8.15 WATER RESOURCES

This section provides a discussion of the existing water resources in the vicinity of the RCEC project site the Advanced Wastewater Treatment (AWT) Plant and, along its linear facilities. Section 8.15.1 discusses the existing hydrologic environment. Potential environmental effects of the RCEC and AWT plant construction activities and operations on water resources are then assessed in Section 8.15.2. Section 8.15.3 presents proposed mitigation measures that will prevent significant impacts. Section 8.15.5 discusses cumulative impacts. Section 8.15.6 presents applicable laws, ordinances, regulations, and standards (LORS) related to water resources. Section 8.15.7 lists relevant regulatory agencies and contacts. Section 8.15.8 discusses project permits that relate to water resources and presents a schedule for obtaining those permits. A list of references cited is located in Section 8.15.9.

Water resources that may be potentially impacted by the RCEC project include water supply, water quality, and flooding hazards. Specific discussions of expected impacts are provided (Section 8.15.2) for the following:

- Depletion of water supplies
- Use of reclaimed water for cooling water
- Disposal of wastewater
- Compliance with State water policies
- Groundwater degradation
- Stormwater impacts
- Flooding impacts

8.15.1 Affected Environment

A 14.7-acre power plant site located at 3636 and 3590 Enterprise Avenue, Hayward, California, will accommodate the generating equipment, AWT plant control/administration buildings, a switchyard, storage tanks, water treatment building, and emission control equipment. Overhead transmission lines will extend east, then southeast from the power plant site to the PG&E Eastshore Substation, a distance of approximately 1.1 miles. These areas are located in Alameda County within an area that forms part of the southeastern shoreline of San Francisco Bay, a large semi-enclosed estuary that conveys the freshwater inflows of the Sacramento and San Joaquin Rivers to the Pacific Ocean. The Bay functions as the only drainage outlet for waters of the entire Central Valley region. It also functions as a natural topographic separation between the northern and southern coastal mountain ranges.

The project site is situated on an elongated, northwest-trending, low-lying alluvial fan complex deposited by stream channels. During Pleistocene and Holocene times, this was an area of aggradation. Streams discharged across the area, depositing lenticular bodies of sand and gravel, later to be encased in finer sediments. Physiographically, this area is bordered by the San Francisco Bay on the west, the Diablo Range on the east and south, and the Sacramento-San Joaquin Delta on the north.

8.15.1.1 Climate and Precipitation

The climate in the project area is Mediterranean (NOAA division CA-04: Central Coast) with moderate year-round temperatures and a winter rainy season.

Since 1958, normal temperatures in the area typically have exhibited a seasonal pattern ranging from winters of approximately 40-57°F (mean daily temperature of 49°F) in December and January, to summer temperatures ranging from 53-76°F (mean daily temperature of 65°F) in August and September. The average annual temperature is 59°F. The average annual evaporation pan rate is approximately 55 inches, indicating that the project site experiences evaporation rates significantly exceeding local precipitation.

The closest long-term precipitation gauge is Station 62, located on the Hayward Corporation Yard, at an elevation of 55 feet msl. Between 1957 and 1992, the annual rainfall at that location averaged 17.9 inches per year. The project site falls in an area that typically receives, on average, approximately 16 inches of rain per year. Most of this precipitation occurs during the months of October through April, while summers are relatively dry.

Table 8.15-1 lists the average rainfall amounts by month over a continuous 35-year period from 1957-1992 as recorded at Meteorological Station 62 (Personal communication Frank Codd, Alameda County Public Works Agency, Flood Control and Water Conservation District, 2001).

The California Department of Water Resources and the Alameda County Public Works Agency have compiled precipitation frequency data for all of Alameda County. Table 8.15-2 summarizes the storm duration-recurrence data for the Hayward area for storm events ranging from the 2-year to the 100-year event (Personal communication, Jim Goodridge, California Department of Water Resources, 2001). This precipitation data is used in Section 8.15.2.4 for estimating flooding impacts by calculating the expected stormwater runoff from the project site.

Table 8.15-1. Average monthly rainfall amounts at Station 62: Hayward, CA (inches).

Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
0.05	0.05	0.34	1.23	2.57	2.60	3.40	2.95	2.92	1.36	0.28	0.14

Annual Average =17.9 inches Source: Frank Codd, Alameda County Flood Control and Water Conservation District.

Table 8.15-2. Storm duration-recurrence intervals - Station 62: Hayward Corporation Yard.

Recurrence	Maximum precipitation (inches)					
(years)	15-min.	1-hour	6-hour	12-hour	24-hour	Annual Mean
2	0.26	0.53	1.14	1.52	1.98	16.54
10	0.43	0.89	1.92	2.56	3.34	24.58
25	0.52	1.07	2.31	3.08	4.01	27.94
50	0.59	1.20	2.59	3.45	4.50	30.23
100	0.65	1.33	2.86	3.82	4.98	32.37

Sources: Alameda County Public Works Agency: Frank Codd; CA-DWR: Jim Goodridge

8.15.1.2 Groundwater Resources

The project site lies within the South East Bay Plain Groundwater Basin (SEBP Basin), an alluvial aquifer system consisting of poorly consolidated to unconsolidated lenses of gravel, sand, silt, and clay (CH_2MHill 2000). The SEBP Basin falls within the jurisdiction of the San Francisco Bay Regional Water Quality Control Board (Hickenbottom and Muir 1988). These groundwater resources are managed by the Regional Water Quality Control Board (RWQCB) and the East Bay Municipal Utility District (EBMUD).

Covering an area of about 115 square miles, the SEBP Basin is the largest, most productive groundwater basin in the EBMUD service area. As depicted in Figure 8.15-1, the SEBP Basin is bounded to the east by the Hayward Fault, an active fault with low permeability that impedes the flow of groundwater. To the west, the basin extends beneath San Francisco Bay. The basin thins to the north, becoming an insignificant source of groundwater near Berkeley. To the south, the basin merges with the Niles Cone Groundwater Basin south of the San Mateo Bridge. Included in this area are the communities of Oakland, Alameda, San Leandro, San Lorenzo, and the northern portion of the City of Hayward, including the RCEC Project site. The major water-bearing unit in the basin is Older Alluvium of Pleistocene Age. This alluvium is overlain by Merritt Sand, Young Bay Mud, fluvial deposits, and younger alluvium of Holocene Age. Most of the sediments that make up the unconsolidated deposits beneath the East Bay Plain were derived from the Diablo Range to the east.

Hydrostratigraphy

The hydrostratigraphy of the SEBP Basin in the area of the project site correlates closely with aquifer units identified in the adjacent Niles Cone Groundwater Basin, which has been extensively studied (ACWD 1998). Consequently, four main stratigraphic units have been delineated for the SEBP Basin: a Shallow Zone (Layer-1), Old Bay Mud (Layer-2), Upper Alameda Formation (Layer-3), and Lower Alameda Formation (Layer-4).

Layer-1

This Shallow Zone represents a water table aquifer system with relatively high vertical resistance to flow (CH_2MHill 2000). This layer consists of recent marine clay, Young Bay Mud, aeolian sand, and alluvial deposits laid down on top of the Old Bay Mud sequence during the Holocene Age. Layer-1 is about 115 to 130 feet thick in the project area. Perched water and localized aquifers shallower than 50 feet exist in this unit. Depth to groundwater under the project site is only a few feet. The Newark aquifer equivalent is present at a depth of approximately 30 to 100 feet. The quality of this water is degraded due to industrial spills, leaking underground tanks, and general urbanization of the area. The lateral extent of these shallow perched zones has never been evaluated. The perched aquifers are recharged by pipe leakage, stream seepage, precipitation, and percolation from salt evaporation ponds. Salinity in the shallow water table of the San Lorenzo Cone is generally low and shows little influence from saltwater intrusion. Chloride concentrations range from less than 50 to 123 ppm (Muir 1997). Groundwater throughout the area generally flows from east to west, from the Hayward fault towards San Francisco Bay (CH_2MHill 2000).

Layer-2

This layer represents the Old Bay Mud, a relatively homogeneous estuarine mud consisting of unconsolidated dark plastic, organic-rich clay and silty clay of late Pleistocene age. This unit is considered an aquitard, and is expected to be about 35 feet thick under the project site (CH_2MHill 2000).

Layer-3

This layer represents the upper, marine-derived portion of the Alameda Formation. The marine Alameda unit is a sequence of estuarine muds separated by alluvial fan deposits (Figuers 1998). Two aquifers are typically present within this unit. The Centerville Aquifer is encountered at depths of 150-220 feet bgs and consists of individual sand and gravel lenses that vary in thickness from 5 to 60 feet (Maslonkowski 1988). The second, lower aquifer encountered within Layer-3 at about 250 to 375 feet is the Fremont Aquifer. The Fremont and Centerville aquifers are both under confined conditions and are separated by a thick aquitard. Layer-3 is approximately 350 feet thick under the project site.

Layer-4

This layer, which occurs at depths below about 500 feet bgs, represents the lower, continentally derived portion of the Alameda Formation as defined by Figuers 1998. Water-bearing formations within the unit consist of alluvial fan deposits inter-fingered with lake, swamp, river channel, and flood plain deposits. The Deep Aquifer zone associated with this unit is generally found within the upper 100 feet of Layer-4 (CH_2MHill 2000).

Bedrock

In the RCEC Project area, bedrock consists of relatively impermeable graywacke, shale, sandstone, mafic volcanic rocks, melange, and ultramafic rocks (Figuers 1988). Depth to bedrock in the project area is about 1,000 feet.

Hydrogeologic Properties

Hydraulic data for the SEBP Basin is limited. A comprehensive environmental assessment of the area by EDMUD is nearing completion and promises to provide more data. A pumping test of the City of Hayward's Well-9 provided a transmissivity estimate of about 35,000 gallons/day/foot (gpd/ft) and a specific capacity of 25 gallons/minute/foot (gpm/ft) at 1,500 gpm (Brown and Caldwell 1986). Well-9 is screened in multiple aquifers below 285 feet bgs, corresponding to the Fremont and Deep Aquifer. Additional aquifer testing in this area provides information on vertical variations in aquifer properties. Wells screened shallower than 300 feet bgs have specific capacities ranging from 2 to 20 gpm/ft. Wells screened deeper than 300 feet have specific capacities that range from 30 to 50 gpm/ft (Brown and Caldwell 1984).

The San Lorenzo and Hayward areas have the greatest well yields in the SEBP Basin (ACFCWD 1993). Wells tapping the Newark Aquifer have yields of 20 to 100 gpm with large drawdowns (Maslonkowski 1988). Wells screened in the Centerville and Freemont aquifers have yields of 200 to 600 gpm. Wells penetrating to depths greater than 400 feet typically have yields as high as 2,000 gpm. The data indicate that the Deep Aquifer is more productive than shallower units, but it is important to note that most deep wells are screened across multiple aquifers and therefore do not provide specific information regarding Deep Aquifer properties.

Selected hydrographs indicate a relatively steady period of water levels since 1990, although water levels are increasing somewhat in the Deep Aquifer (CH_2MHill 2000). Shallow groundwater in Layer-1 and Layer-2 (Newark Aquifer) flows towards the west at an average horizontal gradient of about 0.2%. Slight mounding of water levels beneath San Leandro and San Lorenzo creeks is evident within this zone due to recharge. Groundwater flow within Layer-3 (Centerville and Fremont aquifers) is also westerly with approximately the same 0.2% horizontal gradient. Water level data for Layer-4 is sparse, with horizontal gradients of about 0.1%. Groundwater in the Deep Aquifer under the project site appears to

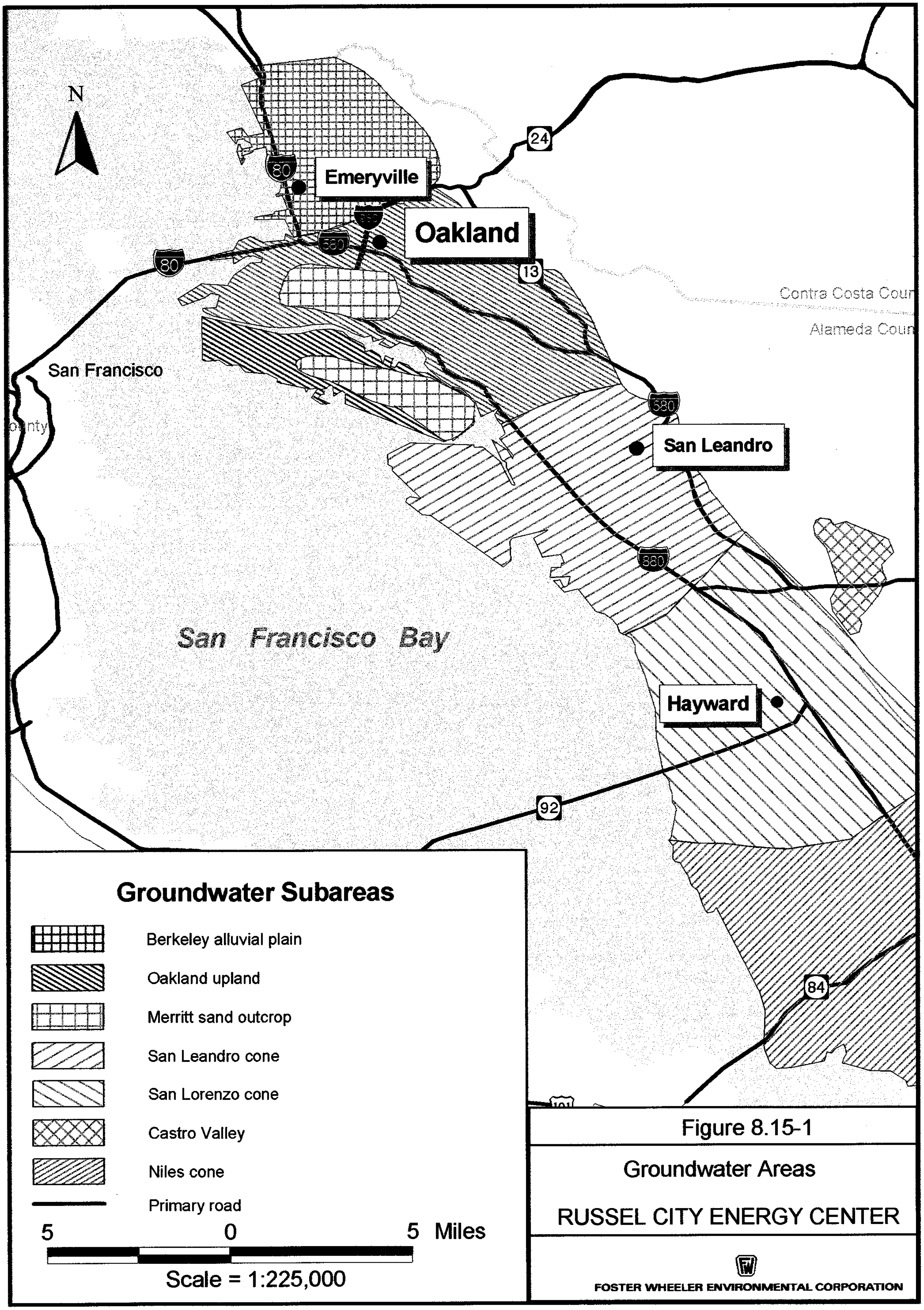

Figure 8.15-1

Groundwater Areas

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May 2001

flow more towards the north than in shallower zones, possibly indicating recharge from the Niles Cone Basin (Maslonkowski 1988). Water level maps indicate that vertical downward gradients are present throughout the basin where the Old Bay Mud is present (CH_2MHill 2000). Near the margin of San Francisco Bay, vertical gradients are approximately 2% (both from shallow to middle zone, and from middle to deep zone). This downward gradient indicates this is a recharge zone for the basin.

Water Balance

A water budget for the SEBP Basin, and specifically for the San Lorenzo Cone in which the project area lies, has been developed for the mid-1990's (Muir 1993a,b; 1996). Groundwater sources, recharge components, and discharge loses as defined by Muir are summarized in Figure 8.15-2. Total recharge to the basin from pipe leakage, stream seepage, rainfall infiltration, agricultural return flow, and lateral movement of groundwater into the basin at depth was estimated to average about 20,000 acre-feet per year (afy). Discharge outflow at the bay margin, pumpage, and evapotranspiration were estimated to average about 17,000 afy. This water balance results in a net recharge to the SEBP Basin of 3,000 afy, which is reflected in rising water levels observed in the Deep Aquifer.

Beneath the SEBP Basin, there are perhaps 2,500,000 acre-feet of groundwater in storage (CA-DWR 1994). Most of this groundwater resides in aquifers below Layer-2, in a zone of saturation that lies below the elevation of the surface of San Francisco Bay (Hickenbottom and Muir 1988). However, due to the hydrogeologic setting and proximity to San Francisco Bay, only that small percentage of groundwater stored above bay level may be tapped without endangering water quality. If groundwater storage declines to or below bay level, salt water could intrude. This has happened in the San Leandro and San Lorenzo areas. A rough determination of the groundwater storage volume was performed by Hickenbottom and Muir (1988) using the following parameters:

- Zone of saturation is 10 feet (average thickness of the zone of saturation above sea level)
- Area of the SEBP Basin is 114 square miles (9,728 acres for the San Lorenzo Cone sub-area)
- Specific yield of aquifers is 7% (sand and clay classification)

Based on the preceding values, the total volume of groundwater stored in a 10-foot zone above sea level in the SEBP Basin (total useable storage capacity) would be about 51,000 acre-feet. Muir (1994) developed a more sophisticated model and estimated total useable groundwater storage at 80,000 acre-feet. For the San Lorenzo Cone sub-area in which the RCEC project site is located, the volume of useable groundwater in storage is estimated to be about 6,800 acre-feet with the simple model described above.

Groundwater Quality

Native groundwater from below 200 feet in the Hayward area is a sodium-calcium-bicarbonate water chemistry type with total dissolved solids (TDS) of less than 450 mg/l, and a slightly alkaline pH of around 8.2 (CH_2MHill 2000). Data suggest that this groundwater is at saturation with respect to calcium carbonate. This condition probably has arisen through subterranean mixing of a calcium bicarbonate type and sodium bicarbonate water chemistry type resulting in precipitation of calcium carbonate. The silica concentration of 12 mg/l is relatively low and trends higher in the North San Leandro area. Nitrate is present only at very low concentrations (0.1 to 0.3 mg/l). Metals concentrations, particularly iron and manganese, are elevated.

Relative to its inorganic mineral content, groundwater beneath the SEBP Basin seems to be suitable for most beneficial uses. Indications are that the majority of the groundwater would meet the Primary Drinking Water Standards established by the USEPA and the State of California (Muir 1997).

Compared to deep intervals, groundwater shallower than 200 feet bgs may contain relatively high concentrations of TDS, chloride, nitrate, and sulfate (CH_2MHill 2000). Materials toxic to man have been introduced into the shallow aquifer (Layer-1) at a number of different locations. These pollutants include petroleum products, liquids containing heavy metals such as lead and chromium, organic solvents such as acetone and benzene, coliform bacteria, and many others (Hickenbottom and Muir 1988). Point sources that have had a past release or have the potential to experience future releases of hazardous materials include regulated and unregulated hazardous waste generators, leaking tank sites, toxic spills, landfills, etc. A survey of such sites performed by CH_2MHill (2000) shows a high density of sites with potential for contaminant release into the shallow aquifer.

Existing beneficial uses of groundwater pumped from the SEBP Groundwater Basin include municipal, process, industrial, and agricultural uses (SFBRWQCB 1995). Today, groundwater in the basin is used mostly for domestic irrigation and isolated industrial purposes (CA-DWR 1994).

8.15.1.2 Surface Water Resources

Surface Water Drainage

The RCEC site is located within the San Lorenzo Cone drainage basin (Figure 8.15-1). This basin drains an area of west Hayward comprising some 9,700 acres. Old Alameda Creek and the Ward-Zeile creek systems convey most of the precipitation runoff in this area. Surface waters flow into South San Francisco Bay. The watershed of potential impact lies in the Arroyo de Alameda between Sulphur Creek and Mt. Eden Creek, the largest streams in the RCEC vicinity. Sulphur Creek (1.7 miles to the northwest) and Mt. Eden Creek (1 mile to the south) also flow into southern San Francisco Bay. Most of the streams and arroyos in the vicinity of the site are ephemeral in nature. Storm-flow runoff is managed by the Alameda County Public Works Agency-Flood Control and Water Conservation District to mitigate flooding impacts and help recharge the groundwater basin. Surface water runoff to the north of the site flows via Landing Canal and discharges into San Francisco Bay at Hayward Landing.

To the west of the site, a small amount of stormwater runoff flows directly onto an adjacent wetlands parcel owned by Waste Management Corporation. Most local runoff from the RCEC site, as it is today, flows south into an unnamed flood canal (Zone 4, Line F) through which the water is channeled into several nearby marsh and wetland areas at the margin of San Francisco Bay. Both fresh and saltwater flows to these wetland areas are carefully managed by the East Bay Regional Parks District (Mark Taylor, EBRPD, personal communication, 5-4-01). During the dry season, water is distributed to maintain the desired wetland habitat for waterfowl and the endangered salt marsh harvest mouse species (see Section 8.2, Biological Resources). During the wet season, excess water is channeled into San Francisco Bay at the Johnson Landing outfall (Sowers and Lettis 1997). A major upgrade to the present surface water drainage and distribution systems in this area is scheduled to begin in September 2001 and should be completed well before the RCEC activities could impact surface water resources.

The Hetch Hetchy Aqueduct is operated by the San Francisco Water Department and provides a large source of imported surface water to the area from the Tuolume River in the Sierra Nevada Mountains for the City of Hayward, which derives 100% of their drinking water (currently 19 mgd) from this source.

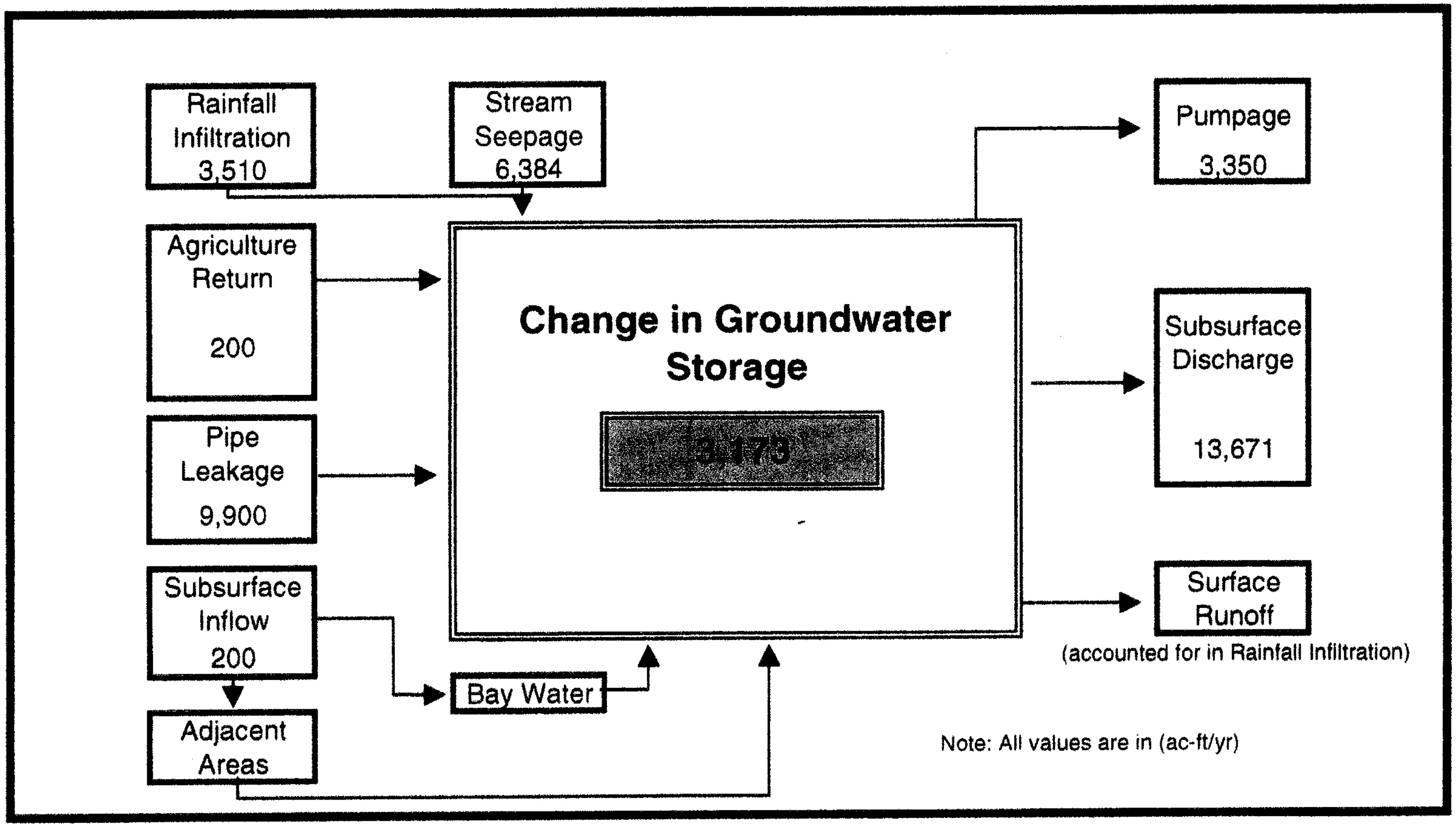

Figure 8.15-2

Groundwater Balance, SEBP Basin
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Wetlands

Small, isolated seasonal wetlands are located on the RCEC site (Section 8.2.1.3). Large areas south of the project site and to the west are brackish or saltwater marshes in various stages of restoration that are located in the Hayward Shoreline zone, between the project site and the San Francisco Bay shore. These areas include several areas that were formerly salt evaporation ponds that are currently open water; areas formerly salt evaporation ponds, but that have returned to natural wetland vegetation (pickleweed dominant); a large area called the HARD Marsh that is a managed and created wetland fed by runoff as well as by secondary treated effluent from USD/EBDA, mixed periodically with bay water; and the Cogswell Marsh, a tidally influenced salt marsh to the northwest of the project area.

Floodplains

The Federal Emergency Management Agency (FEMA) has issued flood insurance rate maps for the Old West Winton landfill (Community-Panel No. 065033-0010-E, revised: 2/09/2000) and for the RCEC plant site and vicinity. A reproduction of the FEMA map showing the flood zones in relation to these sites is provided in Figure 8.15-3. This map indicates that neither the RCEC project site, nor the transmission line route is located within a 100-year floodplain (Zone A) or a 500-year floodplain (Zone X). Clearly, the areas impacted by the RCEC project are subject only to minimal flooding. Additionally, these sites are not located within an area of coastal or tidal flooding hazards (Zone V).

Surface Water Quality

Water quality data from streams in the vicinity of the plant site indicate fair to poor quality water, typical of urban runoff. Water samples collected by the Association of Bay Area Governments (ABAG 1989) showed low to moderate levels of total suspended solids (TSS) (6 to 250 mg/l), moderate levels (6 to 16 mg/l) of biochemical oxygen demand (BOD), heavy metals (copper and lead), and high levels of fecal coliform bacteria. It should be noted that the quality of surface water runoff varies considerably both seasonally and temporally during the course of a storm event. Stormwater runoff was typically of better quality than for low flow periods due to dilution effects from rain. Water quality data from ABAG Station S4 are summarized as "area stormwater runoff" in Table 8.15-3. This data is included to represent typical stormwater runoff generated from areas around the project site.

Surface Hydrology–Current Environmental Assessment

RCEC Plant Site

The proposed project site is located at an elevation of between 5 and 10 feet above mean sea level. The plant site will be located on parcels totaling approximately 14.7 acres, located at 3636 and 3590 Enterprise Avenue, Hayward, California. Prior to 1966, the site was in agricultural use. In 1970, 3590 Enterprise was developed by the C.E. Freeman Company for a metal painting business. In 1976, Freeman sold the property to Runnels Industries, also a metal painting business. The parcel at 3636 Enterprise is home to Salem Broadcasting Company's KFAX radio transmitter facility.

Table 8.15-3 Predicted water quality characteristics for cooling water blowdown along with Hayward industrial source limits.

Constituent	RCEC Cooling Water Discharge *		Hayward Industrial Waste Pretreatment Limits **	
Temperature	100	° F	150	° F
pH	8.1	units	> 6	units
Total Dissolved Solids	2,460	mg/l	-	
Total Suspended Solids	10	mg/l	-	
BOD	< 1	mg/l	-	
Hardness	20	mg/l	-	
Calcium (total)	10	mg/l	-	
Magnesium (total)	10	mg/l	-	
Manganese	< 1	mg/l	-	
Sodium (total)	400	mg/l	-	
Potassium	100	mg/l	-	
Total Alkalinity	310	mg/l	-	
Silica	40	mg/l	-	
Sulfate	100	mg/l	-	
Chloride	840	mg/l	-	
Copper (total)	0.01	mg/l	2	mg/l
Cadmium	ND		0.2	mg/l
Chromium (total)	ND		0.2	mg/l
Cyanide (total)	0.019	mg/l	0.6	mg/l
Iron (total)	1	mg/l	-	
Lead (total)	ND		1	mg/l
Mercury (total)	ND		0.01	mg/l
Nickel (total)	0.01	mg/l	1	mg/l
Nitrate	100	mg/l	-	
Fluoride	ND		-	
Arsenic	ND		1	mg/l
Boron	42	mg/l	-	
Selenium (total)	ND		-	
Silver (total)	ND		0.5	mg/l
Zinc (total)	0.04	mg/l	1	mg/l

* Concentrations predicted after 100 cycles through the cooling tower

** Chemicals used in cooling tower treatment will not contain the priority pollutants listed in 40 CFR 423.17

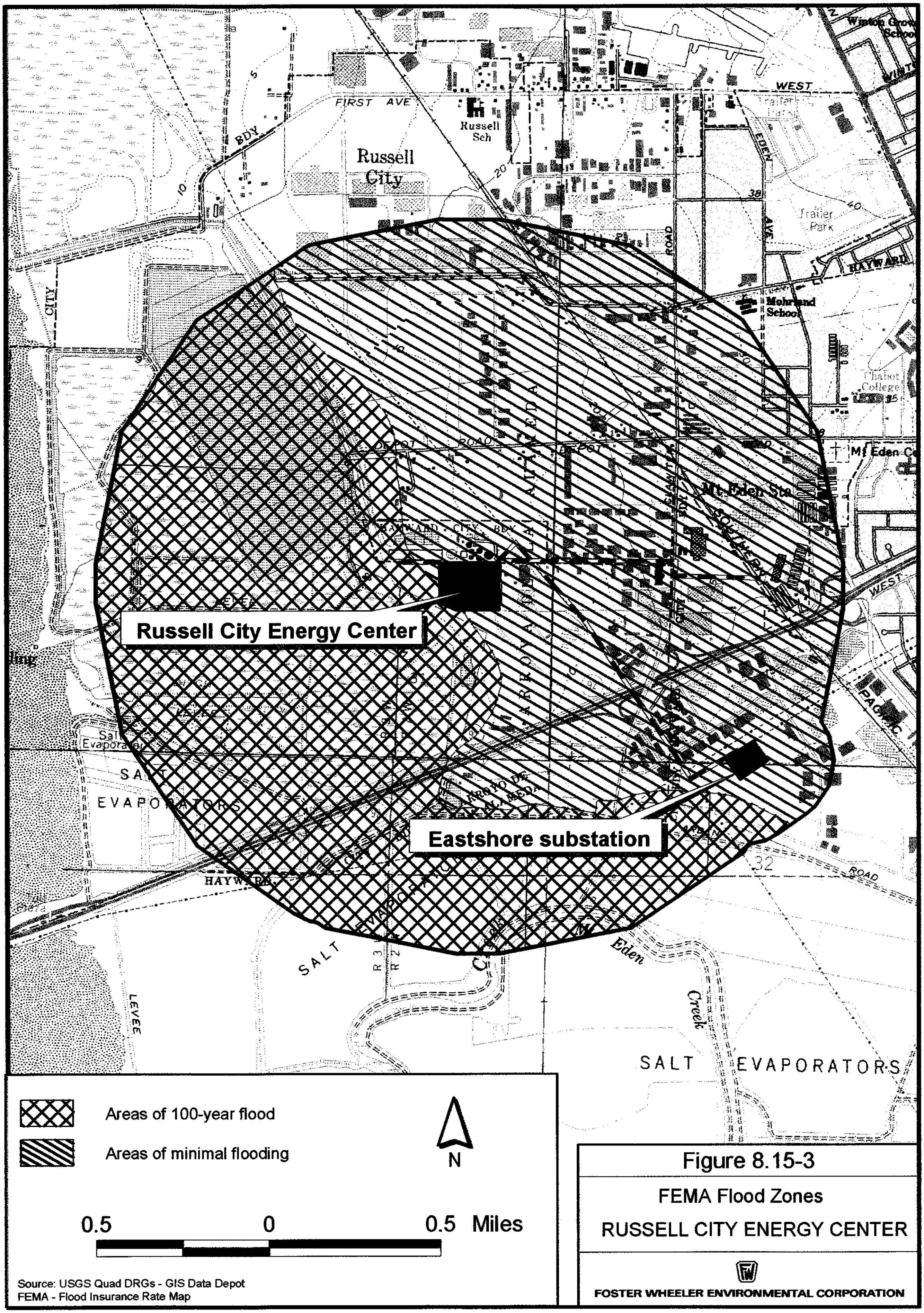

Figure 8.15-3

FEMA Flood Zones

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The Runnels Industries property at 3590 Enterprise has been filled to a height of about 10 feet above sea level, as has the trucking terminal to the west of the KFAX parcel. The KFAX parcel is low-lying and poorly drained, and contains approximately 1.68 acres of isolated, seasonal wetlands (see Section 8.2, Biological Resources). These seasonal wetlands are indicative of previous ground disturbance and poor site drainage. A low berm extends along the southern boundary of the KFAX parcel, but is located on the adjacent lot, which is owned by Waste Management Corporation. This berm has the effect of channeling all runoff on the KFAX property to its southeast corner. A flood control channel with a low levee to prevent all but controlled inlet drainage, runs just south of the adjoining Waste Management lot. Runoff from the KFAX parcel crosses the adjacent Waste Management parcel to the south, to flow into a City of Hayward parcel. Runoff is channeled into a stormwater-retarding basin that is formed by the flood control channel levee and the levee of the HARD marsh, located immediately to the west.

The power plant site parcel lies outside of the 100-year floodplain and does not contain stream channels or flood control ditches.

Electric Transmission Line and Eastshore Substation Expansion—The 1.1-mile-long overhead transmission line route passes southeast from the plant site and will connect with the existing PG&E 115-kV line running north-south to the east of the project site and south to the Eastshore Substation. No flood control resources will be crossed. The transmission line route passes over flood control ditches but no major stream channels. Other than flood control channels, the line will not pass over any other 100-year floodplain zone. The Eastshore Substation is not within a 100-year floodplain zone. The floodplain areas along the transmission line route and at the substation are shown on Figure 8.15-3.

Natural Gas Pipeline—Fuel will be delivered by PG&E from its distribution line No. 153 about 1 mile east of the RCEC site. The proposed natural gas pipeline route will not cross any wetlands, major stream channels, or 100-year floodplain zones.

Wastewater Return Pipeline— The wastewater return line will cross under Enterprise Avenue to the City of Hayward Water Pollution Control Facility. This area is entirely paved.

AWT Plant

Surface hydrology for the AWT plant is the same as for the RCEC plant site.

Construction Laydown and Worker Parking

None of the candidate construction laydown and worker parking areas contain wetlands, streams, drainages, or 100-year floodplain zones.

8.15.1.4 Water Supply Agencies

City of Hayward

Hayward's water source comes from the Hetch Hetchy water system in the Sierra Nevada Mountain Reservoir through an agreement with the San Francisco Water Department. The City of Hayward has a maximum delivery capacity of 32 million gallons per day and an average consumption of about 19 million gallons per day.

8.15.2 Environmental Consequences

The potential effects of the project on water resources have been evaluated based on impacts to:

- Water supplies
- Use of reclaimed water for cooling water
- Disposal of wastewater
- Compliance with State water policies
- Surface water quality and flooding hazards
- Groundwater degradation

8.15.2.1 Significance Criteria

The project would cause a significant environmental impact if it would cause substantial flooding, erosion, or siltation; substantially degrade water quality; substantially degrade or deplete groundwater resources; interfere substantially with groundwater recharge; or contaminate a public water supply.

8.15.2.2 Water Supply Impacts

An estimate of the RCEC plant's average and peak daily water usage is described in Chapters 2 and 7. A water balance diagram for operation, showing the various water requirements and estimated flow rates for the facility, is presented in Figure 2.2-4. Operation of the RCEC will require 3.33 million gallons per day (mgd) (2,313 gallons per minute), or 3,730 acre-ft/year during average water supply demand conditions (assumed at 60°F ambient temperature with no fog injection and power augmentation) and 5.27 mgd (3,660 gpm), or 5,904 acre-ft/year during peak water supply demand conditions (assumed at 90°F ambient temperature with no fog injection and power augmentation). These flow rates account for losses in the water treatment process, to produce the final product demand for the plant of 2.41 mgd during average conditions and 3.8 mgd at peak conditions. In evaluating water supply requirements and impacts, the data for 60ºF were used most often because this is essentially the average temperature at the project site (Section 8.15.1.1). Worst-case water impact scenarios should use the data for 90ºF.

The primary source of cooling tower makeup water, comprising over 96 percent of the total water requirements of the RCEC project, will be treated secondary effluent provided by the City of Hayward WCPF. The Hayward WPCF typically discharges 13.3 mgd to the EBDA pipeline. The RCEC Project will divert and reclaim, on average, 3.33 mgd of this secondary effluent for plant cooling needs. This action will not impact the supply, which far exceeds demand. A new 300 foot-long pipeline will be constructed to convey secondary effluent from the City of Hayward WCPF to the RCEC plant site. The average concentrations of water quality constituents expected in the secondary effluent to the RCEC plant are summarized in Table 8.15-3, which also includes water quality data for an alternate cooling water source derived from the USD. The secondary effluent wastewater supply will be reclaimed through advanced wastewater treatment using microfiltration, reverse osmosis, and hypochlorite disinfection prior to use as a heat transfer (cooling) medium (see Section 7). The reclaimed wastewater influent has moderate levels of TDS, chloride, sodium, copper, nickel, and nutrients, but is generally of sufficient quality for non-potable uses such as cooling tower use (CH_2MHill 1999). The City of Hayward WPCF is currently planning significant plant upgrades that are designed to improve the water quality of the secondary effluent. These upgrades will occur over the next 5 years; therefore, the water quality of the influent to the RCEC is expected to improve in the near future. However, the proposed

AWT plant is designed to treat secondary effluent of existing quality (Table 8.15-3) to the levels required for use at the power plant.

Use of reclaimed water ensures the least impact to the local environment, but does require special precautions since the water may carry bacteria and other disease-causing microorganisms. Reuse of wastewater is encouraged in water-short areas and is in compliance with State water policy for water conservation and maximum reuse of wastewater (Section 8.15.2.2). In addition, the planned use of a reclaimed water source, presently discharged into the Bay, drastically reduces impacts to surface and groundwater resources which would otherwise be tapped for cooling water, and at the same time, reduces the volume and contaminant loading of wastewater discharged by the City of Hayward through the EBDA outfall.

All recycled water pipelines, storage tanks, and ancillary facilities will be constructed in compliance with California Code of Regulations Titles 17 and 22. Title 17 addresses the requirements for backflow prevention and cross-connections, while Title 22 addresses other health-related issues. A Title 22 Engineer's Report must be submitted and approved by the State Department of Health Services and the Regional Water Control Board (RWQCB). The RWQCB will issue Reclamation Requirements to ensure the recycled water is properly treated and safely used. AWT plant will be provided by a furnished vendor package with full redundancy and reliability. The AWT plant is fully described in Section 2. All reclaimed water pipelines must be clearly marked, "Recycled Water - Do Not Drink". Additionally, all reclaimed water used in cooling towers, evaporative condensers, or other equipment that creates a mist, must be equipped with a drift eliminator and must be treated with a biocide to control growth of *Legionella* and other microorganisms (CH_2MHill 1999).

The City of Hayward will supply approximately 0.002 mgd of potable water (2 gpm or 2.2 acre-feet per year) for the RCEC domestic and fire fighting needs. This water will be supplied from an existing 12-inch pipeline adjacent to the RCEC plant site. No significant expansion of the existing water delivery infrastructure will be necessary.

The average concentrations of water quality constituents in the Hayward water supply are summarized in Table 8.15-3. The water is considered to be of excellent quality, with low levels of TDS, hardness, sodium, and sulfate. This water meets the drinking water standards set by the State of California for maximum contaminant levels (MCLs). Calpine/Bechtel will sign long-term contracts with the City of Hayward to provide the required water supply. All project water requirements will be supplied via the new water conveyance systems described in Section 2.0 (Project Description).

With the RCEC project's annual potable water requirements (2.2 acre-feet), the water deliveries of the City of Hayward will increase by less than 0.01 percent from approximately 19 mgd to approximately 19.002 mgd. This small increase in potable water allocation for this project will not significantly affect available water supplies for the City of Hayward.

An alternate source of cooling water for the RCEC is secondary effluent from the Union Sanitary District (USD) which services Fremont, Union City and Newark through EBDA. Secondary effluent from this agency is considered an alternate source because the City of Hayward's WPCF provides more of an opportunity to integrate supply and discharge to and from the RCEC.

During construction of the proposed project, water will be needed primarily for dust suppression. Due to the limited duration of construction activities (up to 24 months) and the relatively small water requirements (250 gpm for dust control and soil compaction) of the construction phase of the project, no significant adverse impacts to water supply are expected to result. Potential water supply impacts due to electrical transmission lines, natural gas pipeline, cooling water pipeline, demolition and construction of the transmission tower will be limited to surface water runoff during excavation and construction of these elements of the infrastructure. Such construction impacts are small and can be controlled through best management practices and proper housekeeping at individual construction sites.

8.15.2.3 Wastewater Disposal

Wastewater generated by the RCEC project will include the following general categories:

- Cooling blowdown wastewaters
- Non-cooling industrial process wastewaters
- Domestic (sanitary) wastewater
- Plant drainage

The efficiencies inherent in building advanced power generation and advanced water treatment (AWT) facilities (i.e., microfiltration/reverse osmosis [MF/RO]) show their benefit in drastically reducing cooling water blowdown to a mere 33 gpm (46 gpm peak), less than 4 percent of the total wastewater generated by the RCEC project. For many power generation projects using evaporative cooling towers, blowdown wastes comprise 90 to 95 percent of the total wastewater generated. The flow rate and chemical characteristics of the cooling blowdown are dependent upon the number of cycles the water is run through the cooling system. By exploiting advances in membrane construction and employing the technology of tertiary treatment based on ultra-filtration, reclaimed water for cooling can be recycled from 50 to 100 times (cycles), with 100 cycles being considered worst-case for the purpose of evaluating wastewater quality and 50 cycles representing worst-case for flow estimates. Cooling water blowdown wastewaters will be pumped over to the headworks of the City of Hayward WPCF. The chemical characteristics of this wastewater will be similar to the secondary effluent obtained from the City of Hayward WPCF, with representative increases in the total dissolved solids (mineral content) due to evaporation. Table 8.15-3 presents a summary of the water quality characteristics expected for cooling water blowdown along with Hayward's industrial source pretreatment limits. Even after 100 cycles through the cooling tower, these limits are achieved by a wide margin principally because RO-based ultra-filtration is very effective at removing heavy metals and complex organics (e.g., dioxins, furans, PCBs, phthalates, cresols, etc.). Essentially no toxic organic compounds will pass through the tertiary treatment process. Therefore, compliance with federal pretreatment standards for new sources in 40 CFR 423.17, can be assured by starting with a clean source, constructing cooling towers with wetted surfaces that do not leach priority pollutants, purchasing water treatment chemicals that contain no priority pollutants, and carefully controlling chemical dosages to the minimum required for achieving the desired result.

Non-cooling process wastewaters include microfilter backwash, reject concentrate wastewater from the reverse osmosis process, and clarified CIP blowdown. These non-cooling waste streams comprise 94% of the total wastewater discharge requirements from the RCEC. The RO concentrate stream is predicted to contain elevated copper concentrations, therefore, a copper removal process will be performed on this stream before it is combined with the remaining clarified streams prior to discharge. This process is described in detail in AFC Section 7. These combined, treated wastewaters will be disposed through a

Table 8.15-3 Predicted water quality characteristics for cooling water blowdown along with Hayward industrial source limits.

Constituent	RCEC Cooling Water Discharge *		Hayward Industrial Waste Pretreatment Limits **	
Temperature	100	° F	150	° F
pH	8.1	units	> 6	units
Total Dissolved Solids	2,460	mg/l	-	
Total Suspended Solids	10	mg/l	-	
BOD	< 1	mg/l	-	
Hardness	20	mg/l	-	
Calcium (total)	10	mg/l	-	
Magnesium (total)	10	mg/l	-	
Manganese	< 1	mg/l	-	
Sodium (total)	400	mg/l	-	
Potassium	100	mg/l	-	
Total Alkalinity	310	mg/l	-	
Silica	40	mg/l	-	
Sulfate	100	mg/l	-	
Chloride	840	mg/l	-	
Copper (total)	0.01	mg/l	2	mg/l
Cadmium	ND		0.2	mg/l
Chromium (total)	ND		0.2	mg/l
Cyanide (total)	0.019	mg/l	0.6	mg/l
Iron (total)	1	mg/l	-	
Lead (total)	ND		1	mg/l
Mercury (total)	ND		0.01	mg/l
Nickel (total)	0.01	mg/l	1	mg/l
Nitrate	100	mg/l	-	
Fluoride	ND		-	
Arsenic	ND		1	mg/l
Boron	42	mg/l	-	
Selenium (total)	ND		-	
Silver (total)	ND		0.5	mg/l
Zinc (total)	0.04	mg/l	1	mg/l

* Concentrations predicted after 100 cycles through the cooling tower

** Chemicals used in cooling tower treatment will not contain the priority pollutants listed in 40 CFR 423.17

return line from the RCEC which will combine with the City of Hayward WPCF treated effluent discharge, conveyed to the Hayward chlorination facility, upstream of the EBDA outfall. An average flow rate for the combined process wastewater discharge is about 0.92 mgd or 638 gpm (1.46 mgd or 1,014 gpm peak flow). Table 8.15-4 summarizes the chemical characteristics of the combined wastewater streams from the RCEC and the City of Hayward WPCF to be discharged to the EBDA pipe line. Although the total amount of wastewater to be treated by the City of Hayward WPCF will actually increase (albeit marginally) as a result of the Calpine project, the flow contributed to the EBDA outfall by the City of Hayward, including the RCEC discharge, will be reduced from 13.3 mgd to 9.5 mgd, a volume reduction of 27 percent. In addition, due to the copper removal process at the RCEC, mass loadings of copper from the City of Hayward WPCF will be reduced approximately 33 percent during peak power plant operation. The effect of the mass reduction on the total copper discharged to the San Francisco bay (i.e. including the mass loadings from the other five EBDA members) is a reduction of 8 percent.

Other wastewater streams from the RCEC site include the non-process wastewater streams generated by domestic sanitary wastewater (2 gpm) from sinks, toilets, and other sanitary facilities, collected in the existing 39-inch sanitary sewer line and discharged to the City of Hayward WPCF, and from plant drainage consisting of washdown water, equipment leakage, and drainage from the facility equipment areas (average of 53 gpm; peak of 66 gpm). Water draining from these areas will be collected in a system of floor drains, sumps, and pipelines. These wastewaters could potentially contain oil or grease and will be routed through an oil/water separation/adsorption pretreatment process before being pumped over to the headworks of the City of Hayward WPCF. Plant drainage wastes will have to be permitted under Hayward's pretreatment program.

The RCEC project will not cause a significant impact on wastewater disposal activities of the City of Hayward. The amount of wastewater to be generated and disposed at the City of Hayward WPCF is approximately 3 mgd less than the secondary effluent to be provided by the City of Hayward for cooling purposes. Since the final treated wastewater from the RCEC project would not be expected to exceed EBDA's discharge limitations, both the volume and total mass of copper contributed by Hayward's wastewater discharged to San Francisco Bay will be reduced. A summary of EBDA's current NPDES discharge limitations is presented in Table 8.15-4.

Potential wastewater disposal impacts due to electrical transmission lines, natural gas pipeline, and cooling water and wastewater return pipeline, will be limited to a short period during which these appurtenances are constructed.

During construction temporary erosion and sedimentation control measures will direct stormwater runoff to existing surface drainage. Standard construction mitigation measures for erosion prevention and water quality assurance such as filter fabric or hay bale filtration and temporary or permanent settling ponds will be very effective at this site because of the flat topography. Portable toilets will be supplied by a licensed contractor for collection and disposal of sanitary wastes during the construction period.

8.15.2.4 Compliance with State Water Policies

Power Plant Cooling Policy (WRCB Resolution 75-58)

In 1975, the SCWRCB issued a policy on the use and disposal of inland surface waters used for power plant cooling (Resolution No. 75-58). The policy contains the following principles that are applicable to this project:

- The order of priority of water sources for power plant cooling was established subject to site specifics such as environmental, technical, economic, and feasibility considerations. The priority for water sources are: (1) wastewater being discharged to the ocean, (2) ocean water, (3) brackish

Table 8.15-4 Predicted water quality characteristics for project wastewaters along with corresponding EBDA NPDES permit discharge limitations.

Constituent	Hayward + RCEC Wastewater Discharge		Area Stormwater Runoff		EBDA Discharge Limit	
Turbidity	2.0	ntu	-		NA	
pH	7 - 8	units	-		NA	
Total Dissolved Solids	852	mg/l	293	mg/l	NA	
Total Suspended Solids	23	mg/l	130	mg/l	30[‡]	mg/l
BOD	22	mg/l	8	mg/l	25[♦]	mg/l
Hardness	168	mg/l	173	mg/l	NA	
Calcium (total)	38	mg/l	-		NA	
Magnesium (total)	13	mg/l	-		NA	
Manganese	0.1	mg/l	-		NA	
Sodium (total)	123	mg/l	-		NA	
Potassium	23	mg/l	-		NA	
Total Alkalinity	255	mg/l	-		NA	
Silica	13	mg/l	-		NA	
Sulfate	113	mg/l	-		NA	
Chloride	172	mg/l	-		NA	
Copper (total)	0.023	mg/l	0.025	mg/l	0.023	mg/l
Cadmium	0.3	mg/l	0.00075	mg/l	NA	
Chromium (total)	2.7	mg/l	0.01	mg/l	NA	
Cyanide (total)	0.0043	mg/l		mg/l	0.021	mg/l
Iron (total)	1.9	mg/l	-		NA	
Lead (total)	0.0024	mg/l	0.027	mg/l	0.056	mg/l
Mercury (total)	0.00007	mg/l	0.00018	mg/l	0.00021	mg/l
Nickel (total)	0.016	mg/l	0.013	mg/l	0.021	mg/l
Nitrate	5.6	mg/l	4.8	mg/l	NA	
Fluoride	3.2	mg/l	-		NA	
Arsenic	0.9	mg/l	0.00011	mg/l	NA	
Boron	0.5	mg/l	-		NA	
Selenium (total)	0.0017	mg/l	0.00023	mg/l	0.050	mg/l
Silver (total)	0.0025	mg/l	ND		0.023	mg/l
Zinc (total)	0.073	mg/l	0.013	mg/l	0.58	mg/l

water from natural sources or irrigation return flows, (4) inland waste waters of low TDS, and (5) other inland waters.

- The use of inland waters for power plant cooling must analyze the impact on Delta outflow and Delta water quality objectives.

- The discharge of blowdown water from cooling towers must not cause a violation of water quality objectives or waste discharge requirements established by Regional Boards.

Calpine/Bechtel has considered SCWRCB Resolution No. 75-58 in the selection of the cooling water source and blowdown disposal for the RCEC facility. The RCEC project complies with SCWRCB Resolution 75-58 by incorporation of the following:

- Wastewater currently being discharged to San Francisco by the City of Hayward was selected as the preferred source of cooling water for the RCEC. The selection of secondary effluent complies with the state's highest priority for cooling water sources.
- The method of cooling tower blowdown disposal will not cause a violation of water quality objectives or waste discharge requirements established by the San Francisco Bay Regional Water Quality Control Board (RWQCB). The planned method for disposal of wastewater generated from the RCEC cooling tower is conveyance back to the headworks of the City of Hayward WPCF. Therefore, all cooling tower blowdown will be treated and discharged into San Francisco Bay via the combined EBDA outfall. This discharge stream would fall under the existing NPDES permit to discharge wastewater to the Bay through the EBDA outfall. EBDA holds the NPDES permit for all of the EBDA members.

CALFED Bay-Delta Program

The CALFED Bay-Delta Program (Program) is a combined state-federal-stakeholder effort to develop a comprehensive long-term plan to restore ecosystem health and improve water management for beneficial uses of the San Francisco Bay-Delta system. The RCEC will not directly use water from the Delta. The project requires only 2.2 acre-feet of potable water annually from the city of Hayward. Since essentially all of Hayward's water is obtained from the Hetch-Hetchy Aqueduct, the use of State Water Project water from the Delta would be zero.

California Water Conservation Policy

California Water Code, Section 461 requires all water users to conserve and reuse available water supplies to the maximum extent possible. The RCEC will comply with this water conservation policy. The project has been designed to reduce cooling water requirements and discharge of wastewater. Design considerations include the selection of a very efficient combined cycle system that requires less heat rejection than conventional steam cycle systems, and the use of cooling towers that use less cooling water than once-through cooling systems. Water conservation measures include reuse of cooling tower blowdown (cycled 50 to 100 times) and recycling of blowdown from the HRSG for use in the cooling tower. Water reuse measures include the reclamation of 4.18 mgd of treated secondary effluent for cooling purposes.

Bays and Estuaries Policy

The "Water Quality Control Policy for Enclosed Bays and Estuaries of California" established water quality principles and guidelines for the prevention of water quality degradation, and protection of beneficial uses of bay waters. The RCEC will comply with this policy by incorporation of design features that will not discharge industrial wastewater or contaminated stormwater runoff to the San Francisco Bay.

Pollutant Policy for San Francisco Bay and the Delta

In 1990, the State Board adopted the "Pollutant Policy", which identified and characterized the pollutants of greatest concern in the Bay-Delta. This policy required that a monitoring program be implemented and established controls for wastewater treatment plants, drydock facilities, dredge disposal practices, and boatyard discharges. The RCEC will comply with this policy by incorporating design features that will not directly discharge untreated industrial wastewater or contaminated stormwater runoff to San Francisco Bay. In addition, a copper removal treatment process will be installed to lower copper (also nickel) concentrations in the wastewater discharged from the RCEC facility. This pretreatment, combined with the significant evaporative reduction in the total volume of wastewater discharged from Hayward through the EBDA outfall, will result in a significant lowering of the mass load of these metals entering the Bay from the EBDA outfall. Instead, these metals and salt precipitates will become part of the 9 tons per day of filter cake generated from operation of the AWT plant. As a result the average mass of copper discharged from the City of Hayward WPCF (including the RCEC wastewater) will be reduced by one-third.

California Wetlands Conservation Policy (Executive Order W-59-93)

This policy established state guidelines for wetlands conservation. The primary goal is to ensure no overall loss of wetlands and to achieve a long-term net gain in the quantity, quality, and permanence of wetlands acreage in California. The RCEC facilities have been located so as avoid disturbance and impacts to wetlands areas (see Section 8.2, Biological Resources).

8.15.2.5 Surface Water Quality and Stormwater Management

During construction, approximately 14.7 acres of land associated with the plant site will be disturbed. Surface water impacts are primarily related to short-term construction periods and consist of increased turbidity due to erosion of newly excavated or placed soils. Activities such as grading can potentially destroy habitat and increase rates of erosion during construction. In addition, construction materials could contaminate runoff or groundwater if not properly stored and used. Compliance with engineering and construction specifications, following approved grading and drainage plans, and adhering to proper material handling procedures will assure effective mitigation of these short-term impacts. In this way, possible erosion and other water quality degradation impacts will be reduced to less than significant levels. This issue is further addressed in Section 8.6, Agriculture and Soils. Calpine/Bechtel will implement Best Management Practices (BMPs) for erosion control and a stormwater management plan to assure there are no significant increases in erosion from construction activities. Additionally, erosion and sediment controls, surface water pollution prevention measures, and other BMPs will be developed and implemented for both construction and operational phases. These plans will be prepared in accordance with the Stormwater Discharge permit requirements of the San Francisco Bay RWQCB.

Stormwater runoff from within the generating and industrial portions of the site will be curbed to contain and route runoff. Rain that falls within the AWT plant curbing will be collected and pumped to the headworks of the City of Hayward WPCF. Rain that falls within areas of the site where impacts from process equipment operation and maintenance could occur will be collected, combined with other site drainage, and sent through an oil-water separator. The oil-water separator will remove floating oil, grease, and other hydrocarbons. This treated runoff will then be transferred to a wastewater holding tank for testing. If appropriate discharge criteria are met, that wastewater will be pumped to the headworks of the City of Hayward WPCF. If surface discharge criteria are not met, the noncompliant batch of wastewater will be treated as necessary before it is discharged to the City of Hayward WPCF. Rain that falls on non-process areas such as roofs and parking lots will drain directly to the on-site stormwater impoundment. The impoundment or retention basin will be located in the southwest and southeast corners of the RCEC site and will be sized to accept the 25-year, 24-hour storm volume of approximately 91,000 gallons without a short-term release flow greater than the model stormwater runoff calculated by Alameda County Flood Control for the site as it currently exists (18 cfs). Design of the containment curbing around process areas of the site will also consider the capacity needed to contain runoff from a catastrophic fire.

All large chemical storage tanks at the plant site will be stored in secondary containment areas to control accidental spills and leaks. All refueling operations and maintenance of construction equipment will be performed only in designated lined and/or bermed areas. A site-specific spill prevention, collection and contingency plan will be prepared for handling of all chemicals and wastes generated at the site.

The drainage design of the facility will conform to the Alameda County Hydrology Manual as stated in Foundations and Civil Engineering Design Criteria, A.3.3.4. Drainage facilities will be designed to handle the flow resulting from a 25-year, 24-hour rainfall event or as per the requirements of the City of Hayward Department of Public Works. The drainage facilities will also be designed to prevent flooding of permanent plant facilities and overflow of plant roads. Drainage of the site will be accomplished through gravity flow. Except for rain that falls within the footprint of the cooling towers and AWT plant, all stormwater runoff will drain to the on-site stormwater retention basins where water quality can be evaluated before ultimate release to the flood control channel (Zone 4, Line F) that runs along the southern boundary of the site. Due to the need to preserve nearby wetland habitat for water fowl nesting and roosting, manage endangered species and their food supply, avoid mosquito infestation, and eliminate the pollution associated with illegal dumping, there is no provision for direct uncontrolled release of stormwater runoff or site drainage directly to the environment. This stormwater management approach includes procedures for carefully controlling inventories of hazardous materials stored on-site, isolating, containing and treating runoff from process areas, removing suspended solids and evaluating the quality of site drainage to preclude discharges of contaminated runoff. Therefore, as long as these plans are followed, no impacts to surface water quality are expected.

These stormwater management systems will be operated in close coordination with the East Bay Regional Parks District so that short-term discharges do not exceed current maximum stormwater flow predictions for the present conditions at the site which were modeled and included in capacity calculations and design of the flood control channel into which site stormwater will be discharged. Thus, the additional runoff from increasing impervious surface areas will be mitigated so as not to cause a significant increase in off-site flooding.

The plant site is located at an elevation 6 feet above mean sea level according to the USGS topographic map. The RCEC plant site is not located within a 100-year or 500-year flood hazard zone as determined by FEMA. Furthermore, the plant site area is not subject to coastal or tidal flooding, according to FEMA. The transmission line and water/wastewater pipelines will pass over several flood hazard zones established by FEMA. Appropriate engineering design of the pipeline crossings will be required to ensure the pipelines are not damaged during a major flooding event. Likewise, proper foundation design and placement of the transmission line poles will be in accordance with the Alameda County Hydrology Manual and Alameda County ordinances related to flooding and drainage control.

Good engineering practices and BMPs will be employed in the project design and operation. Therefore, no significant impacts to surface water quality or quantity are expected during construction or operation of the proposed facility.

8.15.2.6 Groundwater

RCEC Plant Site

RCEC site activities at the plant site will have very little potential to impact groundwater resources in the project area. Although groundwater beneath the site is very shallow (estimated at 5 feet bgs), the groundwater is considered of limited use due to industrial contamination. This perched groundwater zone is separated by a thick clay layer from the deeper, better quality aquifers within Layer-3 and Layer-4. It should be noted that the currently available groundwater quality information indicates that only the shallow zone has been impacted by pollution and contamination. There are no indications that the deeper aquifers have been intruded by toxics (Muir 1997). Since stormwater runoff from the industrial portions of the plant site will be curbed to control and treat the runoff, no releases of contaminated stormwater from the plant site operation are expected. No underground chemical storage tanks are proposed at the project site. All the large above-ground chemical storage tanks will be designed with lined secondary containment structures, and therefore, the potential for release or percolation into the subsurface is remote. Any chemical spills that do occur will be immediately cleaned-up by a corps of individuals trained at rapid spill response. Solid wastes and small amounts of hazardous waste that are generated will be properly accounted for, tracked, handled, and disposed off-site using licensed transporters. No significant impacts to the beneficial use of groundwater are expected from the construction or operation of the RCEC Project.

The project will employ approximately 25 people during operation and will include sanitary facilities designed to handle the plant's domestic sewage needs. Sanitary wastes from the Administration Building will be conveyed across Enterprise Avenue to the City of Hayward WPCF. Cooling tower blowdown and plant drainage will be likewise conveyed. Wastes from these areas will have to be permitted under Hayward's pretreatment program. Since no septic tanks are proposed at the plant site and all wastewaters are disposed offsite, no adverse impacts to groundwater are anticipated.

Use of potable groundwater extracted from the SEBP Groundwater Basin by the City of Hayward is limited to emergencies and is currently of minimal impact. The potable water required by the RCEC project constitutes 0.01 percent of water deliveries by the City of Hayward. Thus, no significant impact to groundwater storage or water levels is expected from this project.

Electric Transmission Line and Eastshore Substation—Construction of the transmission line may result in a small increased potential for erosion due to temporary disturbance of the soil. Construction is anticipated to impact approximately only a small land area along the transmission line route. This includes soil disturbances for pull and tension sites, and land disturbance for pole replacement. These impacts would not occur all at once and would be temporary in duration. The flat topographic gradient of the area will minimize erosion potential at these sites. Only one of the towers is located on or near a significant sloping area. This is the tower located on the State Route 92 offramp to Clawiter-Eden Landing Road. The proposed project will minimize the potential for accelerated erosion through the use of erosion controls, sediment control structures, and re-vegetation measures. The transmission line crosses a single drainage/flood control channel that is covered in this area.

Operation-related impacts of the transmission line would be minor and insignificant. Periodic inspections of the structures and insulators and any minor repairs would not cause surface disturbance outside of the immediate tower area. The same roads used during construction will be used for repairs.

No significant impacts to water resources are expected due to construction and operation of the transmission lines.

Natural Gas Pipeline—Impacts from the natural gas pipeline will be limited to trenching and land disturbance during construction. The natural gas pipeline will be 0.9 miles long, with a 4-foot wide area of disturbance. There is a potential for a small amount of accelerated erosion to occur during construction. The proposed project will minimize the potential for accelerated erosion through the use of appropriate erosion control, prompt backfilling of trenches, and re-paving of the street surface. No significant impacts are expected due to construction of the potable water, sewer, or natural gas lines.

Operation of the pipelines would require periodic inspections. Emergency situations, though unlikely, may require immediate access. Impacts are expected to be minimal and would not significantly affect water resources. Therefore, there would be no significant adverse impacts due to operation of the natural gas pipeline.

Wastewater Return Pipeline—Impacts from the 260-foot secondary effluent pipeline and return line will be limited to trenching, directional drilling, and soil disturbance operations during construction. The estimated land disturbance includes a 4-foot wide area along the length of the pipeline. There is the potential for a small amount of accelerated erosion to occur only during construction of the pipeline. The proposed project will minimize the potential for accelerated erosion by using standard erosion control measures during the rainy season (i.e., sand bags), prompt backfilling of the trench, and re-paving of the street surface. Additionally, the minimal topographic gradient of the route will help to minimize any erosion potential. No significant impacts are expected due to construction of the water supply line.

AWT Plant

Secondary effluent is not suitable for use as process water or cooling water without filtration and disinfection to meet Title 22 standards for turbidity and coliform content. Therefore, a state-of-the-art advanced wastewater treatment plant (AWT plant) will be constructed for on-site treatment of secondary effluent diverted from the City of Hayward WPCF, for use as cooling water and process makeup water. To achieve desired water quality and minimize impacts associated with discharges from the facility, an advanced membrane technology employing microfiltration and reverse osmosis (MF/RO) will be employed. Figure 2.3-2 shows the preliminary layout for the AWT plant. The MF/RO process is described in detail in Section 2.3. Additionally, copper treatment and solids clarification processes will be used to improve the quality of the reverse osmosis concentrate and microfilter backwash before they are discharged to the EBDA system, and ultimately the San Francisco Bay via the EBDA outfall. Treatment of these wastestreams is described in Section 7.3. The AWT plant will be hydraulically designed to meet a peak demand of 2,873 gpm (4.14 mgd), which is the projected peak water need for the power plant operating at 90°F ambient temperature, including a slight safety factor. At peak conditions, the system will divert 5.27 mgd of secondary effluent from the City of Hayward WPCF to the inlet of the MF/RO process for producing the final reclaimed water demand for the RCEC. Activities at the AWT plant will not impact groundwater resources as long as solid waste residues from the clarifiers and strainers undergo proper disposal.

8.15.3 Proposed Mitigation Measures

This section presents mitigation measures that Calpine/Bechtel proposes to reduce impacts to water resources in areas affected by the proposed project, including the plant site, transmission lines, pipelines, and ancillary facilities. Additionally, the measures specified in Section 8.11 (Agriculture and Soils) will be implemented to minimize impacts to the soil resources, erosion control, and associated water quality-related impacts.

- Locate the plant site and other project facilities outside of designated flood hazard zones to the extent possible. Design site drainage to be in conformance with the Alameda County Hydrology Manual and local ordinances.
- Implement Best Management Practices designed to minimize soil erosion and sediment transport during construction of the plant site and project corridor features. Design appropriate erosion and sediment controls for slopes, catch basins, culverts, stream channels, and other areas prone to erosion.
- Perform construction activities at the plant site in accordance with the Stormwater Pollution Prevention Plan (SWPPP) and associated Monitoring Plan, which will likely be required for the project in accordance with the California NPDES General Permit for Stormwater Discharge Associated with Construction Activity. The SWPPP will include Best Management Practices to control erosion, sediment transport, and discharge of pollutants during construction.
- Conduct operations at the plant site in accordance with the Stormwater Pollution Prevention Plan (SWPPP) and with the California NPDES General Permit for Stormwater Discharges Associated with Industrial Activities. Design and implement the Best Management Practices listed in the SWPPP to prevent or control pollutants potentially associated with the operation of the plant from entering stormwaters.
- Perform refueling and maintenance of construction equipment only in designated lined and/or bermed areas located away from stream channels. Prepare and implement spill contingency plans in areas where they are appropriate.
- During construction of pipelines and transmission lines, utilize existing roads as much as possible to limit disturbance. Implement Best Management Practices to control soil erosion. Design and locate foundations and pipeline stream crossings in accordance with the Alameda County Hydrology Manual and local ordinances.
- Define and remove all contaminated soil at the plant site area. Calpine/Bechtel will conduct a Phase II soil contamination investigation and any contaminated soil will be removed from the plant site prior to the start of construction activities.
- Prepare and submit a Title 22 Engineer's Report to the State DOHS and RWQCB to ensure safe use of recycled water for the cooling water. Adhere to Reclamation Requirements issued by the RWQCB.

8.15.4 Significant Unavoidable Adverse Impacts

No significant unavoidable adverse impacts will occur to water resources due to construction or operation of the RCEC Project.

8.15.5 Cumulative Impacts

The RCEC Project will not cause or contribute to cumulative impacts on water resources. Good engineering practices and Best Management Practices (BMPs) will be employed in the project design and operation; therefore, no significant impacts to surface water or groundwater quality are expected during construction or operation of the project. None of the project components coincide or overlap with nearby power projects that would be considered in cumulative impact evaluation.

Since the RCEC project will utilize secondary effluent for cooling purposes, there will be no significant cumulative impact on water supply or wastewater disposal in the South Bay area. The small quantity of potable water used by the RCEC project is considered non-consequential.

8.15.6 Applicable Laws, Ordinances, Regulations and Standards

Construction and operation of the proposed project including transmission lines, pipelines, and ancillary facilities will be conducted in accordance with all LORS related to water resources. The applicable LORS are discussed below.

8.15.6.1 Federal

Clean Water Act

The Clean Water Act (CWA), as amended, Title 40 CFR Parts 112, 122, and 125, strives to protect waters of the U.S. by restoring and maintaining the chemical, physical, and biological properties of these waters. The CWA authorizes the USEPA to regulate discharges of wastewater and stormwater into surface waters by using NPDES permits and pretreatment standards. These permits are implemented at the state level by the State Water Resources Control Board (SWRCB) described in 8.15.4.2. The RCEC will return wastewater to the City of Hayward WPCF, for discharge under their permit.

Resource Conservation and Recovery Act

The Resource Conservation and Recovery Act (RCRA) of 1976 (40 CFR Part 260 et seq.) seeks to prevent surface and groundwater contamination, sets guidelines for determining hazardous wastes, and identifies proper methods for handling and disposing of those wastes.

Comprehensive Environmental Response, Compensation, and Liabilities Act

The Comprehensive Environmental Response, Compensation, and Liabilities Act of 1980 (CERCLA) (40 CFR Parts 300 to 355) places responsibilities on the government and industry for the release, or threatened release, of hazardous materials into the environment.

8.15.6.2 State

The SWRCB in 1995 adopted the Water Quality Control Plan for the San Francisco Bay/Sacramento-San Joaquin Delta Estuary. It includes water quality objectives for total dissolved solids and other constituents that are considered in this AFC.

California Environmental Quality Act

The California Environmental Quality Act (CEQA) Guidelines (CEQA Appendix G) define water resources impacts. These impacts are discussed in Section 8.15.2.

State Water Resources Control Board

SWRCB Water Quality Order No. 91-B-DWQ (as amended by Water Quality Order No. 92-13-DWQ), General Permit No. CAS000001, authorizes a general permit to regulate industrial stormwater discharges. A Notice of Intent will be filed with the RWQCB prior to the start of construction. A stormwater Pollution Prevention Plan (SWPPP) will be developed in accordance with the guidelines of federal NPDES permit requirements, which addresses both construction and operations stormwater pollution prevention. The SWPPP will identify Best Management Practices (BMPs) to be employed at the facility to prevent stormwater pollution during the project's operating lifetime.

SWRCB Water Quality Order No. 92-08-DWQ, General Permit No. CAS000002, authorizes a general permit for stormwater discharges associated with construction activity disturbing more than five acres.

Porter-Cologne Water Quality Control Act of 1972

The Porter-Cologne Water Quality Control Act of 1972 established jurisdiction of the nine RWQCBs to control pollutant discharges to surface and groundwaters. The RWQCB is the local enforcement agency overseeing the RCEC's SWPPP. The RWQCB will issue a waste discharge permit for project water that is to be discharged from the site.

Safe Drinking Water and Toxic Enforcement Act (Proposition 65)

The Safe Drinking Water and Toxic Enforcement Act (Proposition 65) prohibits the discharge of any substance known to cause birth defects or cancer into sources of drinking water.

California Water Code Section 461 and State Water Resources Control Board Resolution No. 77-1

This code encourages conservation of water resources and maximum reuse of wastewater, particularly in areas where water is in short supply.

8.15.6.3 Local

Local ordinances typically address water-related issues such as drainage, erosion control, hazardous material spill control, facility siting in flood zones, stormwater discharge, and discharge of wastewater to the municipal sewer system.

8.15.6.4 LORS Compliance Strategy

Within the specified regulatory framework, the RCEC will comply with federal, state, and local LORS governing water resources. A conformance summary is provided in Table 8.15-5.

Process wastewater from the RCEC will be discharged in accordance with the City of Hayward's discharge permits for their WPCF. A Pollution Prevention Plan and a Monitoring Plan will be implemented for both construction and operation. The State of California/American Public Works Association Stormwater Task Force's *Manual of Best Management for Industrial Activities* will be used to provide general guidance in permit planning.

For compliance and control of sanitary wastewater, permits will be obtained in accordance with the Environmental Health Program of the City of Hayward. The new sanitary systems will be designed according to the Uniform Plumbing Code.

Table 8.15-5. LORS applicable to water resources.

LORS	Applicability	Conformance
Federal:		
CWA	Regulates discharges of wastewater and stormwater in order to protect nation's waters. Applies to waste water discharged from cooling tower basin and stormwater runoff.	Discharges of wastewater and stormwater subject to NPDES permits and treatment standards (Sections 8.15.2.1 & 8.15.2.2).
RCRA	Controls storage, treatment, disposal of hazardous waste.	Hazardous waste will be handled and stored in conformance with Subtitle C. Section 8.13.4. On-site conditioning, treatment, discharge systems will be monitored under the NPDES permitting process.
CERCLA	Places responsibility for releases of hazardous materials into the environment.	Obtain waste generator number and waste discharge/disposal permits as appropriate.
California:		
SWRCB Water Quality Orders	Regulates industrial stormwater discharges during construction and operation of the facility.	Part of federal NPDES permit requirements. Compliance monitored by RWQCB Section 8.15.2.2.
Porter-Cologne Water Quality Control Act	Controls discharge of wastewater to the surface and groundwaters of the state. Applies to wastewater discharged from cooling tower.	Discharge will be in accordance with CWA/Porter-Cologne NPDES/WDR permit. Sections 8.13. and Section 8.15.
Safe Drinking Water & Toxic Enforcement Act	Proposition 65 prohibits certain discharges to drinking water sources.	Part of federal NPDES permit requirements. Compliance monitored by regional WQCB.
California Water Code Section 461 & SWRCB Resolution77-1	Encourages conservation of water resources.	Effective practices for water conservation and reuse were engineered into the facility design. Section 8.15.
Local:		
City of Hayward Pretreatment Permit	Applies to cooling tower blowdown and plant drainage wastewater from process areas that is sent to the headworks of the City of Hayward WPCF.	Treatment of these aqueous wastes will be performed as required to meet pretreatment limits established by the City of Hayward.
Various	Address issues such as drainage, erosion control, hazardous material spill control, facility siting in flood zones, stormwater discharge, and discharge of wastewater to the municipal sewer system.	Project will comply with the General Plan of City of Hayward. Sections 8.15.3 and 8.15.4.

A Stormwater Pollution Prevention Plan (SWPPP) shall be developed prior to submitting a Notice of Intent (NOI) with the State Water Resources Control Board for stormwater discharge. The SWPPP shall be implemented when the RCEC facility begins operation. A water quality monitoring program shall be developed and implemented concurrently with the commencement of industrial activities.

At least 30 days prior to the beginning of operations, Calpine/Bechtel will file an NOI to comply with the terms of the General Permit to discharge stormwater associated with industrial activities.

8.15.7 Involved Agencies and Agency Contacts

Regulatory agencies and agency contacts related to water resources for the RCEC Project are summarized in Table 8.15-6.

Table 8.15-6. Involved agencies and agency contacts.

Agency/Address	Contact/Telephone No.	Permit Requirement/Reason for Involvement
San Francisco Bay Regional Water Quality Control Board 1515 Clay Street, Suite 1400 Oakland, CA 94612	Mr. Keith Lichten Phone: (510) 622-2380 Mr. Cecil Felix Phone: (510) 622-2309	NPDES Stormwater Discharge Permit for General Construction and Industrial Activities.
Alameda County Public Works Agency 951 Turner Court Hayward, CA 94545	Mr. John Rogers Phone: (510) 670-5429 Mr. Frank Codd Phone: (510) 670-5783	Grading Permit, review of erosion control plan, drainage plans, and flood control issues. Rainfall, temperature and other climatic data for Alameda County.
Alameda County Flood Control and Water Conservation District 951 Turner Court Hayward, CA 94545	Mr. Frank Yoo Phone: (510) 670-6633	Geohydrology and groundwater quality.
California Department of Water Resources	Mr. Jim Goodridge Phone: (707) 937-4709	Storm event and other climatic data for Alameda County
East Bay Municipal Utility District 375 11th Street Oakland, CA 94607	Mr. Michael Tognolini Phone: (510) 287-0125	Groundwater hydrogeology under the RCEC site.
City of Hayward Public Works Engineering & Transportation Division 777 B Street Hayward, CA 94541	Mr. Bob Bauman Phone: (510) 583-4740	Stormwater discharge issues. Secondary effluent purchase, wastewater disposal contracting issues, and pipeline interconnection.
East Bay Regional Parks District Hayward Regional Shoreline 3050 Winton Avenue Hayward, CA 94545	Mr. Mark Taylor Phone: (510) 783-1066	Stormwater discharge, impacts to adjacent managed marshes.
City of Hayward Water Pollution Source Control 24499 Soto Road Hayward, CA 94544	Mr. Joe Lucia Phone: 510-881-7900	Water quality issues for cooling tower blowdown and process area drainage wastestreams sent to City of Hayward WPCF.

8.15.8 Permits Required and Permit Schedule

A schedule for agency required permits related to water resources is summarized in Table 8.15-7. Information required to obtain each permit is also included. Agencies will be contacted to obtain the necessary permits at the appropriate time.

Table 8.15-7. Permits required and permit schedule.

Permit	Schedule
Grading and Excavation Permit: • Erosion Control Plan • Plans to import or export material • Drawings of cuts and fills with quantities • Earth-moving equipment and haul routes • Dust and noise controls • Work schedule	30 days prior to start of construction activities
NPDES General Permit for Stormwater Discharges Associated with Construction Activities: • Submit Notice of Intent (NOI), including facility information, receiving water information, implementation requirements, site map, and certification • Prepare a Stormwater Pollution Prevention Plan (SWPPP) • Prepare a Stormwater Monitoring Plan (SMP)	Submit application 120 days prior to start of construction.
NPDES General Permit for Stormwater Discharges Associated with Industrial Activities: • Submit Notice of Intent (NOI), including facility information, receiving water information, implementation requirements, site map, and certification • Prepare a Stormwater Pollution Prevention Plan (SWPPP) • Prepare a Stormwater Monitoring Plan (SMP)	Submit NOI at least 30 days prior to beginning operations.
Title 22 Reclamation Requirements: • Sufficient information to show treatment and reliability commensurate with proposed use; no health hazard or nuisance • Contingency plans, supplemental supply • Monitoring plan • Transmission and distribution systems • Area uses, description and map • Wind data	Submit Engineer's Report 120 days prior to start of operation.
City of Hayward Pretreatment Permit: • Business activity • Schematic flow diagram • Flow rates and variation • Layout of all site drainage facilities • Water source and uses • Characteristics for all discharge streams	Submit application 90 days prior to start of construction
Flood Canal Tie-in Permit: • Hydrology and hydraulic calculations • Site drainage plan • Off-site improvement plans	Submit application at least 30 days prior to construction, two-week review period is typically required.

8.15.9 References

Alameda County Public Works Agency, Flood Control and Water Conservation District. 2001. Rainfall Data for Hayward Station #62. Personal communication between Craig Rice (Foster Wheeler Environmental Corporation) and Frank Codd. March 2001.

Alameda County Water District. 1998. *Groundwater Monitoring Report Fall 1998.* Prepared December 17, 1998.

Association of Bay Area Governments (ABAG). 1986. *Urban stormwater treatment at Coyote Hills Marsh.* Prepared December 1986.

California Department of Water Resources. 2001. Storm recurrence-duration data for Alameda County. Personal communication between Craig Rice (Foster Wheeler Environmental Corporation) and Jim Goodridge (California Department of Water Resources), March 2001.

CH_2MHill. 1999. *Technical memos regarding recycled water use.* Prepared for Alameda County Water District and Union Sanitary District Recycled Water Master Plan Update. September 3, 1999.

CH_2MHill. 2000. *Regional hydrogeologic investigation of the South East Bay Plain.* Prepared for East Bay Municipal Utility District. January 2000.

Federal Emergency Management Agency. 1988. Flood insurance rate map for Alameda County, California (Community Panel Number 060009-0005-E). Dated September 30, 1988.

Hickenbottom, Kelvin and Muir, Kenneth S. 1988. *Geohydrology and groundwater—quality overview of the East Bay Plain area, Alameda County, California.* Prepared for Alameda County Flood Control and Water Conservation District.

Muir, Kenneth S. 1996. *Groundwater yield of the East Bay Plain.* Prepared for Alameda County Flood Control and Water Conservation District.

Muir, Kenneth S. 1997. *Groundwater quality of the East Bay Plain.* Prepared for Alameda County Flood Control and Water Conservation District.

Sowers, Janet M. and Lettis, William. 1997. Creek & watershed map of Hayward & San Leandro. Oakland Museum of California.

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May 2001