of the lands or create excessive nuisances that could affect other recreationists, resource values, or neighboring residential areas (e.g., intrusive noise levels or overcrowding). Allow nonintrusive uses and activities (e.g., day use events, llama use), subject to individual permit, that would have minimal impact on the watershed environment.

DRT.2 Implement an ongoing program to review and update development and management standards for recreational facilities. Ensure that recreational facilities and activities are in compliance with current codes and standards.

DRT.3 Establish the carrying capacity of each major recreation area. Monitor use levels and modify as necessary.

DRT.4 Close recreational facilities and trails as needed to protect sensitive wildlife species (e.g., nesting birds), curtail soil erosion, protect water quality, reduce fire hazards, and address other public safety concerns.

DRT.5 Coordinate recreational programs with environmental education programs to provide recreationists with information about protecting public water supplies, source control and pollution prevention, watershed and natural resource management, and related water delivery system operations.

DRT.6 Incorporate the standards of the Americans with Disabilities Act (ADA) in all facility upgrades and new developments as required by law. Incorporate the requirements of whole-access trails for persons with disabilities as required by law.

DRT.7 Evaluate the personnel and maintenance requirements for administering, operating, patrolling, and supporting proposed new recreational uses or related infrastructure. Proposals that would require increases in District staff or maintenance costs will be given a low priority.

DRT.8 Identify potential risks related to new recreational use of watershed lands, and exercise caution when considering new development or modifications to lease agreements. Recreational proposals that would result in water quality deterioration or excessive safety or financial risks will not be approved.

DRT.9 Evaluate existing recreational use and trails development according to the same criteria used to evaluate new proposals for recreational use. Review uses periodically and consider modifications to reduce or eliminate adverse effects, if found, and protect water quality.

Developed Recreation Guidelines

DRT.10 Separate potentially conflicting uses in recreation areas wherever possible to enhance recreational experiences among users. Prohibit use of firearms, sport hunting weapons, or fishing weapons on District property.

DRT.11 Evaluate proposals for special events on District lands and reservoirs, such as music, theater, races, and boating, on a case-by-case basis. Give priority to those events that are temporary, use existing facilities, impose minimal conflicts with normal use, and have minimal impact on staffing and District resources. Events that could create intrusive noise levels, major traffic and parking conflicts, water quality deterioration, or increased fire risk should be considered carefully and be subject to special nuisance abatement conditions.

DRT.12 Evaluate the cost of personnel and maintenance needs to administer special events on District property. Organizations requesting use of District property for special events should incur the total direct and indirect costs of event administration, law enforcement, equipment use, cleanup, and any additional related activities.

DRT.13 Prohibit swimming or other forms of human or domestic-animal body contact in reservoir waters.

DRT.14 Prohibit new recreational facilities and uses on District-owned land that would require grading or paving (including graveling) areas of the natural landscape larger than 1/2 acre unless appropriate CEQA documentation is completed and concludes that no significant impacts would exist after mitigation.

DRT.15 Establish selection criteria for group uses of District recreational facilities that are based on nondiscrimination in selection of participants, equity in and equal access to the approval process, recovery of all District staff costs associated with the use, and fair economic return to the District. Uses that preclude or disrupt public access to park facilities that are normally designated "nonreservable" will not be permitted unless authorized by the Board of Directors.

DRT.16 Continue to correct accessibility deficiencies for major public facilities, including the visitor centers, restroom facilities, parking, marina and launching areas, group picnic areas, and main trails.

DRT.17 Consider initial capital costs and long-term maintenance costs when evaluating new public or private recreational development proposals. Appraise the potential restitution, grant reimbursement, or settlement that could be required if approved recreational uses were to be suspended in the future. Carefully review recreational uses that involve high initial capital costs that may eventually create financial risk for the District.

DRT.18 Require preparation of detailed feasibility and environmental analyses for recreational proposals related to modification or expansion of existing or new facilities or uses. The applicant will have responsibility for providing adequate information required for these analyses.

Trails Guidelines

DRT.19 Provide regional trail linkages in District-designated trail corridors that would be accessible to the regional trail use community (i.e., planned Hercules/Pinole Ridge Trail connections to the Bay Area Ridge Trail) and that are consistent with District trail use rules, regulations, rates, and charges (**Figure 3-2)**.

DRT.20 Explore the feasibility of establishing a volunteer program for trail maintenance.

DRT.21 Retain the current trail permit system and identify opportunities to provide wider accessibility of permits for regional trail users.

DRT.22 Consider expanding the current trail permit system to include single-day use permits and fees that are made available for regional trail users entering District land from other jurisdictions. Single-day use permits could be purchased at all recreation areas and business offices.

DRT.23 Conform to trail maintenance standards to ensure that public safety is optimized and safety hazards are minimized. Grade multipurpose trails only as required to ensure safety. Require annual review of all trails and trail uses on District property, and correct eroded areas and eliminate hazardous trail segments or uses.

DRT.24 Minimize public access and recreational facilities in areas where potential for trespass from and fire hazards on adjacent private lands are substantial. Do not allow entry to District lands from adjacent private residences, except at Lafayette Reservoir.

DRT.25 Allow community access points (staging areas) to the Bay Area Ridge Trail where such access is not precluded by environmental, operational, political, or fiscal constraints.

DRT.26 Prohibit recreational use of conveyances with wheels, tracks, or skids on unpaved roads or trails except in those portions of the Lake Chabot watershed that are leased to EBRPD or as required under the ADA.

Coordination Requirements for Other Resource Management Programs

Ensure that the following coordination guidelines for other resource programs are met during project planning and implementation under the developed recreation and trails management program:

Program	Guideline
Water Quality	WQ.3, 4, 7, 8, 11, 15, 24, 25, 30, 31, and 35
Biodiversity	BIO.19, 21, 22, 23, and 24
Cultural Resources	CR.5, 6, 7, 10, and 11
Visual Resources	VR.1, 2, 3, 4, 5, 6, and 9
Geographic Information System	GIS.4

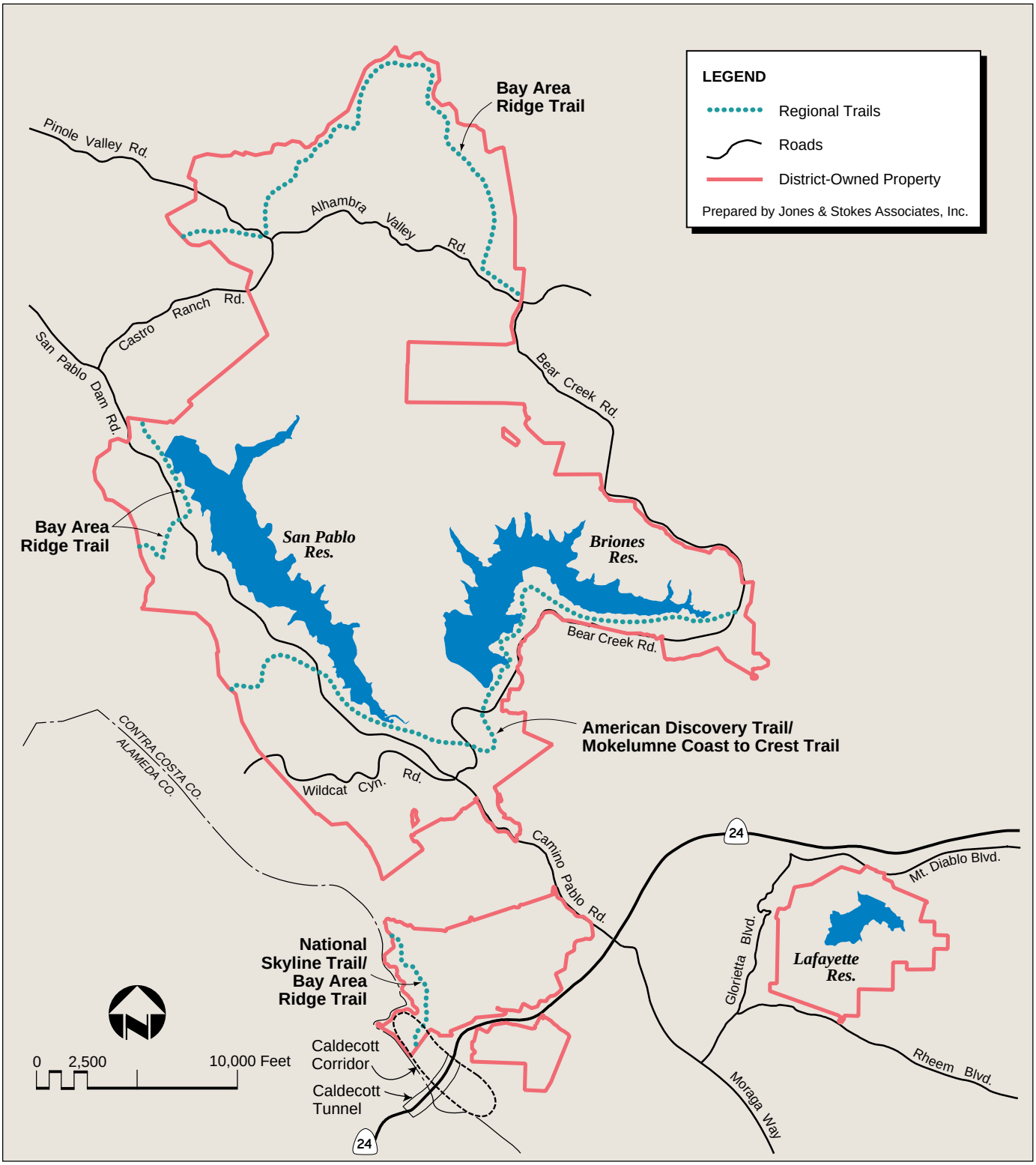


Figure 3-2 (North)
Regional Trail Connectors Proposed or in Place on District Property

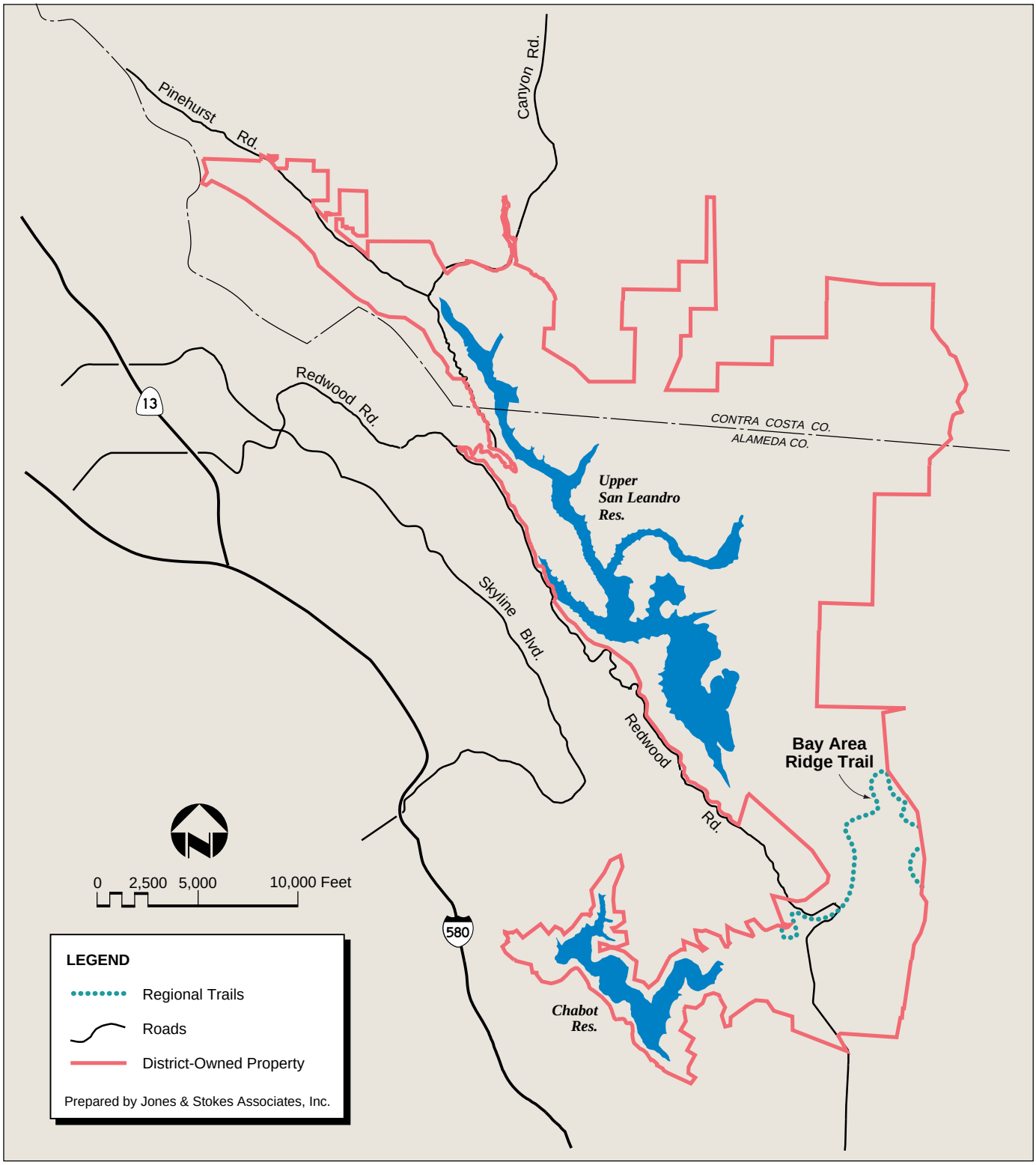


Figure 3-2 (South)
Regional Trail Connectors Proposed or in Place on District Property

The District's goal for environmental education is to encourage educational uses of District watershed lands and to identify lands suitable for environmental education uses.

Environmental Education

The environmental education program encompasses education, interpretation, and research uses of watershed lands. Public education programs sponsored by the District are informal, and specific sites for these activities are considered in the EBWMP. The program promotes activities that contribute to the District's basic understanding and knowledge of watershed resources and educates the public regarding the importance of protecting water quality and the importance of watershed lands, resources, and management activities.

Program Direction

Goal

Encourage educational uses of District watershed lands and identify lands suitable for environmental education uses.

Objectives

- Reclassify 2,500 acres designated under the 1970 Land Use Master Plan as Educational Use Areas as Sensitive Habitats designated for use in environmental education.
- Provide an educational outreach program to inform the public about the importance of protecting water quality and the purpose of the District's watershed lands, resource management practices, and water conservation.
- Promote research on watershed lands and resources that will be used in the District's management practices and add to the District's watershed resource database.
- Formalize those environmental education programs that are currently conducted informally by District staff.
- Incorporate environmental education into appropriate District actions and activities.

Guidelines

EE.1 Develop and conduct an environmental education program that is focused on water quality protection, watershed management, resource protection, management challenges, and water conservation.

EE.2 Develop and conduct an outreach program that emphasizes school participation in watershed restoration projects. Elements of the outreach program may also include visits by District staff to or placement of public information displays in adjacent communities and local classrooms.

EE.3 Explore the feasibility of developing a "docent" volunteer program to supplement and support District staff in conducting environmental education programs. Such a volunteer program should not increase overall program costs. Consider developing a newsletter to educate residents, neighbors, friends, and the general public on issues of concern in the East Bay watersheds.

EE.4 Incorporate interpretive information, on signs or by other appropriate means, and place this information where the public is likely to encounter it on District lands, to describe District management practices, interpret special watershed resources, or point out special management challenges.

EE.5 Develop and distribute public information materials that inform visitors using watershed lands about the potential effects of their activities on watershed resources and ways to avoid or reduce adverse effects (i.e., appropriate disposal of human and pet wastes, reduction of trail erosion, and introduction of exotic species). Require the distribution of such materials by staff and concessionaires.

EE.6 Prepare public information materials on special management issues facing the District (e.g., urban runoff and sewage overflow problems, soil erosion, the encroachment of development into viewsheds, and the impacts of development on wildfire and risks of wildfire), and use this information in public outreach, especially in communities that share these management challenges because of their urban/wildland interface with District lands.

EE.7 Prepare public information materials on gains made and agreements reached with surrounding communities on special management issues facing the District, and use these materials for public outreach, especially within communities that share these issues because of their location near District lands.

EE.8 Develop and conduct a research monitoring program that promotes college and university research on District watershed lands, and ensure that the District obtains the data and results of this research.

Coordination Requirements for Other Resource Management Programs

Ensure that the following coordination guidelines for other resource programs are met during project planning and implementation under the environmental education program:

Program	Guideline
Water Quality	WQ.7 and 8
Biodiversity	BIO.19, 21, 22, 23, and 24
Developed Recreation and Trails	DRT.5
Cultural Resources	CR.5, 6, 7, 10, and 11
Visual Resources	VR.1 and 4
Geographic Information System	GIS.4

Cultural Resources

The District's goal for cultural resources is to avoid adversely affecting sensitive cultural resources while implementing District activities on watershed lands and to establish relationships with local Native American groups.

The District's watershed lands contain numerous archaeologic and historic resources. In addition, as-yet-undiscovered cultural resources may be present. These resources include remnants of Native American occupation and historic ranching and farming operations. Cultural resources will be protected by policies requiring review of existing documentation before undertaking management actions and by complying with existing laws and regulations.

Program Direction

Goal

Avoid adversely affecting sensitive cultural resources while implementing District activities on watershed lands, and establish relationships with local Native American groups.

Objectives

- Identify, preserve, and protect significant cultural resources.
- Provide for appropriate research and educational uses of District lands with respect to cultural resources.
- Maintain an ongoing relationship with Native Americans who have ancestral ties to District lands.

Guidelines

CR.1 Designate staff contact persons to act as liaisons with the Native American community. The contact persons' roles are to convey to District employees the need to protect the cultural resources of District watershed lands and to determine the appropriate level and timing of further coordination with interested Native Americans.

CR.2 Negotiate a memorandum of understanding with local Native American groups regarding the disposition of Native American artifacts and remains, should any be discovered.

CR.3 Include cultural resource protection and management into the District's training program for Natural Resource Department staff.

CR.4 Identify resources that have a high potential for vandalism and ensure that they are protected.

CR.5 Avoid disturbing significant cultural resource sites and sites of unknown significance, where feasible. Require fire management and other watershed personnel to protect known cultural resource sites during management activities.

CR.6 Follow the requirements of CEQA Section 21083.2 when undertaking or approving watershed activities.

CR.7 Conduct records searches and surveys before beginning ground-disturbing activities.

CR.8 Maintain an inventory of cultural resources in compliance with applicable laws and regulations, including confidentiality requirements.

CR.9 Document the procedures to be used if potentially significant cultural resources or human remains are discovered accidentally.

CR.10 Designate areas that are sensitive because of their potential to contain buried cultural resources and ensure that these areas are monitored during surface-disturbing activities.

CR.11 If sites cannot be avoided or if the boundaries of a site are unknown, consult a qualified archaeologist (including tribal experts designated by the tribe) for recommendations. Recommendations may include covering or "capping" sites with a protective layer of material, recovering data through research and excavation, performing subsurface testing to determine the extent of a site, and relocating or reconstructing historic structures.

CR.12 Continue to maintain vestiges of early county settlement on District-owned property, especially where land deeds require protection.

Coordination Requirements for Other Resource Management Programs

There are no coordination requirements for the other resource management programs.

Visual Resources

The District's goal for visual resources is to limit the negative visual effects of District activities on watershed lands by ensuring that valuable and rare visual resources are protected from degradation during other management activities.

The natural features of the District's watershed lands provide a valuable visual resource to people who use those lands, as well as to people who pass through them or who reside, work, and recreate on adjacent lands. Vegetation removal, facility construction, operational activities, road placement, utility easements, fuelbreak construction, and erosion are all activities that can have negative visual effects on District watershed resources.

The visual resource management program addresses important, sensitive visual areas and prescribes management of those key resources. This program also addresses the development of consistent and systematic methods to ensure consistency in structures, signs, and other improvements on watershed lands.

Program Direction

Goal

Limit the negative visual effects of District activities on watershed lands by ensuring that valuable and rare visual resources are protected from degradation during other management activities.

Objectives

- Maintain and protect the general character and visual qualities of watershed lands.
- Maintain and protect the visual qualities experienced from reservoir surfaces on which public access is permitted.
- Maintain and protect the visual qualities viewed from specific public use areas, public trails, and public roads within watershed lands.
- Maintain and protect the visual qualities viewed from key public viewpoints located adjacent to District lands.
- Maintain and develop a unified visual quality and unity in structures, signs, and other improvements on watershed lands.

Guidelines

VR.1 Review new land use proposals to ensure that they are consistent with the watershed's visual character, outside of important viewing areas, or screened from important views from reservoir surfaces, shoreline locations, public trails, roads, and key public viewing areas.

VR.2 Retain viable shoreline vegetation where it occurs on reservoirs.

VR.3 Control public access along reservoir edges to designated use areas or facilities as needed to prevent visual degradation of important shoreline resources.

VR.4 Develop design standards for all development, including recreational facilities, District buildings, watershed signs, and other physical improvements to reflect a strong, unified visual character. Design standards should specify general architectural character, material types, acceptable colors, structure heights, roof configurations and overhangs, uniform site furnishings (e.g., benches, trash receptacles, bicycle racks, and bollards), and uniform sign treatment. Require all proposed new development to conform to design standards. Retrofit existing development, to the extent feasible, to conform to design standards.

VR.5 Develop native plant restoration standards and apply these to all development as appropriate. Plant restoration standards should specify the use of natives where available for all site restoration and the replacement of non-native plant materials with native plant materials to the extent feasible and compatible with fire protection needs. Non-natives may be used where site natives are unavailable for a specific application.

VR.6 Cluster watershed development and uses to reduce visual intrusions into natural watershed lands and to reduce adverse visual effects on intervening watershed lands.

VR.7 Coordinate with fire management personnel to ensure, to the extent practicable, that fire management needs (e.g., pruning and clearing) and fire management patterns are consistent with visual management guidelines. Avoid the use of "vista pruning" along trails and public roads and around use areas, and avoid the use of firebreaks or the establishment of "fuel cells" as wildfire management techniques except where other mitigation measures are not effective and as a last resort.

VR.8 Avoid controlled burns in developed public use areas during peak use periods (generally June through September). Coordinate the timing of controlled burns with recreation staff.

VR.9 Coordinate with EBRPD, Alameda and Contra Costa Counties, and other adjacent jurisdictions that have significant open space resources to develop common goals and guidelines for preserving and strengthening the regional visual landscape.

Coordination Requirements for Other Resource Management Programs

Ensure that the following coordination guidelines for other resource programs are met during project planning and implementation under the visual resources management program:

Program	Guideline
Water Quality	WQ.8
Biodiversity	BIO.19, 21, 22, 23, and 24
Fire and Fuels	FF.10
Cultural Resources	CR.5, 6, 7, 10, and 11

The District's goal for land ownership is to apply a consistent procedure for identifying and evaluating potential watershed land acquisitions, consistent with the District's goal of protecting water quality and natural resource values.

Assets Management Programs

Land Ownership

The District's Real Estate Services Division is responsible for acquiring lands identified as critical to the operation of the District and for the sale of District property identified as surplus. Private holdings within the reservoir watersheds are acquired on a priority basis designed to protect water quality.

Program Direction

Goal

Apply a consistent procedure for identifying and evaluating potential watershed land acquisitions to protect water quality and for evaluating the current and future need to dispose of District property, consistent with the District's goals of protecting water quality and natural resource values.

Objectives

- Ensure long-term protection of District-owned watershed lands through a systematic program of land retention, acquisition, and disposal.
- Identify high-priority basin parcels not currently in District ownership that should be acquired by purchase, trade, or sale to ensure protection of watershed lands, reservoir water quality, wildland fire protection, and biodiversity.
- Increase revenues generated by the use of District facilities and land, consistent with water quality and natural resource protection priorities.

Guidelines

LO.1 Consider the use of land gifts, cooperative protection agreements by local jurisdictions, acquisition by other groups, and conservation easements for water quality and watershed protection when considering acquisition.

LO.2 Develop a watershed classification system that clearly outlines property characteristics important to the District for maximizing water quality protection and water supply operations and for optimizing biodiversity.

LO.3 Use the watershed classification system to evaluate lands that are being considered for acquisition or disposal. Set as high priorities the protection of watershed lands that:

- contribute important hydrologic and water quality functions to reservoir waters (e.g., parcels suited for stormwater management or that contain important water bodies),
- are important to protect from urban encroachment,
- contain pristine resources that are important to the continued health of watershed lands, including "connectivity" to protect biodiversity,
- are strategically important for fire and fuels management, and
- have a high probability of general strategic District use in the future.

LO.4 Develop a watershed protection program that provides the following options:

- coordinate a broad regional program of land protection and acquisition that supports the District's resource management priorities, in cooperation with EBRPD, other public agencies, and nonprofit land trusts,
- identify key watershed parcels that could be protected consistent with District watershed management goals by local jurisdictions as open space in lieu of purchase by the District,
- identify resource protection measures that could be implemented by adjacent jurisdictions to protect high-priority watershed areas adjacent to District-owned property,
- coordinate with owners of land adjacent to District-owned property to obtain land donations or to designate conservation easements in strategic watershed locations,
- analyze the feasibility of preserving strategically important lands by acquiring easements and using other resource protection mechanisms, and
- attempt first to purchase strategically important lands in fee title. If that is not possible, attempt other forms of protection, including donation or "less-than-fee" acquisition.

LO.5 Perform a systematic review of District-owned properties that are not tributary to a reservoir to determine their value with respect to watershed protection, including consideration of a "take line" approximately 80 feet on the other side of the ridgetop to prevent physical and visual encroachment on watershed property.

LO.6 District watershed lands are generally not sold. However, in those instances where sale may be in the District's best interest, the following guidelines shall be adhered to:

- Rank District-owned properties that could be disposed of to generate funds to acquire watershed lands that are within the reservoir basins *and* that are important for protecting water quality, biodiversity, fire and fuels management, or other critical issues.
- Do not allow permanent rights-of-way across District watershed property except for necessary utilities.
- Evaluate lands that are appropriately considered for disposal to ensure that they are not strategically important for water operations, water quality, biodiversity, or fire and fuels management now or in the future.
- Segregate the proceeds from any sale of District watershed lands and subsequently use those proceeds for the sole purpose of acquiring similar watershed lands that are necessary or desirable to protect water quality, biodiversity, and other related District interests.
- Watershed land that is sold must be sold at fair market value.

Coordination Requirements for Other Resource Management Programs

There are no coordination requirements for the other resource management programs.

Entitlements

The entitlements program allows for review and modification of lease agreements and permits when these entitlements are to be renewed. It also allows for formal agreements where desirable to allow other entities to maintain, continue, or conduct appropriate activities on District watershed lands and reservoirs.

The entitlements program allows for formal agreements where desirable to allow other entities to maintain, continue, or conduct appropriate activities on District watershed lands and reservoirs.

Program Direction

Goal

Provide administrative flexibility for natural resource managers while ensuring that leases and permits do not create excessive management costs, conflict with reservoir operations or other high-priority management programs, or create unacceptable watershed conditions.

Objectives

- Administer current and proposed lease agreements and access, research, and land use permits to ensure that lessees/permittees are complying with District priorities to maintain reservoir water quality and protect sensitive natural resources.
- Ensure that all lease agreements and land use permits consider potential public safety or nuisance issues that could result from lessee/permittee operations.
- Ensure that the District receives an appropriate percentage of revenues generated from entitlements for use of District watershed property.

Guidelines

ENT.1 Limit discretionary right-of-way leases, other lease proposals, and land use permits on watershed lands that could adversely affect watershed resources such as reservoir water quality, sensitive habitat areas, sensitive visual resources, or ongoing District management programs.

ENT.2 Require mitigation of all adverse effects that result from nondiscretionary right-of-way actions (e.g., construction of transmission lines) on District lands.

ENT.3 Prohibit or restrict lease agreements or land use permits that are proposed near populated watershed areas to reduce conflicts, nuisances, or trespass complaints with uses on District lands, except those intended to address urban interface problems (e.g., cattle and goat grazing for fire hazard reduction).

ENT.4 Review all lease agreements and land use permits at the time of renewal and modify agreements as necessary to correct problems identified during the lease/permit period. All lease agreements should require conformance with standard District practices, such as erosion control, vegetation management, and fire and fuels management. Leases should include operation plans that are updated annually and allow modification of required management practices, as needed.

ENT.5 Ensure that an appropriate application fee schedule, approved by the Board of Directors, is implemented to offset staff costs for processing entitlement applications.

ENT.6 Ensure that all leases contain provisions stipulating that the District receives an appropriate percentage of any revenues generated from use of District property.

Coordination Requirements for Other Resource Management Programs

There are no coordination needs for other resource management programs.

Geographic Information System

The District's goal for GIS is to provide geographically based data for watershed managers' use in implementing EBWMP programs.

The District's GIS management program addresses the development, maintenance, and use of an integrated database and mapping system to aid in managing District resources and assets. The District's GIS will provide managers with information to help assess constraints and identify assets or opportunities needed to implement EBWMP management programs.

Program Direction

Goal

Provide geographically based data for watershed managers' use in implementing EBWMP programs.

Objectives

- Develop and maintain a regularly updated GIS that reflects current reservoir and nonreservoir watershed conditions.
- Use the GIS as a resource for watershed managers in planning for and implementing watershed management programs.
- Use the GIS as a tool to assess the appropriateness of new watershed actions, especially land-disturbing actions in potentially sensitive areas.

Guidelines

GIS.1 Maintain an updated GIS by requiring that water quality resource, assets, water operations, and adjacent land use data are collected annually and integrated into the GIS database.

GIS.2 Periodically review the GIS data categories to ensure that the GIS appropriately reflects watershed conditions and that useful information is collected for the database.

GIS.3 Ensure that adequate District staffing is allocated to ensure that the GIS database is updated, maintained, and implemented in a manner that is most useful to watershed managers.

GIS.4 Require use of the GIS to assess the appropriateness of proposed manage ment programs or land-disturbing actions on portions of the watershed that could affect reservoir water quality, reservoir operations, sensitive habitat or wildlife areas, cultural resources, established watershed land uses, and land uses immediately adjacent to District-owned lands.

Coordination Requirements for Other Resource Management Programs

Implementing a successful and useful GIS database will require coordination and data-gathering activities in cooperation with all the EBWMP management programs and watershed managers.

Introduction

Watershed management area guidelines are provided in recognition that issues, sensitivities, and land management practices differ for each watershed.

Watershed management areas are defined as District-owned lands within each reservoir basin boundary (Figure 2-1). Reservoir basins encompass both the District-owned watershed lands and basin lands not owned by the District. Watershed management areas on District lands are addressed in this section. Section 5 contains a discussion of management direction for basin lands not owned by the District.

Watershed management areas consist of portions of the basins of San Pablo, Briones, Upper San Leandro, Chabot, and Lafayette Reservoirs. The Pinole watershed, which is not tributary to a District reservoir, is also addressed as a watershed management area.

Watershed management area guidelines are provided because issues, sensitivities, and land management practices differ for each watershed. Specific management area direction is consistent with the broader guidance provided for management programs described in Section 3. The watershed management area for each reservoir has been assigned a relative sensitivity based on the current quality of water at the applicable reservoir, the current watershed and basin conditions, and the water treatment facilities available for each reservoir. Sensitivities are used to identify specific management area guidelines for each reservoir basin.

	Management Direction						
Watershed Management Area	Water Quality	Biodiversity	Fire and Fuels	Developed Recreation and Trails	Visual Resources	Land Ownership	Entitlements
San Pablo Reservoir (SP, page 95)	✓	✓	✓	✓	✓		
Briones Reservoir (B, page 99)	✓	✓	✓	✓	✓		
Upper San Leandro Reservoir (USL, page 102)	✓	✓	✓	✓	✓	✓	✓
Chabot Reservoir (C, page 105)	✓		✓	✓	✓		
Lafayette Reservoir (L, page 107)			✓	✓	✓		
Pinole (PW, page 109)	✓	✓	✓	✓	✓		✓

WATERSHED MANAGEMENT AREA DIRECTION

The watershed management areas are important for maintaining or enhancing natural resource conditions and water quality. The Pinole watershed property is considered the least sensitive watershed because it does not contribute runoff to a District reservoir. Sensitivities are highest for Briones, San Pablo, and Upper San Leandro Reservoirs and lower for Chabot and Lafayette Reservoirs.

The Briones Reservoir basin is considered the most sensitive watershed because of its relatively pristine condition, its status as a high-quality source of water, its small watershed area, the cost of pumping water up to it, the lack of downstream water treatment facilities, and its ability to gravity-feed the District's water supply system. The San Pablo and Upper San Leandro Reservoir basins are also sensitive because these facilities are the District's primary on-line water supply reservoirs. Water quality is somewhat lower in these reservoirs, requiring more extensive treatment because of runoff they receive from large urban areas. The Chabot and Lafayette Reservoir basins are considered the least sensitive because these reservoirs are emergency standby sources of water to be available only during extreme droughts. However, Chabot Reservoir has a high potential for use if a seismic event were to close the water tunnel from Upper San Leandro Reservoir to the San Leandro Filter Plant.

San Pablo Reservoir Watershed

Management Direction

Water Quality

SP.1 Collect data on water quality impacts of horse stables and other concentrated animal facilities within the watershed. Coordinate with agencies and other responsible entities to develop, select, and implement BMPs.

SP.2 Assess potential water quality and supply concerns at the PG&E substation.

SP.3 Monitor the amount and quality of runoff after heavy rainfall from historic quarries near the east portal of the Caldecott Tunnel and the Gateway area.

Biodiversity

SP.4 Coordinate fire and fuels management activities with other agencies in the Caldecott Tunnel corridor to maintain the biological viability and integrity of the corridor for wildlife movement, especially for large mammals.

SP.5 Continue annual monitoring of the population size and location of the Aleutian Canada goose in the Oursan Valley and San Pablo Reservoir in coordination with the USFWS. Continue the current grazing management regime in the areas of the upper Oursan Valley utilized by the Aleutian Canada goose. Continue to prohibit public access, including trails (except for valid scientific research), in the Oursan Valley to ensure the long-term protection of the Aleutian Canada goose.

SP.6 In cooperation with universities and other agencies, evaluate adequacy of oak regeneration in oak woodland habitats and identify those factors that limit oak regeneration; initiate restoration if necessary and financially feasible.

Fire and Fuels

SP.7 Explore the possibilities of entering into a CRMP for roadside vegetation management activities within the San Pablo Reservoir watershed. Consider water quality and other resource protection measures during the planning process. Other participants (and suggested roles) include:

- EBRPD and Richmond Fire Department (San Pablo Dam Road/ Kennedy Grove area),
- Moraga-Orinda Fire Protection District (enforcement and leadership role), and

- Contra Costa County Public Works Department (vegetation treatment along San Pablo Dam, Camino Pablo, Bear Creek, and Wildcat Canyon Roads).

SP.8 Explore opportunities for the District and the Moraga-Orinda Fire Protection District to conduct homeowner training in defensible space self-protection to increase awareness, involvement, and support from home owner associations and individual homeowners in the El Toyonal interface areas. Encourage homeowners to extend their defensible space zones into the grassy, low fuel-volume vegetation adjacent to interface areas.

SP.9 Continue livestock grazing in and adjacent to the El Toyonal Road interface areas. Where compatible with natural resource objectives, continue to mow grass to a 4-inch height (or disc) within a 30-foot-wide strip along all District property lines adjacent to the urban interface development (e.g., Mistletoe Fire Road area).

SP.10 Continue District participation in cooperative interagency efforts to develop a fuels management network along the west boundary of the watershed that maintains important biological and other resource values.

SP.11 Continue livestock grazing on the grassy slopes and in the light brush fuels located in the northwestern portion of the watershed (Eagle's Nest and Woodchopper areas).

SP.12 Continue to allow grazing of the grassy slopes and light brush fuels adjacent to Fish Ranch Road and Highway 24 to link this low fuel-volume vegetation to fuel modification activities proposed in the VMC's fuelbreak in the area of Highway 24 near the Caldecott Tunnel corridor (Amphion Environmental 1995).

SP.13 Conduct a comprehensive assessment of fire management needs within the Caldecott Tunnel corridor area to evaluate wildfire control issues and explore opportunities for and constraints on the use of a mosaic pattern of prescribed fire treatments as a fuel reduction tool and to enhance natural resource habitat. Fuel treatment in this area should support the management objectives of the wildlife corridor and adequately protect water quality.

SP.14 Continue cooperative planning efforts and encourage formation of, and participation in, a natural resource and fuels management CRMP for the entire Caldecott Tunnel corridor area to reduce fire hazard and protect biological integrity. Other participants should include EBRPD, California Department of Transportation (Caltrans), Contra Costa County, fire districts, the Cities of Oakland and Berkeley, University of California, Berkeley, water quality specialists, and private landowners. Fire and fuels manage ment treatments to be considered should include:

- treatment by Caltrans of the fuels within 50 feet on both sides of Highway 24,
- treatment by Caltrans or appropriate landowners of the fuels immediately over the east tunnel opening, and roadside fuels 30 feet on each side of Old Tunnel Road, and
- continuation of the 30-foot road treatment along each side of the road connecting Old Tunnel Road to Skyline Boulevard.

Roadside fuel treatment should involve a combination of goat grazing, hand pruning and thinning of vegetation, and roadside mechanical brushing. The rest of the open space area can be left in its natural state.

SP.15 Work with responsible agencies to implement strategic closure of Fish Ranch Road, Wildcat Canyon Road, Upper Grizzly Peak Boulevard, and Lomas Cantadas Road during extreme fire weather.

SP.16 Evaluate opportunities to reduce fire ignitions and risks by partially or completely closing portions of the watershed to public use during very high to extreme fire weather conditions.

SP.17 Prohibit public access on the east side of San Pablo Reservoir beyond the shoreline fishing boundary to reduce the likelihood of accidental wildfire ignition.

Developed Recreation and Trails

SP.18 Maintain shoreline fishing control at the San Pablo Reservoir recreation area to reduce trespass in restricted shoreline areas. Control measures include posting signs and installing barriers to clearly delineate the appropriate area available for shoreline fishing. Consider measures to stabilize and revegetate eroded areas.

SP.19 Locate picnic areas away from steep shorelines in wooded settings. Plan the circulation in picnic areas carefully to provide relatively direct access to destination points (e.g., fishing docks and cleaning facilities, restrooms, and open-play meadows). Locate picnic pads away from shoreline to discourage uncontrolled traffic down steep shoreline embankments.

SP.20 Maintain and enforce a 25-mph boat wake zone and a 5-mph no-wake zone currently designated at San Pablo Reservoir.

SP.21 Modify concessionaire contracts as needed to correct practices that may be inconsistent with the District's water quality and natural resource protection goals.

SP.22 Provide direct District management oversight of concessionaire staff to ensure adequate contract compliance with quality and quantity control, retail pricing, operation standards, and District water quality and natural resource management priorities.

SP.23 Maintain the District recreational trail system in the current configuration and with the current use rules and regulations and a permit system.

SP.24 Develop a Bay Area Ridge Trail connector that crosses District property approximately west and north of San Pablo Reservoir.

SP.25 Designate the Inspiration Trail and Bear Creek Trail system that crosses south of San Pablo Reservoir as a District-controlled portion of the American Discovery Trail and Mokelumne Coast to Crest Trail. The operation and types of uses permitted on these trails will be consistent with District rules and regulations.

SP.26 Develop a multiuse community facility at the upper parking lot of the San Pablo Recreation Area after adequate environmental review.

SP.27 Develop permanent facilities to replace modular temporary launch ramp facilities at the San Pablo Recreation Area.

SP.28 Prohibit the use of high emission motorboat engines on San Pablo Reservoir, effective January 1, 2000; and prohibit the use of motorboat engines at San Pablo Reservoir that discharge any fuel pollutent into the water, effective January 1, 2002 in accordance with Resolution No. 33088-98, effective March 10, 1998.

Visual Resources

SP.28 Prohibit management practices, with the exception of the phased elimination of the Monterey pines surrounding the reservoir, or development proposals that would require large-scale modifications to portions of the San Pablo watershed landscape that are highly visible from San Pablo Dam Road, the San Pablo Dam recreation area, Old San Pablo Dam Road, Inspiration Trail, proposed regional trail connectors, and the reservoir surface.

SP.29 Consider effects on visual quality when proposing watershed management activities in high-priority visual resource areas on Sobrante and San Pablo Ridges.

SP.30 Formalize visual quality guidelines with EBRPD that emphasize protection of visually sensitive areas on San Pablo Ridge at Tilden Regional Park/ Nature Area, Wildcat Canyon Regional Park, and Kennedy Grove Park.

Briones Reservoir Watershed

Management Direction

Water Quality

B.1 Assess potential water quality impacts and supply concerns at the University of California, Berkeley, Russell Reservation.

B.2 Consider restoration of Bear Creek upstream of Briones Reservoir to reduce livestock impacts and accelerated erosion.

B.3 Prohibit use of the Briones trench spoils site except for those uses specifically approved by the Board of Directors under the Trench Spoils Management Plan. To ensure that the trench spoils site will continue to meet and support District water quality objectives and regulatory requirements, site operation will require a security plan that will allow only authorized access to the site, including the crest and spillway of Briones Dam, and will prohibit any unauthorized dumping.

B.4 Coordinate with the Contra Costa County Public Works Department to develop roadside vegetation management techniques that protect water quality by minimizing herbicide and pesticide application and erosion and sediments in runoff.

Biodiversity

B.5 In cooperation with universities and other agencies, evaluate adequacy of oak regeneration in oak woodland habitats and identify those factors that limit oak regeneration. Initiate restoration if necessary and financially feasible.

Fire and Fuels

B.6 Encourage and participate in a CRMP effort for fire and fuels management activities along Bear Creek Road (from San Pablo Dam Road to Hampton Road), which surrounds much of the Briones Reservoir watershed. The Black Hills/Happy Valley homeowners should be encouraged to link their self-protection (defensible space and roadside fuel reduction) efforts into the Bear Creek Road fuel treatment program. These efforts will provide a regional strategic fuel reduction zone around the critical fire hazard areas within the watershed, as well as provide protection for the Black Hills/Happy Valley interface area. Other potential participants (and their roles) include:

- Contra Costa County Road Department (proposed Bear Creek Road fuel treatment),
- Moraga-Orinda Fire Protection District (enforcement and leadership roles),
- Contra Costa County Fire Protection District (CCCFPD) (coordination and leadership role),
- Black Hills/Happy Valley homeowners association(s) and individual homeowners (defensible space and access roadside fuel treatment), and
- EBRPD (fuels treatment) at Bear Creek Road/Briones Regional Park.

B.7 Explore opportunities for District, EBRPD, CCCFPD, and Moraga-Orinda Fire Protection District to conduct seminars for homeowners about defen sible space self-protection to increase public awareness and elicit involve ment and support from homeowner associations and individual homeowners in the Black Hills/Happy Valley interface area and surrounding areas.

B.8 Seek opportunities to use methods to reduce fuels in the Sobrante Ridge area in the northern and western portions of the Briones Reservoir watershed, especially along Oursan Fire Road. Vegetation here consists mostly of grass and short, light, brushy fuels. When linked with additional road side clearance along Oursan Fire Road (western flank), this treatment would provide a fuel reduction zone extending from Boy Scout Creek (northern section) through Sobrante Hill (western flank) to Bear Creek Road (southern, eastern, and northeastern portions) of the Briones Reservoir watershed.

Implementing this fuel reduction approach would provide a strategic wildfire containment zone completely around the reservoir. The Sobrante Ridge/Oursan Fire Road fuel reduction zone could be the principal area for suppressing large, east wind-driven wildfires originating east of Briones Reservoir.

B.9 Link Bear Creek Road fuel reduction efforts to the San Pablo Dam Road fuel treatment to extend the strategic regional fuel treatment network into the San Pablo Reservoir watershed.

B.10 Evaluate opportunities to reduce fire ignitions and risks by partially or completely closing portions of the watershed to public use during very high to extreme fire weather conditions.

B.11 Work with responsible agencies to implement strategic closure of Upper Happy Valley Road during extreme fire weather.

Developed Recreation and Trails

B.12 Maintain or reduce current levels of recreational access to the Briones Reservoir water surface consistent with water quality and natural resource protection priorities.

B.13 Review and modify, if appropriate, lease agreements with college crew teams for use of Briones Reservoir. Review of leases must focus on ensuring that current activities do not create adverse water quality, soil erosion, team safety, or other detrimental effects on watershed lands or the reservoir or compromise team safety.

Visual Resources

B.14 Prohibit management practices, with the exception of the phased elimination of the Briones Overlook Monterey pine grove, that would require large-scale modification of portions of the Briones Reservoir watershed landscape that are highly visible from the Bear Creek Road, the Bear Creek Trail, or the Oursan Trail, public use areas near the reservoir shoreline, and other public viewpoints.

B.15 Consider effects on visual quality when proposing watershed management activities in high-priority visual resource areas on hillsides and ridgelines surrounding Briones Reservoir.

B.16 Establish visual quality guidelines in coordination with the Cities of Orinda and Lafayette to ensure that high-priority visual resources located near the urban interface areas (e.g., Black Hills interface area) are protected. Encourage visual resource policy to be incorporated into the general plans of each city. Guidelines should:

- establish, through use of a memorandum of understanding or similar document, the intent of the District and adjacent jurisdictions to protect portions of the watershed that exhibit high visual resource qualities,
- identify the types of uses, if any, that could be allowed in visually sensitive or high-quality portions of the watershed,
- establish or formalize design guidance for development of portions of the watershed that cannot be completely protected (i.e., height limitations, ridgeline restrictions, and density/scale limitations), and
- formalize the planning review process between Orinda, Lafayette, and District planning bodies.

Upper San Leandro Reservoir Watershed

Management Direction

Water Quality

USL.1 Monitor the amount and quality of runoff after heavy rainfall from historic quarries near the south end of Gudde Ridge. Develop and implement BMPs and mitigation measures, if needed.

USL.2 Monitor surface runoff and groundwater water quality of the abandoned spoils disposal site at the north end of the reservoir. Develop and implement BMPs, if appropriate.

USL.3 Develop and stipulate BMPs for horse stables and other concentrated animal facilities.

Biodiversity

USL.4 Continue to prohibit stocking of fish and any type of angling, and actively control poaching in Upper San Leandro Reservoir and all of its tributaries to protect the native land-locked steelhead rainbow trout.

USL.5 Cooperate with DFG in monitoring spawning habitat for the historically unique land-locked steelhead rainbow trout, and cooperate in monitoring road crossings of spawning streams to ensure that adequate fish passage is provided.

USL.6 Rank streams suitable for habitat restoration based on their contribution to water quality, biodiversity, and steelhead rainbow trout management goals, and conduct restoration in cooperation with DFG and other interested groups as financially feasible.

USL.7 Develop a long-term strategy for managing the knobcone pine forest on Flicker Ridge, emphasizing the use of all available tools to promote ecosystem health while improving fire safety in the community of Canyon.

USL.8 In cooperation with universities and other agencies, evaluate adequacy of oak regeneration in oak woodland habitats and identify those factors that limit oak regeneration. Initiate restoration if necessary and financially feasible.

Fire and Fuels

USL.9 Evaluate management needs in the forest west of Miller Road, between Upper San Leandro Reservoir and the Chabot Staging Area. This stand has high biological value and supports high fuel loadings. A fire under infrequent extreme fire weather conditions could drastically alter biological values in this stand.

Additional analysis should include fuel moisture and loading studies (to more precisely determine potential fire intensity and risk), assessment of risk to water quality and adjacent lands, and documentation of biological values and potential effects of hazard reduction. The analysis would provide guidance for a site-specific management option, including restricting human access to reduce fire ignition risk, fuel modification within the stand, increased suppression capability, or treatment of fuel hazards on adjacent lands.

USL.10 Explore the possibility of the District entering into a CRMP for fire and fuels management activities along Camino Pablo Road to protect the Old Moraga Ranch and Rancho Laguna Park/King Canyon interface areas. Other potential participants (and their roles) are:

- Town of Moraga Park and Recreation Department, which manages Rancho Laguna Park (maintaining defensible space),
- area homeowner associations (defensible space),
- Moraga-Orinda Fire Protection District (enforcement and leadership role),
- individual homeowners (defensible space), and
- the District (continue strategic area grazing, mowing, or discing along the interface and lower King Canyon drainage).

USL.11 Pursue opportunities to conduct homeowner training on defensible space self-protection with the Moraga-Orinda Fire Protection District. Training should be designed to increase public awareness and to encourage involve ment by homeowner associations and individual homeowners in the Old Moraga Ranch, Rancho Laguna Park, and King Canyon areas within the Town of Moraga.

USL.12 Work with responsible agencies to implement strategic closures of portions of Pinehurst Road and Redwood Road during extreme fire weather.

USL.13 Continue efforts to treat fuels along Skyline Road at Pine Hills Court in cooperation with EBRPD and the City of Oakland.

USL.14 Evaluate opportunities to reduce fire ignitions and risks by partially or completely closing portions of the watershed to public use during very high to extreme fire weather conditions.

Developed Recreation and Trails

USL.15 Maintain current limitations on recreational access to the reservoir and maintain the District recreational trail system in the current general configuration with current use rules and regulations and a permit system.

USL.16 Provide annual maintenance of trails to ensure that trail hazards are minimized.

Visual Resources

USL.17 Prohibit management practices or development proposals that would require large-scale modification of the Upper San Leandro Reservoir watershed landscape, especially in areas that are highly visible from Redwood Road, Anthony Chabot Regional Park, and other public viewpoints.

USL.18 Minimize the effects on visual quality when proposing watershed management activities in high-priority visual resource areas on Rocky Ridge.

Land Ownership

USL.19 Pursue opportunities to consolidate ownership in the Canyon area to improve fire management effectiveness and water quality protection through land exchange, acquisition, and disposal.

Entitlements

USL.20 Phase out Christmas tree production on the watershed.

USL.21 Prohibit introduction of other types of agricultural production on the watershed.

Chabot Reservoir Watershed

Management Direction

Chabot Reservoir and portions of the watershed are managed by EBRPD under a lease with the District. The District will work with EBRPD to incorporate the relevant guidance from this plan into the lease.

Water Quality

C.1 Prohibit use of the Miller Road trench spoils site except for those uses specifically approved by the Board of Directors under the Trench Spoils Management Plan. To ensure that the trench spoils site will continue to meet and support District water quality objectives and regulatory requirements, site operation will require a security plan that will allow authorized access to the site via Miller Road and will prohibit any unauthorized dumping. Monitor surface water and groundwater quality downgradient of the trench spoils site, and develop BMPs, if appropriate.

C.2 Investigate and monitor residual water quality impacts at the World War II-era, 50-caliber machine gunnery range located off Miller Road. Develop BMPs to clean up the site, if warranted.

Fire and Fuels

C.3 Explore opportunities for the District, EBRPD, and Alameda County Fire Department to conduct homeowner training in defensible space self-protection to increase awareness, involvement, and support from homeowner associations and individual homeowners in the Lake Chabot area.

C.4 Explore opportunities for a joint venture with EBRPD to conduct fuel hazard reduction along Redwood Road from Proctor Staging Area northward, using Willow Park Golf Course, to Chabot Staging Area. This effort will link with the Upper San Leandro Reservoir fuel modification zones.

Developed Recreation and Trails

C.5 Any future amendments to the Lake Chabot lease or subsequent subleases should be consistent with District priorities for reservoir water quality and watershed natural resource protection and public health and safety standards.

C.6 Establish an annual mid-management tour and review of Lake Chabot operations with EBRPD that addresses water quality, trails, fire and fuels management, public safety, and sublessee operations.

C.7 Modify the lease agreement for the Chabot Park property. Should the District determine that no alternative use for Chabot Park is available, the lease agreement with the City of San Leandro should be modified to improve safety for park users and the adjacent residential area.

Visual Resources

C.8 Coordinate with EBRPD to identify priority visual resources in Chabot Reservoir watershed and work in partnership to establish appropriate restrictions on development or use of the watershed that is consistent with guidelines implemented on other District lands.

Lafayette Reservoir Watershed

Management Direction

Fire and Fuels

L.1 Continue to modify as necessary and implement the Lafayette Reservoir watershed fire management plan, which has been approved by CCCFD.

L.2 Continue to maintain fire access roads in the watershed. Lafayette Reservoir has a very good road system that fully surrounds the reservoir, and most adjacent spur ridges provide road access for fire equipment.

L.3 Continue to assess fire management needs in the areas of heavier fuels in the Lafayette Reservoir watershed to evaluate wildfire control issues, and explore opportunities and constraints for the use of prescribed fire and other techniques for fuel reduction and natural resource habitat enhancement. The western and southwestern portions of the watershed are the highest priority areas.

L.4 Explore opportunities for the District, Countra Costa County, and Moraga-Orinda Fire Protection Districts to conduct homeowner training in defen sible space self-protection to increase awareness, involvement, and support from homeowner associations and individual homeowners. Encourage homeowners to link their defensible space zones into the grassy, low-fuel-volume vegetation adjacent to the urban/wildland interface areas.

L.5 Evaluate opportunities to reduce fire ignitions and risks by partially or completely closing the recreation area, especially the areas above the paved surface road, to public use during very high to extreme fire weather conditions.

Developed Recreation and Trails

L.6 Monitor use levels and changes in use patterns to establish carrying capacities for existing facilities.

L.7 Complete the designed food service facilities adjacent to the Visitor Center building and operate these facilities with a private concessionaire. Aside from this additional food service facility, no further facility expansion is planned.

L.8 Review use of the recreation area for day camps. Consider conflicts among users and impacts from large day-camp user groups, and permit such use only within the facility's carrying capacity. Evaluate District costs for administration, operation, and maintenance of day camp events compared to the revenue generated by the events, and ensure that District permit fees are commensurate with incurred direct and indirect costs. (See guideline DRT.15 in Section 3.)

L.9 Permit special events only in strict accordance with general recreation guidelines. Screen event proposals to reduce their impacts on adjacent residential areas and other general recreation area users. Avoid events that close the areas to the general public. (See guideline DRT.15 in Section 3.)

L.10 Consider developing a daily and annual use fee and permit for dogs or other means to encourage compliance with requirements for keeping dogs on leash and picking up fecal matter.

Visual Resources

L.11 Maintain the current visual character of the Lafayette Reservoir watershed by restricting additional recreational development (with the exception of the food service facilities), maintaining and improving existing watershed facilities and signs to reflect a unified recreation area design, and developing a cooperative agreement with the Cities of Orinda and Lafayette to avoid additional development encroachment near the current looped trail system.

L.12 Use California "site natives" in any supplemental plantings of woody species in the undeveloped areas of the park. Use appropriate District-recommended drought-tolerant species in the developed areas. Give highest priority to fire-resistant species.

Pinole Watershed

Management Direction

Water Quality

PW.1 Establish appropriate creek buffers in agricultural use areas as time and resources allow.

PW.2 Develop appropriate corrective measures on Pinole Creek to rectify streambank instability as time and resources allow.

Biodiversity

PW.3 Monitor the recolonization of the Pinole watershed by the California ground squirrel.

PW.4 Evaluate opportunities to reintroduce the California tiger salamander into suitable habitats in coordination with DFG.

PW.5 Continue ongoing efforts to protect and restore riparian stream ecosystems.

PW.6 Prohibit use of pesticides in the watershed, except for those herbicides specifically approved for spot treatment of pest plant species according to District IPM guidelines.

Fire and Fuels

PW.7 Develop and implement a fire management plan for the Pinole watershed in consultation with CDF and CCCFPD that clearly demonstrates adequate fire protection.

PW.8 Continue livestock grazing in the less sensitive portions of the Pinole watershed. Where compatible with natural resource objectives, graze or mow grass to a 4-inch height (or disc) within a 30-foot-wide strip along all District property lines adjacent to the urban/wildland interface.

PW.9 Explore opportunities for the District, the City of Richmond and Pinole Fire Departments, the Rodeo-Hercules Fire Protection Disrtrict, and CCCFPD to conduct homeowner training in defensible space self-protection to increase awareness, involvement, and support from homeowner associations and individual homeowners. Encourage homeowners to link their defensible space zones into the grassy, low fuel-volume vegetation adjacent to the interface areas.

Developed Recreation and Trails

PW.10 In addition to the alignment selected for the Bay Area Ridge Trail, permit recreational use of watershed lands in Pinole Valley on a case-by-case basis consistent with the water quality, biodiversity, fiscal responsibility, and public safety goals of the EBWMP.

Visual Resources

PW.11 Maintain or improve the current visual quality in areas visible from Castro Ranch, Alhambra Valley, and Pinole Valley Roads by limiting new structures and providing appropriate levels of agriculture and grazing use near these public roads.

PW.12 Prohibit development or structures near the Bay Area Ridge Trail regional connector to preserve current open space views of Pinole Valley.

PW.13 Establish visual quality guidelines in coordination with the Cities of Pinole, Hercules, and El Sobrante to ensure that high-priority visual resources located near the current or planned urban interface are protected. Encourage visual resource policies to be incorporated into the general plans of each city.

Entitlements

PW.14 Initiate organic farming in the Pinole Valley for vegetable or flower production if farming practices are consistent with IPM practices that provide for water quality and other environmental protection. In the interim, current agricultural uses will continue under strict controls.

PW.15 Continue the phased elimination of the former Christmas tree farming area along Pinole Creek, including phased elimination of the Monterey pine grove and replacement with native forest species.

MANAGEMENT DIRECTION FOR INTERJURISDICTIONAL COORDINATION

Introduction

Some land uses in the areas that surround District-owned East Bay watershed lands can have substantial adverse impacts on District water quality and watershed management. Development and use of these adjacent lands require special management consideration because the jurisdictions involved have differing land use goals and objectives. In addition, allowable uses of District-owned watershed lands are influenced by the local land use policies of jurisdictions whose planning boundaries coincide with District ownership. District watershed lands are located primarily in unincorporated portions of Alameda and Contra Costa Counties. Small portions are located within the Cities of Orinda, Lafayette, and Oakland and adjoin the incorporated Cities of Hercules, Lafayette, Moraga, Oakland, Orinda, Pinole, Richmond, and San Leandro and the unincorporated communities of Castro Valley and El Sobrante. In addition, substantial portions of District land are bordered by EBRPD lands **(Figures 5-1 and 5-2)**.

Each of the eight incorporated cities and both counties set their local land use and development policies through the general plan process. County land use and development policies apply to unincorporated areas, just as city policies apply to incorporated areas.

In addition to these local jurisdictions, regional agencies can also affect management of District lands. The California Department of Transportation (Caltrans) and the Metropolitan Transportation Commission enact the plans and policies of the state and federal governments. The Regional Water Quality Control Board, the Bay Area Air Quality Management District, and CDF set policy for fire management throughout the state. EBRPD also has numerous parklands that adjoin the District's watershed lands. Because EBRPD is the largest adjacent landowner, its actions can have a substantial effect on management of District watershed lands. The history of cooperation and coordination between the District and EBRPD has been important in addressing issues of concern.

Major Management Issues

Management direction for lands adjacent to District-owned watershed lands recognizes that some of these areas are within the hydrologic basins of District reservoirs and drain into them and that others do not. Issues related to the use and development of adjacent lands extend well beyond land use, but these issues can be addressed nonetheless through a land use and management coordination program involving the District and the various agencies responsible for adjacent jurisdictions. The major management issues resulting from the use and development of adjacent lands are the following:

MANAGEMENT DIRECTION FOR INTERJURISDICTIONAL COORDINATION

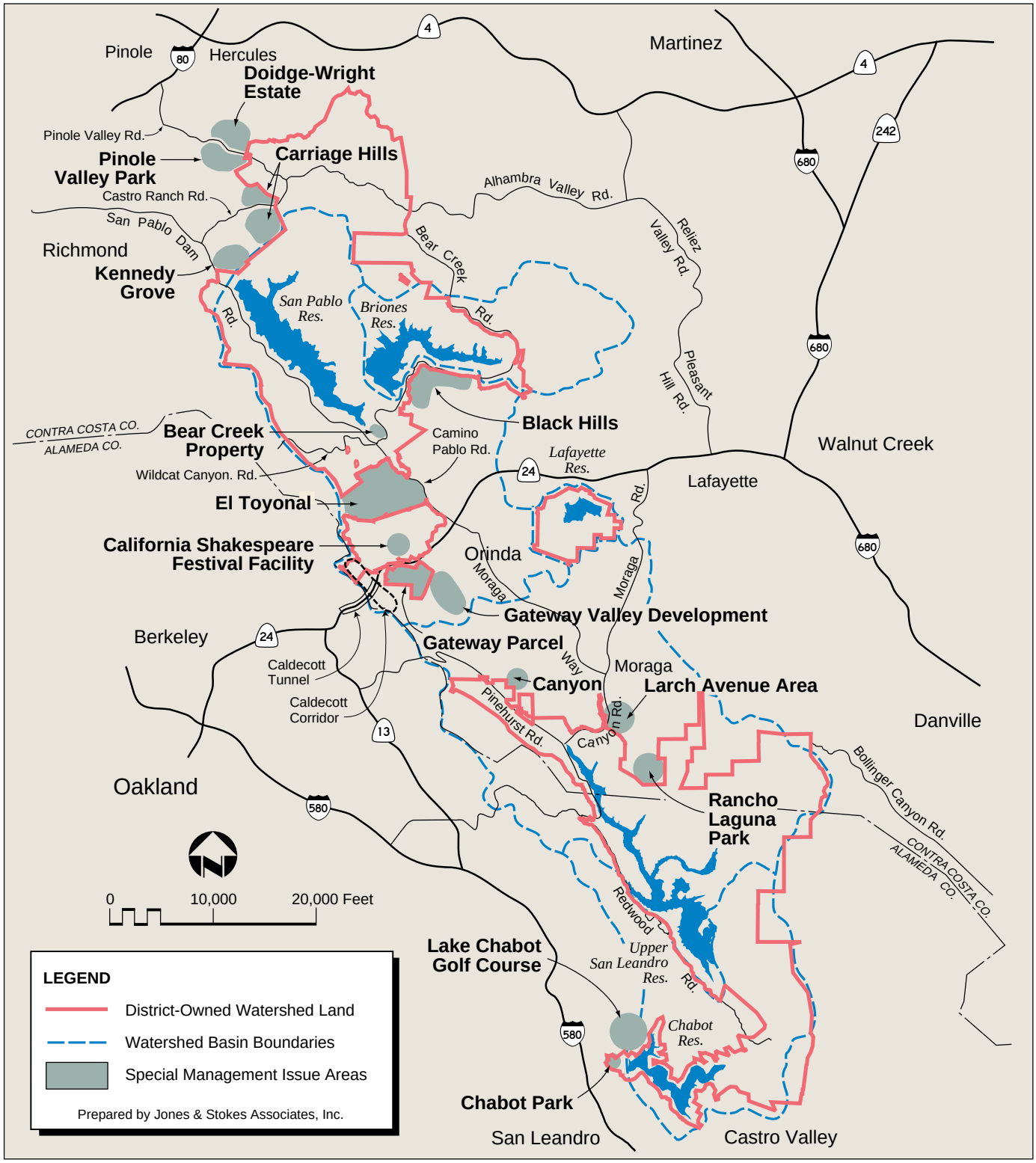


Figure 5-1
Adjacent Jurisdictions and Special Management Issue Areas

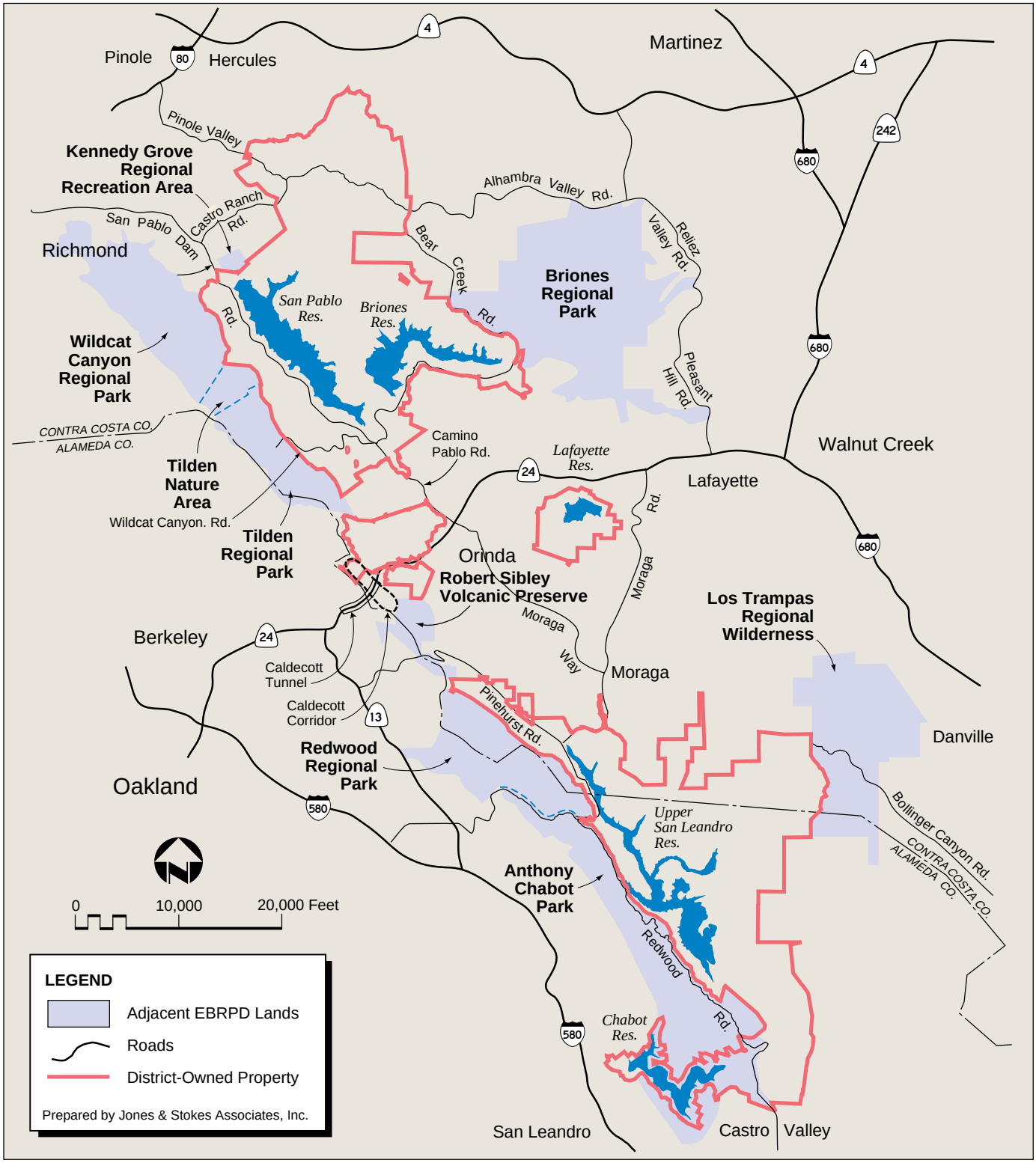


Figure 5-2
Adjacent EBRPD Lands

- ***Water Quality Protection:*** Protection of water quality is foremost among management considerations. Land use and development have been shown in District studies to adversely affect the quality of water draining onto District watershed lands and into District reservoirs (see the water quality management discussion in Section 3).

- ***Wildfire and Public Safety:*** Use of adjacent lands raises significant concerns regarding the risk of wildfire. The pattern of adjacent development affects the District's ability to manage the risk of wildfire or its spread onto or off from District watershed lands.

- ***Public Encroachment:*** Use of adjacent lands, particularly for residential development, could substantially increase public encroachment onto watershed lands. Public encroachment can lead to violations of District management objectives, adverse effects on sensitive watershed habitats, increased incidence of trespass and vandalism, and increased degradation of the environment and views along the urban/wildland interface.

- ***Viewshed Protection:*** Locally approved urban encroachment on adjacent lands could disrupt or degrade the visual qualities of District watershed lands and the regional visual environment.

- ***Biodiversity:*** Because plants and animals do not recognize political or planning boundaries, biodiversity planning must occur between adjacent public and private landowners to maintain connectivity between large patches of habitat and avoid maintenance practices that result in inadvertent mortality of species. Close coordination between landowners to discuss the offsite impacts of maintenance activities and projects, both within and outside the context of the CEQA process, is essential to preserve regional biodiversity.

These major issues also apply to the management of adjacent lands not tributary to a reservoir. On those lands, however, water quality issues, although still important, are not emphasized as heavily as they are on basin lands that are tributary to District reservoirs.

Summary of Land Use Conditions on Adjacent Lands

Land use conditions, particularly those relating to water quality, public safety, and watershed protection, are summarized in this section for each jurisdiction having property adjacent to District-owned watershed lands. The relationship between land use conditions and issues of concern to the District has been developed through focused studies conducted by the District and the evaluation conducted specifically to support the EBWMP.

Adjacent Basin Lands

Contra Costa County

Lafayette

Except for very small areas at the extreme western edge of the city that drain into San Pablo Reservoir, the City of Lafayette does not include lands that drain into District reservoirs. The Lafayette Reservoir watershed is essentially self-contained. The watershed is within the jurisdiction of the City of Lafayette but is entirely under District ownership and management.

Moraga

Much of the western half of the Town of Moraga is within the Upper San Leandro Reservoir basin. King Canyon, Moraga, and Rimer Creeks and their tributaries flow southward to Upper San Leandro Reservoir. Las Trampas Creek and its tributaries in the eastern part of town flow northward to join Lafayette and Walnut Creeks and finally discharge into Suisun Bay.

According to the Moraga general plan, much of the town consists of steep, undevelopable slopes whose "open space characteristics contribute to the Town's high quality environment". The community maintains its small-town character through one- and two-story structures that incorporate landscaping and open space into their design. Much of the town is designated for open space, and most of the remaining areas are developed with single-family residential units. Together, these uses make up nearly 90% of the land use in Moraga. Cluster housing is permitted in areas designated for open space or residential uses, but the town's goal is "to permit a limited amount of cluster housing where it does not impinge upon or adversely affect existing detached single-family environments".

According to the Moraga general plan, much of the town consists of steep, undevelopable slopes whose "open space characteristics contribute to the Town's high quality environment".

Most of the growth planned in Moraga is on lands that are already designated for residential uses. Much of the land available for residential development is on steep slopes or in areas within 100-year floodplains. Streambank erosion is acknowledged as a long-term problem. Moraga does not allow industrial uses, and only about 100 acres of land are zoned for office and commercial activities, with much of that land remaining vacant. The general plan does not designate land uses for District watershed lands, which are outside of the city limits.

Although the potential for development anywhere along the watershed interface has implications for managing water quality, fire and fuels, public encroachment, and visual quality of District lands, several areas of the interface involve special land use management issues.

Palos Colorados. A proposal exists for development of 188 single-family dwelling units and an 18-hole golf course on 476 acres of land southeast of Lafayette Reservoir. Approximately 100 acres in the northwestern portion of the

development area are within the Moraga Creek basin, which drains to the Upper San Leandro Reservoir. The portion of the proposed development that would be located on District watershed lands would accommodate approximately 27 dwelling units, a portion of a school site, and a small portion of the golf course. It is understood that grading of the project site for development will direct drainage away from Upper San Leandro Reservoir and thereby eliminate water quality conflicts. This proposed grading modification should be approved by the city and county to protect water quality. The development is also an important wildlife corridor into Lafayette Reservoir, and buildout may curtail wildlife movements in the Lafayette Reservoir watershed.

Larch Avenue Area. A 65-acre vacant parcel located between Larch Avenue and Sanders Drive near Canyon Road is being considered for possible development. Most of the area is zoned for open space, but a small portion is designated for residential uses in the general plan. The Larch Avenue area is in the drainage of Moraga Creek, which drains to Upper San Leandro Reservoir. Development of this area with 12-25 dwelling units is possible within the next several years.

Orinda

Almost the entire city of Orinda lies either within the San Pablo Reservoir or Upper San Leandro Reservoir basin. According to its general plan, Orinda is a residential community that has almost reached buildout. Some development is possible on the western edge of the city, particularly in Gateway Valley, southeast of the District's Gateway parcel.

Orinda's general plan seeks to preserve the semirural character of the city by keeping development densities low, limiting development on highly visible, undeveloped ridges and hillsides, retaining vegetation during project construction; limiting site grading, preserving creeks and creekbeds, clustering development, and protecting the open space north and west of the city. Much of this open space is District-owned watershed land.

The District watershed lands adjacent to Orinda are outside of the city limits but within the planning area boundary. The general plan designates these lands for "utility" uses, defined as being appropriate for utility, watershed, open space, and public recreation and for cultural uses where specifically designated. The California Shakespeare Festival site on District-owned land in Siesta Valley is one such use. The general plan designates most development adjacent to watershed lands for very low-density to low-density single-family housing (e.g., a maximum of one to two units per acre).

Although the potential for development anywhere along the watershed interface has implications for managing water quality, fire and fuels, public encroachment, and visual quality of District lands, several areas present special management issues.

El Toyonal Interface. A portion of the City of Orinda extends into the area generally between El Toyonal Road (to the north) and the District's deLaveaga Fire Road (to the south). This area is developed with residential uses and has minimal new residential development. Access to this area is very limited because of a road closure at the north end of El Toyonal Road. Land configuration, limited access, narrow roadway, vegetative cover, and fire risks associated with this area and with urban development in general make management of this area extremely important.

Orinda's general plan seeks to preserve the semirural character of the city by keeping development densities low; limiting development on highly visible, undeveloped ridges and hillsides; and protecting the open space north and west of the city.

In addition, the general plan designates a proposed collector street in this area to connect El Toyonal Road to Wagner Ranch School. This proposed collector street has not yet been constructed and its location is not defined, but it appears to bisect a District-owned parcel. Construction of the proposed collector street has serious implications for managing the District-owned property, and the acquisition will be strongly opposed.

California Shakespeare Festival Facility. The California Shakespeare Festival leases a portion of the District's watershed lands in Siesta Valley (north of the Gateway Boulevard interchange on Highway 24) as a site for the California Shakespeare Festival and Bruns Amphitheatre. This permanent facility is currently used for performances primarily during the summer months. Management activities required under the lease address wildfire ignition and public encroachment onto adjacent District watershed lands.

Gateway Property. The District-owned Gateway property is located south of Highway 24 at the Gateway Boulevard interchange and is within the San Pablo Reservoir basin. This property has and continues to be associated with the City of Orinda's infrastructure and residential development plans for the area directly to the south.

The Gateway property also is contiguous with the Caldecott Tunnel corridor, an undeveloped strip of land that serves as a critical avenue for wildlife movement between large, publicly owned open space areas north and south of Highway 24.

The Caldecott Tunnel corridor and environs also form an important visual backdrop for the considerable number of people traveling west toward the Caldecott Tunnel on Highway 24, and they provide motorists a dramatic last view of the eastern slopes of the Oakland Hills before they enter the tunnel.

Any proposals submitted to the District for use of the Gateway property should be reviewed carefully. This review should comprehensively address potential effects on water quality, the functioning of this area as it relates to the Caldecott Tunnel corridor, and urban/wildland interface issues (e.g., fire and fuels management). Any potential future fire mitigation must be borne by the Gateway developer.

MANAGEMENT DIRECTION FOR INTERJURISDICTIONAL COORDINATION

The Contra Costa County General Plan designates District watershed lands as "watershed", a designation intended to safeguard the public water supplies stored in District reservoirs.

Bear Creek Property. The Bear Creek property (also known as the Duffel property) is a 43-acre site owned by the District that is located on Bear Creek Road adjacent to San Pablo Creek. Because of its location near San Pablo Creek and San Pablo Reservoir, protection of water quality is the primary concern associated with use of the site.

In 1990, the City of Orinda expressed interest in the use of the Bear Creek property for sports fields. As with proposals for use of other District-owned property, environmental concerns and appropriateness of use should be considered regarding this site in coordination with city representatives.

Castlegate. Approximately 40 acres of land south of Gateway Valley near Stein Way has been subdivided into 25 1/2-acre lots. The parcel is being developed and has required the implementation of extensive erosion control measures.

Black Hills. Residential development on the northern edge of Orinda is encroaching on the ridge of the Black Hills, moving closer to Bear Creek Road, and encroaching into the Briones Reservoir viewshed where it has crested this ridge. Development in these areas already has serious implications for wildfire hazard and visual resource impacts on District lands. Any further development in this area must meet strict fire and fuels management requirements to fully mitigate the potential impact. This area is currently under construction. Encroachment on District land by occupants will need to be monitored regularly.

Unincorporated Area

Contra Costa County has jurisdiction over all lands located outside incorporated areas, including District watershed and EBRPD lands.

The District watershed lands north of Orinda are within the Briones Hills planning area, which is subject to the Briones Hills Agricultural Preserve Area Compact. The compact was made in 1988 between the county and the Cities of Martinez, Pleasant Hill, Walnut Creek, Lafayette, Orinda, Richmond, Pinole, and Hercules. The county's general plan strongly supports the intent of this agreement, in which the signatories agree not to annex lands in the Briones Hills planning area for urban development. This area also includes EBRPD lands and large tracts of agricultural land east of District watershed lands.

The Contra Costa County General Plan designates District watershed lands as "watershed", a designation intended to safeguard the public water supplies stored in District reservoirs. Permitted on lands designated as "watershed" by the county are agricultural uses that do not rely on pesticides or chemical fertilizers, such as grazing and Christmas tree farming, passive, low-intensity recreational uses, such as hiking and biking, and small-scale commercial uses that support picnicking, boating, and fishing activities on adjacent reservoirs.

The general plan specifies that the county shall cooperate with other regulatory agencies to control point and nonpoint water pollution sources to protect adopted beneficial uses of water.

Although the potential for development anywhere along the northern and northwestern urban/wildland interface between Contra Costa County and District lands could have implications for managing water quality, fire and fuels, public encroachment, and visual quality of District watershed lands, several areas of the interface present special land use management issues.

Community of Canyon. Development in the unincorporated community of Canyon consists primarily of houses, a school, and a post office. District watershed lands surround this small community. Critical wildland management issues of land configuration, septic tanks and leach fields, limited access, narrow roadways, dead-end roads, and fire and fuels associated with the interface of wildlands and rural residential use must be addressed.

Indian Valley Area. Most of the private, unincorporated land that borders the eastern edge of District watershed lands around Canyon is in open space use (i.e., Indian Valley). Management of the District-owned interface focuses on the cooperative actions needed to reduce the potential risk and damage from wildfire. Scattered among these lands are residences and other development that could be damaged by wildfires and could also be considered potential sources of wildfire. In addition, these lands could be rezoned for more intensive uses in the future, which would intensify urban/wildland interface issues and concerns.

Alameda County

Castro Valley

A small portion of the unincorporated community of Castro Valley immediately adjacent to Chabot Reservoir drains into Chabot Reservoir. According to the Castro Valley Plan (part of the Alameda County General Plan), Castro Valley is extensively developed, with relatively little vacant land remaining. Castro Valley consists predominantly of single-family housing. Most of the District's watershed lands in Alameda County are within the Castro Valley planning area, but none are within the community's urban area. The Castro Valley Plan designates District lands in its planning area as "appropriate open space", as defined by the Alameda County General Plan.

Future development anywhere along the northern and northwestern urban/wildland interface between Castro Valley and District watershed lands could have adverse implications for managing water quality, fire and fuels, public encroachment, and visual quality of watershed lands. This area should be monitored carefully for future actions even though no significant problems exist at present.

Section 5

MANAGEMENT DIRECTION FOR INTERJURISDICTIONAL COORDINATION

Oakland

Essentially all of the City of Oakland is west of the ridgeline of the Oakland Hills and drains into San Francisco Bay. A portion of the north shoreline of Chabot Reservoir and a portion of the reservoir itself are within the city limits, however. This land is occupied by the City of Oakland's Lake Chabot Municipal Golf Course, portions of which drain into Chabot Reservoir. Because it drains directly into the reservoir, the golf course presents water quality issues for management of Chabot Reservoir, especially regarding the use of pesticides and fertilizers. Also, the Grizzly Peak Estates area above the Caldecott Tunnel east portal presents difficult fire hazard mitigation challenges to downhill agencies, including the District and EBRPD. It is important that Oakland prohibit further development in this ridgetop location.

Unincorporated Area

Alameda County has land use jurisdiction over unincorporated areas of the county. The Alameda County General Plan strongly encourages that development remain within existing urban boundaries. For incorporated areas, the plan promotes efficient use of suitable vacant and infill land. For unincorporated areas, the plan establishes a limit to urban development to reduce the impacts of development on open space and the environment.

Although the potential for development anywhere along the northern and northwestern interface between Alameda County and District watershed lands has implications for managing water quality, fire and fuels, public encroachment, and visual quality of District watershed lands, one general area of the interface presents special issues.

Cull Canyon Area. Most of the private, unincorporated land that borders the eastern edge of District watershed lands in Alameda County is in open space use. Management of the District-owned interface focuses primarily on cooperative actions to reduce the potential risk and damage from wildfire. Possible future rezoning of these lands for more intensive uses could create issues typical of an urban interface. Any significant change of use could also affect the visual quality of District watershed lands and the visual character of the region.

East Bay Regional Park District

Other than the District, EBRPD is the largest single landowner within the basins of the District reservoirs. Because management activities on those lands have the potential to affect water quality and other District programs, the District retains an ongoing interest in land use modifications and proposed new uses. The District supports providing timely technical feedback on any proposed change.

MANAGEMENT DIRECTION FOR INTERJURISDICTIONAL COORDINATION

The policy of EBRPD is to cooperate with other public agencies in acquiring, preserving, and managing nonpark open space lands and ecosystems and in fostering sound stewardship practices.

Almost the entire western edge of District watershed lands is bordered by EBRPD property, with the exception of the areas near the Caldecott Tunnel at Highway 24 and immediately northwest of Chabot Reservoir **(Figure 5-2)**. Properties owned or operated by EBRPD drain into Briones, Chabot, San Pablo, and Upper San Leandro Reservoirs. The specific parks and their relative sizes within the drainages are listed below:

San Pablo Reservoir Basin

Sibley Volcanic Preserve partial area (large)
Tilden Regional Park (very small)
Wildcat Canyon Regional Park (very small)
National Skyline Trail (small)

Briones Reservoir Basin

Briones Regional Park (large)

Upper San Leandro Reservoir Basin

Redwood Regional Park (large)
Roberts Regional Recreation Area (small)
Sibley Volcanic Regional Preserve partial area (medium)
Huckleberry Botanic Regional Preserve (small)
Lafayette-Moraga Regional Trail (small)
Old Moraga Ranch Trail (very small)

Chabot Reservoir Basin

Anthony Chabot Regional Park (large)
Fairmont Ridge Regional Park (large)

In addition to the parklands within the basins, the following EBRPD parks adjoin District watershed property but are outside of the basins:

Las Trampas,
Kennedy Grove Regional Recreation Area,
Sobrante Regional Preserve, and
Claremont Canyon Regional Preserve.

The policy of EBRPD is to cooperate with other public agencies in acquiring, preserving, and managing nonpark open space lands and ecosystems and in fostering sound stewardship practices. EBRPD also acts as a “good neighbor” to adjacent owners by managing its resources and planning, developing, and operating its parks in a manner that does not conflict with adjacent management practices or that reduces impacts to the greatest extent possible. The District intends to work in partnership with EBRPD, much as it has with the City of Orinda, Town

of Moraga, and Alameda and Contra Costa Counties, to develop and implement BMPs that mitigate impacts on reservoir water quality that may occur from parkland runoff. An important mechanism for ensuring ongoing coordination with EBRPD is the District/EBRPD Liaison Committee, a Board-level joint committee that regularly reviews broad issues of mutual concern.

Briones Regional Park. The western half of Briones Park drains directly into Briones Reservoir via Bear Creek and several smaller drainages. Land use practices in the park can affect water quality in the reservoir. Road and trail use and maintenance, recreational development, grazing, and herbicide use are activities of concern that will require monitoring. Mitigation measures for a recent recreational change of use in the park have been coordinated with the District and will become more important in the future.

Redwood Regional Park. Redwood Regional Park is tributary to Upper San Leandro Reservoir, and land use practices in the park can affect water quality in the reservoir. Road and trail use and maintenance, herbicide use, and vegetation management (particularly timber harvesting practices) are activities that will require water quality monitoring. In addition, mountain bike trespass onto the District's Redwood Trail from EBRPD's East Ridge Trail is increasing, and trail damage in this sensitive area has already been documented. The District will take the lead in working with EBRPD to address this growing problem.

Gateway Valley. The developers of Gateway Valley in Orinda plan to deed 442 acres of open space, adjacent to Sibley Volcanic Preserve and the District's Gateway parcel, to EBRPD in the near future. Preliminary plans for this parcel involve a major loop trail that crosses District watershed property over much of its length. No other firm plans are known at this time; however, a number of urban interface issues can be expected to emerge in the near future. Because this new acquisition will bring EBRPD ownership significantly closer to San Pablo Reservoir, it is important that EBRPD management plans are discussed with District staff at an early stage. In addition to urban interface issues, the District has continuing concerns about changes of use in the greater Gateway Valley area because of the potential for water quality impacts on San Pablo Reservoir. The District will take a lead role in working with EBRPD to address these concerns.

Lake Chabot. EBRPD plans, manages, and operates the Lake Chabot Recreation Area under a long-term agreement with the District. Use of the reservoir and the recreational development surrounding it are managed in accordance with the terms and conditions of the Park and Recreation Lease (50-year term initiated in 1964) and according to the Provisions and Conditions of the District's Revised Domestic Water Supply Permit. The strategic importance of Lake Chabot in the District's water supply system was reviewed in 1994. As a result, interest in the potential role of Lake Chabot as an emergency water supply during a major earthquake has been renewed.

Recently, EBRPD has implemented an extensive eucalyptus harvest program in Anthony Chabot Regional Park within the Grass Valley Creek basin, which drains into Lake Chabot. This program has used clear-cutting as the primary silvicultural technique to manage the vast eucalyptus stands in this area. This type of activity can degrade water quality from increased sedimentation, herbicide runoff, and nutrient release into Lake Chabot and will require monitoring. In addition, EBRPD is responsible for addressing fire and fuels management issues from the reservoir south to the urban/wildland boundary.

The District has cooperated with EBRPD in the development of regional trails that link the lands of the two districts. These trails provide the public with an opportunity to enjoy a high-quality trail experience while meeting the land use constraints of both agencies.

Willow Park Golf Course. The District leases land upstream of Chabot Reservoir to EBRPD to operate Willow Park Golf Course, which, in turn, is leased to a concessionaire. The District's primary issue of concern with the management of Willow Park Golf Course is the potential for pesticides and fertilizers, used for turf management, to affect the water quality of Lake Chabot. Provisions were added to the Sixth Amendment to the Park and Recreation Lease in 1994 that improved control and monitoring of pesticide and fertilizer use at the golf course. These lease provisions will require monitoring in coordination with EBRPD to ensure compliance by the concessionaire.

Regional Trails System. The District has cooperated with EBRPD in the development of regional trails that link the lands of the two districts, especially the National Skyline Trail. Additional opportunities, including the Bay Area Ridge Trail, American Discovery Trail, and Mokelumne Coast to Crest Trail are in progress. These trails provide the public with an opportunity to enjoy a high-quality trail experience while meeting the land use constraints of both agencies. All future trail plans for either agency must be developed with early input from the other to identify the impacts of proposed alignments, the alternate alignments that may be required, and specific trail use conflicts requiring mitigation or prohibition.

Adjacent Lands Not Tributary to a Reservoir

The following jurisdictions are located within adjacent nontributary lands.

Contra Costa County

Hercules

The City of Hercules is within the Refugio Creek basin. District watershed lands do not drain into Hercules, and lands within the jurisdiction of Hercules do not drain into District watershed lands.

Northeast of Refugio Creek, high-density residential development adjoins District property, and some of this development abuts District property directly with no setbacks at the urban/wildland interface. Other residential developments in the area provide open space buffers adjacent to District-owned lands. Southwest of

Refugio Creek, open space and low-density residential land within the City of Hercules adjoin District land. Most of these areas are essentially built out, with only a few scattered lots remaining to be developed.

Although the potential for development anywhere along the urban/wildland interface could have implications for managing fire and fuel safety issues, public encroachment, and visual quality of District watershed lands, only one area of the interface presents special land use management issues.

Hanna Ranch Development. The Hanna Ranch Development directly abuts District property at the northwestern corner of Simas Valley. Because of the absence of law enforcement in this area, a variety of urban/wildland interface effects are being noted, including poaching, trespassing, vandalism, and mountain bike access. In addition, the District has been forced to adopt fire hazard mitigation measures on its own property because of the proximity of residential development to District watershed property. This area will require an increased level of monitoring and District presence in the near future.

Pinole

The City of Pinole is in the Pinole basin, but it is located downstream of District-owned lands.

Pinole is essentially a built-out residential community. North of Pinole Creek, the city adjoins District property primarily with low-density residential development, much of which directly abuts District watershed lands with no setbacks at the urban/wildland interface. Much of this area is undeveloped and is one of the major remaining areas in the city that are designated for residential development. South of Pinole Creek, the city's Pinole Valley Park abuts District watershed lands.

The City of Pinole Draft General Plan acknowledges the importance of working in coordination with the District to address water quality issues. The draft general plan also designates District lands as providing trail connections into District property and to connected portions of the city at the interface.

Although the potential for development anywhere along the Pinole/District watershed interface could have implications for managing water quality, wildfire hazard, public encroachment, and visual quality of District watershed lands, two specific areas present special land use management issues.

Doidge-Wright Estate. The largest parcel of land likely to undergo development is the Doidge-Wright Estate on the southern end of Pinole Valley Road, located on the Pinole side of the ridge that separates Pinole and Hercules. Development of this 185-acre parcel could affect District watershed land by increasing urban interface effects.

Richmond

Pinole Valley Park. Pinole Valley Park, which consists of a sports field complex and surrounding open space with trail use, adjoins District watershed lands. This park is owned and operated by the City of Pinole and primarily presents fire and fuels management and public encroachment management issues. The portion of the City of Richmond adjacent to District property is in the San Pablo Creek basin. Most of the interface is downstream from watershed lands and does not drain onto them. A small area of the city northwest of the San Pablo Reservoir drains into the reservoir. The reservoir and the District watershed lands below it drain into San Pablo Creek, which flows into Richmond.

Although the potential for development anywhere along the Richmond/District watershed interface has implications for managing water quality, fire and fuels, public encroachment, and visual quality of District watershed lands, several areas present special land use management issues.

Carriage Hills. The Carriage Hills area on the eastern edge of Richmond has been permitted to develop to the District property boundary without setbacks at the urban/wildland interface. This development pattern has fire and fuels, public encroachment, wildlife, and visual quality management implications for watershed lands. The area is essentially built out, and no other new development is planned for the area.

Castro Ranch. A development proposal for 149 dwelling units on 33 acres south of Castro Ranch Road near Amend Road was recently denied. Development at this location could occur in the future, however. The form this development takes could have significant implications for fire and fuels management and other facets of interface management (including wildlife habitat and trail alignments).

East of Carriage Hills. The area east of Carriage Hills is designated in the general plan for low-density residential development. Several proposals for the development of this area have been submitted, but none have been approved. Development of this area can be expected in the future, however. As with Castro Ranch, the form this development takes could have significant implications for fire and fuels management and other facets of interface management (including wildlife habitat and trail alignments).

Alameda County

San Leandro

Only a very small portion of the City of San Leandro is in the Chabot Reservoir basin. Most of the city drains into San Leandro Creek and San Francisco Bay. This includes Chabot Park (downstream from Chabot Dam), which is owned

by the District but leased to the City of San Leandro for a day-use park. Residents of neighboring areas have complained about the negative effect park users have on the neighborhood, including late-night activities and disturbances, for the past 30 years. The city is looked upon as the responsible land management agency in this case.

East Bay Regional Park District

Kennedy Grove Regional Park. Kennedy Grove Regional Park adjoins District watershed lands just northeast of San Pablo Dam. Kennedy Grove is well managed by EBRPD for fire and fuels. Kennedy Grove is a source of some public encroachment onto District watershed lands.

General Management Direction

This section describes the general objectives and guidelines for interagency coordination needed to manage the interface between District watershed lands and those of adjacent jurisdictions. (General direction for District watershed lands themselves is provided in Section 3.)

Management of District lands requires coordination with adjacent jurisdictions primarily for protection of water quality and fire and fuels management. Other management issues, such as providing management coordination on adjacent lands for biodiversity protection, visual resource protection, recreation, and property acquisition and disposal, are desirable secondary goals. District-sponsored interagency coordination will take place at three levels: policy, plan implementation, and development proposal and environmental review.

Objectives

- Encourage policy discussions between local jurisdictions to resolve common interface issues, work on revisions to local general plans that address interface issues important to the District, formalize District review and comment on general plan revisions, specific development proposals, and environmental review actions, and promote District participation in overall land use planning and the decision-making processes of adjacent jurisdictions.

- Strengthen the understanding of District staff and staff of adjacent jurisdictions regarding important interface issues.

- Develop mutually agreed-upon interface guidelines that could be incorporated into the planning documents of adjacent jurisdictions, primarily for protection of water quality, emergency response, and fire and fuels management.

MANAGEMENT DIRECTION FOR INTERJURISDICTIONAL COORDINATION

Management Guidelines

Management of District lands requires coordination with adjacent jurisdictions primarily for protection of water quality and fire and fuels management. District-sponsored interagency coordination will take place at three levels: policy, plan implementation, and development proposal and environmental review.

1. Establish and formalize a central point of contact for adjacent jurisdictions wishing to contact the District and for District contacts to adjacent jurisdictions and

2. Formalize an internal procedure for:

   - District staff communication with adjacent jurisdictions and

   - coordinated staff review and comment on planning actions, development proposals, and environmental review in adjacent jurisdictions.

3. Designate key contact individuals as liaisons between the District and adjacent jurisdictions regarding watershed management issues.

4. Establish policy-level contacts with adjacent jurisdictions (e.g., District/EBRPD Liaison Committee) to establish lines of communication, discuss common interface management issues, and determine actions that could be undertaken to address joint management concerns.

5. Establish staff-level contacts with adjacent jurisdictions to review and refine District interface guidelines and to work toward incorporating these guidelines into local general plans.

6. Coordinate with adjacent jurisdictions on the use of the land bridge across Highway 24 (Caldecott Tunnel corridor) to preserve its function as a wildlife corridor.

7. Continue coordination with adjacent jurisdictions and participation in coordinated efforts to maintain communication among agencies with water quality interests related to District-owned watershed lands.

Area-Specific Management Direction

Contra Costa County - Within Basin

Unincorporated

CC.1 Work with Contra Costa County to define a mutually agreeable process for review of planning and land use proposals on District watershed lands that are within the county's jurisdiction.

CC.2 In coordination with the Community of Canyon and Contra Costa County agencies, develop a coordinated process for land use planning and management and land tenure adjustment to improve the effectiveness of fire protection and other resource management programs.

CC.3 Review the lease for the California Shakespeare Festival facility when it comes up for renewal and evaluate how well it meets the guidelines in this management plan. If the lease is renewed, adjust the terms as necessary to meet management guidelines.

CC.4 Coordinate with Contra Costa County on future planning and development of the eastern agricultural interface (i.e., Canyon and Indian Valley areas) to limit degradation of water quality, wildfire hazards, public encroachment, and visual resource degradation at the interface with District watershed lands.

CC.5 Coordinate with Contra Costa County to address water quality issues related to the county pesticide spraying program on roadsides within District reservoir watersheds, particularly San Pablo Dam Road, Bear Creek Road, and Wildcat Canyon Road.

CC.6 Coordinate with nonpoint-source control programs to address water quality concerns.

CC.7 Agree to a policy of nonannexation of privately held parcels within the Briones Hills Agricultural Preservation Area (BHAPA). Consistent with the BHAPA, the District may annex parcels owned by the District or other public agencies. This guideline would remain in force as long as the BHAPA is in effect. Consistent with this guideline, the District endorses the BHAPA agreement.

MANAGEMENT DIRECTION FOR INTERJURISDICTIONAL COORDINATION

Moraga

M.1 Coordinate with the City of Moraga on the planning and development of the Larch Avenue area to limit water quality effects, risk of wildfire, and degradation of views on the Upper San Leandro Reservoir watershed.

M.2 Coordinate with nonpoint-source control programs to address water quality concerns.

Orinda

OR.1 Coordinate with City of Orinda staff on planning and development within the El Toyonal interface to limit the effects of development on water quality, fire and fuels management, public encroachment, degradation of views, and street extensions and to improve public access and egress and emergency access to this area. Support a coordinated county- and city-sponsored process to provide important transportation improvements in this area.

OR.2 Review proposals for use of the Gateway parcel, parcels adjacent to the Gateway parcel, and Bear Creek parcel based on the District's master plan priorities, and deny or discourage proposals that are not consistent with these guidelines.

OR.3 Coordinate with the City of Orinda, EBRPD, and other agencies on use of the Caldecott Tunnel land bridge to encourage preservation of its function as an important wildlife corridor.

OR.4 Coordinate with the City of Orinda to ensure that District priorities regarding water quality and fire and fuels management are considered in plans for development of the Castlegate area.

OR.5 Coordinate with the City of Orinda on the planning and development of ridgeline land uses in the Black Hills and to limit the risk of water quality effects, wildfire hazards, and visual resource degradation in the Briones Reservoir watershed.

OR.6 Coordinate with nonpoint-source control programs to address water quality concerns.

MANAGEMENT DIRECTION FOR INTERJURISDICTIONAL COORDINATION

Alameda County - Within Basin

Unincorporated

AC.1 Work with Alameda County to define a mutually agreeable process for review and approval of planning and land use proposals on District watershed lands that are within the county's jurisdiction.

AC.2 Coordinate with Alameda County on the planning and development of the eastern agricultural interface (i.e., Cull Canyon area) to limit degradation of water quality, risk of wildfire, public encroachment, and degradation of views on District watershed lands and the regional visual landscape.

AC.3 Coordinate with Alameda County to address water quality issues related to the county pesticide spraying program on roadsides within District reservoir watersheds, particularly Redwood Road and Lake Chabot Road.

AC.4 Coordinate with nonpoint-source control programs to address water quality concerns.

Oakland

O.1 Coordinate with the City of Oakland to ensure that the Lake Chabot Municipal Golf Course is managed to minimize all water quality effects on Chabot Reservoir.

O.2 Coordinate with the City of Oakland regarding any future development along Grizzly Peak Boulevard that would require fire hazard mitigation on District watershed land inside the Caldecott Tunnel corridor.

East Bay Regional Park District

EB.1 Coordinate with EBRPD on the planning and management of all regional parks that are within or coincident with District reservoir watersheds to address issues pertaining to water quality, wildfire, public encroachment, viewshed, and wildlife movement in the Caldecott Tunnel corridor.

EB.2 Review the leases for Chabot Reservoir and Willow Park Golf Course when they are to be renewed, and evaluate them in the context of District priorities. If the leases are renewed, adjust the terms as necessary to be consistent with management plan guidelines. Resolve any outstanding issues related to facility ownership.

EB.3 Coordinate with nonpoint-source control programs to address water quality concerns.

Contra Costa County - Outside Basin

Hercules

H.1 Coordinate with the City of Hercules on the development of neighborhood connectors to the Bay Area Ridge Trail.

Pinole

P.1 Coordinate with the City of Pinole to ensure that District interests are protected in plans for the Doidge-Wright Estate and when development proposals for the area are being formulated (including urban/wildland interface setbacks on private land).

P.2 Coordinate with Pinole on the planning and management of Pinole Valley Park to limit the risk of wildfire, public encroachment, and degradation of views in the area.

P.3 Coordinate with the City of Pinole on the development of neighborhood connectors to the Bay Area Ridge Trail.

Richmond

R.1 Coordinate with the City of Richmond to develop methods for reducing the potential wildfire hazard in the Carriage Hills area.

R.2 Coordinate with the City of Richmond to ensure that District interests are protected in planning for development of the Castro Ranch area and an area east of the Carriage Hills development (including urban/wildland interface setbacks on private land).

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Photographs and GIS Mapping Credits

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