CHAPTER 2
Project Description

This chapter contains the following sections:

Background reports used to prepare this chapter include the *Lamorinda Water System Improvement Program Facilities Plan* (Facilities Plan; EBMUD, 2005a, 2006) and related reports, draft Pressure Zone Planning Program (PZPP) studies (EBMUD, 2003a, 2003b, 2004, and 2005b–2005f), and the *Draft Water Treatment and Transmission Improvements Program Lamorinda Tunnel Conceptual Study* (Jacobs Associates, 2005).

2.1 Overview of the Alternatives

The Water Treatment and Transmission Improvements Program (WTTIP) includes new facilities and upgrades to existing facilities, primarily in Lafayette, Moraga, Orinda, and Walnut Creek. The East Bay Municipal Utility District (EBMUD) formulated and evaluated a series of alternatives addressing systemwide water treatment and distribution needs and identified other improvements needed to serve current and future customers.

This environmental impact report (EIR) evaluates, at a project level of detail, the following WTTIP alternatives:

- Alternative 1 – Supply from Orinda and Lafayette WTPs (preferred alternative)
- Alternative 2 – Supply from Orinda WTP

The fundamental difference between these alternatives is whether the Lafayette Water Treatment Plant (WTP) is retained and upgraded (Alternative 1) or decommissioned (Alternative 2). Table 2-1 lists the projects associated with these alternatives. (Refer to the page number references in Table 2-1 to proceed directly to descriptions of specific WTTIP projects.) As shown in the table, there are a number of other projects involving treatment plant facilities and transmission and distribution system pipelines, pumping plants, and reservoirs.

TABLE 2-1
WTTIP PROPOSED FACILITY LOCATIONS

Facility	Project Location	Address or Nearest Intersection	Page	Map Code
Lafayette Water Treatment Plant (WTP)[a]	Lafayette	3848 Mt. Diablo Boulevard	2-29	LWTP
Orinda WTP[a]	Orinda	190 Camino Pablo	2-42	OWTP
Walnut Creek WTP[a]	Walnut Creek	2201 Larkey Lane	2-47	WCWTP
Sobrante WTP[a]	Contra Costa County	5500 Amend Road	2-50	SOBWTP
Upper San Leandro WTP[a]	Oakland	7700 Greenly Drive	2-54	USLWTP
Orinda-Lafayette Aqueduct	Orinda/Lafayette	Tunnel from Orinda Sports Field near Orinda WTP to intersection of East Altarinda Drive and St. Stephens Drive; Pipeline: along El Nido Ranch Road from St. Stephens Drive to Mt. Diablo Boulevard, along Mt. Diablo Boulevard from El Nido Ranch Road to 3848 Mt. Diablo Boulevard	2-61	OLA
Project-Level Transmission and Distribution System Improvements Common to Both Alternatives				
Ardith Reservoir and Donald Pumping Plant[a]	Orinda	At existing Donald Pumping Plant near Ardith Drive and Westover Court	2-67	ARRES
Fay Hill Pumping Plant and Pipeline Improvements[a]	Moraga	Pumping Plant: southwest corner of intersection of Rheem Boulevard and Moraga Road; Pipeline: Rheem Boulevard west of Chalda Way	2-71	FHPP
Fay Hill Reservoir[a]	Moraga	At existing Fay Hill Reservoir site off of Fay Hill Road near Rheem Boulevard	2-72	FHRES
Glen Pipeline Improvements and Glen Reservoir Decommission[a]	Lafayette	Nordstrom Lane from Hilltop Drive to Glen Road, Glen Road from Nordstrom Lane to just west of Monticello Road; Monticello Road north of Presher Way	2-73	GLENPL
Happy Valley Pumping Plant and Pipeline	Orinda	Pumping Plant: on Lombardy Lane near Van Ripper Lane; Pipeline: from pumping plant southwest on Lombardy Lane to Miner Road, then southwest on Miner Road to Oak Arbor Road	2-74	HVPP
Highland Reservoir and Pipelines	Lafayette	Lafayette Reservoir Recreation Area; Pipeline: from reservoir to Mt. Diablo Boulevard	2-75	HIGHRES
Lafayette Reclaimed Water Pipeline	Lafayette	Lafayette WTP; Pipeline: from Lafayette WTP to Highland Reservoir overflow/drain pipeline	2-40	-- [b]
Leland Pressure Zone Isolation Bypass Valves[a]	Walnut Creek	Danville Boulevard near Rudgear Road	2-77	LELPL
Leland Isolation Pipeline	Walnut Creek	Lacassie Drive from North California Street to North Main Street	2-77	LELPL
Moraga Reservoir[a]	Moraga	At existing Moraga Reservoir near Draeger Drive and Claudia Court	2-78	MORRES

[a] Existing EBMUD facility.
[b] The Lafayette Reclaimed Water Pipeline would be co-located with other pipelines (refer to HIGHRES maps).
[c] No conceptual design has been completed for program-level facilities. Refer to topographic maps (Maps C) for facility locations.

TABLE 2-1 (Continued)
WTTIP PROPOSED FACILITY LOCATIONS

Facility	Project Location	Address or Nearest Intersection	Page	Map Code
Moraga Road Pipeline	Lafayette/Moraga	Northern edge of Lafayette Reservoir Recreation Area, Moraga Road from Nemea Court/Madrone Drive to Draeger Drive	2-79	MORPL
Sunnyside Pumping Plant and Pipeline	Orinda/Lafayette	Pumping Plant: Happy Valley Road near Sundown Terrace; Pipeline: pumping plant to Happy Valley Road	2-81	SUNPP
Tice Pumping Plant and Pipeline	Contra Costa County	Pumping Plant: near Tice Valley Boulevard and Olympic Boulevard; Pipeline: from pumping plant across Olympic Boulevard, north on Boulevard Way to Warren Road	2-82	TICEPP
Withers Pumping Plant	Contra Costa County	At Grayson Reservoir near Reliez Valley Road and Silver Hill Way	2-83	WITHPP
Program-Level Transmission and Distribution System Improvements Common to Both Alternatives				
Leland Reservoir Replacement[a]	Lafayette	Opposite 1050 Leland Drive	2-85	-- [c]
New Leland Pressure Zone Reservoir and Pipeline	Walnut Creek / Contra Costa County	Reservoir: Caltrans property adjacent to I-680; Pipeline: from reservoir northwest to Danville Boulevard near Rudgear Road	2-85	NLELRES[c]
St. Mary's Road/Rohrer Drive Pipeline	Moraga / Lafayette / Walnut Creek	Tentative location: Moraga Road south from Draeger Drive to St. Mary's Road, northeast on St. Mary's Road to Rohrer Drive	2-86	-- [c]
San Pablo Pipeline	Orinda / Contra Costa County / Richmond	Tentative location: Orinda WTP east to Old San Pablo Dam Road to San Pablo Tunnel; through tunnel to San Pablo WTP	2-86	-- [c]

[a] Existing EBMUD facility.
[b] The Lafayette Reclaimed Water Pipeline would be co-located with other pipelines (refer to HIGHRES maps).
[c] No conceptual design has been completed for program-level facilities. Refer to topographic maps (Maps C) for facility locations.

2.1.1 Alternative 1 – Supply from Orinda and Lafayette WTPs

This preferred alternative involves retaining and upgrading the Lafayette WTP. This plant typically supplies water to the Lafayette, Moraga, Orinda, and Walnut Creek area from March through November; the Orinda WTP supplies water to this area in winter. Almost all water treatment processing systems at the Lafayette WTP would be renovated and expanded. Under this alternative, there would also be upgrades at the Orinda, Walnut Creek, Sobrante, and Upper San Leandro WTPs; the proposed changes at these WTPs generally involve improvements to one or more water treatment processes to improve water quality and upgrade equipment.

2.1.2 Alternative 2 – Supply from Orinda WTP

Under Alternative 2 – Supply from Orinda WTP, the Lafayette WTP would be decommissioned, and the customers currently served by that plant[1] would instead receive water from the Orinda WTP year-round. EBMUD would modify Orinda WTP operations and construct a new treated water storage facility (clearwell), pumping plant, and combination tunnel/pipeline (referred to as the Orinda-Lafayette Aqueduct) to convey treated water to Lafayette for distribution. Under Alternative 2, proposed changes to the Walnut Creek, Sobrante, and Upper San Leandro WTPs would basically be the same as proposed under Alternative 1, although the proposed sizes of some facilities at the Sobrante and Upper San Leandro WTPs would be somewhat bigger.

2.1.3 Overview of Project-Level and Program-Level Improvements

The WTTIP includes project-level improvements (evaluated in detail in the EIR) and program-level improvements (evaluated more generally). Table 2-1 lists the project-level and program-level transmission and distribution system improvements; Table 2-2 distinguishes specific processes and facilities at the WTPs that are evaluated at a project level of detail from those that are evaluated at a program level of detail. Generally, program-level improvements are projects that EBMUD might implement sometime in the future, depending on (for example) changing water quality regulations, changing source water quality, and/or increases in demand for treated water. Some program-level improvements also depend on whether Alternative 1 or Alternative 2 is ultimately selected. For example, potential future water treatment processes at the Lafayette WTP (high-rate sedimentation and ultraviolet-light disinfection) would only be constructed if Alternative 1 is approved for implementation and if warranted by future changes in drinking water regulations. The District will undertake further environmental review pursuant to the California Environmental Quality Act (CEQA) as the need arises to design and implement these program-level components. There are project-level and program-level improvements at three of the WTPs: Lafayette (Alternative 1), Orinda (Alternative 1 or 2), and Walnut Creek (Alternative 1 or 2).

The following sections describe the need for and scope of proposed project-level and program-level improvements at the WTPs and other facilities.

1 The areas served by the Lafayette WTP (during warm-weather demand conditions) include portions of the following communities: Lafayette, Moraga, Orinda, and Walnut Creek.

TABLE 2-2
SUMMARY OF WTTIP ALTERNATIVES 1 AND 2
WATER TREATMENT PLANT IMPROVEMENTS

Facility and Project	Alternative 1 (Preferred)		Alternative 2	
	Project Level	Program Level	Project Level	Program Level
Lafayette WTP				
Capacity[a]	Increase from 25 to 34 mgd		Decrease from 25 to zero mgd	
Clearwells	■			
Chlorine Contact Basin	■			
Backwash Water Recycle System[b]	■			
Sodium Hypochlorite Storage and Feed	■		■	
Raw Water Bypass Pipe	■			
Leland and Bryant Pumping Plants	■			
Electrical Substation	■			
Emergency Generator	■			
Lafayette Reclaimed Water Pipeline	■			
High-Rate Sedimentation Units		■		
Ultraviolet Light Disinfection		■		
Walter Costa Trail Relocation				
Orinda WTP				
Capacity[a]	175 mgd (no change)		No change, but plant would need to operate at 180 mgd during peak demand periods	
Backwash Water Recycle System[b]	■		■	
Clearwell[d]		■	■	■
Los Altos Pumping Plant No. 2			■	
San Pablo pumping plant and pipelines		■		■
Low Lift Pumping Plant		■		■
Orinda-Lafayette Aqueduct			■	
Electrical Substation		■	■	
Emergency Generator	■		■	
High-Rate Sedimentation Units		■		■
Chlorine Contact Basin		■		■
Ultraviolet Light Disinfection		■		■
Walnut Creek WTP[a]				
Capacity	Plant operating capacity would increase to 115 mgd[c]		Plant operating capacity would increase to 115 mgd[c]	
Leland Pumping Plant No. 2	■		■	
UV Disinfection		■		■
High-Rate Sedimentation Units		■		■
Sobrante WTP				
Ozone Upgrades	■		■	
Filter-to-Waste Equalization Basin	■		■	
Backwash Water Equalization Basin	■		■	
High-Rate Sedimentation Units	■		■	
Chlorine Contact Basin	■		■	
Upper San Leandro WTP				
Ozone Upgrades	■		■	
Filter-to-Waste Equalization Basin	■		■	

[a] WTP capacity values are for maximum-day operating capacity during warm-weather demand conditions.
[b] The backwash water recycle system may include the following facilities: filter-to-waste equalization basin, backwash water waste equalization basin, flocculation and sedimentations basins, UV disinfection building, solid storage tank and pumping plant, chemical storage and feed room, and electrical room.
[c] To meet peak-hour demands, the plant must operate up to 115 mgd for a few hours each day. Maximum daily demand remains at 96 mgd.
[d] Orinda WTP, Alternative 1, Program Level includes 2 clearwells

2.2 Project Background, Need, and Objectives

2.2.1 Project Background

Service Area

EBMUD provides water service to 20 incorporated cities and 15 unincorporated areas in Alameda and Contra Costa Counties. EBMUD's water system serves approximately 1.3 million people in a 325-square-mile area. The Oakland-Berkeley Hills divide EBMUD's service area into the West of Hills and East of Hills service areas. Figure 2-1 shows the District's water service area, the water treatment plants, major raw (untreated) water transmission facilities, and raw water reservoirs in the service area.

Overview of Existing Water System Operations

Water Supply[2]

EBMUD's primary water source is the Mokelumne River. The Mokelumne River watershed is on the west slope of the Sierra Nevada and is generally contained within national forest or other undeveloped lands. Mokelumne River water is stored at the Pardee and Camanche Reservoirs, about 40 miles northeast of the city of Stockton.[3] Raw water from the Pardee Reservoir is conveyed to EBMUD's service area and terminal storage reservoirs via the Mokelumne Aqueducts. The Mokelumne Aqueducts begin at the Pardee Tunnel (in Campo Seco) and terminate approximately 80 miles to the west, at the Lafayette Aqueducts in Walnut Creek. Mokelumne Aqueducts No. 1 and No. 2 combine to become Lafayette Aqueduct No. 1, and Mokelumne Aqueduct No. 3 becomes Lafayette Aqueduct No. 2.

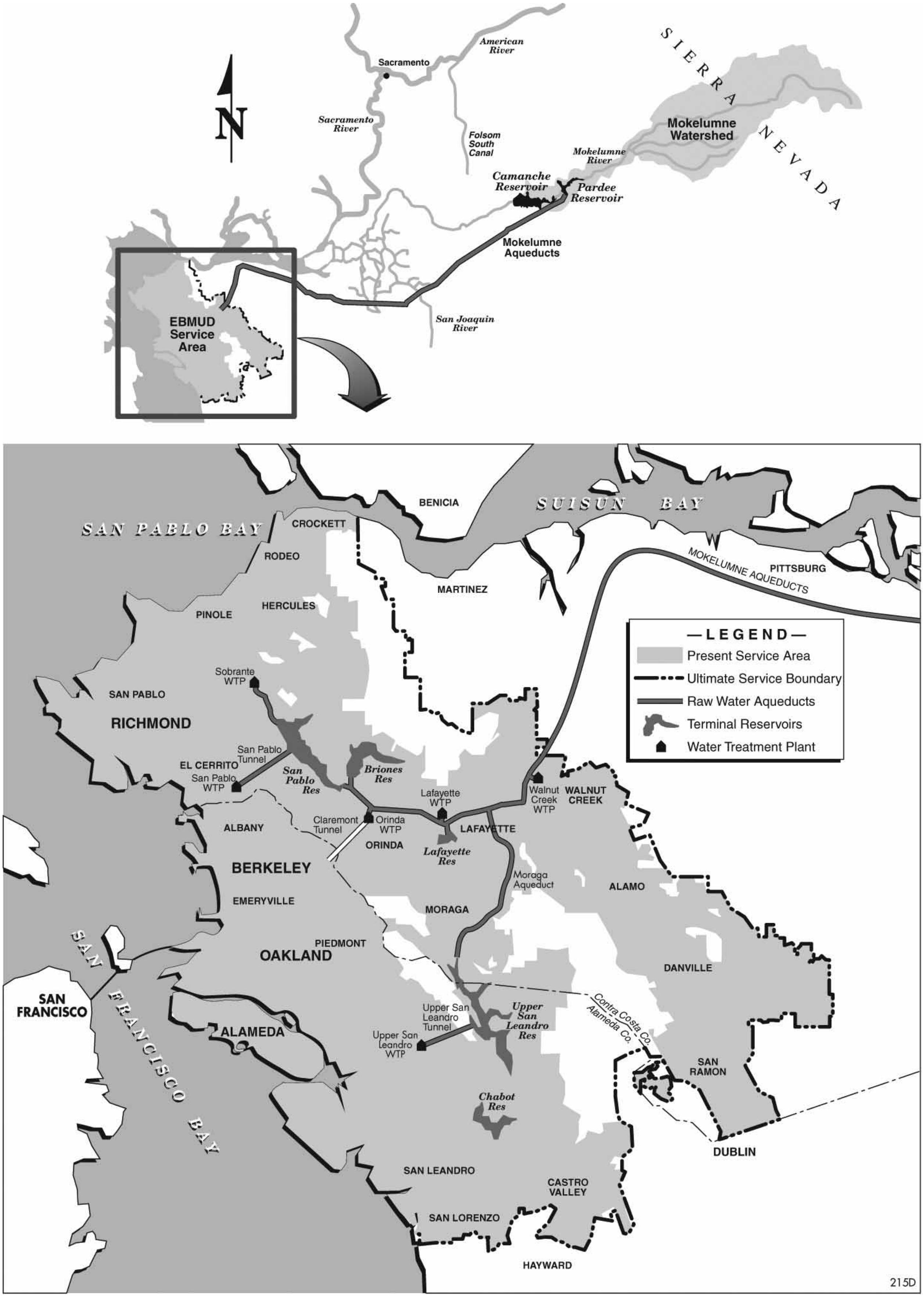
Water Treatment

EBMUD operates six water treatment plants: Walnut Creek, Lafayette, Orinda, Sobrante, Upper San Leandro, and San Pablo. Together the WTPs treat an average-annual demand of 222 million gallons per day (mgd).[4] Figure 2-2 depicts the service area boundaries for the WTPs (based on summer demand conditions) as well as major transmission mains that carry treated water. There is substantial overlap in the service areas of the Sobrante, Orinda, and Upper San Leandro WTPs as well as between the service areas of the Lafayette and Orinda WTPs. This overlap notwithstanding, on any given day, production from one WTP could offset some or all of the production from another. In the spring, summer, and fall all but the San Pablo WTP must be operated to meet demands. No service area is shown for the San Pablo WTP because it is a standby facility used only during planned outages of key facilities.

2 EBMUD is developing projects to manage future water supply needs and is currently implementing numerous water conservation and recycling programs to reduce demand. Water supply projects in the planning phase include use of local groundwater supplies and surface water from the Sacramento River at Freeport during droughts.

3 The Camanche Reservoir, which is part of an integrated operation, stores water for irrigation and stream-flow regulation, providing flood control and water to meet the needs of downstream water-rights holders.

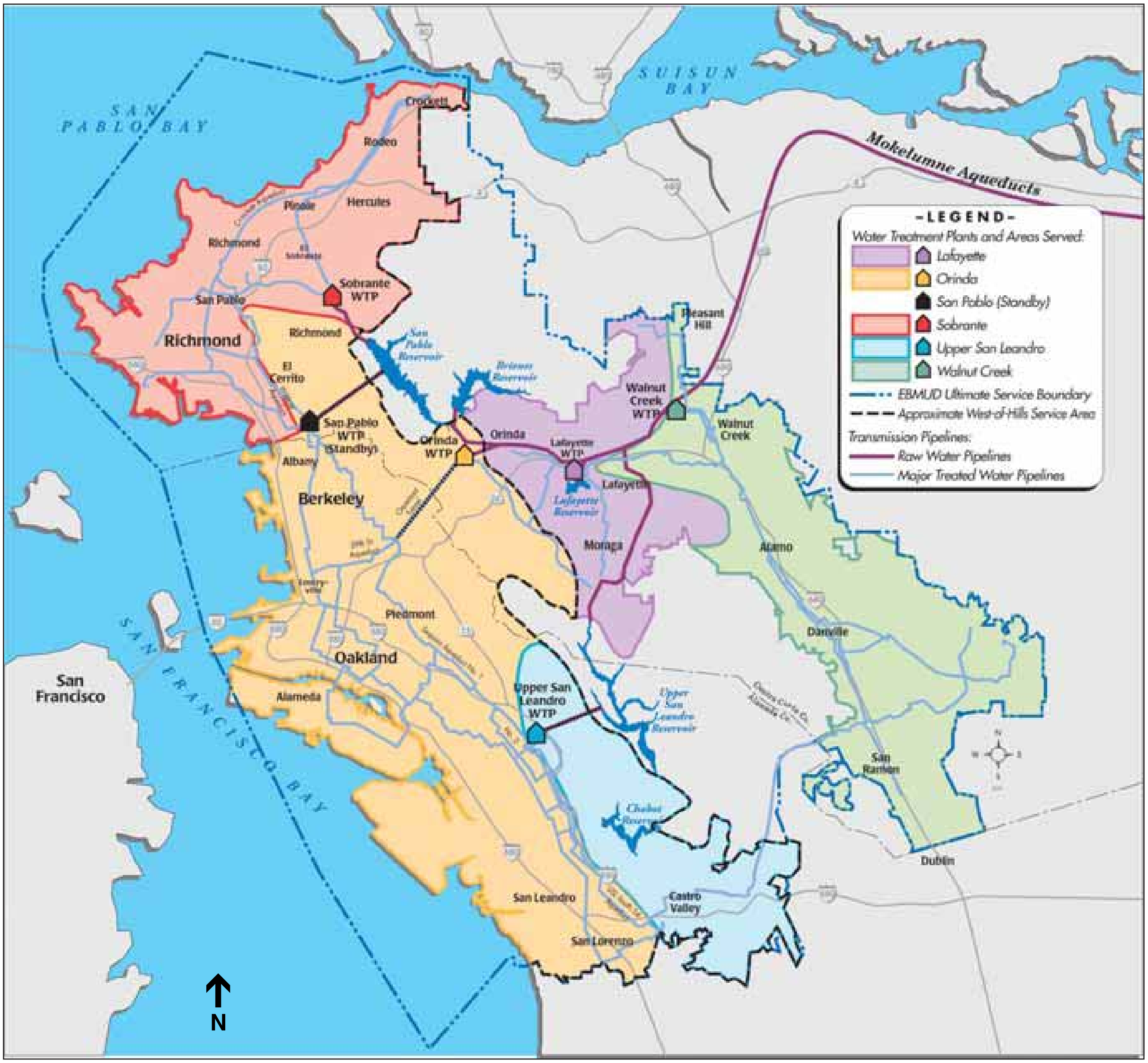
4 2006 projected average-annual demand.



SOURCE: EBMUD

EBMUD Water Treatment and Transmission Improvements Program . 204369

Figure 2-1
EBMUD Service Area



NOTE: Represents summer demand conditions.

SOURCE: EBMUD

EBMUD Water Treatment and Transmission Improvements Program . 204369

Figure 2-2
E isting Water Treatment P ant Service Area Bo ndaries

As discussed below under "Overview of Water Treatment Processes," water from the Pardee Reservoir requires less treatment than the water supply that originates within the watershed areas of the local terminal reservoirs (e.g., San Pablo Reservoir) or that has been stored there. Achieving the desired water quality through treatment of water from the terminal storage reservoirs is more difficult and costly than using water from the Pardee Reservoir. Consequently, EBMUD has for years relied more heavily on the Orinda, Lafayette and Walnut Creek WTPs than on other sources during day-to-day operations. Each of the six plants is described below.

- *Walnut Creek WTP*. The Walnut Creek WTP receives raw water directly from the Pardee Reservoir via the Mokelumne Aqueducts. Water is diverted out of the Mokelumne Aqueducts downstream of the Walnut Creek Pumping Plants.[5] The Walnut Creek WTP provides treated water to the Walnut Creek/San Ramon Valley area, as shown on Figure 2-2. The plant has recently undergone major reconstruction of treatment and storage facilities (completed in 2006).

- *Orinda WTP*. EBMUD's largest WTP, the Orinda WTP treats water from the Lafayette Aqueducts, much of which in the summer is sent to the West of Hills service area via the Claremont Tunnel (see Figure 2-2). A small portion of the Orinda summertime production serves the Lamorinda area. During the winter months, all of the Lamorinda area is served by the Orinda WTP. Like the Walnut Creek and Lafayette WTPs, the Orinda WTP receives water directly from Pardee Reservoir.

- *Lafayette WTP*. The Lafayette Aqueducts supply raw water to the Lafayette WTP. The two aqueducts pass through the plant westward to the Orinda WTP and Briones Reservoir. Water treated at the Lafayette WTP is distributed to the central part of the service area (see Figure 2-2). As described below, the current capacity of the plant is not adequate to meet existing or future summertime demand, and major repairs and upgrades are needed.

- *Sobrante WTP*. The Lafayette Aqueducts and local creeks supply water to the San Pablo Reservoir, which supplies the Sobrante WTP. Water treated at the Sobrante WTP is distributed to the northern part of the service area (Pinole, Hercules, Richmond, El Sobrante, Rodeo, and Crockett).

- *Upper San Leandro WTP*. The Lafayette Aqueducts and local creeks supply water to the Upper San Leandro Reservoir, which supplies the Upper San Leandro WTP via the tunnel of the same name. Water treated at the Upper San Leandro WTP is distributed to the southern part of the service area (San Leandro, Castro Valley, and south Oakland).

- *San Pablo WTP*. The San Pablo WTP is not used on a regular basis. It has been used intermittently to support planned outages of other facilities, such as the Claremont Tunnel when it was taken out of service in 2002 (for inspection repairs) and in 2004/2005 for tunnel seismic upgrades. It will again be used in the winter of 2006/2007 while the Claremont Tunnel upgrades are completed. When operating, this WTP treats water from the San Pablo Reservoir (via the San Pablo Tunnel).

Treated Water Transmission and Distribution

The facilities described above (and shown in Figures 2-1 and 2-2) constitute the backbone of the EBMUD water treatment and transmission system. Throughout the water system there are over

5 The Walnut Creek Pumping Plants (Nos. 1, 2, and 3), near the terminus of the Mokelumne Aqueducts, are operated as needed to increase the flows in the Mokelumne Aqueducts.

4,000 miles of potable (treated) water distribution pipelines, over a dozen tunnels, 175 potable water reservoirs, approximately 150 pumping plants, and numerous other facilities that together provide water to EBMUD customers.

Pressure Zones

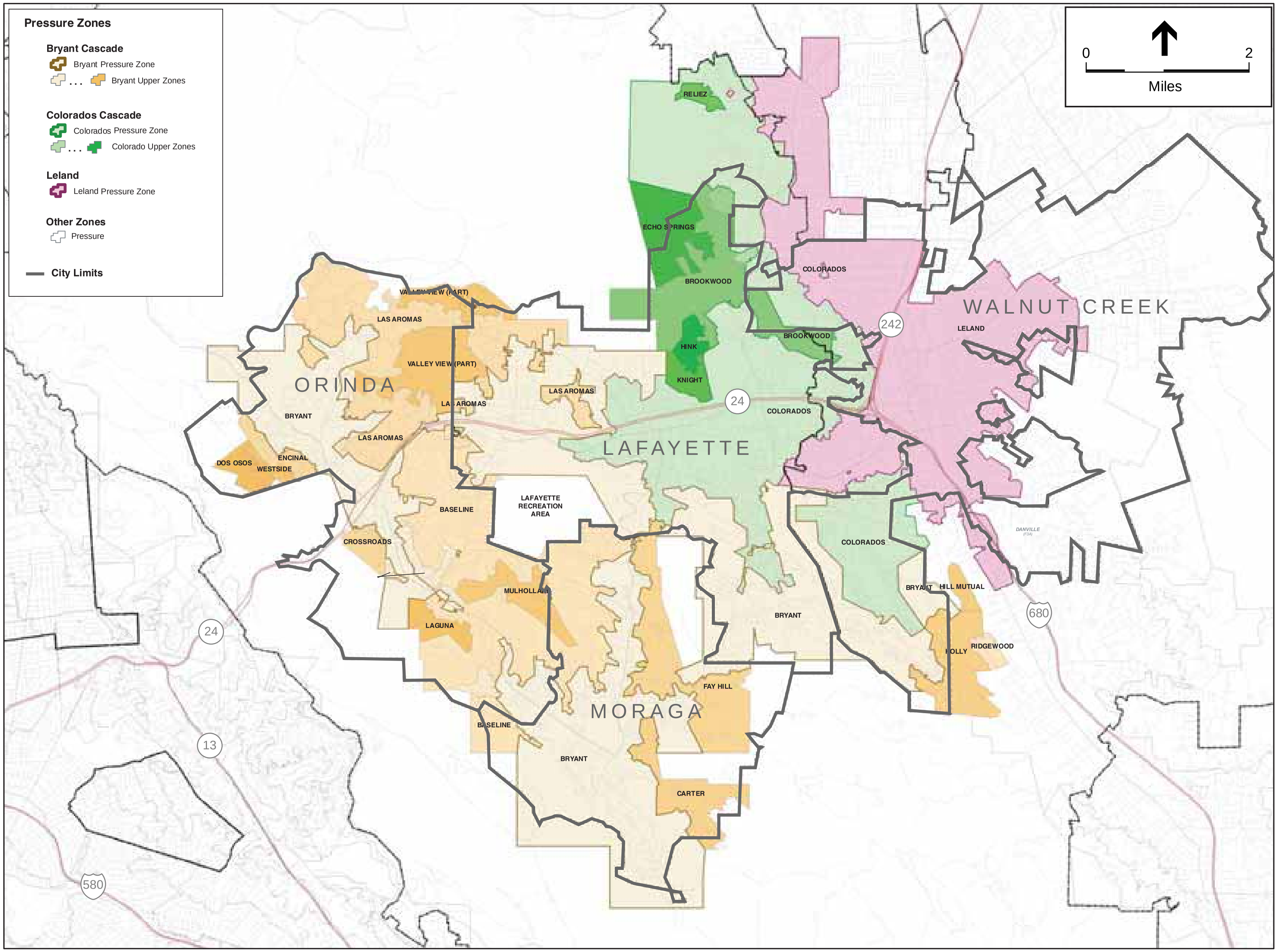
EBMUD's service area is divided into 122 pressure zones ranging in elevation from sea level to 1,450 feet. A pressure zone is an area within a specified elevation range (e.g., 250 to 450 feet) where storage and distribution facilities are designed to deliver water at a pressure range suitable for customer use. Figure 2-3 shows the pressure zones in the Lamorinda/Walnut Creek area. The major pressure zones serving this area are Leland, Bryant, and Colorados. Numerous smaller zones at higher elevations are served from these major zones via pumping plants; these smaller zones stair-step up the hills and are sometimes referred to as pressure zone cascades.

Coordination among facilities in different pressure zones is important for maintaining system operations. Figure 2-4 displays some basic facilities serving each pressure zone. Generally, the pumping plant(s) in one pressure zone will pump water up to reservoirs in the next higher zone. Pumping plants in that higher pressure zone will in turn pump water up to higher zones. Reservoirs in higher zones provide water by gravity flow to lower-elevation pressure zones. The WTTIP includes numerous pipeline, reservoir, and pumping plant projects that address specific needs for pressure zones in the Lamorinda/Walnut Creek area.

Overview of Water Treatment Processes

Raw water contains impurities such as sediment, bacteria, algae, and other microorganisms. The levels of these impurities vary depending on the water source and determine the extent of water treatment processes needed. The primary goal of water treatment is to minimize or eliminate the potential for disease from waterborne pathogens. Pathogen reduction regulations require a multi-barrier approach, including disinfection, filtration, as well as protection of source water. Figure 2-5 describes the existing treatment processes at the WTPs.

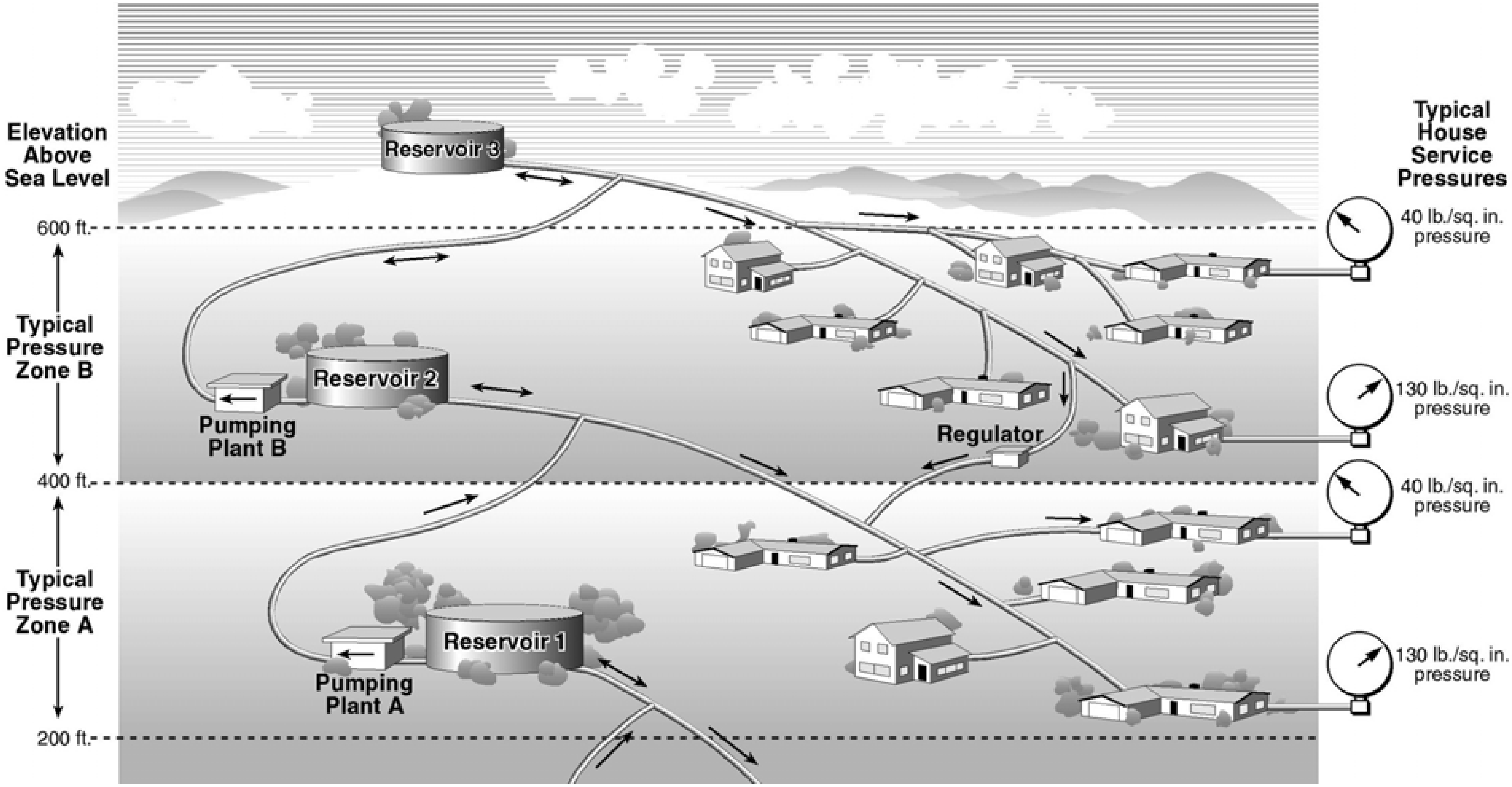
Full conventional treatment (treatment process train) consisting of five basic steps—coagulation, flocculation, sedimentation, filtration, and disinfection—is used at three of the water treatment plants: Upper San Leandro, San Pablo, and Sobrante. The Upper San Leandro and Sobrante WTPs conduct an additional step (ozonation) for taste and odor control. The water sources for these WTPs are East Bay reservoirs, which have higher levels of sediment and algae than Pardee Reservoir. (High algae levels can create a grassy taste or smell in treated water.) The Upper San Leandro, San Pablo, and Sobrante WTPs are referred to as "conventional" WTPs. The Orinda, Lafayette, and Walnut Creek WTPs use only coagulation, filtration, and disinfection processes for raw water because their source water comes directly from Pardee Reservoir via the Mokelumne Aqueducts and needs less treatment; the treatment process at these WTPs is referred to as "in-line filtration." Whether a conventional WTP or an in-line WTP, the California Department of Health Services (DHS) requires disinfection as part of a multi-barrier treatment approach to eliminating pathogens. One of the goals of the WTTIP involves improving the disinfection processes for the Lafayette, Orinda, Upper San Leandro, and Sobrante WTPs. Disinfection processes at the Walnut Creek WTP were recently upgraded.



SOURCE: EBMUD

EBMUD Water Treatment and Transmission Improvements Program . 204369

Figure 2-3
Pressure Zone Map



SOURCE: EBMUD

EBMUD Water Treatment and Transmission Improvements Program . 204369

Figure 2-

Press re one Diagram

2.2.2 Need for the Project

WTTIP improvements are driven by a variety of overlapping needs, including meeting existing and future water demands, meeting future regulatory standards related to water quality, complying with environmental permit conditions, and replacing and upgrading aging infrastructure. These needs are discussed in the following section and are summarized in Table 2-3. The needs specifically addressed by proposed improvements at each WTP are discussed in Sections 2.4 and 2.5; the needs specifically addressed by each water transmission and distribution system improvement (common to both WTTIP alternatives) are discussed in Section 2.6.

Water Demands

The WTTIP includes projects to address existing capacity deficiencies in the Lamorinda/Walnut Creek area as well as anticipated future (to 2030) capacity needs.

Customer need for water varies substantially on a seasonal and daily basis, and water facility sizing must account for actual water delivery requirements, including the peak hours of maximum-day demands as well as unaccounted-for water (e.g., leakage and firefighting), variations in pumping demand conditions, and system outages for planned and unplanned emergencies. WTPs may have to operate at higher rates than the daily demand capacity during peak periods in order to meet short-term water delivery requirements (WTP operational capacity).

For this analysis, 2030 maximum-day demand projections were developed based on the *Districtwide Update of Water Demand Projections* (EBMUD and Montgomery Watson, 2000). The projections were refined through further study in the Lamorinda area, resulting in a Districtwide WTP maximum-day demand of 363 mgd. These demands, allocated by water treatment plant service area (WTP demand capacities[6]), are shown in Table 2-4.

The capacity of some facilities serving the Lamorinda/Walnut Creek area is already insufficient to reliably meet summer demands; the Lafayette WTP is the most critical capacity-deficient facility serving the area. The current maximum sustainable operating capacity of the plant is 25 mgd with all available functioning filters, while the current service area maximum-day demand is over 30 mgd. The demand capacity will need to increase to 34 mgd to reliably meet future demand.

Under Alternative 1, the capacity of the Lafayette WTP would be expanded to meet this need and would include additional operational capacity to meet short-term water delivery requirements. Under Alternative 2, the Orinda WTP would meet this need. Under either Alternative 1 or 2, the Walnut Creek WTP operational capacity must be increased to meet short-term water delivery requirements for the Leland Pressure Zone.

6 Demand capacity is the capacity needed at a WTP to meet projected 2030 maximum-day demand for that plant's service area.

Water Treatment Plant	Raw Water Treatment								Backwash Water Treatment					
	Coagulation	Flocculation/ Sedimentation or High Rate Sedimentation	Ozonation	Filtration	Disinfection	Chlorine Contact Basin	Clearwell	Chemical Feed Systems	Backwash Water Equalization Basin	Filter-to-Waste Equalization Basin	Flocculation/ Sedimentation or High Rate Sedimentation	Ultraviolet Light Disinfection	Backwash Water Settling Basin	Sludge Storage and Disposal
Lafayette	■	– –	– –	■	■	– –	■	■	■	– –	■	– –	– –	■
Orinda	■	– –	– –	■	■	– –	– –	■	– –	– –	– –	– –	■	■
Walnut Creek	■	– –	– –	■	■	■	■	■	■	■	■	■	– –	■
Sobrante	■	■	■	■	■	– –	■	■	– –	– –	– –	– –	■	■
Upper San Leandro	■	■	■	■	■	■	■	■	– –	– –	– –	– –	■	■

COAGULATION
Coagulation is a chemical process to induce particles suspended in the water to settle out. Chemicals are added to reduce or eliminate interparticle forces. Coagulants such as polyaluminum chloride, alum, and polymers typically are added upstream of the rapid-mix structures where coagulation occurs to facilitate the process.

FLOCCULATION/SEDIMENTATION
Following coagulation, water is gently mixed in flocculation basins to accelerate the rate of particle collisions, causing smaller particles to combine into larger particles ("flocs") of sufficient size to be settled or filtered out. In sedimentation basins the flocs settle out, forming sludge and clarified fluid. High-rate sedimentation units perform the same function as conventional flocculation/sedimentation basins but require less space. At the Lafayette WTP, this process occurs in the "backwash water clarification basin." (Clarification basins perform the same function as flocculation/sedimentation basins but are circular instead of rectangular.)

OZONATION
Ozonation is a disinfection process that uses ozone gas (O3) to inactivate or destroy pathogenic organisms and to oxidize taste-and odor-causing compounds. Ozonation systems generate ozone from a feed gas (air or liquid oxygen) and feed the ozone into a contact chamber. In the chamber, ozone and its decomposition products oxidize/destroy the cellular material of pathogenic organisms and taste- and odor-causing compounds. The off-gases from the contact chamber are treated to destroy residual ozone before release into the atmosphere.

FILTRATION
Filtration is a physical/chemical process whereby the coagulated or settled water leaving the rapid-mix structure flows by gravity through a layer of sand and/or anthracite. Particles are trapped as water passes through the filter media.

DISINFECTION, ULTRAVIOLET LIGHT (UV) DISINFECTION
The purpose of disinfection is to minimize or eliminate the potential for disease from waterborne pathogens. Sodium hypochlorite is the primary disinfectant used at the District's WTPs and is added at the head of the plant and/or after backwash water sedimentation or filtration. At the Walnut Creek WTP, water decanted from the backwash water sedimentation basin is disinfected by ultraviolet light (UV). UV disinfection is a physical (rather than chemical) process used to inactivate or destroy pathogenic organisms. UV disinfection systems transfer electromagnetic energy from a mercury arc lamp to an organism's genetic material, thereby destroying a cell's ability to reproduce.

CHLORINE CONTACT BASIN
Chlorine contact basins provide disinfection contact time between free chlorine (sodium hypochlorite) and water for disinfection. Placing a basin after filtration allows for the removal of organics through sedimentation and filtration prior to chlorination, which reduces the formation of disinfection byproducts.

CLEARWELL
A clearwell is a reservoir used to hold treated water prior to its release into the distribution system.

CHEMICAL FEED SYSTEMS
Chemicals are used at various points in the water treatment process: to facilitate coagulation and flocculation, to disinfect raw water, to adjust the pH of finished water, and to provide fluoridation. The components of WTP chemical feed systems include storage tanks, pumps, chemical mixing equipment, and piping. Chemical buildings include a central control room for chemical feed operations, chemical storage areas, and electrical and control equipment.

BACKWASH WATER EQUALIZATION BASIN
WTP operators periodically clean filters by backwashing them with water (or a mixture of air and water) to flush out particles and prevent the filters from clogging. The backwash water is stored in the equalization basins before being treated in settling basins or in flocculation/sedimentation basins. The backwash water is flocculated (with the addition of coagulants) and settled in basins; the supernatant or decant water is removed. At the Walnut Creek, Sobrante and Upper San Leandro WTPs, the decant water is recycled to the head of the plant. At the Lafayette WTP, the decant water is pumped into Lafayette Aqueduct No. 2. At the Orinda WTP, the decant water is dechlorinated and discharged to San Pablo creek.

FILTER-TO-WASTE EQUALIZATION BASIN
After a filter is backwashed, WTP operators put the filter back in service. The filtered water produced during the first 15-20 minutes after a filter is returned to service tends to have somewhat elevated turbidity and particle levels. "Filter-to-Waste" is a strategy to reduce that turbidity and particles by storing the first 15-20 minutes of post-backwash filtered water in a Filter-to-Waste Equalization Basin. The water from the basin is then recycled back to the head of the plant.

SLUDGE STORAGE AND DISPOSAL
Sludge generated from backwash water processing is stored in tanks or basins before being trucked to the EBMUD Wastewater Treatment Plant (Walnut Creek, Lafayette, and Orinda WTPs) or discharged to the local sanitary sewer (Sobrante and Upper San Leandro WTPs).

SOURCE: EBMUD and ESA

Figure 2-
E isting Water Treatment P ant Processes

TABLE 2-3
SUMMARY OF NEED ADDRESSED BY SPECIFIC WATER TREATMENT IMPROVEMENT PROJECTS

Facility and Project	Demand	Disinfection Byproduct Rules (Federal)	Surface Water Treatment Rules (Federal)	California Cryptosporidium Action Plan (State)	NPDES Permit (State)	Infrastructure and Technology
Lafayette WTP						
Increase Capacity from 25 mgd to 34 mgd					x	
Clearwells					x	
Chlorine Contact Basin	x				x	
Blower Building						x
Backwash Water Recycle System			x		x	
Sodium Hypochlorite Storage and Feed Building (Lafayette Aqueduct and WTP)	x					
Raw Water Bypass Pipe						x
Leland and Bryant Pumping Plants and Pipelines					x	
Electrical Substation					x	x
Lafayette Reclaimed Water Pipeline			x			
High-Rate Sedimentation Units [a]		x				
Ultraviolet Light Disinfection [a]		x				
Orinda WTP						
Backwash Water Recycle System				x		
Clearwell					x	
Los Altos Pumping Plant No. 2					x	
Tunnel/Pipeline					x	
Electrical Substation					x	
Additional Clearwell [a]						x
High-Rate Sedimentation Units [a]		x				
Chlorine Contact Basin [a]		x				
Ultraviolet Light Disinfection [a]		x				
Walnut Creek WTP						
Increase Capacity from 96 mgd to 115 mgd (add filters)					x	
Leland Pumping Plant					x	
Sobrante WTP						
Ozone Upgrades						
Filter-to-Waste Equalization Basin						x
Backwash Water Equalization Basin						x
High-Rate Sedimentation Units						x
Chlorine Contact Basin	x					x
Upper San Leandro WTP						
Ozone Upgrades						
Filter-to-Waste Equalization Basin						x
Distribution System	x	x [b]	x [b]			x

a Program-level projects.
b As related to water aging and poor mixing.

TABLE 2-4
EXISTING AND FUTURE DEMANDS FOR EACH WATER TREATMENT PLANT (mgd)

Water Treatment Plant	Current WTP Capacity (Summer)	Maximum-Day Demands (2000 Records)	2030 Forecast Demand Capacity
Walnut Creek	91[a]	72	96
Lafayette	25	31[b]	34
Orinda	175	173	175
Sobrante	45[c]	45	33
Upper San Leandro	55[c]	20	25
Total	**391**	**341**	**363**

[a] The capacity for the Walnut Creek WTP is based on implementation of the Walnut Creek/San Ramon Valley Project.
[b] Recent summer demands have been met by operating all of the plant's available filters at the maximum rate and by drawing the local distribution reservoirs down into the emergency storage reserves.
[c] The sustainable treatment capacity of the Sobrante and Upper San Leandro WTPs is 45 and 55 mgd, respectively, to support Claremont Tunnel outages and other emergency operations. However, normal operations include ozonation processes for taste and odor issues (caused by algae), which limit each plant's production to about 30 mgd during summer operations.

The WTTIP also includes projects to address existing capacity deficiencies in the Lamorinda/Walnut Creek distribution system area as well as anticipated future (to 2030) capacity needs. Several areas of the existing distribution system have inadequate pumping or pipeline capacity to deliver water to customers and maintain customer pressure or fire flow. These issues have developed over the last 30 to 50 years as the region has grown.

Water Quality Regulations

Many WTTIP projects, particularly improvements at the WTPs, are driven by new and emerging water quality issues. EBMUD is subject to numerous federal and state regulations pertaining to domestic water supplies, many of which stem from the Safe Drinking Water Act. In California, the federal government has assigned responsibility for the administration and enforcement of federal regulations to the state. Federal and state regulations impose treatment technology standards, monitoring standards, and other rules.[7]

Drinking water regulations impose enforceable standards to protect public health, called Primary Maximum Contaminant Levels, and include nonenforceable goals called Maximum Contaminant Level Goals (federal) and Public Health Goals (state). The nonenforceable goals indicate the level for a given contaminant at which no adverse health effects are expected to occur from a lifetime of exposure. California sets Notification and Response Levels for constituents of concern where research is not sufficient to identify a Primary Maximum Contaminant Level. California also enforces aesthetic standards, called Secondary Maximum Contaminant Levels, that apply to taste, odor, color, and other characteristics that do not relate to public health. EBMUD also establishes

[7] Title 22, Division 4, Chapter 15 of the California Code of Regulations (entitled "Domestic Water Quality and Monitoring") contains key regulations for drinking water.

internal water quality goals that meet or exceed state or federal requirements. EBMUD sets these independent goals to ensure it can meet regulations with a margin of safety.

Current major regulatory initiatives that affect the treatment of drinking water involve reductions in microbial pathogens—in particular, *cryptosporidium*—and disinfection byproducts:

- *Cryptosporidium* is a microscopic parasite (protozoan) that can cause gastrointestinal illness. It is a significant concern in drinking water because it contaminates surface waters, is resistant to chlorine and other disinfectants, and has caused disease outbreaks. *Cryptosporidium* may significantly affect individuals with immature or weakened immune systems and can be fatal in people with severely compromised immune systems.

- *Disinfection Byproducts* (DBPs) form when disinfectants used to treat drinking water react with organic matter or other constituents that occur naturally in drinking water. DBPs are a concern because long-term exposure through drinking water is potentially carcinogenic and represents a reproductive and developmental risk. All strong oxidants—including chlorine, chlorine dioxide, and ozone—produce DBPs. Two widely occurring classes of DBPs formed during disinfection with oxidants are:

  - Total trihalomethanes (TTHMs; there are four: chloroform, bromoform, bromodichloromethane, and dibromochloromethane)

  - Haloacetic acids (HAA5s, there are five; monochloroacetic, dichloroacetic, trichloroacetic, monobromoacetic, and dibromoacetic acid)

  Because TTHMs and HAA5s typically occur at higher levels than other known DBPs, and because their presence is representative of the presence of many other chlorination DBPs, these two classes of DBPs act as indicators of DBP occurrence.

Amendments (in 1996) to the Surface Water Treatment Rule required the U.S. Environmental Protection Agency (U.S. EPA) to promulgate rules to balance the risks associated with waterborne pathogens like *cryptosporidium* against the potential health risks associated with disinfection byproducts. The Stage 1 Disinfectants/Disinfection Byproducts Rule and Interim Enhanced Surface Water Treatment Rule were the first phase of rule-making required by Congress as part of the 1996 amendments. The second phase of rule-making, signed into law in December 2005, includes the Stage 2 Disinfectants/Disinfection Byproducts Rule (Stage 2 D/DBP Rule) and the Long Term 2 Enhanced Surface Water Treatment Rule (LT2 Rule).

The Stage 2 D/DBP Rule and LT2 Rule, discussed below, create the need for many of the proposed improvements at the WTPs.

Stage 2 Disinfectants/Disinfection Byproducts Rule

The purpose of the U.S. EPA's Stage 2 D/DBP Rule is to reduce potential cancer, reproductive, and developmental health risks from DBPs in drinking water by setting limits for disinfectants and DBPs in water distribution systems. The rule applies to all community water systems that use disinfectants other than ultraviolet light.[8] Key provisions (1) require that water system operators

8 Disinfection using ultraviolet light does not produce disinfection byproducts.

evaluate their distribution systems to identify locations of high DBP concentrations, (2) lower the maximum contaminant levels for TTHMs and HAA5, and (3) establish compliance monitoring procedures. The WTTIP projects that are designed to meet DBP regulations include proposed changes at the Sobrante WTP (chlorine contact basin), Lafayette WTP (Alternative 1: aqueduct disinfection station and chlorine contact basin; Alternative 2: aqueduct disinfection station), and potentially at the Orinda WTP (chlorine contact basin, evaluated programmatically in the EIR). (The Walnut Creek and Upper San Leandro WTPs already have chlorine contact basins.)

Long-Term 2 Enhanced Surface Water Treatment Rule

The purpose of the LT2 Rule is to reduce the incidence of disease associated with *cryptosporidium* and other pathogens in drinking water. The rule applies to all public water systems that use surface water. Key provisions in the LT2 Rule include (among other things) source water monitoring, criteria for the use of *cryptosporidium* treatment and control processes, and additional treatment requirements for higher risk systems (i.e., those with the highest source-water levels of *cryptosporidium*). The rule does not likely require any major changes to EBMUD's conventional plants (Upper San Leandro, Sobrante, and San Pablo); however, at the in-line WTPs (Walnut Creek, Lafayette, and Orinda), flocculation and sedimentation treatment of the raw water may eventually be needed. The WTTIP includes the addition of high-rate sedimentation processing at the in-line WTPs as a potential future project, which is evaluated programmatically in this EIR. Otherwise, EBMUD compliance with the LT2 Rule dovetails with compliance with the *California Cryptosporidium Action Plan*, as described below.

California Cryptosporidium Action Plan and EBMUD's Permit to Operate (Water Supply Permit)

The *California Cryptosporidium Action Plan* was published by the DHS, Division of Drinking Water and Environmental Management in April 1995. The *California Cryptosporidium Action Plan* is intended to optimize the water treatment process in order to maximize *cryptosporidium* removal. EBMUD's Water Supply Permit requires the District to implement actions to meet the *California Cryptosporidium Action Plan* for the Walnut Creek and Lafayette WTPs because they return settled backwash water to the Lafayette Aqueducts, the supply source for the Orinda WTP.

Filter backwash water (described in Figure 2-3) must be managed properly so that pathogens are not reintroduced into the raw water at treatment plants when the water is recycled to the plant influent. Filter backwash water may contain higher concentrations of pathogens that were removed by the filters, and typically this water is recycled to minimize waste. Treating the backwash water before returning it to the head of the plant prevents possible contamination of the plant influent with *cryptosporidium*.

The recently completed Walnut Creek WTP Improvement Project included additional treatment and onsite recycling of filter backwash water to reduce the potential for reintroduction of pathogens and to comply with the *California Cryptosporidium Action Plan*. As part of the WTTIP, EBMUD proposes to make similar improvements (i.e., constructing new backwash water recycling systems) at the Orinda WTP and, under Alternative 1, at the Lafayette WTP.

Water Quality Problems Caused by Water Aging and Poor Mixing

The 1989 Surface Water Treatment Rule requires that a residual disinfection level be maintained in the distribution system. The Stage 2 D/DBP Rule, meanwhile, restricts the DBP concentration in the distribution system (and effectively limits the disinfection required by the Surface Water Treatment Rule). As treated water ages, its quality degrades because residual disinfectant levels decrease and the formation of some disinfection byproducts increases. Excessive water age is a concern for EBMUD; its distribution system is complex and has a large amount of treated water storage and storage reservoirs that contain waters that may not mix well. In some locations, water in the distribution system may be 30 days old or older before it reaches a consumer. Low residual chlorine levels can allow bacteria to colonize the distribution system and can reduce the protection against inadvertent contamination (due, for example, to pipe breaks) that might allow untreated water to enter the system. In certain reservoirs serving the Lamorinda/Walnut Creek area water levels do not fluctuate sufficiently to ensure a continuous mixing of fresh water. As part of the WTTIP, EBMUD is proposing changes to pumping and transmission facilities serving these and other reservoirs to correct this problem.

NPDES Permit Requirements

EBMUD discharges to area streams and reservoirs from two sources, the Lafayette Aqueducts (raw water originating from the Mokelumne watershed) to fill terminal storage reservoirs and from the Orinda WTP filter backwash treatment system for disposal. While raw water discharges have not been a compliance issue, EBMUD has had compliance issues with backwash water discharges.

At the Orinda WTP, filter backwash water is dechlorinated and discharged to San Pablo Creek, which in turn discharges into San Pablo Reservoir. The discharge from the backwash water settling ponds to San Pablo Creek is covered by the Regionwide NPDES Permit for Discharge from Surface Water Treatment Facilities for Potable Supply. There have been repeated violations of this permit, primarily due to bioassay failures (indicating acute aquatic toxicity) of this discharge. Providing backwash water treatment at the Orinda WTP, as proposed under the WTTIP, would allow treated backwash water to be returned to the head of the WTP and would eliminate this discharge to San Pablo Creek.

Infrastructure Replacement and Technology Upgrades

Infrastructure, both at the WTPs and in the transmission and distribution systems, must be periodically replaced and upgraded due to aged condition or to meet current safety, regulatory, and technology standards. The Walnut Creek WTP is currently in the final stages of a major overhaul and expansion, and the Orinda WTP went through a similar process a decade ago. The Lafayette WTP has numerous operating problems, due in part to aging infrastructure. Some systems at the plant have not been upgraded for 45 years. Examples of existing problems at the Lafayette WTP include the poor condition of the filters, which constrains plant operations when the turbidity of source water is higher than normal; numerous problems with backwash water handling facilities; recurring electrical brownouts; and problems with treated water storage facilities (clearwell and weir) that can adversely affect water quality. WTTIP improvements at the

Lafayette WTP would correct these problems (Alternative 1) or the plant would be decommissioned (Alternative 2).

Infrastructure in the transmission and distribution systems, must be periodically replaced and upgraded due to aged condition or to meet current safety, regulatory, and technology standards. WTTIP projects that address aging infrastructure issues include replacement of the Fay Hill, Moraga, and Leland open-cut reservoirs with tank-style reservoirs.

2.2.3 Project Purpose and Objectives

The purpose of the WTTIP is to meet the needs described in the preceding section, as well as facility-specific discussions of project need presented in Sections 2.3 through 2.5. Table 2-5 identifies the project objectives that were considered during development of WTTIP projects to meet these needs.

TABLE 2-5
PROJECT OBJECTIVES

Category	Project Objectives
Reliability	▪ Provide reliable water treatment, transmission, and distribution infrastructure that meets long-term operational needs under average and maximum-day demand conditions ▪ Meet EBMUD standards for planned, unplanned, and emergency outages ▪ Meet security initiatives
Regulatory & Water Quality	▪ Continue to meet drinking water and environmental regulations with a margin of safety and achieve EBMUD internal long-term water quality goals
Operations	▪ Ensure project will meet short-term peak demand periods in excess of projected demands ▪ Minimize the risk of service disruption and meet demands during construction
Implementation	▪ Minimize implementation issues by considering the complexity of public and local agency issues
Environmental	▪ Minimize environmental impacts during construction ▪ Minimize environmental impacts after construction and during operations
Economics	▪ Minimize life-cycle costs (capital, operating, and maintenance) to EBMUD customers

Who Benefits

The communities that would benefit from the WTTIP differ depending on the need being addressed and the facility being improved. In general, all of the improvements would make the EBMUD system more reliable, benefiting all District customers. The improvements to reduce microbial pathogens and to control disinfection byproducts are proposed at all of the regularly operated WTPs and therefore represent an added health benefit to all EBMUD treated-water customers. Improvements to ozonation systems at the Sobrante and Upper San Leandro WTPs would provide the District's West of Hill's customers with better-tasting water. Improvements to address existing capacity deficiencies, to meet projected increases in demand, and to address existing hydraulic constraints and aging infrastructure would benefit customers in the Lamorinda/Walnut Creek area by ensuring that supplies continue to meet demand, maintaining or increasing the amount of water available for firefighting during warm weather, and reducing pressure fluctuation problems. There would also be environmental benefits associated with eliminating backwash system discharges from the Orinda WTP to San Pablo Creek.

2.3 Project Location

Section 2.2 described the location of the District's service area and the communities served by WTTIP projects. The proposed project sites are located in Lafayette, Orinda, Moraga, Walnut Creek, Oakland, and unincorporated Contra Costa County. Figure 2-6 and Table 2-1 show the locations of WTTIP projects (although some, e.g., Orinda-Lafayette Aqueduct, would only be associated with one of the program alternatives). This EIR includes four types of maps:

- Street Base
- Topographic Base
- Aerial Photograph Base
- Conceptual Design Drawings

These maps are presented at the end of Chapter 2 and organized as follows.

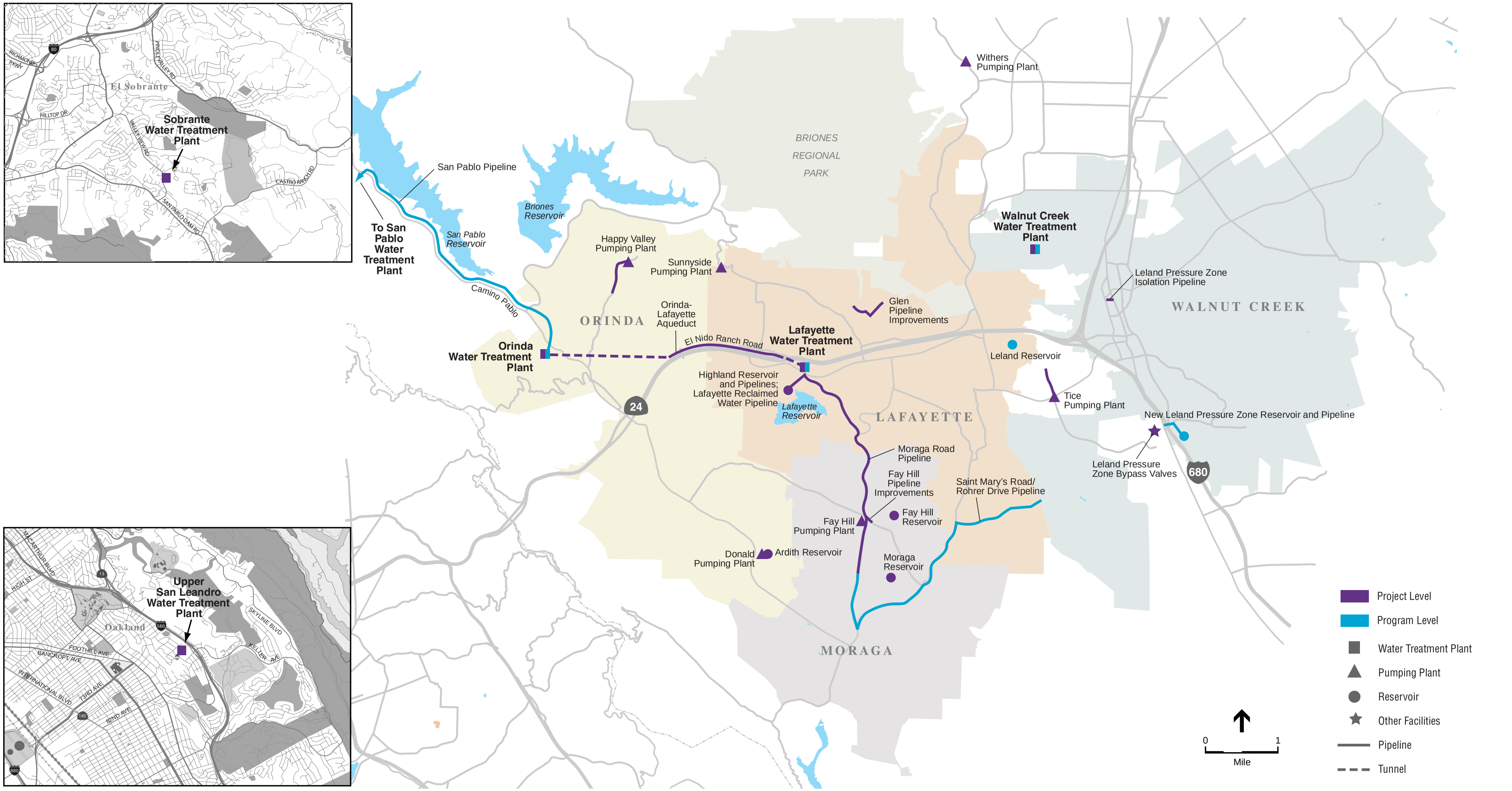
Street Base and Topographic Base Maps

These maps show the general locations of the WTTIP projects and surrounding areas and the proximity of project sites to one another on a street base (Maps A1 through A4) and on a topographic base (Maps B1 through B7).

Site-Specific Aerial Photographs and Design Drawings

These maps show the specific sites and alignments of each WTTIP project in greater detail than the general maps (the scale of the site-specific maps is typically 1 inch equals 200 feet or 1 inch equals 300 feet). The site-specific maps are organized by WTTIP project and coded by project and by map type; maps beginning with the letter C have aerial photograph bases and maps beginning with the letter D are conceptual design drawings (site plans and select facility profiles).

For example, Map C-WCWTP-1 is an aerial photograph of the Walnut Creek WTP, and Map D-WCWTP-1 is a design drawing for that facility.



SOURCE: East Bay Municipal Utility District; ESA

EBMUD Water Treatment and Transmission Improvements Program . 204369

Figure 2-6
Project Location

2.4 Water Treatment Plant Improvements, Alternative 1

This section describes the improvements at the Lafayette, Orinda, Walnut Creek, Sobrante, and Upper San Leandro WTPs proposed under Alternative 1 – Supply from Orinda and Lafayette WTPs, the EBMUD Preferred Alternative.

2.4.1 Lafayette Water Treatment Plant

Water demand in the areas served by the Lafayette WTP currently exceeds the plant's capacity. Recent summer demands have been met by operating all of the plant's available filters at the maximum rate and by drawing down water levels in the local distribution reservoirs into the emergency storage reserves (e.g., water for firefighting). The plant is also in need of extensive upgrades to meet future regulations as well as to maintain performance. Alternative 1 improvements would meet most of the future demand increases in the Lafayette area with an expanded, improved Lafayette WTP. Improvements proposed under Alternative 1 are described below.

The Lafayette WTP capacity is limited due to poor filter media conditions, limiting hydraulic influence on the filters from the clear well, limited filter backwash capability and recurring electrical brownouts. Under Alternative 1, numerous improvements would be made to increase the WTP capacity and reliability. The filters would be rebuilt and a new blower building would be added to allow for more efficient combined air and water filter backwash. A new Backwash Water Recycle System would accommodate more rapid filter backwash and return to service, and two new clear wells would be constructed at a lower elevation to eliminate the hydraulic constraint on filter production.

Location, Existing Facilities, and Operations

The Lafayette WTP is in the city of Lafayette between Mt. Diablo Boulevard to the south and the right-of-way of Highway 24 to the north. Lafayette Creek and the Walter Costa Trail traverse the WTP property (see Maps A2 and B2 for general location). The Lafayette Aqueducts pass through the WTP site from east to west.

There are numerous steps involved in turning raw water into drinking water. Figure 2-5 describes each of these steps for the WTPs under current conditions. Figure 2-7 illustrates proposed processes at water treatment plants. Figure 2-8 presents schematic flow diagrams of the existing and proposed (Alternative 1) water treatment process trains for the Lafayette WTP. On Figure 2-8, the upper series of boxes represents raw water treatment and the lower series of boxes represents backwash water processing.

Project-Level Improvements – Design Characteristics

Map D-LWTP-1 shows the proposed layout for the Lafayette WTP under Alternative 1. Map D-LWTP-3 shows a cross-section through the pumping plants building and clearwells under Alternative 1.

Raw Water Bypass

The Lafayette WTP has no raw water bypass. In a catastrophic event that disrupts EBMUD's ability to provide treated water, all of the WTPs except Lafayette have a means of providing customers with chlorinated raw water for emergency use. Under Alternative 1, a new 24-inch-diameter raw water bypass pipeline would be constructed so that raw water could bypass treatment processes and be pumped directly into the Leland and Bryant Pressure Zones in an emergency.

Backwash Water Recycle System

The District's Water Supply Permit from the state DHS requires the District to implement actions to meet the *California Cryptosporidium Action Plan*. The *California Cryptosporidium Action Plan* focus is to optimize water treatment practices in order to maximize *cryptosporidium* removal. The Lafayette WTP treated filter backwash water is currently discharged into the Lafayette Aqueducts, which are the raw water supply for the Orinda WTP. The filter backwash may contain higher concentrations of pathogens that were removed by the filters. EBMUD has agreed to discontinue that practice by 2008.

The WTTIP includes an interim and a long-term solution to meet the *California Cryptosporidium Action Plan*. The interim solution, the Lafayette Reclaimed Water Pipeline, is described in Section 2.4.2. The proposed long-term solution under Alternative 1 is the construction of a backwash water recycle system which would provide additional treatment, recycle the backwash water to the head of the plant, reduce the potential for reintroduction of pathogens, and comply with the *California Cryptosporidium Action Plan*. The new backwash water recycle system would also reduce the amount of chlorination required at Orinda WTP, thereby reducing disinfection byproduct formation in the Orinda WTP water supply.

The new backwash water recycle system would include the following (refer to Figure 2-7 for a description of the functions of these facilities): filter-to-waste equalization basin, backwash water equalization basins, flocculation and sedimentation basins, ultraviolet-light (UV) disinfection reactor, chemical room, electrical room, solids holding tank, and solids pumping plant. A filter backwash blower building would also be constructed to enable backwashing with air and water. Map D-LWTP-1 and Map D-LWTP-2 show the plan views and select profiles of the proposed facilities. The basins would be buried, concrete structures approximately 25 feet deep. The UV disinfection building would house the UV disinfection system, which would disinfect the backwash water before the decant[9] pumps send it to the head of the plant. The chemical room would house chemical feed pumps and would be used to store coagulants and/or nonionic polymers (in totes or small tanks) needed for coagulation and flocculation of the backwash water. The electrical room would house the electrical panels and control systems for various pumps and motors for the backwash water recycle system.

[9] Decant means to draw off the upper layer of liquid after the heaviest material (a solid or another liquid) has settled.

Water Treatment Plant	Raw Water Treatment											Backwash Water Treatment				
	Coagulation	Flocculation/ Sedimentation or High Rate Sedimentation	Ozonation	Filtration	Ultraviolet Disinfection	Chlorine Contact Basin	Clearwell	Distribution Pumping	Chemical Feed Systems	Piping Modifications	Electrical Substations	Backwash Water Equalization Basin	Filter-to-Waste Equalization Basin	Flocculation/ Sedimentation or High Rate Sedimentation	Ultraviolet Disinfection	Sludge Storage and Disposal
Lafayette - Alternative 1	NC	□	– –	■	□	■	■	■	■	■	■	■	■	■	■	■
Lafayette - Alternative 2	– –	– –	– –	– –	– –	– –	– –	– –	■	■	NC	– –	– –	– –	– –	– –
Orinda - Alternative 1	NC	□	– –	NC	□	□	□	□	NC	■	■	■	■	■	■	■
Orinda - Alternative 2	NC	□	– –	NC	□	□	□	■ □	NC	■	■	■	■	■	■	■
Walnut Creek - Alternative 1 or 2	NC	□	– –	■	□	NC	NC	■	NC	■	NC	NC	NC	NC	NC	NC
Sobrante - Alternative 1 or 2	NC	NC	■	NC	– –	■	NC	NC	NC	■	NC	■	■	■	– –	■
Upper San Leandro - Alternative 1 or 2	NC	NC	■	NC	– –	NC	NC	NC	NC	■	NC	NC	■	– –	– –	NC

NC - No Change to Existing Process

■ - Proposed New or Upgraded Process or Facility, Evaluated at Project Level of Detail

□ - Potential Future Process or Facility, Evaluated at Program Level of Detail

– – - Not Applicable

COAGULATION
Coagulation is a chemical process to induce particles suspended in the water to settle out. Chemicals are added to reduce or eliminate interparticle forces. Coagulants such as polyaluminum chloride, alum, and polymers typically are added upstream of the rapid-mix structures where coagulation occurs to facilitate the process.

FLOCCULATION/SEDIMENTATION
Following coagulation, water is gently mixed in flocculation basins to accelerate the rate of particle collisions, causing smaller particles to combine into larger particles ("floc") of sufficient size to be settled or filtered out. In sedimentation basins the flocs settle out, forming sludge and clarified fluid. High-rate sedimentation units perform the same function as conventional flocculation/sedimentation basins but require less space.

OZONATION
Ozonation is a disinfection process that uses ozone gas (O3) to inactivate or destroy pathogenic organisms and to oxidize taste-and odor-causing compounds. Ozonation systems generate ozone from a feed gas (air or liquid oxygen) and feed the ozone into a contact chamber. In the chamber, ozone and its decomposition products oxidize/destroy the cellular material of pathogenic organisms and taste- and odor-causing compounds. The off-gases from the contact chamber are treated to destroy residual ozone before release into the atmosphere.

FILTRATION
Filtration is a physical/chemical process whereby the coagulated or settled water leaving the rapid-mix structure flows by gravity through a layer of sand and/or anthracite. Particles are trapped as water passes through the filter media.

ULTRAVIOLET LIGHT (UV) DISINFECTION
UV disinfection is a physical (rather than chemical) process used to inactivate or destroy pathogenic organisms. UV disinfection systems transfer electromagnetic energy from a mercury arc lamp to an organism's genetic material, thereby destroying a cell's ability to reproduce.

CHLORINE CONTACT BASIN
Chlorine contact basins provide disinfection contact time between free chlorine (sodium hypochlorite) and water. Placing a basin after filtration allows for the removal of organics through sedimentation and filtration prior to chlorination, which reduces the formation of disinfection byproducts.

CLEARWELL
A clearwell is a reservoir used to hold treated water prior to its release into the distribution system.

CHEMICAL FEED SYSTEMS
Chemicals are used at various points in the water treatment process: to facilitate coagulation and flocculation, to disinfect raw water, to adjust the pH of finished water, and to provide fluoridation. The components of WTP chemical feed systems include storage tanks, pumps, chemical mixing equipment, and piping. Chemical buildings include a central control room for chemical feed operations, chemical storage areas, and electrical and control equipment.

BACKWASH WATER EQUALIZATION BASIN
WTP operators periodically clean filters by backwashing them with water (or a mixture of air and water) to flush out particles and prevent the filters from clogging. The backwash water is stored in the equalization basins before being treated in settling basins or in flocculation/sedimentation basins. The backwash water is flocculated (with the addition of coagulants) and settled in basins; the supernatant or decant water is removed.

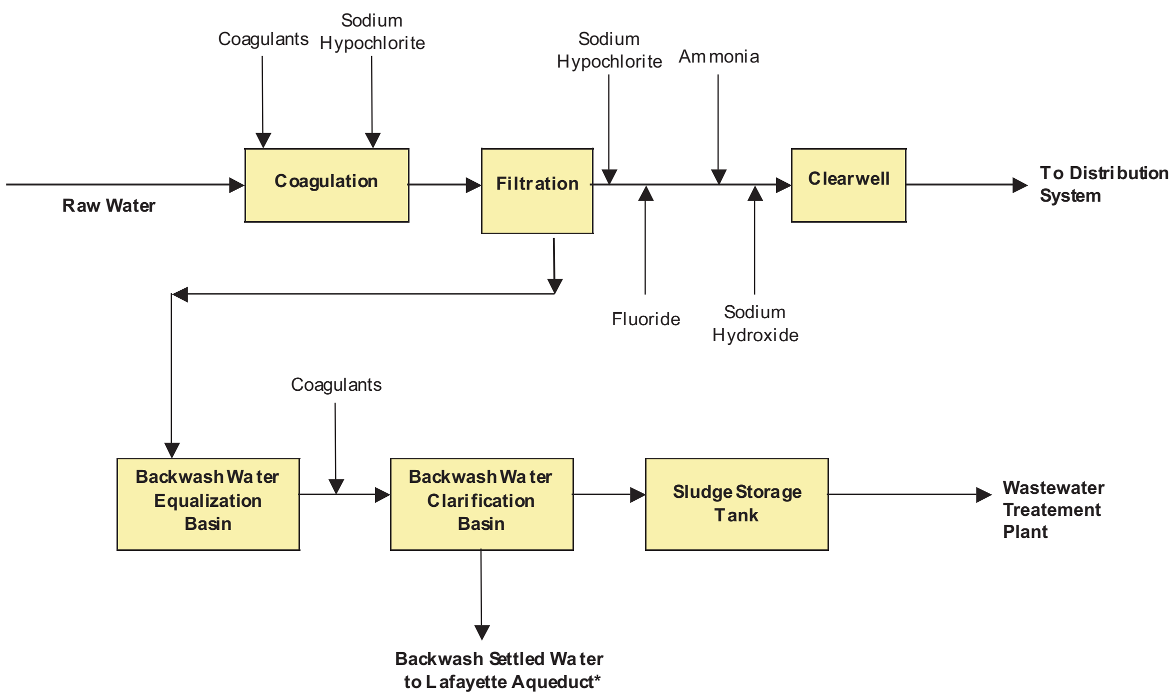
FILTER-TO-WASTE EQUALIZATION BASIN
After a filter is backwashed, WTP operators put the filter back in service. The filtered water produced during the first 15-20 minutes after a filter is returned to service tends to have somewhat elevated turbidity and particle levels. "Filter-to-Waste" is a strategy to reduce that turbidity and particles by storing the first 15-20 minutes of post-backwash filtered water in a Filter-to-Waste Equalization Basin. The water from the basin is then recycled back to the head of the plant.

SLUDGE STORAGE AND DISPOSAL
Sludge generated from backwash water processing is stored in tanks or basins before being trucked to the EBMUD Wastewater Treatment Plant (Walnut Creek, Lafayette, and Orinda WTPs) or discharged to the local sanitary sewer (Sobrante and Upper San Leandro WTPs).

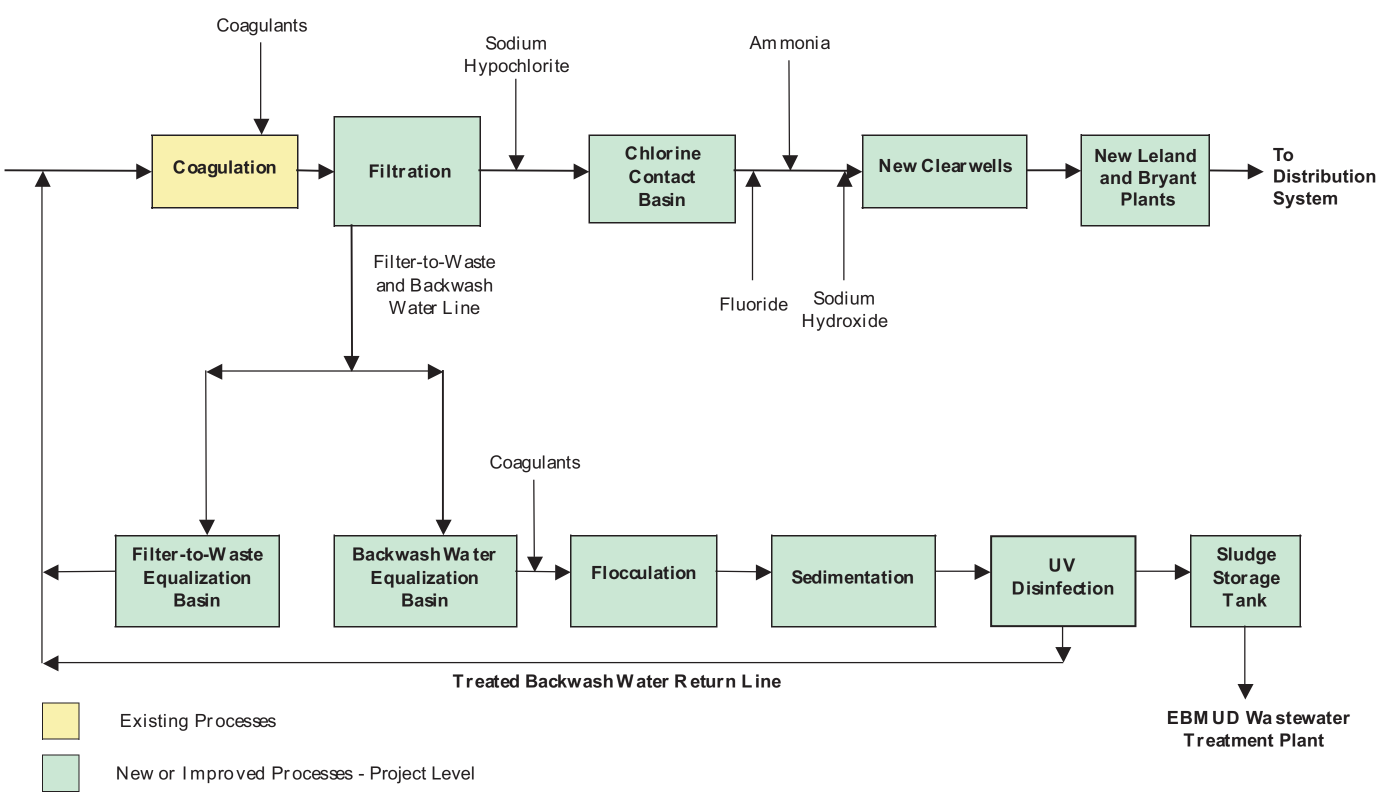
SOURCE: EBMUD and ESA

Figure 2-
Proposed New or Upgraded Water Treatment Plant Processes

Lafayette WTP - Existing Process Train



Lafayette WTP, Alternative 1 - Proposed Process Train



* The Lafayette Reclaimed Water Pipeline will be an interim solution to meet DHS regulations related to backwash water quality. The Pipeline would divert backwash water from the clarification basin to the Lafayette Reservoir following dechlorination.

SOURCE: EBMUD and ESA

Figure 2-8
Sc ematic o Diagrams o a a ette WTP
E isting onditions and A ternative
Proposed onditions

Chemical Feed Systems

In order to provide disinfection in the Lafayette aqueducts rather than in the Mokelumne Aqueducts, thereby reducing chlorine contact time and disinfection byproducts at the Orinda WTP, the existing sodium hypochlorite storage and feed systems housed in the chemical building at the Lafayette WTP would be replaced. A new 2,500-square-foot building to store and pump (Feed) sodium hypochlorite would be constructed. Sodium hypochlorite would be fed to the chlorine contact basin and to the Lafayette Aqueducts to meet disinfection requirements in the Lafayette Aqueducts for the Orinda WTP. (This facility would be constructed in the existing chemical building under Alternative 2.)

Table 3.11-1 in Section 3.11, Hazards and Hazardous Materials, lists the water treatment chemicals used at the WTPs and describes the purpose of each chemical. Refer to Section 3.11 for details on proposed changes in the quantity of water treatment chemicals used and stored at the WTPs.

Chlorine Contact Basin

Disinfection is currently achieved at the Lafayette and Orinda water treatment plants through chlorination and long contact times in the Mokelumne Aqueducts. This is an effective strategy for meeting pathogen reduction goals but not a good strategy for controlling disinfection byproduct formation, as the raw water contains organics which react with the chlorine to create disinfection byproducts. EBMUD proposes to construct a chorine contact basin after filtration to allow for the removal of organics through filtration prior to chlorination, which will reduce the formation of disinfection byproducts at the Lafayette WTP. A new 1.1-million-gallon (mg) chlorine contact basin and associated weir structure and feed system would be constructed to meet disinfection requirements for the Lafayette WTP. The chlorine contact basin would be a buried concrete tank with a diameter and depth of approximately 70 feet and 40 feet, respectively.

Treated Water Storage (Clearwell)

The existing 0.3-mg clearwell at the Lafayette WTP is substantially undersized, is too high in elevation, and experiences maintenance problems. The clearwell would be replaced with two new clearwells with a total active storage of 6 mg (Clearwell No. 1 would have 4 mg and Clearwell No. 2 would have 2 mg of storage). The clearwells would be buried, covered, concrete tanks approximately 50 feet deep. A new overflow discharge pipe between the clearwells and Lafayette Creek would be constructed for emergency use only.

Pumping Plants and Pipelines

Under Alternative 1, the Bryant and Leland Pumping Plants currently operating at the Lafayette WTP would be decommissioned and replaced with new plants at the west end of the WTP near the new clearwells. The filter backwash water pumps would also be located within the Bryant and Leland Pumping Plants. The pumping plants would draw water from the clearwells and pump it into the Bryant and Leland Pipelines or back to the filters. The alignments of these pipelines would be partially within the Lafayette WTP property and partially within Mt. Diablo Boulevard, as described below and shown on Map D-LWTP-1.

- *Bryant Pipeline*. The proposed alignment for the 36-inch-diameter Bryant Pipeline begins at the proposed Bryant Pumping Plant and extends south across Lafayette Creek to Mt. Diablo Boulevard. At Mt. Diablo Boulevard the alignment extends eastward in the westbound travel lanes of Mt. Diablo Boulevard, shifts north and continues east in EBMUD property, then shifts south back into the westbound lanes of Mt. Diablo Boulevard and continues east to the box culvert over Lafayette Creek east of the entrance to the WTP. The pipeline would pass over the concrete box culvert and transition to become the proposed Moraga Road Pipeline (see description in Section 2.6, below).
- *Leland Pipeline*. The proposed alignment for the 30-inch-diameter Leland Pipeline parallels the Bryant Pipeline alignment until reaching the concrete box culvert. There, the Leland Pipeline would bifurcate into two 20-inch-diameter pipelines to fit in the space between the box culvert and the roadway. After exiting east of the box structure, the two pipelines would merge into one 30-inch-diameter pipeline, which would tie into an existing pipeline serving the Leland Pressure Zone.

Two other pipelines proposed as part of the WTTIP, the Lafayette Reclaimed Water Pipeline and the Highland Reservoir Inlet/Outlet Pipeline, would originate at the Lafayette WTP and then parallel segments of the Bryant and Leland Pipelines near the Lafayette WTP, as shown on Map D-LWTP-1. Detailed descriptions of these pipelines are provided in Section 2.6.

Electrical Modifications

The Lafayette WTP has experienced recurring brownouts of electrical power during the operation of large pumps. A new electrical substation would be constructed as part of Alternative 1. The proposed substation is needed to improve existing conditions and provide additional power supply for new facilities. The substation would be fenced and would include a transformer, switchgear, capacitors, and meters.

Project-Level Improvements – Construction Characteristics

Schedule, Work Hours, and Staging

Table 2-6 presents the proposed schedule for design and construction of upgrades for WTTIP projects at water treatment plants under Alternative 1. Table 2-7 presents the proposed work hours for all WTTIP projects. Table B-LWTP-1 in Appendix B provides construction sequencing, duration of specific construction activities, construction staffing, and parking information.

Construction Activities

Map D-LWTP-1 shows the proposed facilities under Alternative 1. Proposed phasing and methods of construction, described below, are based on conceptual facility designs and requirements for maintaining water service during construction. This description provides the basis for the impact evaluation presented in Chapter 3. During final design, construction phasing and methods will likely be refined.

- *Mobilization*. The contractor would close the segment of the Walter Costa Trail traversing the Lafayette WTP, clear the site, and set up the construction staging area. Construction staging would occur at the WTP, adjacent to Mt. Diablo Boulevard on EBMUD property, and under Highway 24 west of the plant.

TABLE 2-6
WATER TREATMENT AND TRANSMISSION IMPROVEMENTS PROGRAM CONSTRUCTION SCHEDULE – WATER TREATMENT PLANT IMPROVEMENTS, ALTERNATIVE 1

Facility	Duration (Years)	Expected Start Date
CITY OF LAFAYETTE		
Alternative 1		
Lafayette Water Treatment Plant (WTP), Project-Level	4 to 6	May 2012
Lafayette WTP, Program-Level	To be determined	After 2015
Lafayette Reclaimed Water Pipeline	1 to 2	May 2007
CITY OF ORINDA		
Alternative 1		
Orinda WTP, Project-Level	1 to 2	July 2011
Orinda WTP – Alternative 1, Program-Level	To be determined	After 2015
CITY OF WALNUT CREEK		
Alternative 1 or 2		
Walnut Creek WTP, Project-Level	1 to 2	October 2007
Walnut Creek WTP, Program-Level	To be determined	After 2015
CITY OF OAKLAND		
Alternative 1 or 2		
Upper San Leandro WTP, Project Level	1 to 2	October 2011
UNINCORPORATED CONTRA COSTA COUNTY		
Alternative 1 or 2		
Sobrante WTP, Project-Level	1 to 2	October 2011

TABLE 2-7
EXPECTED CONSTRUCTION WORK HOURS FOR WTTIP PROJECTS

Activity	Days	Hours
Standard onsite work hours for most activities[a]	Monday through Friday[b]	7:00 a.m. to 6:00 p.m.
Construction of pipelines in public roadways	Monday through Friday[b]	8:30 a.m. to 4:30 p.m.
Offsite truck trips to or from project sites	Monday through Friday	9:00 a.m. to 4:00 p.m.
Tunneling	Monday through Sunday for some phases	24 hours per day for some phases

[a] For some construction activities such as dewatering, some pieces of equipment (e.g., pumps and generators) would be required to operate 24 hours per day.
[b] Occasional weekend work would be needed for some construction activities (e.g., system connections to maintain water service).

- *Excavation, Construction, and Backfilling for Clearwells and Pumping Plants*. Contractors would excavate the area where the clearwells and pumping plants are to be located. The clearwells and pumping plant wetwells[10] would require substantial excavation; for purposes of impact evaluation, the assumed method of excavation and ground support for this area is use of diaphragm and slurry walls.[11] Foundations would be drilled piers; no pile driving is proposed. Once construction of the clearwell, pumping plant, and electrical substation facilities is complete, the clearwell and pumping plants would be backfilled. Soil to be reused for backfilling would be stored temporarily on EBMUD property along Mt. Diablo Boulevard.

- *Bryant and Leland Pipelines*. Following construction of the clearwells and pumping plants, the Bryant and Leland Pipelines, substation, and raw water bypass pipelines would be installed. The Bryant and Leland Pipeline alignments cross Lafayette Creek and are within the westbound lanes of Mt. Diablo Boulevard for two segments totaling approximately 700 feet. The pipelines would be constructed by the open-trench construction method. This construction method is described in Figure 2-9. Where the pipes pass over the box culvert east of the WTP entrance, a concrete cap would be placed on top of the pipelines before that roadway segment is reconstructed.

- *Demolition*. Existing facilities proposed for demolition include backwash water facilities, clearwells, and existing Leland Pumping Plant (the Bryant Pumping Plant would be decommissioned but not demolished).

- *Construction of Other Proposed Facilities*. Following construction of facilities at the western end of the Lafayette WTP, excavation and foundation construction for the backwash water recycle system facilities, chlorine contact basin, blower building and air-wash system to the filters, and chemical feed building and installation of related structures (valving, piping, meters, etc.) would occur. The filters would be rehabilitated and temporary backwash water handling facilities disassembled.

- *Demobilization.* The contractor would break down staging areas. Site restoration (rebuilding onsite roadways and landscaping) would follow.

For the deep excavation at the west end of the plant, dewatering would be required 24 hours per day, seven days per week for the duration of construction. The groundwater would be settled and filtered prior to discharge into Lafayette Creek.

Construction Equipment

Excavators, backhoes, bulldozers, scrapers, and water trucks would be used for excavation, grading, and fill. Concrete would be delivered to the site by ready-mix trucks; a crane would set structural components and equipment; and supply trucks would deliver materials and equipment used in the construction process. Pumps, settling tanks, and temporary piping would be required for dewatering operations, and a bentonite/slurry plant would be needed for slurry wall excavation at the west end of the plant. Additional equipment likely to be used includes air compressors, welding machines, and various air- and electric-powered hand tools. Paving equipment would include grinders, pavement cutters, dump trucks, pavers, and vibratory rollers.

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[10] A wetwell is a reservoir from which pumps draw water.

[11] A diaphragm wall with tiebacks would encompass Clearwell No. 1, Clearwell No. 2, and the Leland and Bryant Pumping Plants to provide temporary shoring. Contractors would construct a slurry wall about 2 to 3 feet thick and extending 15 to 20 feet below the bottom of the excavation (approximately to 65 to 70 feet below ground level). Then a 5-foot- to 8-foot-thick seal-slab would be constructed at the bottom of excavation.

Figure 2-9
Pipeline Construction Techniques

Open Trench Technique

The main construction technique that would be used to construct WTTIP pipelines would be open trench (or "cut and cover") technique, illustrated in the figure below. Open trench construction involves the following:

- Sawcutting the pavement
- Excavating a trench
- Removing the soils
- Installing the pipeline
- Backfilling the trench
- Repaving

Construction Corridor. A minimum construction easement width of 25 feet (for small-diameter pipe) is needed to accommodate pipe storage and to allow trucks and equipment access along the trench. In areas where large-diameter pipelines (e.g., 48 inch or greater) or multiple pipelines may be installed, a wider trench and construction easement of up to 40 feet would be required. Other construction activities, such as the installation of pipeline connections, could also require wider excavations.

Construction in Streets, Open Space. Open trench construction in public roadways would require closure of at least one travel lane, depending on roadway width and size of the pipeline and trench. Most spoils would be hauled off site, and some new materials would be imported for backfilling. Pipeline construction in unpaved areas (i.e., the Lafayette Reservoir Recreation Area) likely would use some excavated materials for fill above the top of the pipe.

Construction Details by Project. Refer to the tables in Appendix B for the following information for each pipeline project:

- Pipe length and diameter by street
- Construction production rate (feet per day, unpaved and paved areas) and duration by street
- Daily excavation and fill quantities
- Worker and truck vehicle trips per day

Equipment. Typical construction equipment associated with installation of pipelines would include: pavement saws, jack hammers, excavators, backhoes, dump trucks, front-end loaders, forklifts, flatbed delivery trucks, paving equipment (asphalt and/or concrete trucks, rollers), water trucks, and vibratory compactors. Staging areas would be accommodated adjacent to or in vicinity of the pipeline corridors wherever feasible.

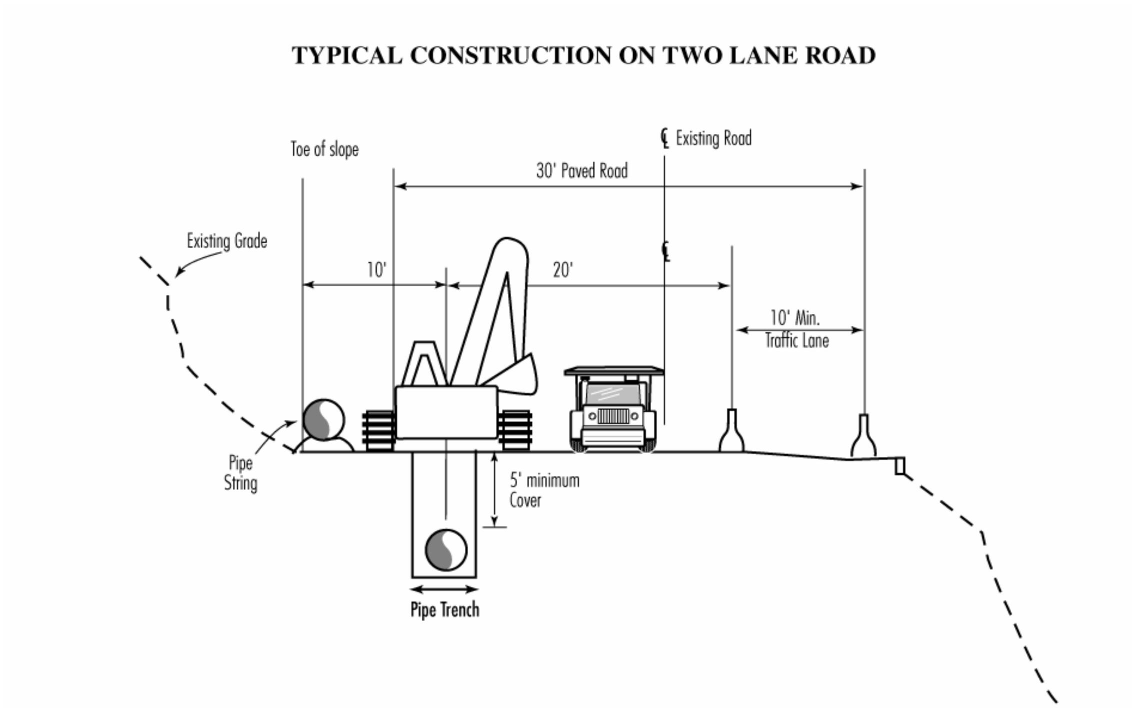


Figure 2-9 (Continued)
Pipeline Construction Techniques

Trenchless Techniques

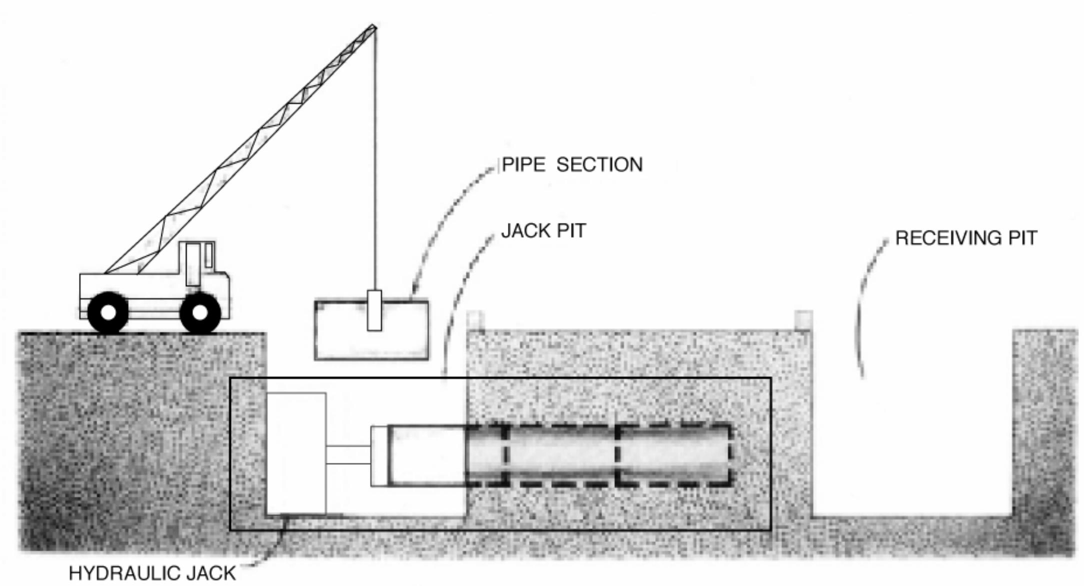
Two types of trenchless construction–bore-and-jack and microtunneling–are proposed at several WTTIP sites:[a]

- Moraga Road Pipeline: Rheem Boulevard Intersection
- Orinda WTP (Alternative 2 only): Pipelines from Filters to Clearwell and from New Los Altos Pumping Plant to Entry Shaft
- Highway 24 crossing of the pipeline segment of the Orinda-Lafayette Aqueduct

Bore-and-Jack. This method requires the use of a horizontal boring machine or auger to drill a hole, and a hydraulic jack to push a casing through the hole under the crossing. As the boring proceeds, a steel casing pipe is jacked into the hole and the pipeline is installed in the casing. This process requires the excavation of pits typically 10 feet by 35 feet (depth varies) at opposite ends of the crossing. Soil removed from pits would either be stockpiled and reused, or loaded directly into dump trucks and hauled away for disposal. If existing soil is not adequate for backfilling, then new material would be imported for backfilling. Below is an illustration of bore and jack.

Microtunneling. Microtunneling is a trenchless method that uses a remotely controlled Microtunnel Boring Machine (MTBM) combined with the pipe jacking technique to directly install pipelines underground in a single pass. Microtunneling does not require man-entry. Excavated tunnel spoils are removed and the exterior of the pipeline is lubricated as construction progresses. This form of tunneling can be performed with less excavation than traditional tunneling. Microtunneling is often used in areas where there are already numerous utilities and other subsurface structures, constraining potential tunneling alignments.

TYPICAL JACK-AND-BORE PIPELINE INSTALLATION
SPECIAL CONSTRUCTION LOCATIONS



[a] Refer to Section 2.5.3 for a description of traditional tunneling methods proposed for the Orinda-Lafayette Aqueduct (Alternative 2).

Program-Level Improvements

Potential future program-level improvements at the Lafayette WTP, under Alternative 1, that might eventually be required to meet water quality regulations include high-rate sedimentation units for solids removal for the entire WTP flow (i.e., not just for backwash water, a proposed project-level element), and UV disinfection. These processes, described in Figure 2-7, would occur prior to and following filtration, respectively. Map D-LWTP-1 shows the tentative locations identified for these facilities.

The proposed facilities would infringe on the existing Walter Costa Trail to the point that it would need to be relocated for security and safety reasons. The trail relocation, which EBMUD would intend to complete on District property, is addressed programmatically in this EIR. As part of the Lafayette WTP project, the existing trail would terminate at the future fenceline at the west end of the WTP. In that vicinity, the trail would generally be relocated near El Nido Ranch Road to the south of Lafayette Creek, parallel to and in between the creek and Mt. Diablo Boulevard, along an alignment that minimizes tree removal. The specific realignment would be determined in coordination with the City of Lafayette and consistent with EBMUD security requirements.

2.4.2 Lafayette Reclaimed Water Pipeline

EBMUDs Water Supply Permit from the state DHS requires the District to implement actions to meet the *California Cryptosporidium Action Plan*. The *California Cryptosporidium Action Plan* focus is to optimize water treatment practices in order to maximize *cryptosporidium* removal. The Lafayette WTP treated filter backwash water is currently discharged into the Lafayette Aqueducts, which are the raw water supply for the Orinda WTP. The filter backwash may contain higher concentrations of pathogens that were removed by the filters. EBMUD has agreed to discontinue that practice by 2008. As an interim solution under either Alternative 1 or Alternative 2, the Lafayette Reclaimed Water Pipeline project would deliver reclaimed water from the Lafayette WTP filter backwash treatment system to the Lafayette Reservoir. EBMUD would construct the Lafayette Reclaimed Water Pipeline in conjunction with the pipelines associated with the Highland Reservoir.

Location

Maps A2 and B2 show the general location of the proposed alignment for the Lafayette Reclaimed Water Pipeline on street and topographic base maps. Map C-HIGHRES-1 shows the proposed alignment in more detail on an aerial photograph base. The pipeline would be installed primarily on EBMUD property in the city of Lafayette (the Lafayette WTP property and the Lafayette Reservoir Recreation Area). The northern terminus of the Lafayette Reclaimed Water Pipeline is at the Lafayette WTP. The southern terminus is in the Lafayette Reservoir, where the pipeline would discharge water reclaimed at the WTP into the reservoir. For purposes of description, there are essentially three distinct segments to the proposed alignment:

- <u>Segment 1</u>. From the existing backwash water facilities at the Lafayette WTP, the proposed alignment travels south across the creek. The pipe would span Lafayette Creek; there would be concrete abutments on either side of the creek supporting the pipe. South of the creek, the pipe would be constructed in a trench adjacent to the Bryant and Leland Pipelines, as shown on Map D-LWTP-1.

- Segment 2. The Lafayette Reclaimed Water Pipeline would be co-located in the same trench (and constructed at same time) as the overlapping alignment segment of the Highland Inlet/Outlet pipeline.

- Segment 3. The Lafayette Reclaimed Water Pipeline and Highland Reservoir overflow pipeline are the same. The pipeline would extend into the reservoir, terminating at a dissipater. For construction of the pipe within the reservoir, the pipe would likely be floated on top of the water, then sunk into place and anchored to the bottom.

Design Characteristics

The pipeline would deliver reclaimed water to the Lafayette Reservoir on an interim basis during the months when the Lafayette WTP is operated (typically between March and November). If Alternative 1 is implemented, then EBMUD would construct a backwash water recycle system at the Lafayette WTP that would allow the water to be reclaimed at the WTP. If Alternative 2 is implemented, water treatment operations at Lafayette (and the need for this project) would discontinue. The backwash flow quantity during project operation would average about 0.3 mgd, with a maximum of about 0.5 mgd. The projected annual quantity would be about 100 million gallons, equal to about 330 acre-feet.

Lafayette Reservoir is a standby water supply reservoir for EBMUD; however, it has not been used for drinking water purposes for over 40 years because of its limited storage volume and relatively poor water quality. The volume of Lafayette Reservoir is about 4,250 acre-feet at the spillway elevation and its only source of water is local runoff and rainfall.

The additional water from the Lafayette Reclaimed Water Pipeline would enable EBMUD to maintain water levels near the maximum operating range of 442 to 448 feet in wet or dry years. As a result, the frequency of releases or spills from the reservoir into Lafayette Creek would increase with the project. In the past 42 years, the District has released and/or spilled water from the Lafayette Reservoir in about half of the years. With the addition of 330 acre-feet of water per year under this project, the District expects that water would be released or spilled nine out of ten years.

Other key characteristics of the Lafayette Reclaimed Water Pipeline are as follows:

- Dechlorination. The reclaimed water could be dechlorinated prior to discharge into Lafayette Reservoir. The project includes construction and operation of a dechlorination facility at the Lafayette WTP near the northern terminus of the pipeline.

- Pumping Plant. An existing pumping plant at the Lafayette WTP would be modified (i.e., the pump horsepower increased), and a new power supply would be connected to pump flows through the pipe.

- Pipe Length. The proposed pipeline is approximately 3,200 feet long.

- *Pipe Diameter*. The diameter would range from 8 inches (segments 1 and 2) to 20 inches (segment 3).
- *Material*. The pipe would be welded steel and/or high-density polyethylene (HDPE). The segment extending into the reservoir would be HDPE pipe.

Construction Characteristics

Schedule, Work Hours, and Staging

Table 2-6 presents the proposed schedule for design and construction. Table 2-7 presents proposed work hours for all WTTIP projects. The Lafayette Reclaimed Water Pipeline would be constructed at the same time as the pipelines for the Highland Reservoir project. Table B-HIGHRES-1 in Appendix B provides construction sequencing, duration of specific construction activities, construction staffing, and parking information. The tank site would serve as the construction staging area; sufficient parking is available at the recreation facility.

Construction Activities

Most of the pipe would be installed in the ground using open-trench construction, as described in Figure 2-9. Near the northern terminus, the pipe would span Lafayette Creek; pipe supports (concrete abutments or cradles) would be constructed atop either bank. For construction of the pipe segment in the reservoir, the HDPE pipe would likely be floated on top of the water and then sunk into place. It would be anchored to the reservoir bed using pipe saddles and anchor rods. An underwater jack hammer would likely be used to install the anchor rods.

2.4.3 Orinda Water Treatment Plant

At the Orinda WTP, filter backwash water is dechlorinated and discharged to San Pablo Creek, which in turn discharges into San Pablo Reservoir. The discharge from the backwash water settling ponds to San Pablo Creek is covered by the Regionwide NPDES Permit for Discharge from Surface Water Treatment Facilities for Potable Supply. There have been violations of this permit, primarily due to bioassay failures (indicating acute aquatic toxicity) of this discharge. Providing backwash water treatment at the Orinda WTP, as proposed under both alternatives, would allow treated backwash water to be returned to the head of the WTP and would eliminate this discharge to San Pablo Creek.

Location, Existing Facilities, and Operations

The Orinda WTP is located north of Highway 24 and east of Camino Pablo in Orinda (refer to Maps A1 and B1 for general location). The WTP site is bisected by Manzanita Drive, a public street. EBMUD’s property extends north of its plant facilities and includes an undeveloped area north of the existing washwater settling basins and the Orinda Sports Field (ballfields south of Wagner Ranch Elementary School). San Pablo Creek traverses the Orinda WTP site along the eastern property boundary.

Figure 2-5 illustrates and describes existing processes at the Orinda WTP. Figure 2-10 presents schematic flow diagrams of existing processes and future processes with implementation of either Alternative 1 or Alternative 2. On Figure 2-10, the upper series of boxes represents raw water treatment and the lower series of boxes represents backwash water processing.

Project-Level Improvements – Design Characteristics

Map D-OWTP-1 shows the proposed layout for the Orinda WTP under Alternative 1. Section B on Map D-OWTP-3, a profile drawing, shows a cross-section of the Backwash Water Recycle System proposed under both Alternatives 1 and 2. The new system would include basins constructed below grade as well as above-ground buildings and a tank, all of which would be located in an area adjacent to the existing chemical building and west of the main entrance to the plant. Refer to Figure 2-7 for descriptions of the facilities and processes described in this section.

- *Basins*. The basins would include a filter-to-waste equalization basin, two backwash water equalization basins, and two flocculation and two sedimentation basins.

- *Above-Grade Structures*. The UV disinfection building would contain the backwash water return pumps, UV disinfection systems, and a chemical/electrical room that would house coagulants and/or nonionic polymers, the chemical feed pumps, and electrical panels and control systems. This building would be adjacent to and west of the basins. To operate the backwash water recycle system during a power outage, one 200-kilowatt emergency diesel generator would be stored onsite in a concrete building. An above-ground solids storage tank and solids pumping plant would also be constructed adjacent to the other components. Solids collected in the tank would be pumped into trucks and hauled to EBMUD's wastewater treatment plant for further treatment. Currently, there is a chain-link gate to the fence around the existing settling basins just north of Manzanita Drive. Under this alternative new project-level facilities are not proposed at this location, however, a new gate would be constructed at the Manzanita Drive entrance to the existing fence. The new gate would be more aesthetically pleasing.

Project-Level Improvements – Construction Characteristics

Schedule, Work Hours, and Staging

Table 2-6 presents the proposed schedule for design and construction of upgrades at the Orinda WTP. Table 2-7 presents proposed work hours. Table B-OWTP-1 in Appendix B provides construction sequencing, duration of specific construction activities, construction staffing, and parking information.

Construction Activities

Map D-OWTP-1 shows the location of proposed facilities at the Orinda WTP under Alternative 1. Construction activities would be concentrated between Manzanita Drive and the existing chemical building. Some construction staging (e.g., parking, equipment storage) would occur in the parking area southeast of the WTP's main entrance off of Manzanita Drive and at the ballfields area. All construction traffic would use the plant's main entrance off of Manzanita Drive.

Proposed construction activities and methods, described below, are based on conceptual facility designs and requirements for maintaining water service during construction. This description provides the basis for the impact evaluation presented in Chapter 3. During final design, construction phasing and methods will likely be refined.

- *Mobilization*. The contractor would clear the site and set up the construction staging area.
- *Excavation*. Underground structures would include basins and piping. Construction at the Orinda WTP would not involve sheetpile driving.
- *Foundation Construction*. Following excavation, the contractor would construct the basin and building foundations using concrete and rebar.
- *Backfilling*. Following foundation construction, the basins would be backfilled.
- *Mechanical/Electrical*. Mechanical and electrical equipment used for backwash water recycling would then be installed.
- *Demobilization*. Following the completion of construction, the contractor would break down the staging areas.

Construction Equipment

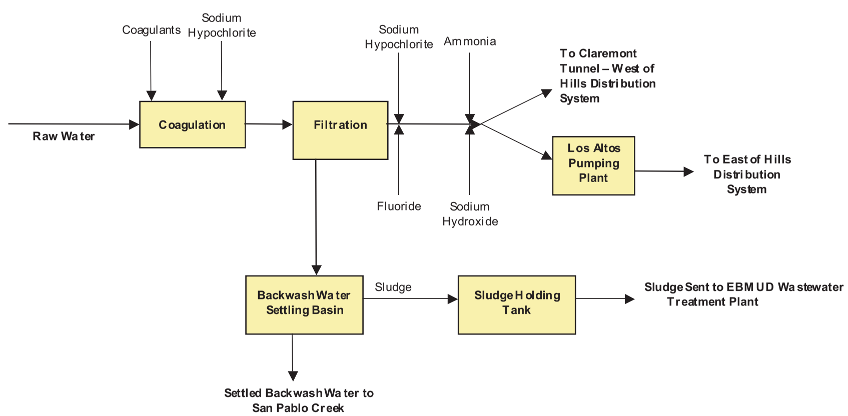
Backhoes, bulldozers, scrapers, and water trucks would be used for excavation, grading, and fill. Concrete would be delivered to the site by ready-mix trucks; a crane would set structural components and equipment; and supply trucks would deliver materials and equipment used in the construction process. Additional equipment likely to be used includes air compressors, welding machines, and various air- and electric-powered hand tools.

Program-Level Improvements

There is no clearwell at the Orinda WTP. Most water from the Orinda WTP is sent directly through the Claremont Tunnel to the West of Hills portion of the EBMUD service area. Several EBMUD West-of-Hills reservoirs function as remote clearwell storage for the Orinda WTP. The tunnel itself also provides de facto treated water storage. Consolidating clearwell capacity at the Orinda WTP may be necessary to effectively manage water quality delivered to the distribution system and maintain water quality within the distribution system.

The District needs to keep water that does not meet water quality regulations (due to source water quality problems or a problem in the treatment process) out of the distribution system. Once water enters the Claremont Tunnel it cannot be retrieved and enters the distribution system. A clearwell at the water treatment plant would allow the District to more effectively manage the quality of treated water delivered to the distribution system by preventing such water from entering the Claremont Tunnel.

A clearwell at the water treatment plant would also reduce water age and improve water quality in the distribution system. A clearwell at the water treatment plant would be designed to turn over all of its water in a single day. Reservoirs in the distribution system are designed to use the top ri - i i g r e ri



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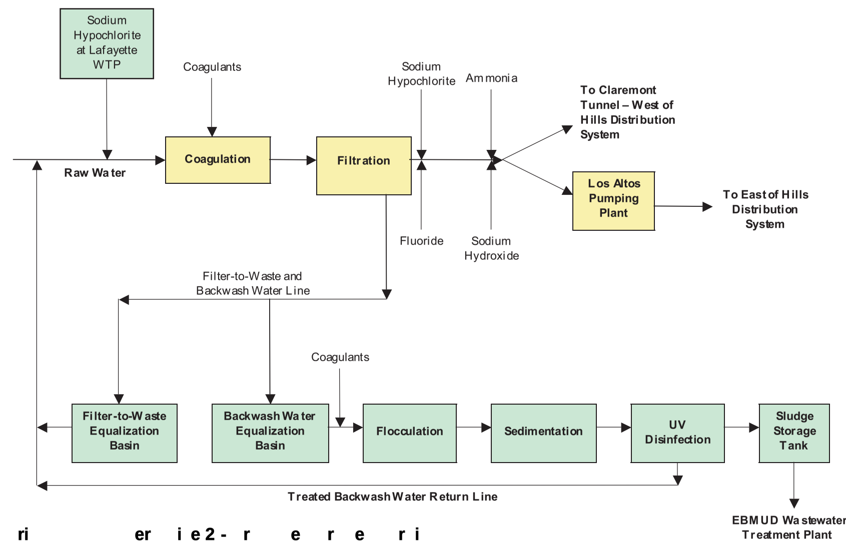

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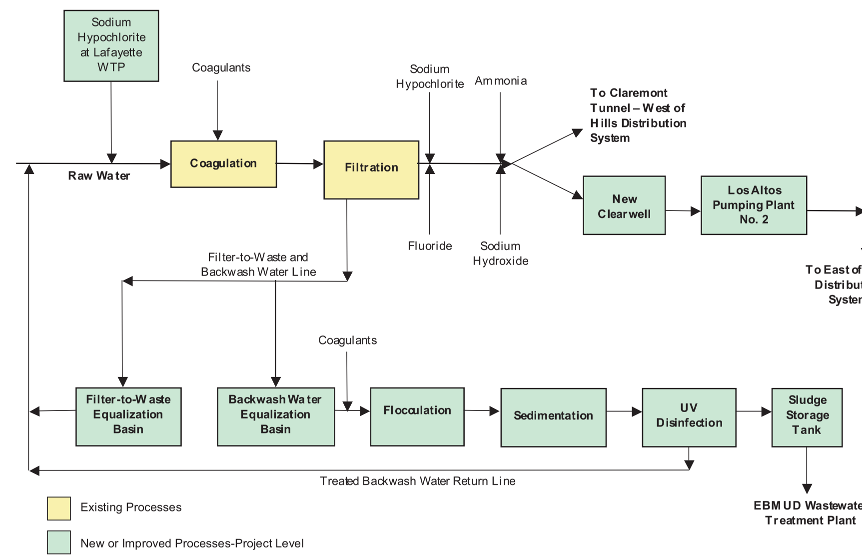


SOURCE: EBMUD and ESA

EBMUD Water Treatment and Transmission Improvements Program . 204369

Figure 2-1
Sc ematic o Diagrams o rinda WTP
E isting onditions and A ternatives and 2
Proposed onditions

30 percent of the reservoir volume. The bottom 70 percent of reservoir volume is considered emergency storage. Low customer water pressures can develop once a distribution reservoir drops below 50 percent. The result is that water held in distribution reservoirs cannot be turned over in a single day and has a greater water age and lower water quality.

Other future potential improvements associated with providing clearwell storage under Alternative 1, to be considered programmatically, are shown on Map D-OWTP-1. These improvements include a low-lift pumping plant, another clearwell that would act as a buffer between the filters and the pumping plant, an electrical substation to power the low-lift pumping plant, and associated pipelines.

Potential program-level improvements that might eventually be required to meet future water quality regulations include high-rate sedimentation units, a chlorine contact basin, and UV disinfection facilities. Figure 2-10 presents descriptions of water treatment processes. Map D-OWTP-1 shows the potential locations for these facilities.

2.4.4 Walnut Creek Water Treatment Plant

The Walnut Creek WTP requires additional filter capacity to meet peak operational demands and to accommodate occasional source water quality problems. To reduce energy costs, EBMUD turns off distribution system pumping plants during peak energy time of use, from noon to 6:00 p.m. During this time, clearwell storage at the WTPs and storage in the distribution system reservoirs are drawn down to meet demands. When the pumps are turned back on, additional water treatment plant peaking capacity is required for a few hours per day during peak summer demands to recover storage and meet demand. Additional treatment plant capacity is also required to address occasional changes in source water quality. Increases in turbidity in spring and early summer, and recent increases in algae in Pardee reservoir, have adversely affected the source water quality at the WTP. Consequently, the efficiency of the filters is reduced, and the ability of the plant to meet demand is constrained. To correct these problems, the District proposes to construct new filters to increase the reliability of the WTP.

A new Leland Pumping Plant (No. 2) is also proposed at the Walnut Creek WTP to correct hydraulic problems in Leland Pressure Zone. The hydraulic connectivity between the Danville Pumping Plant suction pipeline and the Leland Pressure Zone is adversely affecting water supply, causing (among other problems) water from the Lafayette WTP to flow into the Leland Pressure Zone; drawdown of the Leland Reservoir; and low water pressure for some customers. Proposed improvements at the WTP, coupled with the Leland Pressure Zone Isolation Pipeline and Bypass Valves, would correct these problems and isolate the Leland Pressure Zone from the Danville Pressure Zone.

Location, Existing Facilities, and Operations

The Walnut Creek WTP is located in northwest Walnut Creek, north of Larkey Lane. The Acalanes Ridge Open Space surrounds the plant to the north, south, and west. EBMUD has recently completed major upgrades to many of the plant’s facilities and systems. Figure 2-5 describes existing processes at the Walnut Creek WTP. Figure 2-11 presents a schematic flow diagram of existing and proposed (Alternative 1 or 2) water treatment process trains for the Walnut Creek WTP.

Project-Level Improvements – Design Characteristics

Proposed improvements to the Walnut Creek WTP would be the same under Alternatives 1 and 2, as shown on Map D-WCWTP-1. As shown on Map D-WCWTP-1, the new filters would be constructed adjacent to the existing filters, near the operations building. The new Leland Pumping Plant would be constructed adjacent to the recently completed backwash water treatment facilities. Two segments of 42-inch-diameter pipelines would be constructed to connect the new pumping plant to the transmission main serving the Leland Pressure Zone.

Project-Level Improvements – Construction Characteristics

Schedule, Work Hours, and Staging

Table 2-6 presents the proposed schedule for design and construction of upgrades at the Walnut Creek WTP. Table 2-7 presents proposed work hours for all WTTIP projects. Table B-WCWTP-1 in Appendix B provides construction sequencing, duration of specific construction activities, construction staffing, and parking information.

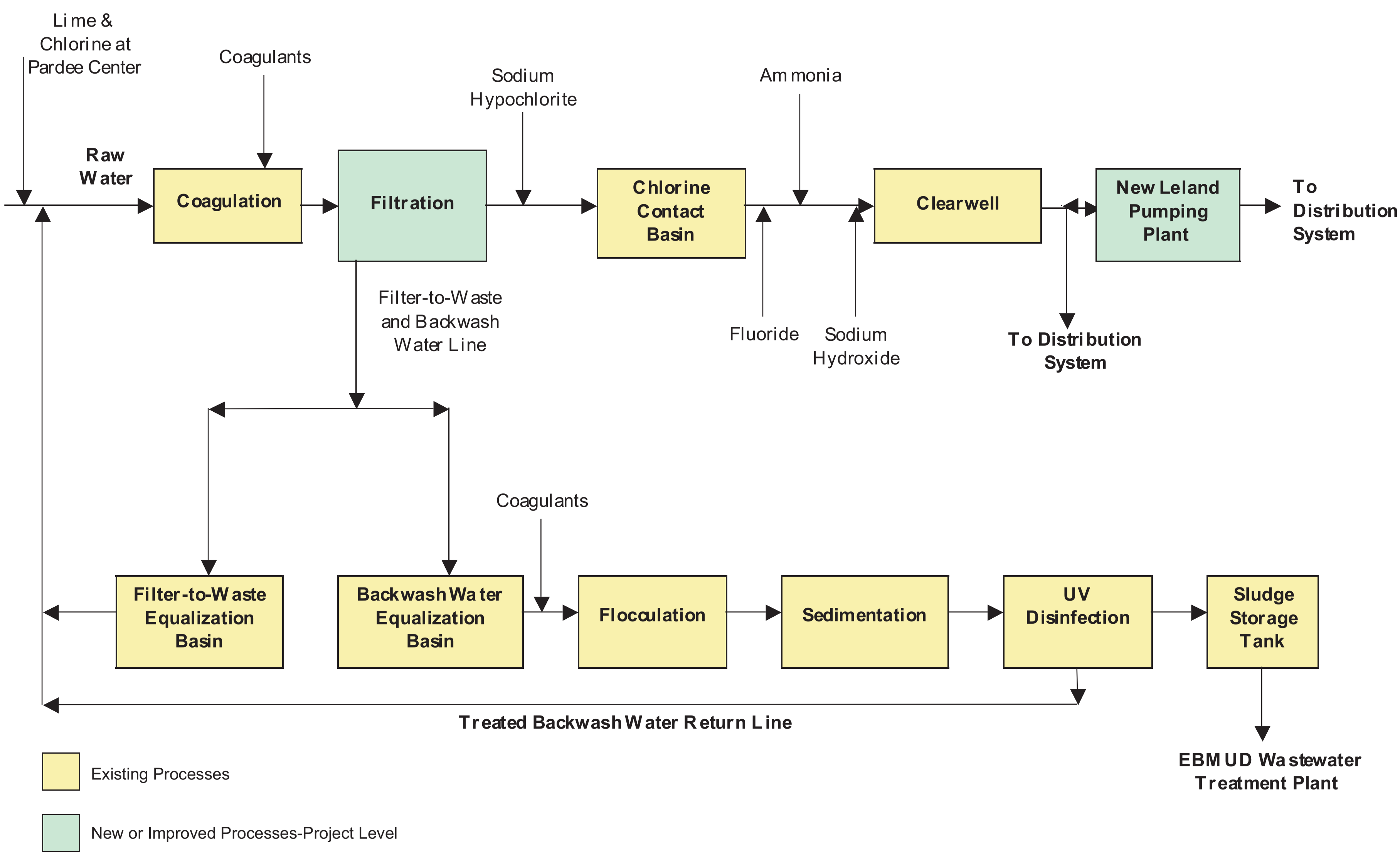
Construction Activities

Construction activities would be concentrated at the two sites of proposed facilities. Some construction staging (e.g., parking, equipment storage) would occur elsewhere within the WTP site. All construction traffic would use the plant's main entrance off of Larkey Lane.

- *Mobilization*. The contractor would clear the site and set up the construction staging area.
- *Excavation*. Underground structures would include the filters, pumping plant wetwell, and piping.
- *Foundation Construction*. Following excavation, the contractor would construct the basin and building foundations using concrete and rebar.
- *Backfilling*. Following foundation construction, the areas around the filters would be backfilled.
- *Mechanical/Electrical*. Mechanical and electrical equipment used for backwash water recycling would then be installed.
- *Demobilization*. Following the completion of construction, the contractor would break down the staging areas. Site restoration (rebuilding onsite roadways and landscaping) would follow.

Construction Equipment

Backhoes, bulldozers, excavators, scrapers, and water trucks would be used for excavation, grading, and fill. Concrete would be delivered to the site by ready-mix trucks; a crane would set structural components and equipment; and supply trucks would deliver materials and equipment u ree er i e 1 2 - r e r e r i



Exisitng Process Train is same as proposed with two exceptions: a new Leland Pumping Plant and new filter would be added.

SOURCE: EBMUD and ESA

EBMUD Water Treatment and Transmission Improvements Program . 204369

Figure 2-11
Sc ematic o Diagrams o Wa n t ree WTP
E isting onditions and A ternatives and 2
Proposed onditions

used in the construction process. Additional equipment likely to be used includes air compressors, welding machines, and various air- and electric-powered hand tools.

Program-Level Improvements

Under either Alternative 1 or 2, future program-level improvements at the Walnut Creek WTP might eventually be required to meet future water quality regulations. These improvements include high-rate sedimentation units and UV disinfection facilities. Figure 2-11 describes these water treatment processes. In terms of the WTP's process train, high-rate sedimentation would occur before filtration, and UV disinfection would occur after filtration. Map D-WCWTP-1 shows tentative locations identified for these facilities.

2.4.5 Sobrante Water Treatment Plant

Location, Existing Facilities, and Operations

The Sobrante WTP is located in unincorporated Contra Costa County, adjacent to the city of Richmond. The WTP site is bisected by Valley View Road and D'Avila Way/Amend Road. The entrance to the main portion of the plant site is off of Amend Road; the entrance to the western portion is off of D'Avila Way. San Pablo Creek is parallel to and within the western and southern property boundaries of the western portion of the site.

Figure 2-5 describes existing processes at the Sobrante WTP. Figure 2-12 presents schematic flow diagrams of existing and proposed (Alternative 1 or Alternative 2) water treatment process trains for the Sobrante WTP.

Design Characteristics

Proposed improvements to the Sobrante WTP would be virtually the same under Alternative 1 and 2, as shown on Map D-SOBWTP-1. Map D-SOBWTP-2 provides a cross-section of the proposed Backwash Water Recycle System on the western side of the plant. The size of the chlorine contact basin would be 0.7 mg under Alternative 1, and 1.0 mg under Alternative 2. The proposed improvements are described below.

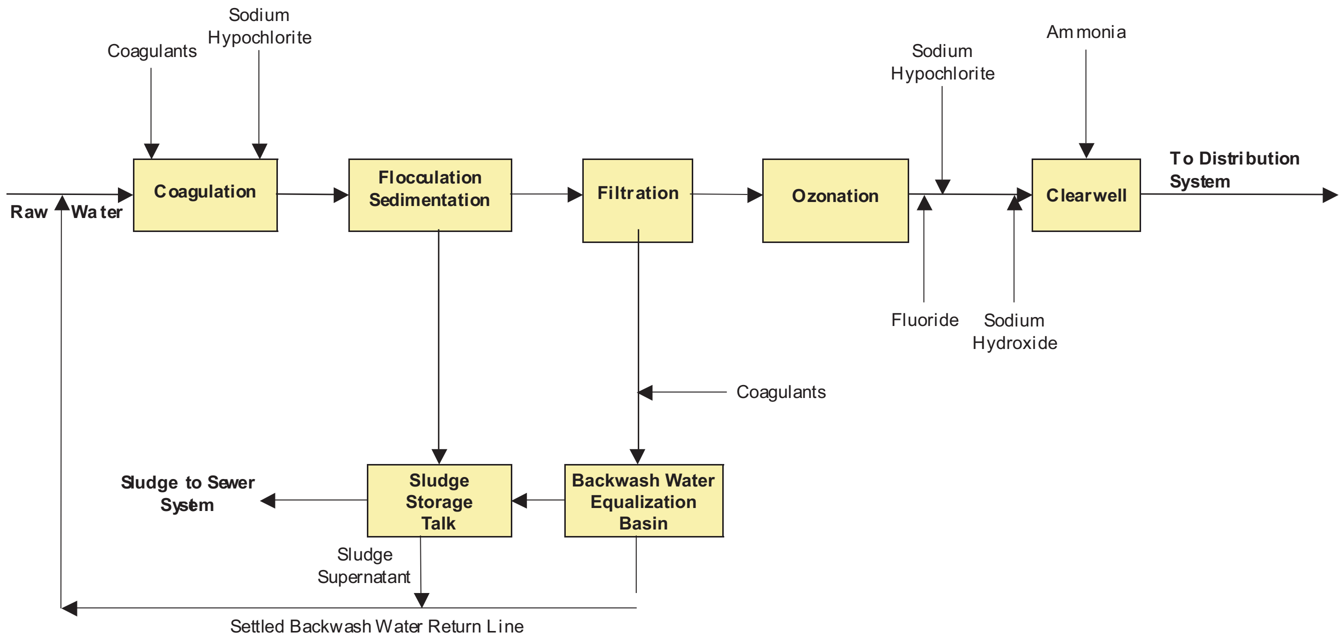
Ozonation System

Ozone is produced by passing oxygen between high-voltage electrodes, thereby converting a small amount (10 to 12 percent) of the oxygen into ozone. The ozone is then injected into the contact basin, where it disinfects raw water and removes potentially objectionable taste and odor.

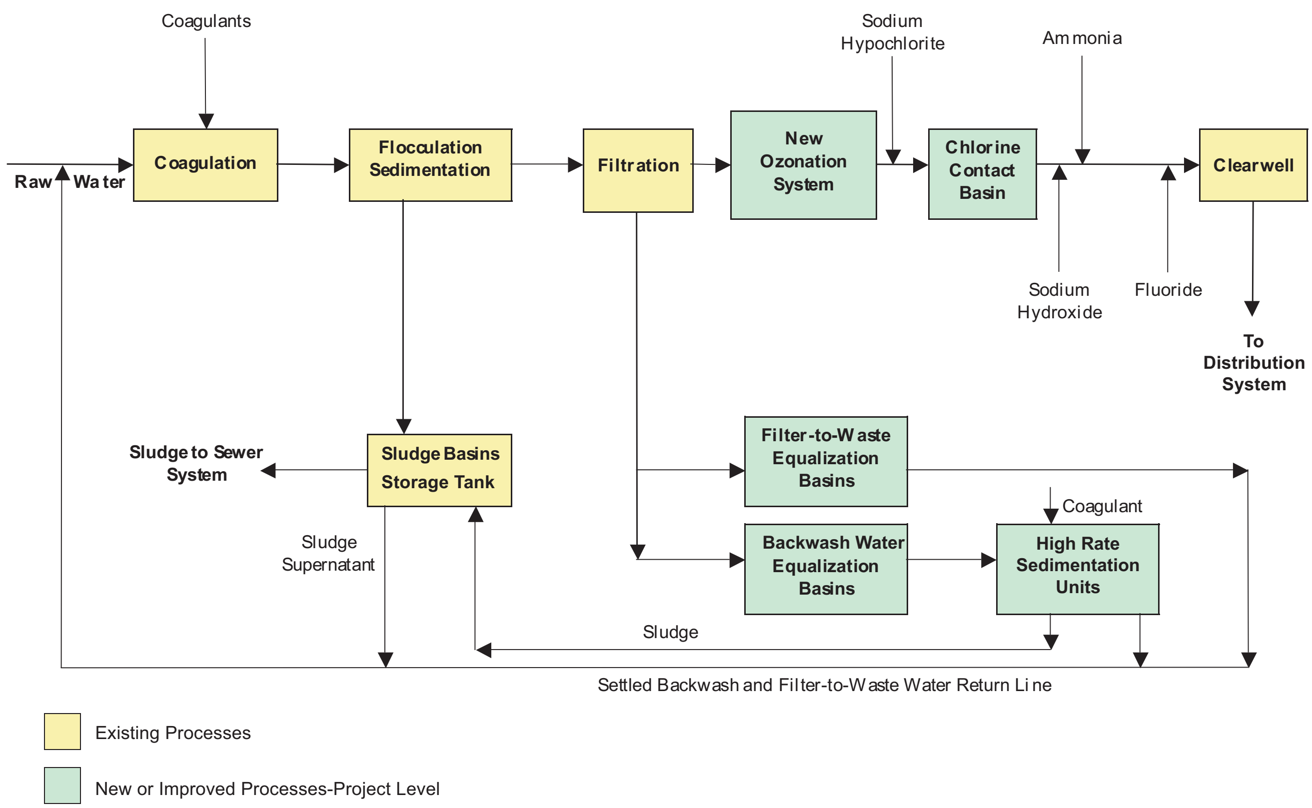
The Sobrante WTP ozonation system is undersized for handling poor raw water quality episodes occasionally experienced at the WTP.

The existing ozonation system at the Sobrante WTP is an air-feed system; as part of the WTTIP (under either Alternative 1 or Alternative 2), the system would be converted to a liquid oxygen feed. The proposed ozonation system includes the following components: liquid oxygen tanks,

Sobrante WTP - Existing Process Train



Sobrante WTP, Alternatives 1 and 2 - Proposed Process Train



SOURCE: EBMUD and ESA

Figure 2-12
Schematic Flow Diagrams of Sobrante WTP-
Existing Conditions and Alternatives 1 and 2,
Proposed Conditions

ozone generators, ozone contactor, and ozone destruct units. Other than the two new oxygen tanks, all changes related to upgrading the ozonation system would occur in existing buildings. New ozone generators with the ability to process 1,650 pounds per day would be constructed. The liquid oxygen tanks would be installed above ground and northwest of the existing ozonation building. The existing ozone destruct unit would capture and destroy any excess ozone from the ozone contact basin.

Backwash Water Recycle System

The Sobrante WTP capacity is limited by the existing backwash water treatment system. The existing backwash water treatment system would be converted to a backwash water recycle system, similar to that proposed at the Lafayette and Orinda WTPs. The two existing backwash water settling basins, located in the western part of the plant west of the main plant, would be converted to backwash water equalization basins. A new filter-to-waste equalization basin would be constructed adjacent to these existing basins (refer to Maps D-SOBWTP-1 and D-SOBWTP-2 for sizing information). The existing basins are partially above grade; the proposed basin would be partially above grade as well. In addition, two high-rate sedimentation units would be installed near the basin. The District is proposing to install high-rate sedimentation units instead of flocculation/sedimentation basins at the Sobrante WTP because the western portion of the plant (where backwash water processing occurs) is relatively small and constrained on all sides by public streets or San Pablo Creek. The two high-rate sedimentation units would be prefabricated, epoxy-painted steel structures approximately 50 feet long, 20 feet wide, and 12 feet high.

Chlorine Contact Basin

To assure the District can meet future disinfection byproduct regulations, a new chlorine contact basin would be constructed. The basin would be a covered concrete tank approximately 36 feet deep and up to 92 feet in diameter; it would be constructed below ground with a finished at-grade roof.

Construction Characteristics

Schedule, Work Hours, and Staging

Table 2-6 presents the proposed schedule for design and construction of upgrades at the Sobrante WTP. Table 2-7 presents proposed work hours for all WTTIP projects. Table B-SOBWTP-1 in Appendix B provides construction sequencing, duration of specific construction activities, construction staffing, and parking information. All construction staging would take place at the WTP site.

Construction Activities

Construction activities would be focused around new facilities, but parking and construction staging could occur at other, generally paved locations at the WTP site (see Map D-SOBWTP-1). For construction in the main portion of the site, it is assumed that all construction parking would occur onsite. For the western portion of the site, it is likely that some construction vehicles would park on local streets. All construction vehicles entering the main portion and western portion of the site would use existing access roads off of Amend Road and D'Avila Way, respectively.

- *Mobilization*. The contractor would clear the site and set up the construction staging area.
- *Excavation*. Underground structures would include basins and piping. The chlorine contact basin would be a deep excavation. One side of the excavation would be supported by soil nailing[12]; the other side would be ramped to allow equipment access down into the basin.
- *Foundation Construction*. Following excavation, the contractor would construct the basin and building foundations using concrete and rebar. The basins at the western portion of the site would have slab-on-grade foundations. The walls of the chlorine contact basin would be prestressed with a prestressing tower; this device is used to wrap the cylinder with bar or wire at high pressure to compress the concrete walls to keep water from seeping out. Shotcrete would then be applied to the prestressing wires. Once the walls are complete, the concrete roof would be poured.
- *Backfilling*. Following foundation construction, the basins would be backfilled.
- *Mechanical/Electrical*. Mechanical and electrical equipment used for backwash water recycling would then be installed.
- *Demobilization*. Following the completion of construction, the contractor would break down the staging areas. Site restoration (rebuilding onsite roadways and landscaping) would follow.

For the purpose of analysis, it is assumed that excavation for the chlorine contact basin, equalization basin, and high-rate sedimentation units would occur simultaneously.

Construction Equipment

Backhoes, bulldozers, excavators, scrapers, haul trucks, and water trucks would be used for excavation, grading, and fill. Chlorine contact basin construction would also involve the use of a prestressing tower, horizontal drill rig, and grout pump. Concrete would be delivered to the site by ready-mix trucks, which would dump concrete into the concrete pumper truck; cranes would set the prefabricated high-rate sedimentation units and equipment; and supply trucks would deliver materials and equipment used in the construction process. Additional equipment likely to be used includes air compressors, welding machines, and various air- and electric-powered hand tools. Paving equipment would include grinders, pavement cutters, dump trucks, pavers, and vibratory rollers.

[12] Soil nailing involves the use of a horizontal drill rig to drill holes (about 20 feet deep) into an excavated surface. Once drilled, steel rods are installed into the holes and grouted in place, and a plate is installed over the holes across the face of the excavation (vertical wall). The face of the excavation is then secured with shotcrete.

2.4.6 Upper San Leandro Water Treatment Plant

Location, Existing Facilities, and Operations

The Upper San Leandro WTP is located near Interstate 580 (I-580) at Keller Avenue in Oakland. The main entrance to the plant is off of Greenly Drive. Figure 2-5 illustrates existing processes at the Upper San Leandro WTP. Figure 2-13 presents schematic flow diagrams of existing and proposed (Alternative 1 or 2) water treatment process trains for the plant.

Design Characteristics

Map D-USLWTP-1 shows the proposed layout for the Upper San Leandro WTP under both Alternatives 1 and 2. The changes to the ozonation system would be the same as those discussed for the Sobrante WTP in Section 2.4.4. The system would include new ozone generators with the ability to process 1,250 pounds per day. Under Alternative 1, the average-annualized capacity at the Upper San Leandro WTP would be 25 mgd. Under the project, as shown on Figure 2-13, water emerging from the filters following backwash would be diverted to a new filter-to-waste equalization basin and recycled back to the head of the plant via a new return pumping plant. The locations of the proposed filter-to-waste basin and pumping plant are shown on Map D-USLWTP-1. The pumping station and equalization basin would be above-ground structures. The pumping station capacity would be 500 gallons per minute. The equalization basin would be constructed of steel.

Construction Characteristics

Schedule, Work Hours, and Staging

Table 2-6 presents the proposed schedule for design and construction of upgrades at the Upper San Leandro WTP. Table 2-7 presents proposed work hours for all WTTIP projects. Table B-USLWTP-1 in Appendix B provides construction sequencing, duration of specific construction activities, truck trips and worker vehicle trips, and excavation and fill requirements. Excavated material would be incorporated into final site grading. Parking and some construction staging (e.g., equipment and materials storage) could occur at other locations at the WTP site.

Construction Activities

For Alternative 1 or 2, the areas of construction/ground disturbance would be focused around proposed new facilities, including the liquid oxygen tanks and filter-to-waste equalization basin and associated appurtenances.

- *Mobilization*. The contractor would clear the site and set up the construction staging area.
- *Excavation*. Underground structures would include basins and piping.
- *Foundation Construction*. Following excavation, the contractor would construct the basin and building foundations using concrete and rebar.
- *Backfilling*. Following foundation construction, the basin would be backfilled.

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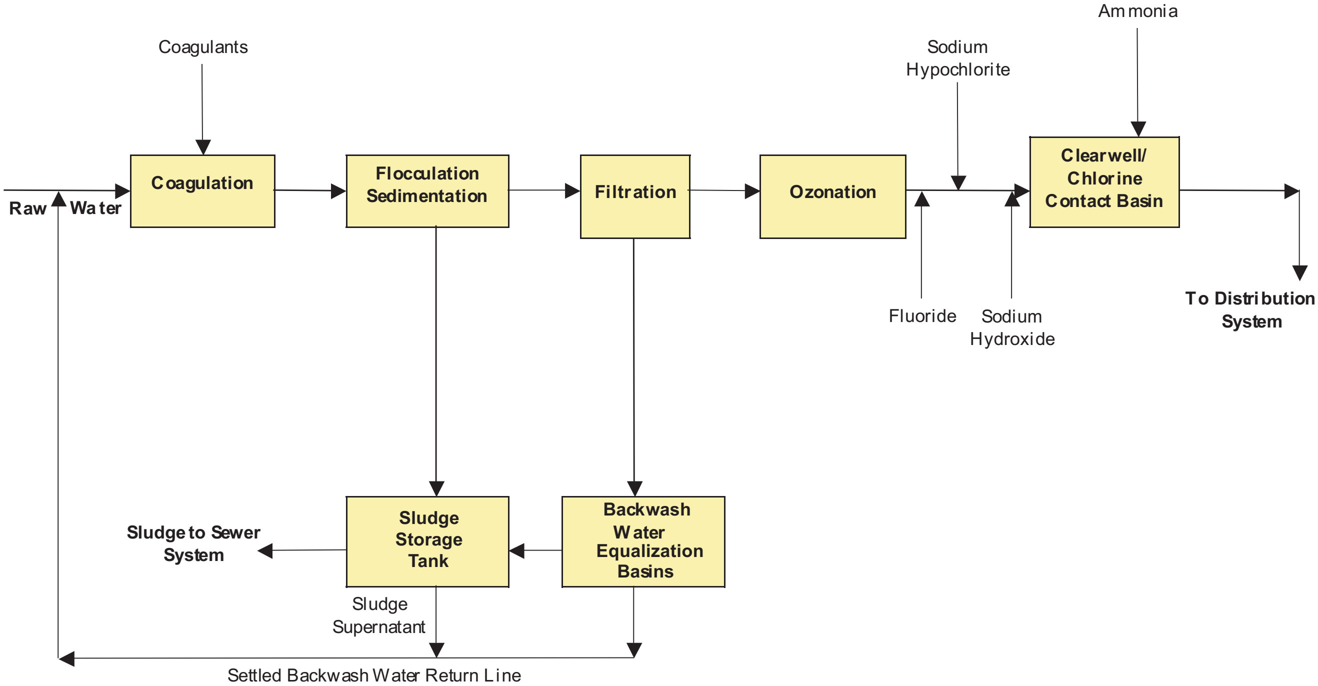

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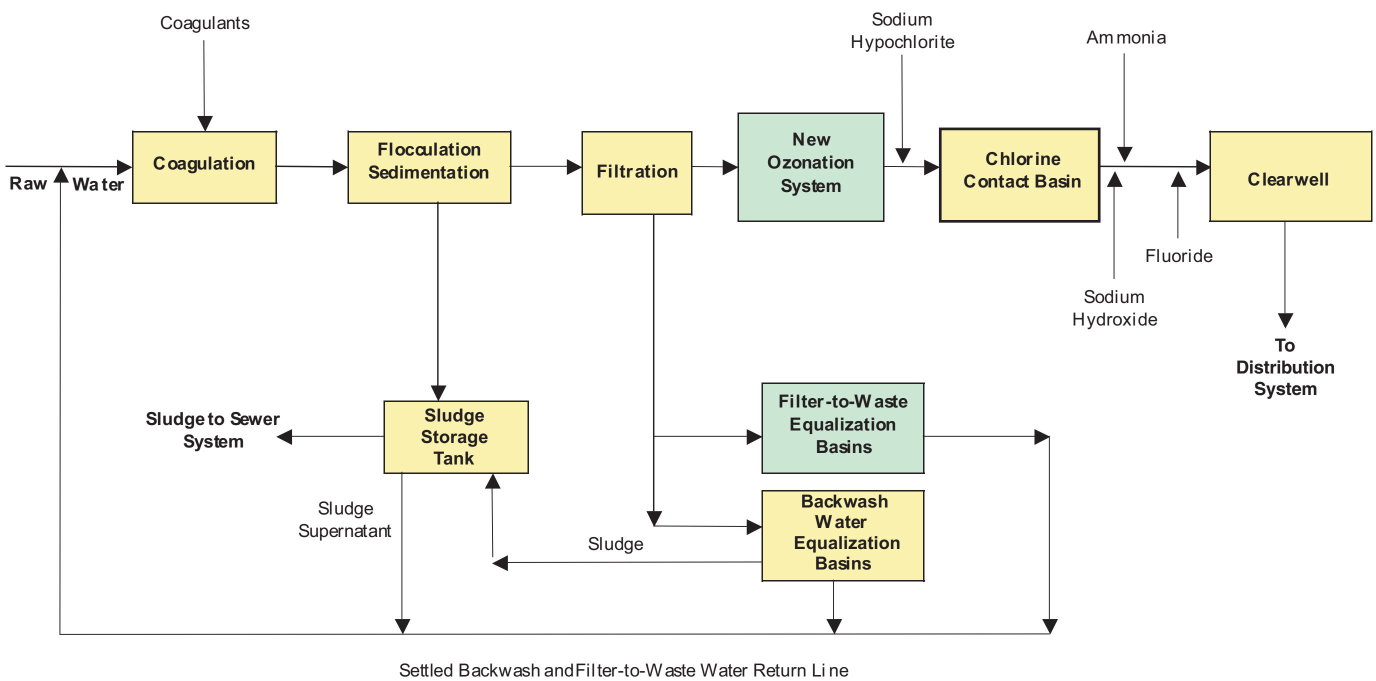


Existing Processess

New or Improved Processes-Project Level

SOURCE: EBMUD and ESA

EBMUD Water Treatment and Transmission Improvements Program . 204369

Figure 2-1
Sc ematic o Diagrams o Upper San eandro WTP
E isting onditions and A ternatives and 2
Proposed onditions

- *Mechanical/Electrical.* Mechanical and electrical equipment used for backwash water recycling would then be installed.
- *Demobilization.* Following the completion of construction, the contractor would break down the staging areas.

Construction Equipment

Backhoes, bulldozers, excavators, haul trucks, and water trucks would be used for excavation, grading, and fill. Concrete would be delivered to the site by ready-mix trucks, which would dump concrete into the concrete pumper truck; cranes would set structural components and equipment; and supply trucks would deliver materials and equipment used in the construction process. Additional equipment likely to be used includes air compressors, welding machines, and various air- and electric-powered hand tools. Paving equipment would include grinders, pavement cutters, dump trucks, pavers, and vibratory rollers.

2.5 Water Treatment Plant Improvements, Alternative 2

This section describes projects at the Lafayette, Orinda, Walnut Creek, Sobrante, and Upper San Leandro WTPs under Alternative 2 – Supply from Orinda WTP. This section includes the Orinda-Lafayette Aqueduct, which is only proposed as part of Alternative 2.

2.5.1 Lafayette Water Treatment Plant

The Lafayette WTP is located on EBMUD property in the city of Lafayette, between Mt. Diablo Boulevard and Highway 24, east of El Nido Ranch Road. Demands in the areas served by the Lafayette WTP currently exceed production rates. In addition the plant is in need of extensive upgrades to meet future regulations as well as to maintain performance. Under Alternative 2, the plant would be decommissioned and demands would be met by the Orinda WTP.

Project-Level Improvements – Design Characteristics

Under Alternative 2, the Lafayette WTP would be decommissioned, although the site would still contain emergency pumping equipment, existing maintenance facilities, aqueduct chlorination facilities, and active water transmission facilities, most notably the two large Lafayette Aqueducts that convey water to the Orinda WTP and Briones Reservoir. Treated water would be conveyed to the Lafayette WTP distribution system from the Orinda WTP via the Orinda-Lafayette Aqueduct. Map D-LWTP-2 shows the proposed layout for the Lafayette WTP under Alternative 2. A sodium hypochlorite and feed system for the Lafayette Aqueducts would be developed at the site to enable the downstream Orinda WTP to meet disinfection requirements; this system would involve the following:

- Convert chemical tanks in the existing chemical building to sodium hypochlorite tanks
- Install new sodium hypochlorite feed pumps and pipeline to feed sodium hypochlorite to the Lafayette Aqueducts (see aqueduct disinfection points on Map D-LWTP-1)
- Demolish backwash water equalization basin and clarifier
- Remove existing chemical feed pumps and electrical equipment

Pipeline connections in the vicinity of the Lafayette WTP under Alternative 2 (connection of the proposed Orinda-Lafayette Aqueduct to existing and proposed pipelines serving the Bryant and Leland Pressure Zones) are described in Section 2.5.3. The Lafayette Reclaimed Water Pipeline would be constructed under Alternative 2 in the identical manner described in Section 2.4.2.

Construction Characteristics

Schedule, Work Hours, and Staging

Table 2-8 presents the proposed schedule for design and construction of upgrades for WTTIP projects at water treatment plants under Alternative 2. Table 2-7 presents proposed work hours for all WTTIP projects.

TABLE 2-8
WATER TREATMENT AND TRANSMISSION
IMPROVEMENTS PROGRAM CONSTRUCTION SCHEDULE – WATER TREATMENT PLANT IMPROVEMENTS, ALTERNATIVE 2

Facility	Duration (Years)	Expected Start Date
CITY OF LAFAYETTE		
Alternative 2		
Lafayette WTP – Project-Level	1 to 2	October 2015
Orinda-Lafayette Aqueduct – Pipeline[a]	1 to 2	September 2015
Lafayette Reclaimed Water Pipeline	1 to 2	May 2007
CITY OF ORINDA		
Alternative 2		
Orinda WTP, Project-Level	4 to 6	April 2012
Orinda WTP – Alternative 2, Program-Level	To be determined	After 2015
Orinda-Lafayette Aqueduct – Tunnel	2 to 3	June 2014
Orinda-Lafayette Aqueduct – Pipeline[a]	1 to 2	September 2015
CITY OF WALNUT CREEK		
Alternative 1 or 2		
Walnut Creek WTP, Project-Level	1 to 2	October 2007
Walnut Creek WTP, Program-Level	To be determined	After 2015
CITY OF OAKLAND		
Alternative 1 or 2		
Upper San Leandro WTP, Project Level	1 to 2	October 2011
UNINCORPORATED CONTRA COSTA COUNTY		
Alternative 1 or 2		
Sobrante WTP, Project-Level	1 to 2	October 2011

[a] Facility is located within multiple jurisdictions. Schedule information is for entire project.

Construction Activities

There would be less construction at the Lafayette WTP site under Alternative 2 than under Alternative 1; construction would mainly entail equipment replacement, some demolition, and pipeline construction. Pipeline construction would occur along Mt. Diablo Boulevard adjacent to the WTP for the proposed Orinda-Lafayette Aqueduct, Moraga Road Pipeline, Lafayette Reclaimed Water Pipeline, and Highland Reservoir Pipeline.

2.5.2 Orinda Water Treatment Plant

The Orinda WTP is located on EBMUD property in Orinda, on the northeast side of Camino Pablo. Demands in the areas served by the Lafayette WTP currently exceed production rates. Under Alternative 2, the Lafayette WTP would be decommissioned and the customers currently served by that plant would instead receive water from the Orinda WTP. EBMUD would modify

Orinda WTP operations, construct a treated water storage facility (clearwell), a pumping plant (Los Altos pumping plant No. 2), an electrical substation, and a combination tunnel/pipeline (Orinda-Lafayette Aqueduct) to convey treated water to Lafayette for distribution.

Project-Level Improvements – Design Characteristics

Orinda WTP

Map D-OWTP-2 shows the proposed layout for the Orinda WTP under Alternative 2. Map D-OWTP-3 provides two cross-section drawings for Orinda WTP under Alternative 2. Section A is through the proposed clearwell and Los Altos Pumping Plant No. 2. Section B is through the proposed Backwash Water Recycle System. The Orinda WTP under this alternative would produce 175 mgd (average-annualized rate), but would operate at the slightly higher rate of 180 mgd, an increase of 5 mgd over existing conditions. (It would also operate at this slightly higher rate under Alternative 1 during peak demand periods.) The additional capacity would not require any changes to treatment processes. As with Alternative 1, the existing backwash water treatment system would be upgraded to treat and recycle backwash water to the head of the WTP. In addition, the facilities needed to store, pump, and convey treated water to the Lafayette WTP would be constructed; these proposed facilities include a clearwell, a pumping plant, an electrical substation, and the Orinda-Lafayette Aqueduct (the last facility is described in Section 2.5.3).

Clearwell

The proposed clearwell, shown on Map D-OWTP-2, would provide equalization storage for the intake to the proposed Los Altos Pumping Plant No. 2. A new 106-inch-diameter, approximately 800-foot-long pipeline would be micro-tunneled from the filter effluent pipe No. 2 to the clearwell.[13] The clearwell would be a buried, prestressed-concrete structure. The 9.8-mg facility would have a diameter of 220 feet and a depth of approximately 70 feet.

Los Altos Pumping Plant No. 2 and Electrical Substation

The proposed Los Altos Pumping Plant No. 2 would pump treated water from the clearwell through the proposed aqueduct to the Lafayette WTP. The pumping plant would consist of a wetwell and a concrete building housing the pumps and electrical/control equipment on top of the wetwell. The pumping plant would be buried 22 feet below ground. The proposed electrical substation would contain above-ground electrical equipment, including transformers and a switchgear. A diesel generator would be installed at the substation for emergency backup power purposes. The substation would provide power for the Los Altos Pumping Plant No. 2.

Currently, there is a chain-link gate to the fence around the existing settling basins at this location. Under this alternative, the fence would be completely reconstructed due to construction of the new clearwell, pumping plant and substation. After completion of the new facilities a new

[13] The proposed size is based on a flow rate of 200 mgd, in the event that EBMUD decides to build a clearwell at the Orinda Sports Field for the West of Hills area. The initial flow rate in the pipe would be 40 mgd.

fence would be built around them with a new gate at the Manzanita Drive entrance. The new gate would be designed to be more aesthetically pleasing.

Backwash Water Recycle System

The backwash water recycle system would be as described for Alternative 1 in Section 2.4.2.

Schedule, Work Hours, and Staging

Table 2-8 presents the proposed schedule for design and construction of upgrades for WTTIP projects at water treatment plants under Alternative 2. Table 2-7 presents proposed work hours for all WTTIP projects.

Construction Activities

Map D-OWTP-2 shows the location of proposed facilities at the Orinda WTP under Alternative 2.

Proposed construction activities and methods, described below, are based on conceptual facility designs and requirements for maintaining water service during construction. This description provides the basis for the impact evaluation presented in Chapter 3. During final design, construction phasing and methods will likely be refined.

- *Mobilization.* The contractor would clear the site and set up the construction staging area.
- *Excavation.* Underground structures would include basins, storage, and piping. Contractors would excavate the area where the clearwell, pumping plant, and basins are to be located. The clearwell and pumping plant wetwell would require substantial excavation; for purposes of impact evaluation, the assumed method of excavation and ground support for this area is use of diaphragm and slurry walls.
- *Foundation Construction.* Following excavation, the contractor would construct the clearwell, pumping plant, basins, and building foundations using concrete and rebar. Foundations for the clearwell would be drilled piers.
- *Backfilling.* Following foundation construction, the clearwell, pumping plant, and basins would be backfilled.
- *Mechanical/Electrical.* Mechanical and electrical equipment used for backwash water recycling would then be installed.
- *Demobilization.* Following the completion of construction, the contractor would break down the staging areas. Site restoration (rebuilding onsite roadways and landscaping) would follow.

Construction Equipment

Backhoes, bulldozers, scrapers, and water trucks would be used for excavation, grading, and fill. Concrete would be delivered to the site by ready-mix trucks; a crane would set structural components and equipment; and supply trucks would deliver materials and equipment used in the construction process. Additional equipment likely to be used includes air compressors, welding machines, and various air- and electric-powered hand tools.

Program-Level Improvements

Future potential improvements associated with providing clearwell storage under Alternative 2, to be considered programmatically, are shown on Map D-OWTP-2; these improvements would include one large clearwell constructed below grade, an electrical substation, a low-lift pumping station, and associated pipelines. The potential need for this clearwell storage would be the same as that discussed under Alternative 1, namely to increase operational flexibility and improve water quality. Potential program-level improvements that might eventually be required to meet future water quality regulations include high-rate sedimentation units, a chlorine contact basin, and UV disinfection facilities. Figure 2-7 presents descriptions of these processes. Map D-OWTP-2 shows potential locations for these facilities.

2.5.3 Orinda-Lafayette Aqueduct

Demands in the areas served by the Lafayette WTP currently exceed production rates. Under Alternative 2, the Lafayette WTP would be decommissioned and the customers currently served by that plant would instead receive water from the Orinda WTP. EBMUD would modify Orinda WTP operations, and construct a combination tunnel/pipeline (Orinda-Lafayette Aqueduct) to convey treated water to Lafayette for distribution.

Design Characteristics

The proposed Orinda-Lafayette Aqueduct would convey treated water from the Orinda WTP to the transmission mains near the Lafayette WTP. The proposed alignment of the aqueduct generally parallels the existing Lafayette Aqueducts No. 1 and No. 2, which convey raw water from Lafayette to the Orinda WTP via gravity. The proposed aqueduct would operate under pressure. The Los Altos Pumping Plant No. 2 would pump treated water from the Orinda WTP to the distribution system currently served by the Lafayette WTP. For purposes of discussion, there are five design components of the Orinda-Lafayette Aqueduct project:

- Pipeline to tunnel entry (west) shaft
- Tunnel entry shaft
- Tunnel
- Tunnel exit (east) shaft
- Pipeline from exit shaft to Lafayette WTP

These components are described below. Maps D-OLA-1 through D-OLA-4 depict design characteristics (typical tunnel cross-section, tunnel shaft design, staging area layouts, and tunnel profile); Maps C-OLA-1 through C-OLA-3 indicate the proposed alignments of the pipelines and the tunnel.

Pipeline to Tunnel Entry (West) Shaft

As shown on Map C-OLA-1, EBMUD would construct a 48-inch-diameter, approximately 900-foot-long, welded-steel pipeline from the proposed Los Altos Pumping Plant No. 2 at the Orinda WTP. (The pumping plant site is shown on Map D-OWTP-2.) The proposed alignment follows the northern perimeter of the washwater settling basins then extends north to the Orinda Sports Field (ballfields northwest of the Orinda WTP).

Tunnel Entry Shaft

The tunnel would be constructed by means of shafts excavated at either end. The proposed location of the entry shaft is the southeast portion of the ballfields (see Map C-OLA-1). The diameter and depth of the entry shaft would be 30 feet and 75 feet, respectively. Most construction activity would take place at and from the entry shaft. (Tunneling construction is described below.) The vault would have a removable "lift slab" to enable equipment to be lowered into the tunnel for inspection and repair (see Map D-OLA-2).

Tunnel

The proposed tunnel alignment is approximately 1.9 miles long and would be located entirely within Orinda. Maps C-OLA-1, C-OLA-2, and D-OLA-4 show the proposed alignment and elevation (depth of cover) of the tunnel. The tunnel would be 13 feet in diameter; the pipe within the tunnel would be a pressure-type tunnel main, 72 inches in diameter. The pipe diameter would provide sufficient space for future inspection, maintenance, and repair. The proposed alignment is a straight line between the entry and exit shafts. The amount of cover over the proposed tunnel alignment varies from 75 feet (at the entry shaft) to up to 400 feet. The tunnel would pass beneath private and public property. EBMUD would obtain easements for properties within up to 50 feet on either side of the tunnel centerline (see Appendix C for a list of these properties.

Tunnel Exit (East) Shaft

The proposed location of the exit shaft is in Orinda, just west of the St. Stephens Drive/El Nido Ranch Road intersection (see Map C-OLA-2). The exit shaft site is a narrow parcel of undeveloped land between the Highway 24 right-of-way and Altarinda Drive, adjacent and to the east of a residence. The site is privately owned; if Alternative 2 is selected, EBMUD would acquire this property. The shaft would be about 20 feet in diameter and 220 feet deep. The tunnel would terminate near the bottom of the shaft and transition to a 48-inch-diameter pipe, which would exit near the top of the shaft in an eastward direction. This shaft would be used for removal of tunnel boring equipment and, following the completion of excavation, as a ventilation shaft during construction of the final lining. Like the entry shaft, the exit shaft would have a removable lift slab to enable equipment to be lowered into the tunnel for inspection and repair.

Pipeline from Exit Shaft

As shown on Maps C-OLA-2 through C-OLA-3, EBMUD would construct a 48-inch-diameter, approximately 1.7-mile-long, welded-steel pipeline from the exit shaft to the Lafayette WTP. The proposed alignment follows El Nido Ranch Road east to the Bentley School in Lafayette, crossing from Orinda into Lafayette near El Castillo. The pipeline would be tunneled using bore-and-jack construction, as described in Figure 2-9. The proposed alignment runs from the Bentley School parking lot south beneath Highway 24 to the field on the south side of Mt. Diablo Boulevard across from the parking lot entrance to Oakwood Athletic Club; it then crosses to the north side of Mt. Diablo Boulevard at El Nido Ranch Road. From there, the alignment follows Mt. Diablo Boulevard east—along the same alignments proposed for the Bryant and Leland Pipelines under Alternative 1—to the box culvert over Lafayette Creek east of the entrance to the Lafayette WTP. There the pipeline would transition into several branches (partly to pass over the concrete box culvert containing Lafayette Creek) to connect to pipelines serving the Leland and Bryant Pressure Zones, as shown on Map D-LWTP-2.

Construction Characteristics

Schedule, Work Hours, and Staging

Table 2-8 presents the proposed schedule for design and construction of the Orinda-Lafayette Aqueduct. Table 2-7 presents proposed work hours for all WTTIP projects. Tables B-OLA-1 and B-OLA-2 in Appendix B provide construction sequencing, duration of specific construction activities, construction staffing, and parking information. For tunnel construction, site development and shaft construction would occur on weekdays. Typically, tunnel construction would take place with three shifts a day (day, swing, and graveyard) up to seven days a week. Some pieces of equipment related to ventilation and dewatering would operate 24 hours per day at the entry shaft site; ventilation equipment would operate 24 hours per day at the exit shaft during the tunnel lining phase only.

Construction Activities

Pipeline to Tunnel Entry Shaft, Pipeline from Tunnel Exit Shaft

These pipelines would be constructed using a combination of open-trench and microtunnel construction methods. These methods, and the construction equipment used for these methods, are described in Figure 2-9 (Insituform, 2006).

Tunnel

Most above-ground construction activities for the tunnel would be concentrated at the entry shaft site. Map D-OLA-2 shows an example of an entry shaft construction site, an illustration of the tunneling process, and a cross-section of the proposed tunnel. Map D-OLA-3 indicates the area within which construction activities would occur. For purposes of analysis, it is assumed that the proposed tunnel would be excavated primarily with a shielded tunnel boring machine. The 13-foot-diameter tunnel would accommodate activities supporting tunnel construction, including ventilation, water supply and discharge lines, compressed air, electricity, and rail tracks. Tunnel excavation would proceed sequentially, from west to east. Final tunnel lining installation (the pipeline) would proceed from east to west. Map D-OLA-1 depicts a typical tunnel boring machine. A tunnel boring machine is equipped with a rotary-wheel cutterhead that digs through bedrock, an enclosed shield with a series of hydraulic jacks for moving the machine forward, and a "tunnel muck" removal system consisting of conveyor belts and rail cars to remove excavated material. The rail cars would transport the muck to the entry shaft for storage and subsequent disposal. An erector arm system would be located at the rear of the boring machine to install the initial tunnel support system (e.g., steel ribs and lagging). Following installation of the pipe, the contractor would backfill the annular space between the pipe and the initial tunnel support system by pumping concrete into the void.

Dewatering. The pipeline would be tunneled below the groundwater table; consequently, groundwater would seep into the tunnel and shafts. Prior to construction, a detailed hydrogeologic study of the area would be performed as part of the tunnel geotechnical program to further assess the water-table profile, the soil and rock permeabilities, the location of natural conduits such as fracture and shear zones, and water chemistry. For planning purposes, average tunnel water flow at the entry shaft is estimated at 100 gallons per minute; the maximum rate is estimated at 350 gallons per minute. Water removed from the tunnel and shaft would be treated prior to discharge to San Pablo Creek.

Tunnel Ventilation during Construction. In order to provide fresh air for workers and equipment inside the tunnel, temporary ventilation would be installed in compliance with contract safety specifications and with the State of California Division of Occupational Safety and Health's Tunnel Safety Orders. Ventilation fans would be located in designated areas at the Orinda Sports Field site (near the shaft) and at the exit shaft (during the tunnel lining process only). If the California Occupational Safety and Health Administration designated the tunnel as a "gassy" or "potentially gassy" tunnel, specific operating requirements would apply to maintain safe working conditions.

2.5.4 Walnut Creek Water Treatment Plant

Under Alternative 2, all project- and program-level improvements at the Walnut Creek WTP would be the same as described for Alternative 1 (see Section 2.4.3, above).

2.5.5 Sobrante Water Treatment Plant

Under Alternative 2, improvements at the WTP would be the same as described for Alternative 1, except that the capacity of the chlorine contact basin would increase to 1.0 mg, and additional chemical storage would be provided for sodium hydroxide, sodium hypochlorite, and liquid ammonia within the existing chemical storage building. With the exception of Section 3.11, Hazards and Hazardous Materials, the impact evaluations presented in Chapter 3 of the EIR do not distinguish between Alternative 1 and Alternative 2 for the Sobrante WTP; construction of the larger chlorine contact basin is assumed. Refer to **Section 2.4.4** for design and construction details.)

2.5.6 Upper San Leandro Water Treatment Plant

Under Alternative 2, almost all improvements at the WTP would be the same as described for Alternative 1. Under this alternative, the average-annualized capacity would be 44 mgd. As with Alternative 1, the ozonation system would be upgraded from air to liquid oxygen, but would be expanded to 2,200 pounds per day (instead of 1,250 pounds per day). In addition, additional chemical storage would be provided for sodium hydroxide, sodium hypochlorite, and liquid ammonia within the existing chemical storage building. In all other respects, the changes proposed under Alternatives 1 and 2 at the Upper San Leandro WTP are identical (refer to Section 2.4.5 for details).

2.6 Elements Common to Both Alternatives

Sections 2.6.1 through 2.6.13 address project-level elements; Section 2.6.14 addresses program-level elements, excluding those at the WTPs, which are described above. Table 2-9 provides a proposed construction schedule for these facilities.

2.6.1 Ardith Reservoir and Donald Pumping Plant

The site for the new Ardith Reservoir and relocated Donald Pumping Plant is on EBMUD-owned property at Ardith Drive near Westover Court in Orinda (see Maps A2 and B2). Ardith Reservoir would be part of the Bryant Pressure Zone (south of Highway 24) and Donald Pumping Plant would be part of the Baseline Pressure Zone which is supplied by the Bryant Pressure Zone (south of Highway 24). The proposed Ardith Reservoir is needed for the replacement of the existing Moraga Reservoir. The open-cut Moraga Reservoir has a liner design that is prone to leakage and is oversized. Although there is no significant leakage presently occurring at the Moraga Reservoir, this type of liner design (referred to as “panel craft”) has leaked at other District reservoirs, requires special maintenance, and must eventually be removed from service. The Ardith Reservoir must be brought on line (in addition to Alternative 1 or 2 WTP improvements and the Moraga Road Pipeline) to provide water to customers currently served by the Moraga Reservoir before the latter can be replaced. The Donald Pumping Plant supplies water from the Bryant Pressure Zone to the Baseline Pressure Zone. There are pressure problems with the pumping plant that currently constrain its operation: its elevation is too high, and the pumping plant does not have adequate inlet pressure during summertime demand periods. Relocating the Donald Pumping Plant to a lower elevation at the site and reconfiguring its pumping operations would correct the problem.

Design Characteristics

Map D-ARRES-1 depicts the proposed site plan for the Ardith Reservoir and relocated Donald Plumping Plant. EBMUD constructed the Donald Pumping Plant in 1960. Map D-ARRES-2 provides profiles of the proposed pumping plant and reservoir. At that time, the District anticipated eventually needing a reservoir there and graded the site accordingly. EBMUD is proposing to construct the Ardith Reservoir at the Donald Pumping Plant site and to relocate the latter facility to a lower elevation on the same site. Table 2-10 indicates the capacity, diameter, and elevation proposed for the Ardith Reservoir. The final grade at the site would be the same as the existing grade.

TABLE 2-9
WATER TREATMENT AND TRANSMISSION IMPROVEMENTS PROGRAM CONSTRUCTION SCHEDULE – ELEMENTS COMMON TO BOTH ALTERNATIVES

Facility	Duration (Years)	Expected Start Date
CITY OF LAFAYETTE		
Pressure Zone Projects – Project-Level		
Glen Pipeline Improvements	1	May 2011
Highland Reservoir and Pipelines	1 to 2	May 2007
Moraga Road Pipeline[a]	1 to 2	April 2007
Sunnyside Pumping Plant and Pipeline[a]	1 to 2	September 2011
Pressure Zone Projects – Program Level		
Leland Reservoir Replacement	1 to 2	July 2014
Saint Mary's Road / Rohrer Drive Pipeline[a]	1 to 2	2018
CITY OF ORINDA		
Pressure Zone Projects – Project-Level		
Ardith Reservoir and Donald Pumping Plant	1 to 2	May 2013
Happy Valley Pumping Plant and Pipeline	1 to 2	May 2011
Sunnyside Pumping Plant and Pipeline[a] (the driveway is located in Orinda)	1 to 2	September 2011
Pressure Zone Projects – Program Level		
San Pablo Pipeline[a]	1 to 2	April 2016
TOWN OF MORAGA		
Pressure Zone Projects – Project-Level		
Fay Hill Pumping Plant, Pipeline, and Reservoir	1 to 2	March 2015
Moraga Road Pipeline[a]	1 to 2	April 2007
Moraga Reservoir	1 to 2	December 2016
CITY OF WALNUT CREEK		
Pressure Zone Projects – Project-Level		
Leland Isolation Pipeline and Bypass Valves	1	May 2010
Pressure Zone Projects – Program Level		
New Leland Pressure Zone Reservoir and Pipeline	1 to 2	April 2011
Saint Mary's Road / Rohrer Drive Pipeline[a] (see Lafayette)	1 to 2	2018
UNINCORPORATED CONTRA COSTA COUNTY		
Pressure Zone Projects – Project-Level		
Tice Pumping Plant and Pipeline	1 to 2	February 2008
Withers Pumping Plant	1 to 2	June 2011
Pressure Zone Projects – Program Level		
San Pablo Pipeline[a] (see Orinda)	1 to 2	April 2016

[a] Facility is located within multiple jurisdictions. Schedule information is for entire project.

TABLE 2-10
RESERVOIR CHARACTERISTICS

Reservoir	New Reservoir or Replacement of Existing Reservoir?	EBMUD Site	Design Capacity (million gallons)	Bottom Elevation (feet)	Overflow Elevation (feet)	Inside Diameter (feet)
Ardith	New	Donald Pumping Plant	2.0	720	750	110
Fay Hill	Replacement	Fay Hill Reservoir	0.8	932	954	81
Highland	New	Lafayette Reservoir Watershed	2.7	532	560	133
Moraga	Replacement	Moraga Reservoir	5.0	720	750	174

The reservoir would be a cylindrical, prestressed-concrete tank constructed on excavated native material. The tank would be partially buried using native backfill. Table 2-11 summarizes the design characteristics of the Donald Pumping Plant (total capacity in mgd, number and horsepower of the pumps) as well as that for other proposed WTTIP pumping plant projects. The capacity of the existing Donald Pumping Plant is 1.3 mgd; the future pumping plant would also have a 1.3-mgd capacity. The pumping plant would be constructed on native material. There would be no offsite pipeline improvements. The reservoir's inlet/outlet pipeline (20-inch-diameter) would be constructed between the pumping plant and tank.

Construction Characteristics

Schedule, Work Hours, and Staging

Table 2-9 presents the proposed schedule for design and construction of work at Ardith Reservoir and Donald Pumping Plant. Table 2-7 presents proposed work hours for all WTTIP projects. Tables B-ARRES-1 and B-DONPP-1 in Appendix B provide construction sequencing, duration of specific construction activities, construction staffing, and parking information. Construction of the reservoir and pumping plant would occur at the same time. The tank site would serve as the construction staging area. Parking would occur onsite and on nearby Ardith Drive.

Construction Activities

Map D-ARRES-1 shows the proposed facilities. Following excavation and grading of the tank and pumping plant site, EBMUD contractors would construct the concrete tank and appurtenant features (e.g., the valve pit). Once the tank and pumping plant are finished, the excavations would be backfilled, and disturbed areas would be landscaped. Some excavated material from the site would likely be hauled offsite for disposal.

Construction Equipment

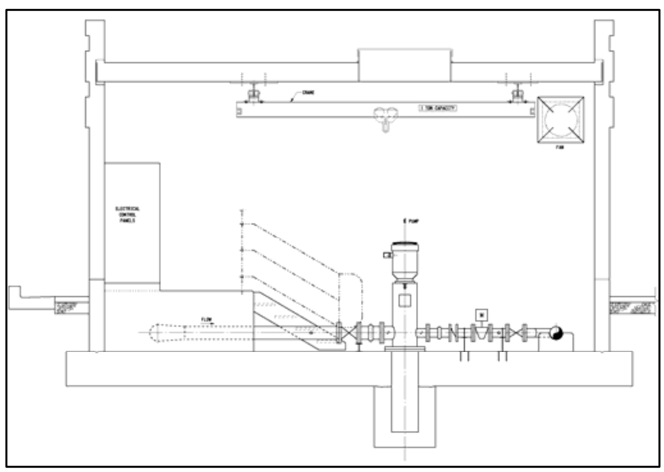
Backhoes, bulldozers, excavators, and water trucks would be used for excavation, grading, and fill. Concrete would be delivered to the site by ready-mix trucks; a prestressing tower would be used to prestress the tank; a crane would set structural components and equipment; and supply

TABLE 2-11
PUMPING PLANT CHARACTERISTICS

Alternative	Proposed Pumping Plant	New, Replacement of Existing, or Expansion of Existing Pumping Plant?	Capacity (mgd)	Total Number of Pumps[a]	Horsepower
1	Leland (Lafayette WTP)	Replacement/Expansion	27	3	350
1	Bryant (Lafayette WTP)	Replacement/Expansion	32	4	1,250
2	Los Altos (Orinda WTP)	New	60	4	2,500
1 or 2	Leland No. 2 (Walnut Creek WTP)	New	34	3	150
1 or 2	Tice	New	10	3	300
1 or 2	Withers	New	3	3	100
1 or 2	Happy Valley	New	3.2	2	200
1 or 2	Sunnyside	New	1.5	2	100
1 or 2	Donald	Replacement	1.3	2	100
1 or 2	Fay Hill	Expansion	2.2	3	75

[a] Each pumping plant would have one pump for standby capacity. For example, the Leland Pumping Plant would have three pumps, two of which would be operated at any one time.

Pumping Plant Schematic



- **Function.** Pumping plants pump water into pipelines and reservoirs throughout EBMUD's service area. Water is pumped from lower elevations (pressure zones) into higher elevations (pressure zones). Water pumped into distribution reservoirs is delivered via gravity to customers. Each pumping plant has suction and discharge pipelines, pumps, and a wetwell. The pumps suction the water out of the suction pipeline into the wetwell and push the water through the discharge pipeline for delivery to a higher pressure zone.
- **Power Supply.** All pumping plants would use electricity supplied by PG&E. Diesel-powered generators would be stationed at the WTPs for emergency operations. The District also maintains portable pumps for deployment during emergency outages.
- **Operations.** Pumping plants are operated remotely via the District's Supervisory Control and Data Acquisition (SCADA) system. The operating hours of the pumping plants would vary; in general, the District tries to operate pumping plants during off-peak hours (e.g., nighttime) when electricity demand and cost are lower.

trucks would deliver materials and equipment used in the construction process. Additional equipment likely to be used includes air compressors, welding machines, and various air- and electric-powered hand tools.

2.6.2 Fay Hill Pumping Plant and Pipeline Improvements

The proposed improvements would be at EBMUD's existing Fay Hill Pumping Plant, located at the corner of a shopping center in Moraga, in the southwest quadrant of the intersection of Moraga Road and Rheem Boulevard (see Maps A2 and B2). These facilities would be part of the Fay Hill Pressure Zone which is supplied by the Bryant Pressure Zone (south of Highway 24). This project is needed to serve future developments in the Fay Hill Pressure Zone, including the Rancho Laguna and Palos Colorados residential projects. The existing 6-inch diameter pipe restricts flow from the Fay Hill Pumping Plant to the Fay Hill Reservoir, and there are some customers who experience low pressure under certain system operating conditions; replacing the 6-inch diameter pipeline would improve flows to these customers and throughout the pressure zone.

Design Characteristics

The existing Fay Hill Pumping Plant is an underground facility. As part of the WTTIP, EBMUD would replace existing pumps with more powerful units to increase the capacity from 1.6 mgd to 2.2 mgd; there would be no structural changes to the facility. Map D-FHPP-1 shows the location and layout of the Fay Hill Pumping Plant. Table 2-11 provides pumping plant design characteristics (proposed capacity in mgd, number and horsepower of the pumps). Map D-FHPP-1 also shows onsite and offsite pipeline improvements. Offsite pipeline construction would involve installing about 500 feet of 12-inch-diameter, welded-steel pipe in Rheem Boulevard. The pipeline would operate under pressure.

Construction Characteristics

Schedule, Work Hours, and Staging

Table 2-9 presents the proposed schedule for design and construction of work at the Fay Hill Pumping Plant site and nearby pipeline alignment. Table 2-7 presents proposed work hours for all WTTIP projects. Tables B-FHPP-1 and B-FHPP-2 in Appendix B provide construction sequencing, duration of specific construction activities, construction staffing, and parking information. Construction of pumping plant and pipeline improvements would occur simultaneously. The District proposes to use the parking lot adjacent to the pumping plant site for construction staging and construction vehicle parking.

Construction Activities

Contractors would use a crane to remove and replace the pumps. The pipeline would be constructed using open-trench construction. Figure 2-9 provides a description of open-trench construction and a list of equipment used for open-trench construction.

2.6.3 Fay Hill Reservoir

The Fay Hill Reservoir is located on existing EBMUD-owned property north of Rheem Boulevard and east of Moraga Road in Moraga (see Maps A2 and B2). This facility would be part of the Fay Hill Pressure Zone which is supplied by the Bryant Pressure Zone (south of Highway 24). The sealant in the liner of the existing open-cut Fay Hill Reservoir contains zinc. Although it is not health threatening, the U.S. EPA has set non-mandatory drinking water standards for zinc. Replacing the open-cut reservoir with two smaller-capacity tanks would eliminate the need to rehabilitate the reservoir liner, eliminate other maintenance problems generally associated with open-cut reservoirs, provide redundancy should one tank have to be removed from service, and improve water quality in the reservoirs and throughout the pressure zone.

Design Characteristics

The existing Fay Hill Reservoir is an open-cut facility. The proposed design for the new reservoir calls for two cylindrical, steel, glass-lined tanks with low-profile dome roofs located in the footprint of the existing reservoir. Map D-FHRES-1 depicts the proposed site plan for the Fay Hill Reservoir. Map D-FHRES-2 provides profile drawings of the new reservoir. Table 2-10 indicates the capacity, diameter, depth, and elevation proposed for the new Fay Hill Reservoir tanks. Some excavation would be needed to accommodate the tanks, tank pad, and paved access road around the tanks. The District would install a temporary tank during construction to maintain water service to customers served by the Fay Hill Reservoir.

Construction Characteristics

Schedule, Work Hours, and Staging

Table 2-9 presents the proposed schedule for design and construction of work at the Fay Hill Reservoir site. Table 2-7 presents proposed work hours for all WTTIP projects.
Table B-FHRES-1 in Appendix B provides construction phasing and sequencing, duration of specific construction activities, estimated excavation and fill quantities, and vehicle trip estimates (construction staff and truck trips). Construction staging and parking would occur at the tank site and within an adjacent District right-of-way for the reservoir’s existing inlet/outlet pipeline (see Map D-FHRES-1).

Construction Activities

Following the construction of the temporary tank and inlet/outlet pipeline, EBMUD contractors would demolish the existing reservoir structure (roof, liner, and internal supports) and perform excavation and grading for the retaining wall, tank pad, and foundation. The concrete/rebar retaining wall, tank pad, and foundation would be constructed on native material. The tanks and appurtenant features (e.g., the valve pit and inlet/outlet lines) would then be constructed, and a crane would be used to set structural components. Excavated material would be incorporated into final site grading. The temporary tank would then be removed.

Construction Equipment

Backhoes and water trucks would be used for excavation, grading, and fill. Concrete would be delivered to the site by ready-mix trucks; a crane would set structural components and equipment; and supply trucks would deliver materials and equipment used in the construction process. Additional equipment likely to be used includes air compressors, welding machines, and various air- and electric-powered hand tools.

2.6.4 Glen Pipeline Improvements and Glen Reservoir Decommission

The Glen Pipeline Improvements consist of a pipeline segment that would be constructed in Nordstrom Lane, from Hilltop Drive to Glen Road, then east in Glen Road to just west of Monticello Road in the city of Lafayette (see Maps A2 and B2 and Map C-GLENPL-1). These pipelines would serve the Bryant Pressure Zone north of Highway 24. There is insufficient pipeline capacity to the Glen Reservoir. The Valory Pumping Plant pumps water out of this area and into the Las Aromas Pressure zone. During high-demand periods, the constrained pipeline capacity and operation of the Valory Pumping Plant cause water levels in the Glen Reservoir to drop below acceptable levels, limiting water available for firefighting and reducing customer water pressure. By increasing the diameter of certain pipelines, the problem is fixed and the Glen Reservoir (a 0.2 mg redwood tank) is no longer needed. The reservoir site would remain in its current state until the District determined whether to sell the property.

Design Characteristics

The pipeline would be constructed of welded-steel pipe and would operate under pressure (see Table B-GLENPL-1 in Appendix B for dimensions and other design information).

Construction Characteristics

Schedule, Work Hours, and Staging

Table 2-9 presents the proposed schedule for design and construction of Glen Pipeline Improvements. Table 2-7 presents proposed work hours for all WTTIP projects.
Table B-GLENPL-1 in Appendix B provides construction sequencing, duration of specific construction activities, estimated excavation and fill quantities, and vehicle trip estimates (construction staff and truck trips). Construction staging would occur within the construction corridor. Parking for construction vehicles would be available within the construction corridor of the project as well as on EBMUD property between Dolores Drive and Happy Valley Road.

Construction Activities and Equipment

The pipeline would be constructed using open-trench construction (see Figure 2-9 for a description of open-trench construction methods and equipment to be used).

2.6.5 Happy Valley Pumping Plant and Pipeline

This proposed new pumping plant would be constructed on a privately owned parcel on Lombardy Lane near Van Ripper Lane in Orinda (see Maps A1 and B1). This facility would be part of the Las Aromas Pressure Zone which is supplied by the Bryant Pressure Zone (north of Highway 24). There is currently inadequate pumping capacity to supply the Las Aromas Pressure Zone during maximum-day demand conditions; an additional 3.2 mgd is required to meet maximum-day demand conditions in 2030. The proposed project would meet existing and anticipated future demand in this area and would supply the Happy Valley Reservoir.

Design Characteristics

Pumping Plant

Map D-HVPP-1 depicts the proposed site plan for the Happy Valley Pumping Plant. Map D-HVPP-2 provides cross-sections of the proposed pumping plant. Table 2-11 indicates pumping plant design characteristics (proposed capacity in mgd, number and horsepower of the pumps). The pumping plant would be constructed on native material.

Pipeline

An approximately 5,300-foot-long, 16-inch-diameter, welded-steel pipe would be constructed between the proposed pumping plant and Happy Valley Reservoir (located near the Miner Road/ Oak Arbor Road intersection). An additional short segment of 12-inch-diameter pipeline would be constructed between the pumping plant and an existing pipeline in Lombardy Lane. The pipelines would operate under pressure.

Construction Characteristics

Schedule, Work Hours, and Staging

Table 2-9 presents the proposed schedule for design and construction of the Happy Valley Pumping Plant. Table 2-7 presents proposed work hours for all WTTIP projects. Tables B-HVPP-1 and B-HVPP-2 in Appendix B provide construction sequencing, duration of specific construction activities, construction staffing, and parking information. Construction of the pumping plant and pipeline would occur at the same time. The pumping plant site would serve as the construction staging area, and a shuttle would be provided to transport workers to and from an offsite parking location.

Construction Activities

Pumping Plant

The proposed site is partially flat; drainage areas extend along the western and southern boundaries of the parcel. The pumping plant would be constructed on native material. EBMUD contractors would grade the area proposed for the pumping plant and construction staging, construct the concrete/rebar building pad, and then construct the pumping plant building and appurtenant features. Excavated material would be incorporated into final site grading. Once the building is finished, disturbed areas would be landscaped.

Pipeline

The pipeline would be constructed using the open-trench method (see Figure 2-9 for a description of open-trench construction methods and equipment to be used).

Construction Equipment

Backhoes, bulldozers, scrapers, and water trucks would be used for excavation, grading, and fill. Concrete would be delivered to the site by ready-mix trucks; a crane would set structural components and equipment; and supply trucks would deliver materials and equipment used in the construction process. Additional equipment likely to be used includes air compressors, welding machines, and various air- and electric-powered hand tools.

2.6.6 Highland Reservoir and Pipelines

Highland Reservoir would be constructed on an undeveloped hill slope in oak woodland within the EBMUD-owned Lafayette Reservoir Recreation Area (see Maps A2 and B2). This facility and its associated pipelines would be part of the Colorados Pressure Zone. The Colorados Pressure Zone has several distinct subzones that operate independently because of distance and pipeline capacity. The subzone issues plus other problems (such as different elevations among the reservoirs, and poor locations of pumping plants serving the zone) cause operational, water quality, and customer service problems. Colorados Reservoir serves the southwestern portion of the Colorados Pressure Zone, which has the largest area, greatest demand, and the lowest storage volume among the subzones in this large pressure zone. During periods of high demand, water levels in this area drop below acceptable levels, limiting water available for firefighting and affecting customer service pressures. The proposed Highland Reservoir would correct these problems by increasing water storage available to this area and stabilizing service pressure.

Design Characteristics

Reservoir Design

Map D-HIGHRES-1 depicts the proposed site plan for the Highland Reservoir. Cross-sections of the new reservoir are shown on Map D-HIGHRES-2. Table 2-10 indicates the proposed capacity, diameter, depth, and elevation. The proposed 2.5-acre site is on a hillside in the northern portion of the Lafayette Reservoir Recreation Area. The site is traversed by the Rim Trail, which would be relocated around the tank as part of the project. The design calls for a cylindrical, prestressed-concrete tank constructed on excavated native material. The tank would be partially buried using native backfill.

Pipelines

The proposed reservoir’s approximately 1,000-foot long, 20-inch-diameter, welded-steel inlet/outlet pipeline would be constructed between the tank and the Lafayette WTP. The proposed pipeline alignment is shown on Map C-HIGHRES-1. From Mt. Diablo Boulevard, the Highland Reservoir inlet/outlet pipeline and the Lafayette Reclaimed Water Pipeline would be located in the same trench, as described below in Section 2.6.7 (see “Segment 2”).

The proposed alignment for the reservoir’s overflow pipeline extends from the tank to Lafayette Reservoir, as shown on Map C-HIGHRES-1. As described in Section 2.6.7 (see “Segment 3”), the Lafayette Reclaimed Water Pipeline and reservoir overflow pipeline would be the same pipeline; the proposed alignment extends into Lafayette Reservoir, terminating at a dissipater. Any overflow from the Highland Reservoir would be dechlorinated in a vault manhole along the overflow pipeline route before discharge into Lafayette Reservoir.

Construction Characteristics

Schedule, Work Hours, and Staging

Table 2-9 presents the proposed schedule for design and construction at the Highland Reservoir site. Table 2-7 presents proposed work hours for all WTTIP projects. Table B-HIGHRES-1 in Appendix B provides construction sequencing, duration of specific construction activities, estimated excavation and fill quantities, and vehicle trip estimates (construction staff and truck trips). The tank site would serve as the construction staging area; sufficient parking is available at the recreation facility.

Construction Activities

During construction, vehicles would use the construction access route shown on Map C-HIGHRES-1 to reduce conflicts with recreation traffic at the Lafayette Reservoir Recreation Area. Part of the proposed construction access road is on private property. The proposed route is a partially paved road up to the point at which it enters EBMUD property (where the route parallels the inlet/outlet pipeline alignment, as shown on Map C-HIGHRES-1); within EBMUD property, the route is graded. For permanent access, District maintenance vehicles would use the Rim Trail.

The tank site would be excavated and graded and excess material would be hauled to the stockpile area shown on Map C-HIGHRES-1. The concrete tank appurtenant features (e.g., valve pit) would be constructed. Once the tank is finished, clean fill and any suitable native materials excavated and stockpiled at the site would be used to backfill the uphill side of the tank. The tank area would then be revegetated. Some excavated material from the tank site would have to be hauled to a disposal site.

Construction Equipment

Backhoes, excavators, front-end loaders, and water trucks would be used for excavation, grading, and fill. Dump trucks would be used to remove excavated material. Concrete would be delivered to the site by ready-mix trucks; a crane would set structural components and equipment; and supply trucks would deliver materials and equipment used in the construction process. A prestressing machine would be used to wrap steel wire around the reservoir and to spray the reservoir with shotcrete. An asphalt paving machine, roller, and front-end loader would be used to construct the access road and parking lot. Additional equipment likely to be used includes air compressors, welding machines, and various air- and electric-powered hand tools.

2.6.7 Leland Isolation Pipeline and Bypass Valves

Pipeline and valve improvements would be constructed in two areas of Walnut Creek in the Leland Pressure Zone (see Maps A3, B3, C-LELPL-1 and C-LELPL-2). These improvements (along with Leland Pumping Plant No.2 proposed at the Walnut Creek WTP) would correct hydraulic problems in Leland Pressure Zone. The hydraulic connectivity between the Danville Pumping Plant suction pipeline and the Leland Pressure Zone is adversely affecting water supply, causing (among other problems) water from the Lafayette WTP to flow into the Leland Pressure Zone; drawdown of the Leland Reservoir; and low water pressure for some customers. Proposed improvements at the WTP, coupled with the Leland Pressure Zone Isolation Pipeline and Bypass Valves, would correct these problems.

Design Characteristics

Leland Isolation Pipeline

A 700-foot-long, 24-inch-diameter pipeline would be constructed in Lacassie Boulevard in Walnut Creek. Additionally, a 54-inch valve would be closed in North California Boulevard.

Leland Isolation Bypass Valves

This work would include closure of a 24-inch valve and installation of an 8-inch-diameter bypass pipeline, a new 24-inch valve, a very short length of 24-inch-diameter pipeline at the existing Danville Pumping Plant, and another short length of 12-inch-diameter pipeline in a nearby section of Danville Boulevard.

Construction Characteristics

Schedule, Work Hours, and Staging

Table 2-9 presents the proposed schedule for design and construction of work on the Leland Isolation project. Table 2-7 presents proposed work hours for all WTTIP projects. Table B-LELPL-1 in Appendix B provides construction sequencing, duration of specific construction activities, estimated excavation and fill quantities, and vehicle trip estimates (construction staff and truck trips). The Danville Pumping Plant site would serve as the construction staging area and would have sufficient space for onsite parking.

Construction Activities

The pipeline improvements would be constructed using open-trench construction methods (see Figure 2-9 for a description). Maps C-LELPL-1 and C-LELPL-2 indicate the areas of construction. Excavated material would be stockpiled during construction and used as backfill after pipeline installation. Once pipeline work is finished, the roadways would be regraded and resurfaced.

Construction Equipment

Backhoes, bulldozers, scrapers, and water trucks would be used for excavation, grading, and fill. Concrete would be delivered to the site by ready-mix trucks and placed with a concrete pumper truck; a crane would set structural components and equipment; and supply trucks would deliver materials and equipment used in the construction process. Additional equipment likely to be used includes air compressors, welding machines, and various air- and electric-powered hand tools.

2.6.8 Moraga Reservoir

The existing Moraga Reservoir is located on EBMUD-owned property at the intersection of Draeger Drive and Claudia Court in Moraga (see Maps A2 and B2). This facility is located in the Bryant Pressure Zone south of Highway 24. The need for the project is described under the Ardith Reservoir Project in Section 2.6.1, above.

Design Characteristics

The design calls for one concrete tank with a dome-shaped roof to be constructed in the footprint of the open-cut reservoir. The reservoir dimensions are shown on the plan view and cross-section drawings (see Maps D-MORRES-1 and Map D-MORRES-2).

Construction Characteristics

Schedule, Work Hours, and Staging

Table 2-9 presents the proposed schedule for design and construction of work at the Moraga Reservoir site. Table 2-7 presents proposed work hours for all WTTIP projects. Table B-MORRES-1 in Appendix B provides construction sequencing, duration of specific construction activities, estimated excavation and fill quantities, and vehicle trip estimates (construction staff and truck trips). The tank site would serve as a limited construction staging area and would have sufficient space for onsite parking. Worker vehicles would need to park on nearby streets during some stages of the construction.

Construction Activities

Construction of the reservoir would involve below-grade excavation. Following excavation and grading of the tank site, EBMUD contractors would construct the concrete tank and appurtenant features (e.g., the valve pit). Once the tank is finished, it would be backfilled and partially buried. The tank area would then be replanted with vegetation. Excavated material would be incorporated into final site grading.

Construction Equipment

Backhoes and excavators would be used for excavation and grading. Dump trucks would be used to remove excavated material. Concrete would be delivered to the site by ready-mix trucks; a crane would set structural components and equipment; and supply trucks would deliver materials and equipment used in the construction process. A prestressing machine would be used to wrap steel wire around the reservoir and to spray the reservoir with shotcrete. An asphalt paving machine, roller, and front-end loader would be used to construct the access road. Additional equipment likely to be used includes air compressors, welding machines, and various air- and electric-powered hand tools.

2.6.9 Moraga Road Pipeline

This pipeline would be part of the Bryant Pressure Zone south of Highway 24. Hydraulic analyses indicate that even with the improvements in WTP production and pumping capacity (at Lafayette WTP under Alternative 1, and at Orinda WTP under Alternative 2), additional transmission capacity to the Moraga Reservoir provided by this project is required to meet current water demands as well as future (2030) demands.

Maps A2 and B2 show the general location of the proposed alignment for the Moraga Road Pipeline on street and topographic base maps. Maps C-MORPL-1 through C-MORPL-7 show the proposed alignment on an aerial photograph base. The approximately three-mile-long pipeline would be entirely buried and installed primarily within open space in the Lafayette Reservoir Recreation Area and within public roadways in the cities of Lafayette and Moraga.

The northern terminus of the Moraga Road Pipeline is at the Lafayette WTP in the city of Lafayette. While the proposed alignment for the Moraga Road Pipeline is the same under Alternatives 1 and 2, the pipeline connections at the Lafayette WTP would differ. Under Alternative 1, the pipeline labeled "Bryant Pipeline" on the site plan for the Lafayette WTP (Map D-LWTP-1) becomes, for purposes of discussion, the Moraga Road Pipeline at Mt. Diablo Boulevard. Under Alternative 2, the Moraga Road Pipeline branches off from the proposed Orinda-Lafayette Aqueduct. The southern terminus is in the city of Moraga, in Moraga Road at Draeger Drive, where the Moraga Road Pipeline would connect to an existing pipeline. Table 2-12 identifies the streets and areas along the pipeline alignment and the construction technique to be employed in those areas.

The specific pipeline alignment within public roadways would be confirmed during final design. Engineers have proposed specific placement of the pipe (i.e., in the northbound or southbound lanes of a roadway) based on the presence of an existing EBMUD pipeline, which the Moraga Road Pipeline would parallel, and the presence of other utilities. In Moraga Road, the proposed alignment is generally in the northbound lane(s), with the exception of a segment south of Donald Drive and a segment near Corte Santa Clara, in the narrow "S-curve" section near the Lafayette/Moraga boundary.

Design Characteristics

The key characteristics of the Moraga Road Pipeline are as follows:

- *Length*. The proposed pipeline alignment is approximately three miles long.
- *Diameter*. The diameter would range from 36 to 48 inches, based on hydraulic considerations for different segments of the pipeline.
- *Material*. The pipe would be constructed of welded steel.

TABLE 2-12
STREETS AND AREAS ALONG THE PROPOSED MORAGA ROAD PIPELINE ALIGNMENT

Street/Area	Between	Approximate Length (feet)	Construction Technique
Mt. Diablo Boulevard	Lafayette WTP and Lafayette Reservoir Recreation Area	65	Open Trench
Lafayette Reservoir Recreation Area	Mt. Diablo Boulevard and Nemea Court/Moraga Road	5,775	Open Trench
Moraga Road	Nemea Court and Via Granada/ Sky-Hy Drive	1,750	Open Trench
Moraga Road	Via Granada/Sky-Hy Drive and Rheem Boulevard	4,570	Open Trench
Moraga Road	North of Rheem Boulevard and south of Rheem Boulevard	400	Bore and Jack
Moraga Road	Bore-and-jack pit south of Rheem Boulevard to Draeger Drive	4,000	Open Trench
Total (feet)		**16,560**	
Total (miles)		**3.1**	

Construction Characteristics

Schedule, Work Hours, and Staging

Table 2-9 presents the proposed schedule for design and construction of the Moraga Road Pipeline project; Table 2-7 presents the proposed work hours for all WTTIP projects.

Construction Activities

Figure 2-9 presents a description of the typical open-trench construction process for pipeline installation. For purposes of impact evaluation of the Moraga Road Pipeline, a 40-foot-wide construction corridor was assumed through the Lafayette Reservoir Recreation Area. The construction zone width in public roadways would depend partly on roadway characteristics and traffic control. The average construction zone width of 40 feet would allow truck and equipment access along the trench; however, the construction zone width would be constrained to as little as 14 feet in the narrowest section of Moraga Road south of Nemea Court in order to maintain one-way alternate traffic flow around the construction zone. Open-trench construction in public roadways (across Mt. Diablo Boulevard and in Moraga Road) would require closure of one or more travel lanes. Construction staging would occur within the construction corridor. Parking would be available within the construction corridor as well as in the parking area for the Lafayette Reservoir.

The duration of construction activities would depend on the construction production rate, which in turn depends on factors such as the method (open-trench versus trenchless construction), the width of the construction corridor, ground conditions, and the ability to string pipe near the work area. The construction production rate represents the amount of construction that could occur in a single day: trenching, preparing the pipe bedding, installing the pipe, welding the joints, and backfilling the pipe. Some backfilling often occurs the following day as the pipe trenching and installation crew moves forward to the next segment, and final paving typically does not occur until all segments are installed. For the Moraga Road Pipeline, engineers estimate that the production rate would range from 40 to 120 feet per day.

2.6.10 Sunnyside Pumping Plant

This proposed new pumping plant would be constructed on privately owned, currently undeveloped property located in Lafayette, on the Orinda border near the intersection of Happy Valley Road and Sundown Terrace (see Maps A1 and B1). This facility would be part of Valley View Pressure Zone which is supplied by the Bryant Pressure Zone (north of Highway 24). There is inadequate pumping capacity in the Valley View Pressure Zone. The capacity of the pipeline connecting the existing pumping plant to the Valley View Pressure Zone service area is not adequate for existing flow rates. Consequently, customers in the vicinity of the pumping plant experience high pressure and pressure fluctuation problems. Constructing the new Sunnyside Pumping Plant would alleviate existing and anticipated capacity deficiencies; its location (closer to the reservoirs than the Valley View Pumping Plant) would also eliminate the pressure fluctuation problems. The capacity of the proposed Sunnyside Pumping Plant would be sufficient to replace the Valley View Pumping Plant; the latter would become a backup facility to assist with fire flow supplies.

Design Characteristics

Pumping Plant

Map D-SUNPP-1 indicates the building dimensions. Cross-sections of the proposed pumping plant can be seen on Map D-SUNPP-2. The pumping plant capacity would be 1.5 mgd (see Table 2-11 for the number of pumps and their horsepower). The pumping plant would be constructed on native material. The pumping plant building would be approximately 20 feet in height (including the roof grade).

Pipeline

A 240-foot-long, 12-inch-diameter inlet pipeline and a 120-foot-long outlet pipeline would be constructed to connect the pumping plant to existing pipelines in Happy Valley Road.

Construction Characteristics

Schedule, Work Hours, and Staging

Table 2-9 presents the proposed schedule for design and construction of work at the Sunnyside Pumping Plant site. Table 2-7 presents proposed work hours for all WTTIP projects. Table B-SUNPP-1 in Appendix B provides construction sequencing, duration of specific construction activities, estimated excavation and fill quantities, and vehicle trip estimates (construction staff and truck trips). EBMUD would purchase property for the site and lease any additional required space for construction staging and parking from the landowner. Sufficient space for construction staging would be provided within the assumed limits of construction shown on Map D-SUNPP-1.

Construction Activities

Following excavation and grading of the pumping plant site, EBMUD contractors would construct the pumping plant building and appurtenant features. The pumping plant and short pipelines would be constructed concurrently. Once the building is finished, the pumping plant area would be replanted with vegetation. Excavated material would be incorporated into final site grading.

Construction Equipment

Backhoes would be used for excavation, grading, and fill. Concrete would be delivered to the site by ready-mix trucks; a crane would set structural components and equipment; and supply trucks would deliver materials and equipment used in the construction process. Additional equipment likely to be used includes air compressors, welding machines and various air- and electric-powered hand tools.

2.6.11 Tice Pumping Plant and Pipeline

The Tice Pumping Plant would be located on privately owned vacant land in unincorporated Contra Costa County, south of Olympic Boulevard (see Maps A3 and B3). This facility would be part of the Colorados Pressure Zone. The Colorados Pressure Zone has several distinct subzones that operate independently because of distance and pipeline capacity. The subzone issues plus other problems (such as different elevations among the reservoirs, and poor locations of pumping plants serving the zone) cause operational, water quality, and customer service problems. The southeastern portion of the Colorados Pressure Zone is served primarily by Tice Reservoir. Tice Reservoir is lower than other reservoirs in the Colorados Pressure Zone. In the winter, the water level in the reservoir does not fluctuate well, resulting in increased water age and impaired water quality. In the summer, reservoir levels cannot be maintained because of a poor hydraulic connection to the pumping supply. Hydraulic modeling indicates that these problems can be corrected by isolating the southwestern portion of the pressure zone (forming a new pressure zone) and providing the area with a new source of pumping capacity: the proposed Tice Pumping Plant.

Design Characteristics

Pumping Plant

Map D-TICEPP-1 indicates the building dimensions and existing topography. Map D-TICEPP-2 provides profile drawings of the proposed pumping plant. The Tice Pumping Plant would consist of a pumping plant building, a rate control station, a transformer, and switchgear. The pumping plant capacity would be 10 mgd (see Table 2-11 for the number of pumps and their horsepower). The toe of the slope would be excavated and the pumping plant built into the hillside. A retaining wall would be constructed along part of the southern site boundary and along the western site boundary to provide space for the transformer and switchgear. The access road and areas around the pumping plant building would be paved; part of the site would remain unpaved and would be regraded and landscaped following construction. The existing PG&E distribution system would be used by this project. PG&E would require EBMUD to install a new transformer and a metering and switchgear cabinet.

Pipeline

A 2,100-foot-long, 20-inch-diameter section of pipeline would be constructed on Boulevard Way from Warren Road to Olympic Boulevard and then to the pumping plant. A discharge pipeline would cross Olympic Boulevard from the pumping plant to an existing 20-inch-diameter pipeline on the north side of Olympic Boulevard. A rate control station, normally closed, and a gate valve on the existing 20-inch-diameter pipeline would be constructed to isolate the southwestern portion of the pressure zone. Map C-TICEPP-1 shows the proposed pipeline alignment.

Construction Characteristics

Schedule, Work Hours, and Staging

Table 2-9 presents the proposed schedule for design and construction of work at the Tice Pumping Plant site. Table 2-7 presents proposed work hours for all WTTIP projects. Tables B-TICEPP-1 and B-TICEPP-2 in Appendix B provide construction sequencing, duration of specific construction activities, construction staffing, and parking information. The pumping plant site would serve as the construction staging area and provide some onsite parking. Additional parking would be available on Olympic Avenue adjacent to the project site.

Construction Activities

Following excavation and grading of the pumping plant site, EBMUD contractors would construct the pumping plant building and appurtenant features. The pumping plant and pipelines would be constructed concurrently. Excavated material would be incorporated into final site grading.

Construction Equipment

Backhoes and excavators would be used for excavation, grading, and fill. Dump trucks would be used to remove excess soil and deliver aggregate base and asphalt concrete for the parking lot and access road. Concrete would be delivered to the site by ready-mix trucks; a crane would set structural components and equipment; and supply trucks would deliver materials and equipment used in the construction process. Additional equipment likely to be used includes air compressors, welding machines, and various air- and electric-powered hand tools.

2.6.12 Withers Pumping Plant

The Withers Pumping Plant would be located on EBMUD property at the existing Grayson Reservoir, near the intersection of Reliez Valley Road and Silver Hill Way in an unincorporated area of Contra Costa County (see Maps A4 and B4). This facility would be part of the Colorados

Pressure Zone. The Colorados Pressure Zone has several distinct subzones that operate independently because of distance and pipeline capacity. The subzone issues plus other problems (such as different elevations among the reservoirs, and poor locations of pumping plants serving the zone) cause operational, water quality, and customer service problems. Withers Reservoir serves the northern portion of the Colorados Pressure Zone. Water levels in the reservoir routinely drop below acceptable levels during summertime operations, limiting water available for firefighting and reducing customer service pressures. This problem occurs because no pumping plants are located near the reservoir, and pipelines to the reservoir are hydraulically constrained. Larkey Pumping Plant (used mainly for Walnut Creek WTP operations) is closest and has been used to pump water to Withers Reservoir with limited effect: the plant is over three miles from the reservoir, and the pipeline connecting the two facilities is relatively small. The proposed Withers Pumping Plant would pump water to Withers Reservoir, eliminating the need to rely on the Larkey Pumping Plant to refill the reservoir. The Withers Pumping Plant would also improve water quality in Grayson Reservoir (Leland Pressure Zone reservoir), which does not fluctuate well during winter demands (creating water aging issues).

Design Characteristics

Pumping Plant

The Withers Pumping Plant would consist of the pump plant building, transformer, and switchgear. Map D-WITHPP-1 indicates the proposed building footprint and topographic changes. Cross-sections of the proposed pumping plant are shown on Map D-WITHPP-2. The pumping plant would be constructed with a slab-on-grade foundation. The pumping plant building would be approximately 26 feet in height (above grade). The plant capacity would be 3 mgd (see Table 2-11 for the number of pumps and their horsepower). PG&E would require EBMUD to install a new transformer and a metering and switchgear cabinet.

Pipeline

A 40-foot-long, 16-inch-diameter inlet pipeline would be constructed on EBMUD property. A 50-foot-long, 12-inch-diameter pipeline would be constructed between the pumping plant and an existing 12-inch-diameter pipeline in Reliez Valley Road.

Construction Characteristics

Schedule, Work Hours, and Staging

Table 2-9 presents the proposed schedule for the Withers Pumping Plant. Table 2-7 lists proposed construction hours for all WTTIP projects. Table B-WITHPP-1 in Appendix B provides construction sequencing, duration of specific construction activities, estimated excavation and fill quantities, and vehicle trip estimates (construction staff and truck trips). The pumping plant site would serve as the construction staging area and would have sufficient space for onsite parking.

Construction Activities

Following excavation and grading of the pumping plant site, EBMUD contractors would construct the retaining walls, pumping plant building, and appurtenant features. The pumping plant access road and pad would then be paved. Some excavated materials would need to be hauled offsite. Disturbed areas around the pumping plant site would be replanted following construction.

Construction Equipment

Backhoes and excavators would be used for excavation, grading, and fill. Dump trucks would be used to remove excess soil and deliver aggregate base and asphalt concrete. Concrete would be delivered to the site by ready-mix trucks and placed with pumper trucks; a crane would set structural components and equipment; and supply trucks would deliver materials and equipment used in the construction process. An asphalt paver and roller would be used to construct the final access road and parking lot. Additional equipment likely to be used includes air compressors, welding machines, and various air- and electric-powered hand tools.

2.6.13 Other Program-Level Improvements

Leland Reservoir Replacement and New Leland Pressure Zone Reservoir

The existing Leland Reservoir, located in the western portion of the Leland Pressure Zone in Lafayette, is one of two reservoirs providing water storage in the Leland Pressure Zone (see Figure 2-3). This 17.2-mg reservoir, placed in service in 1955, has capacity constraints as a result of its age and is located at a less than optimal elevation. This has caused water levels in the reservoir to drop below alarm levels during and immediately following high water demand periods.

The Leland Reservoir also has a dated roofing system that leaks and requires structural reinforcement. It consists entirely of precast roof panels supported by a precast concrete framing system of beams, girders, and columns. The condition of the roof was evaluated in the *Concrete Reservoir Roof Repair and Replacement Study* and it was concluded that the precast roof panels were not repairable and should be replaced.

Leland Reservoir Replacement

The location of the existing Leland Reservoir is shown on Map B6. Under this project, the Leland Reservoir would be drained and demolished and would be replaced with a new 9-mg tank at the same site. Additional storage would be required within the Leland Pressure Zone to accommodate the multi-year outage required to decommission the existing reservoir and construct a new reservoir. Construction of this additional storage, the New Leland Pressure Zone Reservoir, would occur before demolition of the existing Leland Reservoir and is also evaluated at a program level of detail in this EIR.

New Leland Pressure Zone Reservoir

The proposed site for the 9-mg reservoir occupies about 10 acres on a hillside east of I-680 and south of Rudgear Road in the city of Walnut Creek (see Map B7). The proposed pipeline alignment extends between the tank site and a transmission main in South Main Street. The reservoir site is a steep, previously cut and terraced hillside primarily on California Department of Transportation (Caltrans) property; the easternmost portion of the tank site is privately owned. The tank would be almost completely buried. Four potential construction access routes are being considered. (The access routes are located in Walnut Creek and Unincorporated Contra Costa County):

- Option A. Construction traffic would be routed on residential streets through the neighborhood northeast of the site, from Rudgear Road onto southbound Rudgear Drive, through three residential properties, and through a portion of the Sugarloaf Open Space to the reservoir site. Construction traffic leaving the reservoir site would follow this same route.

- Option B. Construction traffic would exit I-680 from Livorna Road to the south, follow Sugarloaf Drive and Sugarloaf Lane, and then traverse the Sugarloaf Open Space along the Bottom Spring Trail. Construction traffic leaving the reservoir site would follow this same route.

- Option C. Construction traffic would access the reservoir site from northbound I-680 via a Caltrans road between Rudgear and Livorna Roads. The Caltrans road parallels I-680 before ascending the slope up to the reservoir site. Construction traffic leaving the site would use option A or B above.

- Option D. A new road would be constructed up the slope from Rudgear Road just north of the Park and Ride lot. This option would require special (track-mounted) construction equipment to negotiate the steeply graded access road and would extend the duration of construction.

Permanent access to the site would be via option D. Map C-NLELRES-1 shows the proposed reservoir site and access road options.

St. Mary's Road/Rohrer Drive Pipeline

The transmission capacity in the southern portion of the Bryant Pressure Zone must be improved to meet 2030 water supply demands and maintain reservoir levels. As part of the WTTIP, and if warranted by actual future demand, the approximately four-mile-long, 20-inch-diameter St. Mary's Road/Rohrer Drive Pipeline would be constructed in Moraga, Lafayette, and Walnut Creek (see Map B6). The alignment currently under consideration begins at the southern terminus of the proposed Moraga Road Pipeline (in Moraga Road at Draeger Drive), continues south on Moraga Road to St. Mary's Drive, proceeds north on St. Mary's Drive to Rohrer Drive, and terminates at the Grizzly Reservoir.

San Pablo Pipeline

The San Pablo WTP currently provides a backup treated water supply for the West of Hills area, but has aging infrastructure that is in need of upgrade or replacement. EBMUD is evaluating whether to reconstruct or decommission the WTP. If the WTP is decommissioned, the preferred method of making up this critical backup supply would be to construct the San Pablo Pipeline and convert the

San Pablo Tunnel to convey up to 30 mgd of treated water from the Orinda WTP to the existing San Pablo WTP clearwell. EBMUD will decide whether to decommission or reconstruct the San Pablo WTP following completion of the seismic retrofit of the Claremont Tunnel. If the San Pablo Pipeline is constructed, it would operate regularly at a low rate to maintain the freshness of water in the pipe and tunnel; it would only operate at maximum capacity when supply from the Claremont Tunnel is unavailable (due to maintenance, for example).

The project would consist of installing a 4.3-mile-long, large-diameter pipeline within the San Pablo Reservoir watershed along or near the reservoir access road to the San Pablo Tunnel; converting the standby 2.5-mile-long San Pablo Tunnel to convey treated water instead of raw water; and connecting the pipeline to the West of Hills water distribution system at Colusa Avenue near the San Pablo WTP in El Cerrito. The pipeline alignment is shown on Map B5. Only minor improvements would need to be made to the tunnel, and no new tunneling would be required. The west tunnel portal is located at the San Pablo WTP, and the east tunnel portal is located in the San Pablo Recreation Area. A pressure-reducing station would be located at the east tunnel shaft. The San Pablo Pumping Plant, shown on Maps D-OWTP-1 and D-OWTP-2, and associated appurtenances would be constructed at the Orinda WTP to pump water from the Orinda WTP through the San Pablo Pipeline.

Staging areas are undetermined but would likely be located at the Orinda WTP, near or at the EBMUD Watershed Headquarters near San Pablo Reservoir, near the east shaft of the San Pablo Tunnel, at the San Pablo WTP, and along the pipeline right-of-way.

2.7 Intended Uses of the EIR

Section 1.1 in Chapter 1, Introduction, describes the purpose of the EIR. The information contained in the EIR and the administrative record will be reviewed and considered by the EBMUD Board of Directors prior to the ultimate decision to approve, disapprove, or modify the WTTIP. The 30-year lifecycle cost estimate of Alternative 1 is $547 million; the 30-year lifecycle cost estimate of Alternative 2 is $567 million; the cost of the distribution system improvements is approximately $144 million.

Subsequent approvals by the EBMUD Board of Directors would be required prior to issuance of any design and/or construction contracts for program-level WTTIP projects. As described in Section 3.1 in Chapter 3, when the District undertakes subsequent environmental review for facilities evaluated at a program level of detail, the information contained in this EIR will be revisited to determine the accuracy and adequacy of these evaluations.

Table 2-13 indicates the other agencies expected to use the EIR in their decision-making, and the permits, other approvals, and consultation requirements necessary to implement the project.

References – Project Description

East Bay Municipal Utility District (EBMUD), *Pressure Zone Planning Program Study for Fay Hill and Carter Pressure Zones*, Water Distribution Planning Division, August 19, 2003a.

______, *Pressure Zone Planning Program Study for Holly, Hill Mutual, Ridgewood, and Crest Pressure Zones,* Water Distribution Planning Division, April 3, 2003b.

______, *Pressure Zone Planning Program Study for Bryant Pressure Zone*, Water Distribution Planning Division, June 9, 2004.

______, *Lamorinda Water System Improvements Program Facilities Plan*, June 2005a.

______, *Pressure Zone Planning Program Study for Colorados Pressure Zone*, Water Distribution Planning Division, April, 2005b.

______, *Pressure Zone Planning Program Study for Las Aromas and Valley View Pressure Zones,* Water Distribution Planning Division, May 31, 2005c.

______, *Pressure Zone Planning Program Study for Leland Pressure Zone*, Water Distribution Planning Division, May 2005d.

______, *Pressure Zone Planning Program Study for Baseline, White Oak, Orchard, Valencia, and Laguna Pressure Zones*, Water Distribution Planning Division, April 2005e.

______, *Pressure Zone Planning Program Study for Encinal, Westside, and Dos Osos Pressure Zones*, Water Distribution Planning Division, April 11, 2005f

______, *Pressure Zone Planning Program Study for Central Pressure Zone, South Reservoir Area*, Water Distribution Planning Division, May 2005g.

______, *Pressure Zone Planning Program Study for Central Pressure Zone, North Reservoir Area*, Water Distribution Planning Division, May 2005h.

______, *Pressure Zone Planning Program Study for Central Pressure Zone, Central Reservoir Area*, Water Distribution Planning Division, May 2005i.

______, *Amendment to the Lamorinda Water System Improvements Program Facilities Plan,* June 2006.

EBMUD and Montgomery Watson, *Summary Report: Districtwide Update of Water Demand Projections*, May 2000.

Insituform, Microtunneling, available online at http://www.insituform.com/microtunneling-g.htm, May 15, 2006.

Jacobs Associates, *Draft Lamorinda Water System Improvements Program, Tunnel Constructability, Cost and Schedule Report*, September 30, 2005.

TABLE 2-13
DISCRETIONARY APPROVALS FOR PROJECT-LEVEL WTTIP ELEMENTS

Project	Regional Water Quality Control Board Section 401[a] Water Quality Certification/Waste Discharge Requirement	U.S. Army Corps of Engineers Section 404[a] Permit	U.S. Fish and Wildlife Service: Programmatic Agreement[b]	U.S. Fish and Wildlife Service: Endangered Species Act Section 7 Consultation	California Department of Fish and Game Streambed Alteration Agreement	State Water Resources Control Board NPDES General Permit for Discharge of Stormwater	California Department of Transportation Encroachment Permit	BAAQMD Authority to Construct/ Permits or Operate	Local Encroachment Permits: Contra Costa Flood Control District	Local Encroachment Permits: Contra Costa County	Local Encroachment Permits: Orinda	Local Encroachment Permits: Lafayette	Local Encroachment Permits: Moraga	Local Encroachment Permits: Walnut Creek
Lafayette WTP – Alternative 1	Yes	Yes	Yes	Informal	Yes	Yes	No	Yes	Yes	No	No	Yes	No	No
Lafayette WTP – Alternative 2	No	No	No	Informal	No	No	Yes	No	Yes	No	No	No	No	No
Orinda WTP – Alternative 1	No	No	No	No	No	Yes	No	No	No	No	No	No	No	No
Orinda WTP – Alternative 2	No	No	No	No	No	Yes	No	Yes	No	No	No	No	No	No
Walnut Creek WTP	No	No	No	No	No	No	No	No	No	No	No	No	No	No
Sobrante WTP	No	No	Yes	Informal	No	Yes	No	Yes	No	No	No	No	No	No
Upper San Leandro WTP	No	No	No	No	No	No	No	Yes	No	No	No	No	No	No
Orinda-Lafayette Aqueduct	Yes	No	No	No	Yes	Yes	Yes	No	Yes	No	Yes	Yes	No	No
Lafayette Reclaimed Water Pipeline	Yes	Yes	Yes	Informal	Yes	Yes	No	No	Yes	No	No	Yes	No	No
Ardith Reservoir and Donald Pumping Plant	No	No	No	No	No	No	No	No	No	No	No	No	No	No
Fay Hill Pumping Plant and Pipeline Improvements	No	No	No	No	No	No	No	No	No	No	No	No	Yes	No
Fay Hill Reservoir	No	No	No	No	No	Yes	No	No	Yes	No	No	No	No	No
Glen Pipeline Improvements	Yes	No	No	No	Yes	Yes	Yes	No	Yes	No	No	Yes	No	No
Glen Reservoir Decommission		No	No	No	No	No	No	No	No	No	No	No	No	No
Happy Valley Pumping Plant and Pipeline	Yes	No	Yes	Informal	Yes	Yes	No	No	Yes	No	Yes	No	No	No
Highland Reservoir and Pipelines	Yes	Yes	Yes	Informal	Yes	Yes	No	No	Yes	No	No	Yes	No	No
Leland Pressure Zone Isolation Bypass Valves	No	No	No	No	No	No	No	No	No	No	No	No	No	Yes
Moraga Reservoir	No	No	No	No	No	Yes	No	No	No	No	No	No	No	No
Moraga Road Pipeline	Yes	Yes	Yes	Informal	Yes	Yes	No	No	Yes	No	No	Yes	Yes	No
Sunnyside Pumping Plant and Pipeline	No	No	No	No	No	No	No	No	No	No	Yes	Yes	No	No
Leland Isolation Pipeline	No	No	No	No	No	No	No	No	No	No	No	No	No	Yes
Tice Pumping Plant and Pipeline	Yes	Yes	Yes	Informal	Yes	Yes	No	No	Yes	Yes	No	No	No	No
Withers Pumping Plant	No	No	No	No	No	No	No	No	No	Yes	No	No	No	No

[a] Refers to Sections 401 and 404 of the Clean Water Act
[b] Project will implement measures from the USFWS programmatic formal Endangered Species Act consultation on issuance of permits under Section 404 of the Clean Water Act or authorizations under the Nationwide Permit Program for projects that may affect the California red-legged frog.

BAAQMD = Bay Area Air Quality Management District
NPDES = National Pollutant Discharge Elimination System