4.6 HYDROLOGY AND WATER QUALITY

4.6.1 Existing Setting

The Master Plan study area is the 1-mile wide corridor along 58 river miles of the San Gabriel River from its headwaters in the San Gabriel Mountains to its terminus at the Pacific Ocean between Long Beach and Seal Beach (**Figure 4.6-1**). The study area includes 19 cities as well as unincorporated areas of Los Angeles and Orange counties.

4.6.1.1 Surface Water Features

The San Gabriel River flows from the San Gabriel Mountains in the north through the San Gabriel Valley and the Los Angeles Coastal Plain, and empties into the Los Angeles/Long Beach Harbor. The River runs parallel to Interstate 605 almost the entire length of the freeway from Azusa to Long Beach. The San Gabriel River Watershed (the area that drains into the River) encompasses 635 square miles (LASGRWC, 2001), and lies mostly within Los Angeles County with small portions in San Bernardino and Orange Counties.

The major tributaries to the San Gabriel River are Walnut Creek, San Jose Creek, and Coyote Creek. The Rio Hondo, a distributary of the San Gabriel River, branches from the River just below Santa Fe Dam and flows westward to the Whittier Narrows area. The Whittier Narrows area is a low point between the Puente Hills and Merced Hills, which forms the southern boundary of the San Gabriel Valley. At Whittier Narrows, portions of the flow from San Gabriel River are conveyed to the Rio Hondo by a manmade channel known as Lario Creek or Zone 1 Ditch.

Channel Conditions

Since the early 1900s, the San Gabriel River and its tributaries have been altered significantly through channelization and construction of dams primarily for flood control purposes (**Figure 4.6-2**). Upstream of Morris Dam, the River remains mostly in its natural state, flowing through the deep, wide canyons of the San Gabriel Mountains. Reaches of the River downstream of Morris Dam have been modified to make the channel straighter, deeper, and narrower. From San Gabriel Canyon Road in Azusa to Firestone Boulevard in Norwalk/Downey, the channel is trapezoidal in shape, with grouted stone sidewalls and an earthen bottom. The 10-mile reach from just south of Firestone Boulevard to the confluence with Coyote Creek in Long Beach is a trapezoidal channel lined with concrete both on the sides and the bottom. Within the 3-mile reach from the confluence with Coyote Creek to the mouth of the river (San Gabriel River estuary), the channel has an earthen bottom.

Figure 4.6-1
Surface Water Bodies and Flood Control Facilities in the San Gabriel River Watershed

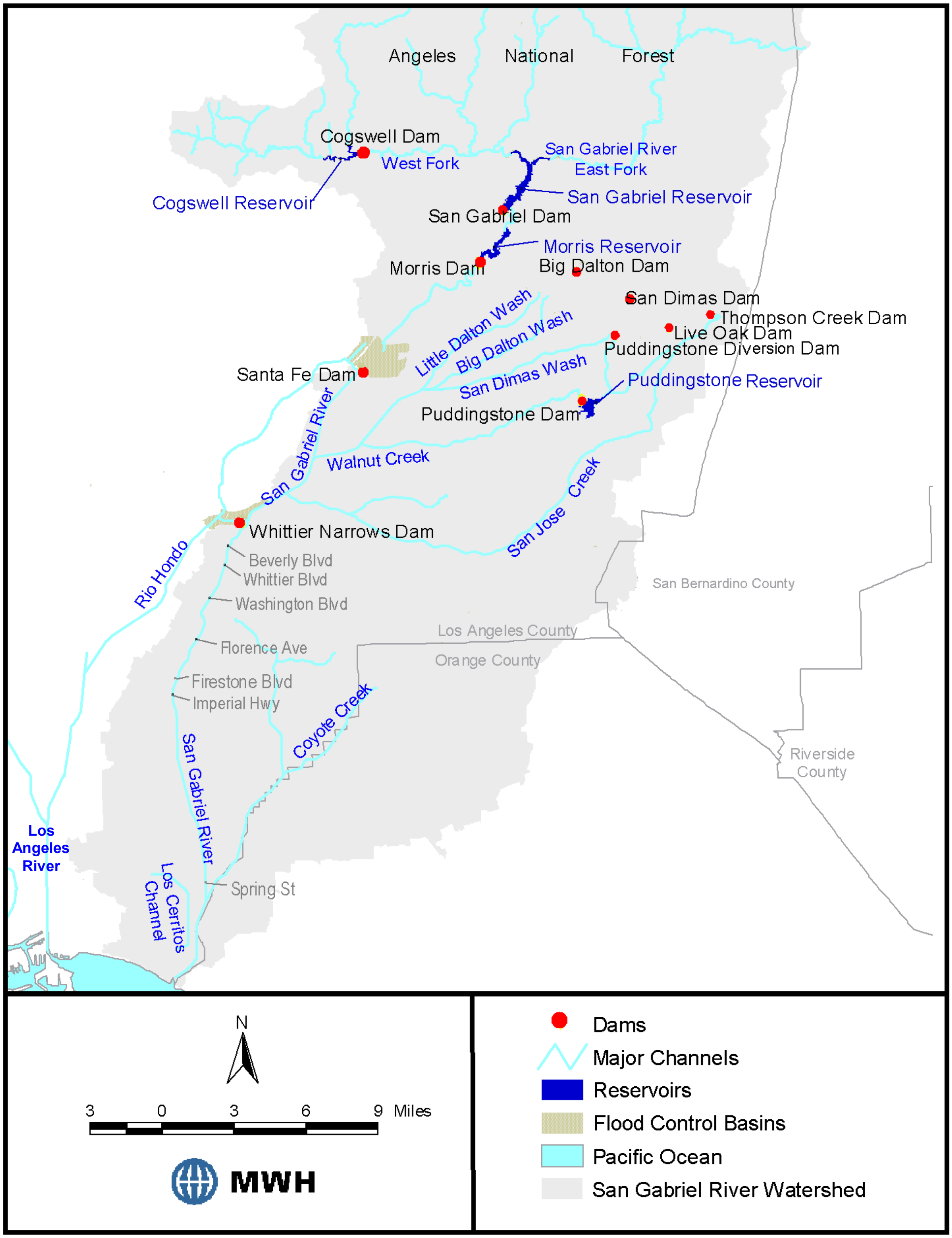


Figure 4.6-2
San Gabriel River Channel Conditions

a) Natural Channel in San Gabriel Canyon

b) Stone Sidewalls with Earthen Bottom

c) Concrete Channel Downstream of Whittier Narrows

d) Confluence with Coyote Creek – Transition to Earthen Bottom

Photographs by MIG, August 8, 2002.

Table 4.6-1 summarizes the channel widths, capacities, and 100-year flood discharges at different segments of the river. The channel accommodates 100-year flood discharges except in two segments (at Whittier Boulevard and between the San Diego Freeway and 7th Street). The reaches upstream and just downstream of the Whittier Narrows Dam have channel capacities substantially in excess of the 100-year flood discharge.

Table 4.6-1
Channel Widths, Capacities, and 100-year Flood Discharges

Channel Segment (From North to South)	Invert Width[1] (feet)	Channel Capacity[2] (cfs)	100-year Discharge[2] (cfs)
Santa Fe Dam - Walnut Creek	216-312	41,000	32,800
Walnut Creek - San Jose Creek	400-450	60,000	49,000
San Jose Creek - Whittier Narrows	N/A	98,000	70,700
Whittier Narrows - San Gabriel River Parkway	240-640	13,100	5,000
San Gabriel River Parkway - Beverly Boulevard	240-640	13,500	12,200
Beverly Boulevard - Whittier Boulevard	240-640	13,300	12,800
Whittier Boulevard	240-640	13,100	13,400
Washington Boulevard - Slauson Avenue	240	14,700	14,000
Slauson Avenue - Telegraph Road	240	16,700	14,600
Telegraph Road - Florence Avenue	240	18,800	15,200
Florence Avenue - Imperial Highway	160-240	19,000	15,800
Imperial Highway - Compton Boulevard	80-160	18,900	16,500
Compton Boulevard - Coyote Creek	80-90	20,000	17,200
Coyote Creek - San Diego Freeway	240	58,800	55,900
San Diego Freeway - 7th Street	240	51,100	55,500
7th Street - Ocean	240-164	55,600	55,000

Sources: 1 COE, 1975.
2 LADPW, 2003b.

Channel segments with capacities below the 100-year discharge
N/A – Not Available
Note: Invert width is the width of the channel bottom. The total width of the channel easement also includes the side slopes, typically sloped at 30 degrees, berms on either side of the channel, and the slope back to grade level.

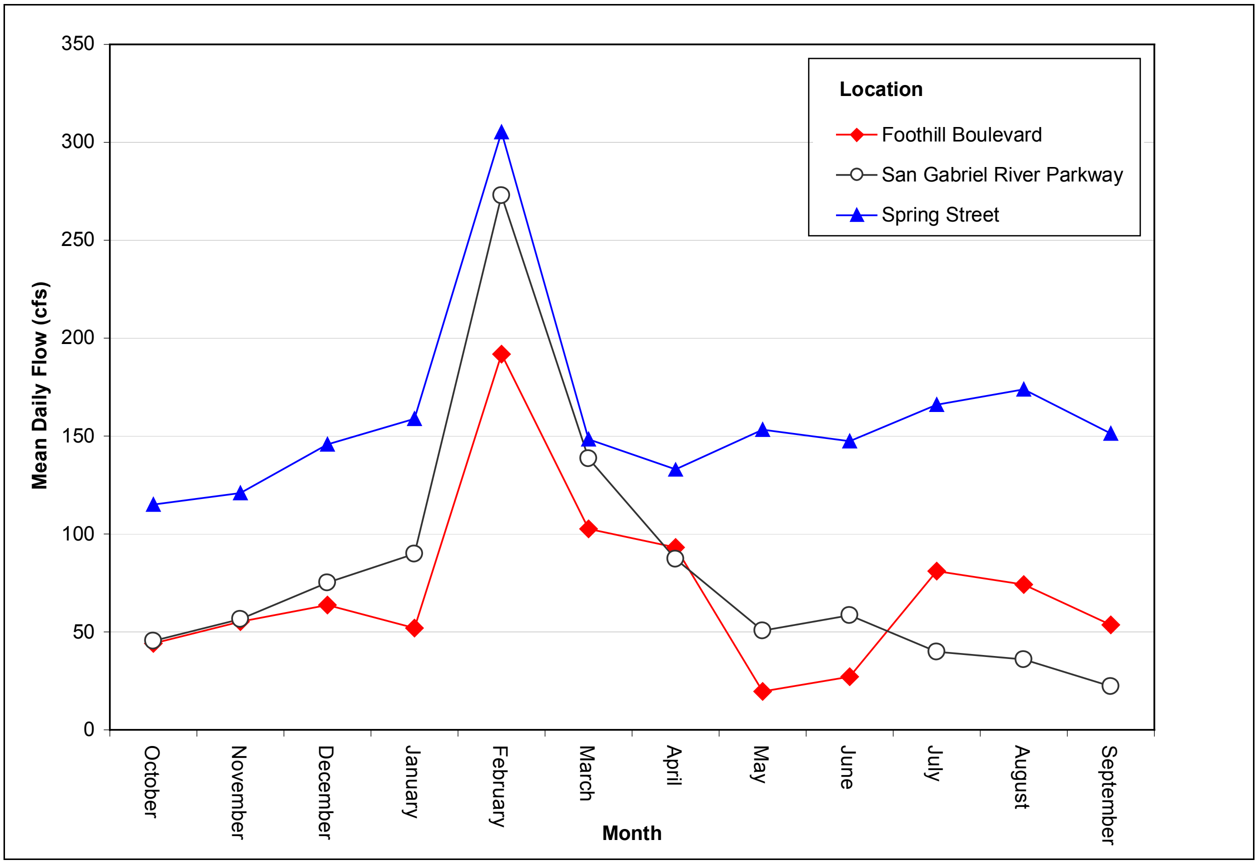
River Flows

The flow in the River and its tributaries consist of runoff, imported water, and recycled water. **Figure 4.6-3** depicts the mean daily flows by month at three locations along the river (listed from north to south):

- Foothill Boulevard in Azusa/Irwindale
- San Gabriel River Parkway in Pico Rivera
- Spring Street in Long Beach/Los Alamitos

Figure 4.6-3 represents average daily flows by month and does not represent the peak flows that can occur on a daily or hourly basis.

Figure 4.6-3
San Gabriel River Mean Daily Flows
(1996 – 2001 Water Years)



Source: LADPW Stream Gauges F190-R (at Foothill Boulevard), F263C-R (below San Gabriel River Parkway), and F42B-R (above Spring Street).
Note: Data shown exclude dam release of May 1998.

At Foothill Boulevard, upstream of most urban development, flows are regulated by the operation of Morris, San Gabriel, and Cogswell Dams. In addition to stormwater runoff, flows at this location can also contain imported water discharged from the outlet of Foothill Feeder-Service Connection USG-3, a pipeline owned by Metropolitan Water District of Southern California (Metropolitan); these flows vary depending on the availability of imported water and the water order placed by the various entities. Average flows range between 40 and 100 cfs throughout most of the year. Highest flows (approximately 200 cfs) are observed in February, corresponding with the precipitation pattern. Flows at Foothill Boulevard are highly variable from year to year. In dry years, there can be weeks or months with almost no flow even during the winter.

Below San Gabriel River Parkway (just downstream of the Whittier Narrows Dam), flows between May and October are generally below 50 cfs. Flows increase in the winter with a peak of approximately 330 cfs in February, and then gradually decrease throughout the spring. Between August and October there is generally very little flow at this location.

Above Spring Street (just upstream of the confluence with Coyote Creek), flows are fairly constant, ranging between 110 and 160 cfs for most of the year. The flow at this location contains approximately 26 cfs of effluent discharged by the Los Coyotes Water Reclamation Plant. Similar to the other two locations, highest flows are observed in February (approximately 300 cfs).

Dams and Spreading Facilities

The San Gabriel River is part of an extensive network of channels, dams, and spreading grounds used for flood control and water conservation. LADPW and the United States Army Corps of Engineers (COE) are the two primary agencies responsible for operating these facilities. **Figure 4.6-1** shows the locations of the dams and spreading facilities discussed below.

The five dams located on the San Gabriel River within the Master Plan study area (**Table 4.6-2**) are described in further detail below. An additional 11 dams are located on the tributaries (Big Dalton, Thompson Creek, Live Oak, San Dimas, Sawpit, Santa Anita, Puddingstone Diversion, Puddingstone, Eaton Wash, Fullerton, and Brea Dams). Originally constructed primarily for flood control, many of these dams are now also operated for water conservation (groundwater recharge) in conjunction with the spreading grounds located along the River. LADPW operates all spreading basins that receive water from the San Gabriel River (**Table 4.6-3**). In addition, the open space areas outside the reservoirs and dams are used for recreation in many cases (see **Section 4.10** regarding recreational facilities in the Master Plan study area).

Table 4.6-2
Dams on the San Gabriel River

Facility (From North to South)	**Year Constructed**	**Capacity (acre-feet)**	**Spillway Elevation (feet)**	**Purpose**	**Operator**
Cogswell	1934	9,339	2,385	Flood Control and Water Conservation	LADPW
San Gabriel	1939	41,549	1,543	Flood Control and Water Conservation	LADPW
Morris	1935	39,300	1,152	Water Conservation	LADPW
Santa Fe	1949	32,109	496	Flood Control	COE
Whittier Narrows	1957	80,805	229	Flood Control	COE

Source: LASGRWC, 2001.

Table 4.6-3
Spreading Facilities Receiving San Gabriel River Flows

Facility (From North to South)	**Location**	**Size (acres)**	**Underlying Groundwater Basin***
San Gabriel Canyon	East side of San Gabriel River, below the mouth of San Gabriel Canyon in Azusa	165	San Gabriel Valley
Santa Fe	Within the Santa Fe Dam reservoir and spillway areas in Irwindale	338	San Gabriel Valley
Peck Road	Confluence of Sawpit and Santa Anita Washes (tributaries to the Rio Hondo) in Arcadia	157	San Gabriel Valley
San Gabriel River (San Gabriel Valley)	In-channel from Santa Fe Dam to Whittier Narrows Dam	196	San Gabriel Valley
Rio Hondo Coastal	On both sides of the Rio Hondo between Whittier Boulevard in Pico Rivera and Foster Bridge Boulevard in Bell Gardens	570	Central
San Gabriel Coastal	West side of the River between Whittier Boulevard and Washington Boulevard in Pico Rivera	128	Central
San Gabriel River (Montebello Forebay)	In-channel from Whittier Narrows Dam to Firestone Avenue	308	Central

Source: LADPW, 2003b.
* See Section 4.6.1.2.

Cogswell, San Gabriel, and Morris Dams, located in the San Gabriel Mountains, are operated by LADPW. These dams capture runoff and snow melt from the mountains and form large reservoirs. Water released from these dams is either diverted to the San Gabriel Canyon Spreading Grounds or conveyed to downstream facilities (Santa Fe Spreading Grounds and the Montebello Forebay via the San Gabriel River; Peck Road Spreading Basin via the Santa Fe Diversion Channel and the Sawpit Wash; and the Montebello Forebay via the Rio Hondo).

Santa Fe Dam, located approximately 4 miles downstream of the mouth of the San Gabriel Canyon, is operated by COE. Water collected behind Santa Fe Dam is used to recharge groundwater, either within the unlined channel of the River downstream of the dam or at the Peck Road Spreading Basin via Sawpit Wash (tributary to the Rio Hondo) (LADPW, 2003b), or is conveyed to the Montebello Forebay via the San Gabriel River or the Rio Hondo.

Whittier Narrows Dam, the largest flood control facility on the River, is operated by COE to regulate flows from the San Gabriel River to the Rio Hondo for flood control and water conservation. The two rivers are connected by two manmade channels – the Crossover Channel and Lario Creek. The Crossover Channel provides the main connection during large storms. Lario Creek (originally named the Zone 1 Ditch) conveys imported water and recycled water deliveries in addition to storm flows. Flood flows from the San Gabriel River are stored temporarily behind the dam, and controlled releases are made to the Rio Hondo and/or the San Gabriel River. Flows released to the Rio Hondo and the San Gabriel River are then diverted for groundwater recharge at the Rio Hondo Coastal Spreading Grounds and the San Gabriel Coastal

Spreading Grounds, respectively. Flows in excess of the capacity of the San Gabriel River that cannot be stored behind the dam are discharged to the ocean.

Rubber Dams. In addition to the permanent dam structures described above, a number of rubber dams are located on the River. When inflated, the rubber dams impound the River flow either to divert it into nearby spreading grounds or to facilitate in-channel recharge.

Discharges to the River and Tributaries

Water Reclamation Plants. Major discharges to the San Gabriel River include five Water Reclamation Plants (WRPs) and three industrial facilities (two power plants and a refinery). All five WRPs located on the River or its tributaries (**Figure 4.6-4**) are operated by the Sanitation Districts of Los Angeles County (LACSD), and provide primary, secondary and tertiary treatment and disinfection of municipal wastewater. **Table 4.6-4** shows the WRP capacities and the amount of water treated and the amount reused during fiscal year 2000-2001.

Other Discharges. There are two power plants that discharge cooling water into the San Gabriel River Estuary (LASGRWC, 2001). The Alamitos Generating Station, owned by AES Corporation, is permitted to discharge about 1,250 million gallons per day (mgd). The LADWP Haynes Generating Station is permitted to discharge about 1,000 mgd of water (LASGRWC, 2001; LARWQCB, 2003). In addition, there are numerous storm drains operated by LADPW and other municipalities that discharge urban runoff into the San Gabriel River. In addition, imported water is discharged to the River (or its tributaries) at several locations, including: downstream of Morris Dam ("USG-3" outlet owned by Metropolitan), downstream of San Gabriel Canyon Spreading Grounds (outlet owned by San Gabriel Valley Municipal Water District (SGVMWD)), Thompson Creek ("CB-28" outlet owned by Metropolitan), and San Dimas Wash ("CB-48" outlet owned by Metropolitan and an outlet owned by SGVMWD).

Table 4.6-4
Water Reclamation Plants with Discharges to San Gabriel River and Tributaries

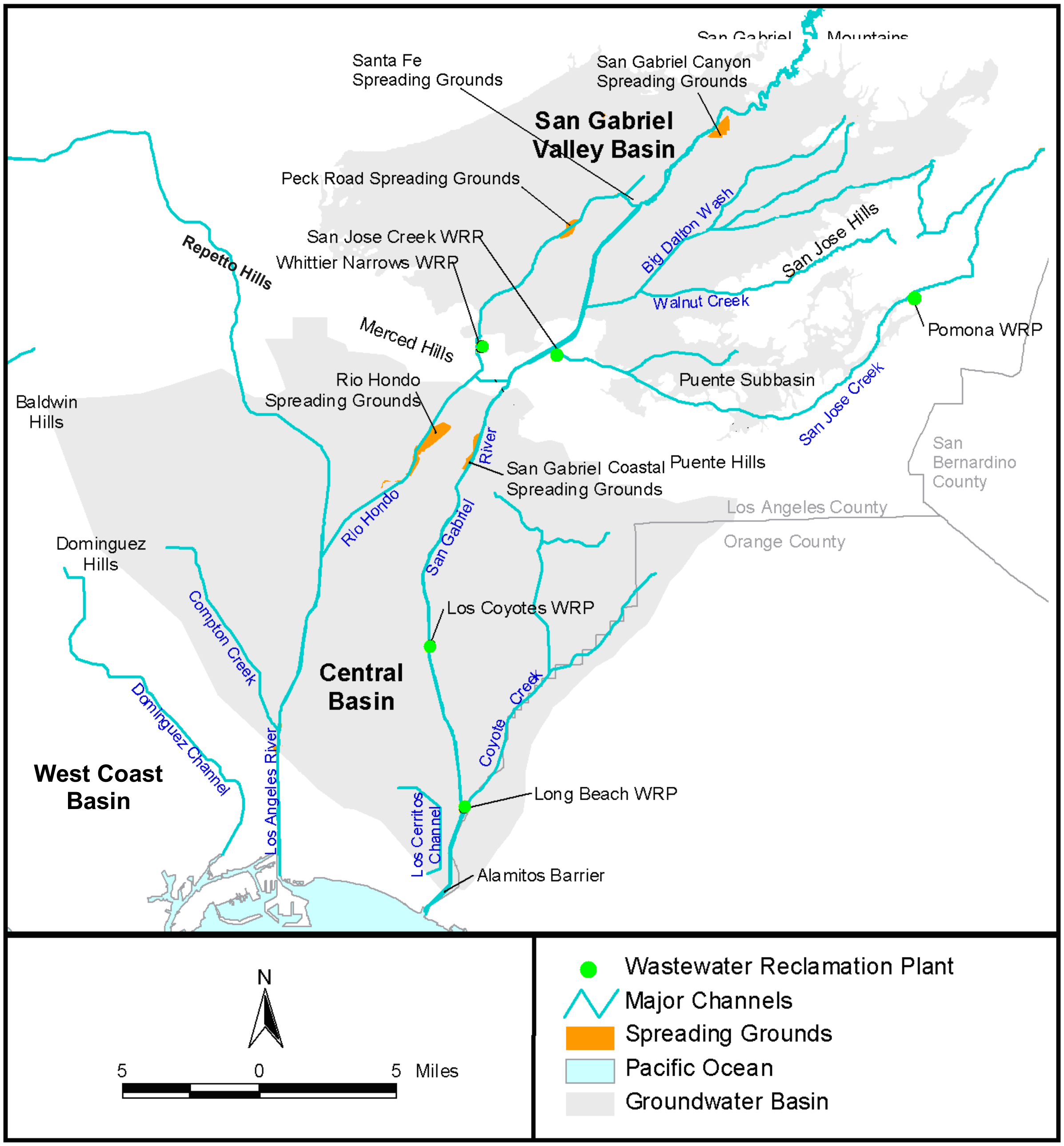
Plant (Receiving Water Body)	Capacity (mgd)	Amount Treated and Reused (Fiscal Year 2000 - 2001) Type	mgd	AFY	Primary Types of Reuse
Pomona (San Jose Creek)	13	Treated	11	12,600	Irrigation and Industrial
		Reused	7	8,000	
		Discharged to RWB	4	4,600	
San Jose Creek[1] (San Jose Creek)	100	Treated	89	100,200	> 90% for groundwater recharge < 10 % Irrigation and Industrial
		Reused	35	39,000	
		Difference	54	61,200	
Whittier Narrows[2] (Rio Hondo/San Gabriel River)	15	Treated	7	7,900	> 90% for groundwater recharge < 10 % Irrigation and Industrial
		Reused	7	7,700	
		Difference	0	200	
Los Coyotes (San Gabriel River)	37.5	Treated	35	39,600	Irrigation and Industrial
		Reused	5	5,400	
		Discharged to RWB	30	34,200	
Long Beach (Coyote Creek)	25	Treated	20	22,900	Irrigation and Industrial
		Reused	4	4,300	
		Discharged to RWB	16	18,600	

Source: LACSD, 2001.
RWB = receiving water body
mgd = million gallons per day
AFY = acre-feet per year
1 Reclaimed water from the San Jose Creek WRP is delivered to the San Gabriel Coastal Spreading Grounds by a direct pipeline or by first discharging into San Jose Creek (to San Gabriel River) then diverting flows from the San Gabriel River. Flows may also be diverted via Lario Creek to the Rio Hondo for recharge at the Rio Hondo Spreading Grounds.
2 The Whittier Narrows WRP discharges directly into either the Rio Hondo, the San Gabriel River, or Lario Creek.

4.6.1.2 Groundwater Basins

The Master Plan study area spans two groundwater basins: the San Gabriel Valley Basin and Central Basin (**Figure 4.6-4**). The two basins are described in detail below.

Figure 4.6-4
Groundwater Basins



San Gabriel Valley Basin

The San Gabriel Valley Basin covers 255 square miles in northeastern Los Angeles County. The basin is bound to the north by the San Gabriel Mountains and the Raymond fault. The Repetto, Merced, and Puente Hills bound the basin to the south and west. The Chino fault and the San Jose fault form the eastern boundary (CDWR, 2003). The storage capacity of the basin is estimated to be approximately 10.7 million acre-feet (CDWR, 2003).

The water bearing materials of the basin are dominated by unconsolidated to semi-consolidated alluvium from the San Gabriel Mountains deposited by streams. The San Gabriel Valley Basin is an unconfined aquifer (i.e., the groundwater is not separated from the ground surface by an impermeable geological boundary). The general direction of the groundwater flow is from the edges of the basin boundary towards the center, then to the southwest to exit through Whittier Narrows (CDWR, 2003) to the Central Basin.

Data necessary to provide a complete accounting of inflows into and outflows from the San Gabriel Valley Basin were not available (CDWR, 2003). As an example of basin's water balance, **Table 4.6-5** presents the amount of known inflows and outflows for the basin for one year (Water Year 1998-1999). Water used to recharge the San Gabriel Valley Basin includes both imported water (from Northern California and the Colorado River) and local surface water.

Table 4.6-5
San Gabriel Valley Basin Inflow and Outflow (Water Year 1998-1999)

Inflow		Outflow	
Type	Amount (acre-feet)	Type	Amount (acre-feet)
Natural Recharge	186,268	--	--
Artificial Recharge	82,803	Extractions	269,782
Subsurface Inflow*	N/D	Subsurface Outflow to Central Basin	27,000

Source: CDWR, 2003.
* N/D – Not Determined. Subsurface inflow to the San Gabriel Valley Basin includes flows from the Raymond Basin, from the Chino Subbasin, and from fracture systems along the San Gabriel Mountain front.

Central Basin

The Central Basin underlies the southeastern part of the Los Angeles Coastal Plain, covering 277 square miles (CDWR, 2003). The Central Basin is bound on the north by the La Brea High and on the northeast and east by the Elysian, Repetto, Merced and Puente Hills. The southeast boundary between the Central and Orange County Groundwater Basins roughly follows the Coyote Creek. The southwest boundary, which separates the Central and West Coast Basins, is the Newport-Inglewood fault system and the Newport-Inglewood uplift (CDWR, 2003). The total storage capacity of the Central Basin is estimated to be approximately 13.8 million acre-feet.

Groundwater in the Central Basin occurs in Holocene and Pleistocene sediments at relatively shallow depths. Areas available for surface recharge of the Central Basin are limited due to the presence of the Bellflower Aquiclude, which is an impermeable layer of soil that prevents downward movement of water. The Bellflower Aquiclude creates semi-perched groundwater conditions in some areas (CDWR, 2003). The Montebello Forebay area, located just south of Whittier Narrows, consists of highly permeable soils and is the most significant area for surface recharge of the Central Basin and the adjacent West Coast Basin. The WRD and LADPW use local runoff, imported water, and recycled water for groundwater recharge at spreading facilities located in the Montebello Forebay (see **Table 4.6-3**). The Los Angeles Forebay, another area of permeable soils, is not available for surface recharge due to urban development (CDWR, 2003). The general direction of the groundwater flow is from the northeast (San Gabriel Valley Basin and recharge areas) to the southwest (West Coast Basin and Pacific Ocean) (CDWR, 2003).

Data necessary to provide a complete accounting of inflows into and outflows from the Central Basin were not available (CDWR, 2003). As an example of basin's water balance, **Table 4.6-6** presents the amount of known inflows and outflows for the basin for one year (Water Year 1998-1999).

Table 4.6-6
Central Basin Inflow and Outflow (Water Year 1998-1999)

Inflow		Outflow	
Type	**Amount (acre-ft)**	**Type**	**Amount (acre-ft)**
Natural Recharge	31,950	--	--
Artificial Recharge	63,688	Extractions	204,335
Subsurface inflow from the San Gabriel Valley Basin	27,000	Subsurface Outflow (to West Coast Basin and Pacific Ocean)	N/D

Sources: CDWR, 2003.
N/D – Not Determined

West Coast Basin

The southern end of the Master Plan study area overlaps the West Coast Basin, which is located west of Central Basin. The West Coast Basin is bound on the north by the Ballona Escarpment, an abandoned erosional channel from the Los Angeles River. On the east it is bound by the Newport-Inglewood fault zone, and on the south and west by the Pacific Ocean and Palos Verdes Hills. The storage capacity of the basin is estimated to be approximately 6.5 million acre-feet (CDWR, 2003).

Groundwater in the West Coast Basin occurs in the unconsolidated and semi-consolidated marine and alluvial sediments of Holocene, Pleistocene, and Pliocene ages. Natural replenishment of the basin's groundwater supply is largely limited to underflow from the Central Basin through and over the Newport-Inglewood fault zone. In addition, freshwater is injected to prevent seawater intrusion near the coast. Minor replenishment to the West Coast Basin occurs from infiltration of surface inflow from both the Los Angeles and San Gabriel Rivers (CDWR, 2003). The general regional groundwater flow pattern is southward and westward from the Central Basin towards the ocean.

Data necessary to provide a complete accounting of inflows into and outflows from the West Coast Basin were not available (CDWR, 2003). As an example of basin's water balance, **Table 4.6-7** presents the amount of known inflows and outflows for the West Coast Basin for one year (Water Year 1998-1999).

Table 4.6-7
West Coast Basin Inflow and Outflow (Water Year 1998-1999)

Inflow		Outflow	
Type	**Amount (acre-ft)**	**Type**	**Amount (acre-ft)**
Natural Recharge	N/D	--	--
Artificial Recharge	95,638	Extractions	51,762
Subsurface inflow (primarily from the Central Basin)	68,473	Subsurface Outflow	N/D

Sources: CDWR, 2003.
N/D – Not Determined

4.6.1.3 Water Rights

The Water Commission Act, which took effect in 1914, established a system of state-issued permits and licenses to appropriate water. Amended over the years, the provisions for appropriating water now appear in Division 2 (commencing with Section 1000) of the California Water Code. The State Water Resources Control Board (SWRCB) is responsible for administering water rights (CDWR, 1998).

Water rights to the San Gabriel River and the groundwater basins underlying the Master Plan study area have been allocated to numerous users. SWRCB (2003a) has declared the San Gabriel River fully appropriated, i.e., no new users can file for a share of the river water. The two groundwater basins, the San Gabriel Valley Basin and the Central Basin, are both adjudicated basins, i.e., rights to extract groundwater have been allocated to various users by a court order. Agencies and organizations involved in administering water rights in the Master Plan study area are described below.

San Gabriel River Watermaster

In 1965, a court judgement settled a lawsuit filed by water users downstream of the Whittier Narrows on the San Gabriel River (Lower Area). The court judgement, known as the Long Beach Judgement, declared that the Lower Area is entitled to receive an annual average of 98,415 acre-feet of "usable water" from the Upper Area (upstream of Whittier Narrows) (SGRWM, 2003). The Judgement is administered by a three-person Watermaster (the San Gabriel River Watermaster) that accounts for all water (surface and subsurface) passing through Whittier Narrows each year and for credit and debit obligations (CRA et al., 2001). The Watermaster is composed of one representative from the Upper Area, one from the Lower Area, and one chosen by both areas (Blomquist, 1992).

Main San Gabriel Basin Watermaster

The San Gabriel Valley Basin is divided into two main parts, the Main San Gabriel Basin and the Puente Subbasin. The Puente Subbasin, lying in the southeast portion outside of the Master Plan Study area, is tributary and hydraulically connected to the Main San Gabriel Basin. However, it is considered a separate entity for management purpose (MSGBW, 2002).

The Main San Gabriel Basin was adjudicated in 1973 to 190 parties (MSGBW, 2003). The Main San Gabriel Basin Watermaster is responsible for administering the water rights allocations, including water spreading activities. The amount of groundwater that can be extracted from the basin (Operating Safe Yield, OSY) is determined by the Watermaster each year based on precipitation (CDWR, 2003). The long-term average OSY (1973 to 2002) is 199,545 acre-feet. The minimum and maximum OSY during this period were 140,000 and 230,000 acre-feet, respectively (MSGBW, 2002).

Parties who pumped 5,000 acre-feet or more in Fiscal Year 2001-2002 from the Main San Gabriel Basin are listed below (MSGBW, 2002). In addition, there are numerous parties with smaller water rights.

- Azusa Valley Water Company
- California Domestic Water Company
- California-American Water Company
- City of Arcadia
- City of Glendora
- City of Monrovia
- City of Whittier
- Covina Irrigating Company
- Pellissier Irrevocable QTIP Trust, et al.
- San Gabriel County Water District
- San Gabriel Valley Water Company
- Southern California Water Company
- Suburban Water Systems
- Valley County Water District

Central Basin Watermaster

The Central Basin was adjudicated in 1965, with the California Department of Water Resources (CDWR) as the Watermaster. Currently, 146 parties hold rights to the Central Basin. The allowed pumping allocation of the basin, as set by the Judgement, is 217,367 acre-feet (CDWR, 2002a). WRD, in conjunction with LADPW, is responsible for replenishing groundwater supply in the Central Basin. Imported water purchased from the Metropolitan Water District of Southern California (Metropolitan) and recycled water from Whittier, Pomona, and San Jose WRPs are used for artificial recharge at LADPW Spreading Grounds (**Table 4.6-3**).

Parties with allocation of 3,000 acre-feet or more from the Central Basin are listed below (CDWR, 2002a). In addition, there are numerous parties with smaller water rights.

- City of Huntington Park
- City of Lakewood
- City of Long Beach
- City of Lynwood

- City of Paramount
- City of Pico Rivera
- City of Santa Fe Springs
- City of South Gate
- City of Vernon
- Los Angeles Department of Water and Power
- Pico Water District
- Southern California Water Company
- Suburban Water Systems

West Coast Basin Watermaster

The West Coast Basin was first adjudicated in 1955, with CDWR as the Watermaster. The final judgement was signed in 1965 and became effective in 1966. Currently, 68 parties hold rights to the West Coast Basin. The allowed pumping allocation of the basin, as set by the adjudication, is 64,468.25 acre-feet (CDWR, 2002b). WRD, in conjunction with LADPW, is responsible for replenishing groundwater supply in the Central Basin. Imported water purchased from the Metropolitan Water District of Southern California (Metropolitan) and recycled water from Whittier, Pomona, and San Jose WRPs are used for artificial recharge at LADPW Spreading Grounds (**Table 4.6-3**).

Parties with allocation of 1,000 acre-feet or more from the West Coast Basin are listed below (CDWR, 2002b). In addition, there are numerous parties with smaller water rights.

- Atlantic Richfield Company
- California Water Service Company
- Chevron USA, Inc.
- City of Hawthorne
- City of Inglewood
- City of Lomita Water System
- City of Los Angeles
- City of Manhattan Beach
- City of Torrance
- Equilon Enterprises, LLC
- Mobil Oil Corporation
- Shell Oil Company
- Southern California Water Company
- Tosco Corporation

San Gabriel River Water Committee

SGRWC was formed in 1889 to settle disputes between nine local water interests and was originally called the "Committee of Nine." Currently, the SGRWC consists of the California-American Water Company, Monrovia Nursery Company, City of Azusa, Covina Irrigating Company, and Azusa Agricultural Water Company. The diversion rights of each SGRWC member are shown in **Table 4.6-8**. SGRWC members are entitled to the first 135 cfs of flow in the San Gabriel River (Rhone, 2003). Most of the diverted water is used for potable uses. The river water is treated at Canyon Filtration Plant (City of Azusa) and Covina Filtration Plant (Covina Irrigating Company) before distribution to consumers. Excess flows are used for groundwater recharge at spreading facilities under an agreement with LADPW. SGRWC members are the only parties allowed to divert water from the River for potable uses.

Table 4.6-8
San Gabriel River Water Committee Members and Diversion Rights
(acre-feet per year)

Party	Amount of Entitlement
City of Azusa	3,252
Covina Irrigating Company	2,514
California-American Water Company	1,672
Monrovia Nursery Company	958
Azusa Agricultural Water Company	170

Source: Rhone, 2003

San Gabriel Valley Protective Association

SGVPA was formed in 1919 to safeguard the rights of water users from Azusa to Whittier (Robinson, 1991). The SGVPA members listed below (C. Shaw, pers. comm., 2003) are entitled to water from the San Gabriel River in excess of 135 cfs (Rhone, 2003), and they use the water solely for groundwater recharge at LADPW facilities.

- California Domestic Water Company
- California-American Water Company
- Central Basin Municipal Water District
- City of Alhambra
- City of Arcadia
- City of Azusa
- City of Glendora
- City of Lakewood
- City of Monrovia
- City of Whittier
- Covina Irrigating Company
- La Habra Heights County Water District
- Montebello Land and Water Company
- Pico County Water District
- San Gabriel County Water District
- San Gabriel Valley Municipal Water District
- San Gabriel Valley Water Company
- Southern California Water Company
- Suburban Water Systems
- Upper San Gabriel Valley Municipal Water District
- Valencia Heights Water Company
- Water Replenishment District of Southern California

4.6.1.4 Water Quality

Water Quality Regulatory Framework

Basin Plan Beneficial Uses and Water Quality Objectives. The Los Angeles Regional Water Quality Control Board (Regional Board) establishes water quality standards for the Los Angeles

Region in its Water Quality Control Plan, commonly known as the Basin Plan. The Basin Plan presents designated beneficial uses for surface and ground waters and numeric and narrative water quality objectives necessary to support the beneficial uses.

Table 4.6-9 summarizes the designated beneficial uses for the San Gabriel River and other water bodies within the Master Plan study area (LARWQCB, 1994).

Beneficial uses for the San Gabriel Valley, Central, and West Coast groundwater basins are Municipal and Domestic Supply, Industrial Service Supply, Industrial Process Supply, and Agricultural Supply (all designated as existing beneficial uses).

Table 4.6-9
Beneficial Uses of Water Features within the Master Plan Study Area

Water Body		Municipal and Domestic Supply	Industrial Service Supply	Industrial Process Supply	Agricultural Supply	Groundwater Recharge	Water Contact Recreation	Non-Contact Water Recreation	Warm Freshwater Habitat	Cold Freshwater Habitats	Wildlife Habitat	Rare, Threatened, or Endangered Species	Spawning, Reproduction, and/or Early Development	Wetland Habitat
Name	**HU No.**	MUN	IND	PROC	AGR	GWR	REC-1	REC-2	WARM	COLD	WILD	RARE	SPWN	WET
San Gabriel River														
San Gabriel River West Fork	405.43	P	--	--	--	E	E	E	E	E	E	E	E	E
San Gabriel River Main Stem	405.43	E	E	--	--	E	E	E	E	E	E	--	--	--
San Gabriel River	405.42	E	E	--	--	E	E	E	E	E	E	E	--	--
San Gabriel River	405.41	P		--	--	I	I	I	I	--	E	--	--	--
San Gabriel River (Whittier Narrows – Firestone Boulevard)	405.15	P	P	--	--	I	E	E	I	--	E	E	--	--
San Gabriel River (Firestone Boulevard - Estuary)	405.15	P	--	--	--	--	E	E	P	--	P	--	--	--
San Gabriel River Estuary	405.15	--	E	--	--	--	E	E	--	--	E	E	--	--
Tributaries														
Walnut Creek	405.41	P	--	----	--	I	I	I	I	--	E	--	--	E
San Jose Creek	405.41	P	--	--	--	I	P	I	I	--	E	--	--	--
Coyote Creek	405.15	P	P	P	--	--	P	I	P	--	P	E	--	--
Reservoirs and Flood Control Basins														
Cogswell Reservoir	405.43	P	--	--	--	E	E	E	E	E	E	--	E	--
Morris Reservoir	405.43	E	E	E	E	E	--	--	--	--	--	--	--	--
Santa Fe Flood Control Basin	405.41	P	--	--	--	I	P	I	I	--	E	--	--	E
Whittier Narrows Flood Control Basin	405.41	P	--	--	--	E	E	E	E	--	E	P	--	--
Legg Lake	405.41	P	--	--	--	E	E	E	E	E	E	--	--	E

HU: Hydrologic Unit
P: Potential Use
E: Existing Use
I: Intermittent Use
Source: LARWQCB, 1994.

The Basin Plan presents numeric water quality objectives that apply to all inland surface waters in the Los Angeles Region. These objectives have been established for various parameters including metals, organic compounds (e.g., pesticides and petroleum byproducts), bacteria, dissolved oxygen, pH, temperature, and total residual chlorine (LARWQCB, 1994).

In addition to the general objectives, the Basin Plan has established water body-specific objectives for certain areas. The objectives specific to the San Gabriel River are presented in **Table 4.6-10**.

Table 4.6-10
Water Quality Objectives for Surface Water Features in the Master Plan Study Area

Reach	Objectives					
	TDS (mg/L)	Sulfate (mg/L)	Chloride (mg/L)	Boron (mg/L)	Nitrogen* (mg/L)	SAR
Above Morris Dam	250	30	10	0.6	2	2
Between Morris Dam and Ramona Boulevard	450	100	100	0.5	8	--
Between Ramona Boulevard And Firestone Boulevard	750	300	150	1.0	8	--
Between Firestone Boulevard and San Gabriel River Estuary including Coyote Creek	--	--	--	--	--	--
All other minor San Gabriel Mountain streams tributary to San Gabriel Valley	300	40	15	--	--	--

Source: LARWQCB, 1994.
* Nitrogen as NO_3-N + NO_2-N
-- No water body specific objectives
TDS: Total Dissolved Solids
SAR: Sodium Adsorption Ratio

Basin Plan water quality objectives for groundwater basins relevant to the Master Plan study area are shown in **Table 4.6-11**.

Table 4.6-11
Water Quality Objectives for Groundwater Basins in the Master Plan Study Area

Basin	Objectives (mg/L)			
	TDS	Sulfate	Chloride	Boron
Main San Gabriel Basin – Western Area*	450	100	100	0.5
Main San Gabriel Basin – Eastern Area*	600	100	100	0.5
Central Basin	700	250	150	1.0

Source: LARWQCB, 1994.
TDS: Total Dissolved Solids
*Walnut Creek, Big Dalton Wash, and Little Dalton Wash separate the Eastern area from the Western area.

NPDES Stormwater Program. The primary regulatory framework for pollutant discharges to water bodies is the National Pollutant Discharge Elimination System (NPDES) program, which is administered by the U.S. Environmental Protection Agency (EPA) under the Clean Water Act (CWA) with authority relegated to the Regional Board. In 1987, the NPDES program was expanded to regulate stormwater discharges in response to the increasing awareness for the need to control stormwater pollution. Under the NPDES Stormwater Program, municipalities, ten categories of industrial activities, and construction activities over 1 acre in area are required to obtain a NPDES permit for stormwater discharges.

Municipalities in the Master Plan study area are covered by three separate NPDES municipal stormwater discharge permits. The County of Los Angeles and all incorporated cities in the Master Plan Study area within Los Angeles County (except the City of Long Beach) are covered under Order No. 01-182, issued by the Regional Board in 2001. The City of Long Beach is covered under Order No. 99-060 issued by the Regional Board in 1999. The City of Seal Beach and unincorporated areas of Orange County are covered under Order No. R8-2002-0010 issued by the Santa Ana Regional Water Quality Control Board (SARWQCB) in 2002. Under these permits, municipalities are required to develop area-wide stormwater management plans (known as Standard Urban Stormwater Mitigation Plans or SUSMPs), implement best management practices (BMPs) to reduce and/or treat stormwater runoff, and perform stormwater monitoring. LADPW has prepared a manual that serves as a guideline for compliance with the County's SUSMP (LADPW, 2002b). The SUSMP outlines the necessary BMPs that must be incorporated into design plans for various categories of development and/or redevelopment.

NPDES stormwater permits do not currently impose effluent limitations. However, as part of the NPDES Stormwater Program, EPA established "benchmark" concentrations for various pollutant parameters that are of potential concern in stormwater runoff from industrial facilities. If concentrations of constituents exceed the benchmark levels, stormwater discharges are considered by EPA to have the potential to impair, or contribute to impairing, water quality or to affect human health if ingested. The benchmarks are intended to serve as a guide in determining whether stormwater pollution prevention measures have been successfully implemented. They are not effluent limitations (EPA, 1995).

Title 22 – Recycled Water Use Regulations. Title 22, Division 4, Chapter 3 of California Code of Regulations (CCR) regulates non-potable uses of recycled wastewater (i.e., water from sources that contain treated sewage). The objective of Title 22 standards is to protect public health from pathogens and other contaminants that may be present in recycled wastewater. Although they do not legally apply to stormwater reuse, Title 22 standards have been used as a treatment goal for previous stormwater reuse projects, such as the Santa Monica Urban Runoff Recycling Facility (SMURRF) (City of Santa Monica, 2003).

Title 22 establishes required treatment levels for recycled water use based on the expected degree of public contact with the recycled water. For applications with a high potential for the public to come in contact with the recycled water (e.g., irrigation of food crops, residential landscaping, and parks and playgrounds), Title 22 requires tertiary treatment and disinfection. For applications with a lower potential for public contact (e.g., irrigation of areas with restricted access, crops for livestock, and freeway landscaping), Title 22 requires secondary treatment with varying degrees of disinfection depending on the proposed use (CCR Sections 60303-60307).

Title 22 does not specify water quality or treatment level standards for use of recycled wastewater for groundwater recharge. The regulations stipulate generally that "reclaimed water used for groundwater recharge of domestic water supply aquifers by surface spreading shall be at all times of a quality that fully protects public health." The California Department of Health Services (CDHS) makes recommendations to the applicable Regional Water Quality Control Board on an individual case basis where there is a potential risk to public health (CCR Section 60320).

Surface Water Quality

LADPW Water Quality Data. **Table 4.6-12** presents selected water quality data for the San Gabriel River. The left column shows water quality data collected in September 2001 from 12 locations, ranging from the West Fork of the River in the San Gabriel Mountains to upstream of the City of Azusa. This set of data was collected by LADPW (2002) as required by the permits issued for sediment management in the San Gabriel and Morris Reservoirs.

The two columns on the right present water quality data collected from 1994 to 2000 in the River below San Gabriel River Parkway in Pico Rivera and in Coyote Creek below Spring Street in Long Beach/Los Alamitos. This set of data was collected by LADPW (2001) as part of the annual stormwater sampling and reporting program throughout Los Angeles County as required by the NPDES Municipal Stormwater Permit.

Water quality in the River north of Azusa (upstream of urban development) is generally good. Most parameters are consistent with the Regional Board's water quality objectives. However, the Curve and Williams Fires of 2002 in the Angeles National Forest have affected the water quality in this reach and will continue to do so for several years until the watershed recovers. The lower reaches of the River and Coyote Creek generally have higher turbidity and nutrient concentrations. High bacteria counts are also observed in the downstream portions.

Table 4.6-12
Selected Water Quality Data – San Gabriel River and Coyote Creek

Parameter	Unit	September 2001 (LADPW, 2002a)	1994-2000 (LADPW, 2001)	
		12 Sampling Points Upstream of City of Azusa	San Gabriel River Below San Gabriel River Parkway	Coyote Creek below Spring Street
		Range	Median	Median
Temperature	°C	19 - 23.5	---	---
pH	std units	8.1 - 8.5	7.5	7.4
Dissolved Oxygen	mg/L	6.6 - 7.2	---	---
Biological Oxygen Demand	mg/L	---	32	20
Chemical Oxygen Demand	mg/L	---	56	55
Turbidity	NTU	0.3 - 5.2	41	64
Total Suspended Solids	mg/L	ND	96	196
Total Petroleum Hydrocarbons	mg/L	---	0.5	1.0
Total Residual Chlorine	mg/L	ND - 0.14	---	---
Indicator Bacteria				
Total Coliform	MPN/100ml	---	300,000	1,600,000
Fecal Coliform	MPN/100ml	---	30,000	900,000
Nutrients				
Ammonia-Nitrogen	mg/L	ND - 0.12	0.41	0.33
Total Kjeldahl Nitrogen	mg/L	ND - 0.37	2.7	2.2
Nitrate + Nitrite as N	mg/L	ND - 0.15	1.9	1.1
Orthophosphate-P	mg/L	ND - 0.018	---	---
Total phosphorus-P	mg/L	ND - 0.053	0.43	0.28
Metals				
Aluminum	µg/L	---	333	419
Boron	µg/L	---	265	225
Copper	µg/L	---	8	14
Chromium	µg/L	---	2.5	2.5
Lead	µg/L	---	2.5	11
Nickel	µg/L	---	2.5	7.5
Zinc	µg/L	---	51	125

MPN Most Probable Number
ND non-detect
NTU nephelometric turbidity units
--- Data not reported

Impaired Water Bodies and Total Maximum Daily Loads. Section 303(d) of the CWA requires each state to develop a list of water bodies that do not meet water quality standards ("impaired water bodies"). This list of impaired water bodies is referred to as the "303(d) list", and is developed and periodically updated by the Regional Board. States are then required to develop action plans for improving the water quality of impaired water bodies on the 303(d) list. The process for developing the action plan begins with establishment of Total Maximum Daily Loads (TMDLs). TMDL is defined as the maximum amount of a particular pollutant that a water body can receive from various sources without violating the water quality standard. Once a TMDL is established for a specific body of water, responsibility for reducing pollution is assigned among both point sources and non-point sources that discharge to the target water body.

According to the 303(d) list, the water quality of the San Gabriel River is substantially impaired downstream of Whittier Narrows by a variety of pollutants. **Table 4.6-13** lists the San Gabriel River reaches listed on the most recent 303(d) list. The major point source dischargers that are potentially contributing to these water quality impairments include: five WRPs located on the River or its tributaries (**Table 4.6-4**); industrial facilities (the Alamitos and Haynes generating stations and Santa Fe Springs Refinery); and municipal storm drains (LARWQCB, 2002). In addition to general urban development, potential nonpoint sources of pollution include equestrian facilities, nurseries, and golf courses (LARWQCB, 2002).

The Regional Board, SWRCB, and EPA share responsibilities for the development of TMDLs for the San Gabriel River and tributaries. The only TMDL that has been developed in the San Gabriel River Watershed to date is the Trash TMDL for the East Fork San Gabriel River (outside of the Master Plan study area). According to the Draft Strategy for Developing TMDLs and Attaining Water Quality Standards in the Los Angeles Region (LARWQCB, 2002), the following TMDLs for the San Gabriel River Watershed are scheduled for completion in 2004: nutrients, organics, bacteria, and metals. These future TMDLs will most likely include requirements for municipalities to reduce pollutant loads from stormwater runoff.

Table 4.6-13
Impaired Reaches within the Master Plan Study Area

Water Body / Reach	Abnormal Fish Histology	Algae	High Coliform Count	Toxicity	Copper	Zinc	Lead	Selenium	pH
San Gabriel River (From North to South)									
Above Ramona	None								
Ramona to Whittier Narrows Dam (7.2 miles)				X					
Whittier Narrows Dam to Firestone Boulevard (12 miles)			X		X	X	X		
Estuary to Firestone Boulevard (6.4 miles)	X	X	X	X					
Estuary (3.4 miles)	X								
Walnut Creek Wash – Drains from Puddingstone Reservoir (12 miles)				X					X
San Jose Creek									
Confluence with San Gabriel River to Temple Street (2.7 miles)		X	X						
Temple Street to I-10 at White Avenue (17 miles)		X	X						
Coyote Creek (13 miles)	X	X	X	X	X	X	X	X	

Source: SWRCB, 2003b.

Stormwater Quality

Stormwater contains various pollutants that are picked up as runoff travels through urban and suburban areas. Typical pollutants in urban stormwater are bacteria, nutrients, trash, sediment, heavy metals, and organic compounds (e.g., pesticides, vehicular exhaust materials, and chemicals used in industrial processes). However, the types and amounts of pollutants contained in stormwater are highly variable, depending on factors such as climate, season, drainage area land use, and sequence and duration of storm events. Therefore, numerical characterization of stormwater quality can be a challenge.

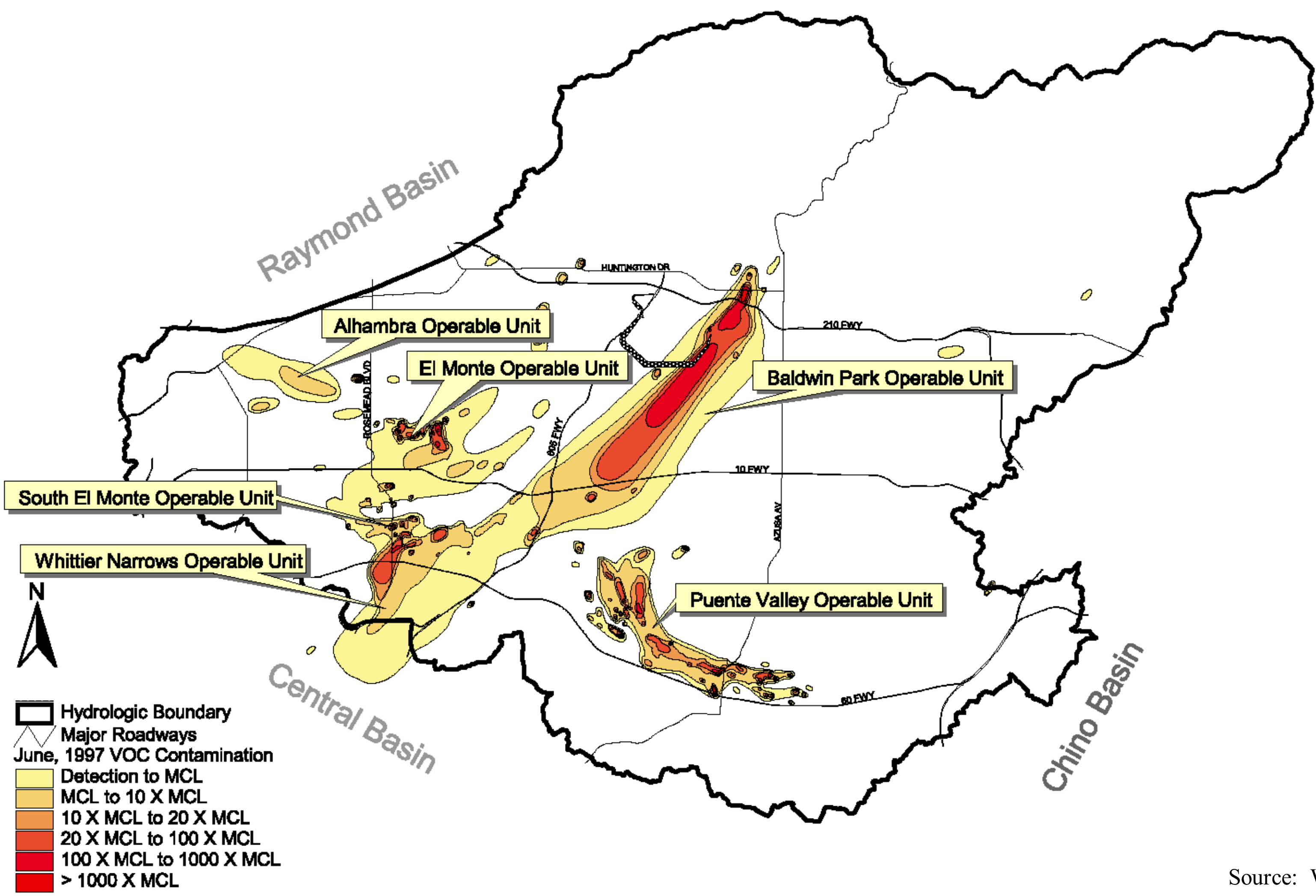
Since the 1994-1995 storm season, LADPW has been conducting an annual stormwater sampling and reporting program throughout Los Angeles County as required by the NPDES Municipal Stormwater Permit. Two of the monitoring stations used in this program are located in the Master Plan study area. The San Gabriel River Monitoring Station (Station No. S14) is located at an historic stream gage station below San Gabriel River Parkway in Pico Rivera. The Coyote Creek Monitoring Station (Station No. S13) is located at the existing COE stream gage station below Spring Street in Long Beach/Los Alamitos (LADPW, 2001). Selected water quality data collected at these two stations are shown in **Table 4.6-12** above.

Groundwater Quality

San Gabriel Valley Basin. The primary water quality issue in the San Gabriel Valley Basin is volatile organic compounds (VOCs) contamination caused by historical ground disposal of industrial solvents and other pollutants. VOC contamination in the basin was first detected in 1979. In 1984, EPA added approximately 30 square miles within the San Gabriel Valley to the National Priorities List (NPL) under the federal Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), commonly known as Superfund. NPL is a list of sites with known or threatened releases of contaminants that have been determined to warrant further investigation by EPA. Primary contaminants of concern for the San Gabriel Valley Superfund site include trichloroethylene (TCE, commonly used for degreasing and cleaning), perchloroethylene (PCE, a component of solid rocket fuel), and carbon tetrachloride (used to make chlorofluorocarbon propellants and refrigerants).

EPA and local agencies, including the San Gabriel Basin Water Quality Authority (WQA), have been conducting clean-up by pumping groundwater from a series of wells and treating the water to remove the VOCs. The WQA was formed in 1993 by cities and municipal water districts within the San Gabriel Valley Superfund area to augment EPA's cleanup activities. Currently, there are six active Operable Units (OUs), or focused study areas established to facilitate the clean-up efforts (**Figure 4.6-5**). Portions of the Whittier Narrows and Baldwin Park OUs overlap with the Master Plan study area. Water from wells located within the OUs is treated and/or blended with higher quality water to meet drinking water standards before entering public water supply distribution systems (EPA, 2002b).

Figure 4.6-5
San Gabriel Valley Basin Superfund Sites



Source: WQA, 2003.

Central Basin. The Central Basin Early Remediation Project removes contaminants entering the Central Basin from the San Gabriel Valley Basin. WRD issued a "Non-Consumptive Use Permit" in Fiscal Year 2001-2002 allowing groundwater extraction for the program (CDWR, 2002a).

Since the 1950s, saltwater intrusion has been an issue in groundwater basins in the coastal areas of Los Angeles County, including the Central Basin. Saltwater intrusion is the subsurface movement of ocean water into freshwater groundwater basins in coastal and inland areas, usually caused by excessive groundwater pumping. To protect the freshwater supply of the Central Basin, the Alamitos Barrier Project was constructed in 1964. The project, now operated by LADPW, recharges the basin through a series of injection wells located near the Los Angeles-Orange County line about two miles inland from the mouth of the San Gabriel River, an area known as the Alamitos Gap. The injected water consists of imported water from Metropolitan's distribution system and reclaimed water (LADPW, 2003d).

West Coast Basin

Seawater intrusion occurs in the Silverado zone along the Santa Monica Bay and in the Gaspur zone in the San Pedro Bay. Two seawater barrier projects are currently in operation: the West Coast Basin Barrier Project, which runs from the Los Angeles Airport to the Palos Verde Hills, and the Dominguez Gap Barrier Project, which covers the area of the West Coast Basin bordering the San Pedro Bay. Injection wells along these barriers create a groundwater ridge, which inhibits the inland flow of salt water into the subbasin to protect and maintain groundwater elevations (CDWR, 2003).

4.6.2 Significance Criteria

Project impacts related to hydrology and water quality would be considered significant if the project:

- Exposed people or structures to a significant risk of loss, injury or death involving flooding
- Increased runoff volume to a level which could exceed the capacity of existing or planned stormwater drainage systems
- Altered the existing drainage pattern of the site or area in a manner which would result in substantial erosion or siltation
- Resulted in substantial degradation of water quality or exceedance of the established water quality objectives for a surface water feature or groundwater basin

4.6.3 Impacts of Adopting the Master Plan Elements

The Master Plan includes six plan elements (also called Master Plan goals), set forth as the CEQA project objectives for the Master Plan. The plan elements are supported by objectives and performance criteria (see **Section 3.3.1**). The adoption of the Master Plan by the County of Los

Angeles (and other municipalities in the study area) will promote implementation of projects that are consistent with these Master Plan goals. This section describes the overall Master Plan impacts based on a qualitative assessment of reasonably foreseeable effects of the adoption of the Master Plan. Since projects similar to the Concept Design Studies are proposed throughout the river corridor, the Concept Design Study impacts (**Section 4.6.4)** further illustrate the types of potential impacts expected from implementation of the overall Master Plan.

As described below in **Table 4.6-14**, adoption of the Master Plan could result in both beneficial and potentially adverse impacts. Adverse impacts on hydrology and water quality would be addressed in second-tier CEQA documentation for future projects developed in a manner consistent with the Master Plan (see **Section 4.6.5**). Since mitigation will reduce these impacts to less than significant levels (see Master Plan program mitigation measures described in **Table 4.6-14** and Section **4.6.5**), the overall impacts on hydrology and water quality from adopting the Master Plan are considered less than significant. Site-specific mitigation measures will be identified and implemented by the specific lead agencies for each future project in the Master Plan study area.

Table 4.6-14
Impacts on Hydrology and Water Quality from Adopting the Master Plan Elements

Master Plan Elements	Impacts on Hydrology and Water Quality	Impact Summary
Habitat Element: Preserve and enhance habitat systems through public education, connectivity and balance with other uses	**Beneficial:** Habitat enhancements could result in a reduction of impervious surfaces thus reducing urban runoff and stormwater pollutant discharges to surface waters (beneficial impact on flooding and water quality). **Neutral:** This element also includes objectives and performance criteria that are neutral with respect to impacts on hydrology and water quality (e.g., identification of indicator species, enhances specific species that have experienced decline). **Potentially Adverse:** Habitat enhancement that involves active restoration (e.g., extensive removal of existing vegetation and replanting with high-value, native vegetation) would result in ground disturbance, which could have a temporary adverse impact on water quality, if appropriate measures are not taken to minimize the release of sediments from disturbed surfaces or pollutant releases from construction equipment or vehicles. Preparation of SWPPPs including implementation of standard erosion control measures that would contain sediment on-site and minimize sedimentation to adjacent waterways would reduce impacts to less than significant levels (**Section 4.6.5**). Adoption of this element would encourage removal of invasive species. If chemical herbicides are used, this could temporarily result in adverse water quality impacts. Implementation of **MP-W4** would reduce this	Potentially significant for construction related soil disturbance; less than significant with mitigation Potentially significant for effects associated with chemical use for exotics removal; less than significant with mitigation Beneficial (no adverse impact) for operations-related effects

Master Plan Elements	Impacts on Hydrology and Water Quality	Impact Summary
	impact by limiting chemical use, requiring the selection of chemicals that are less persistent in the environment, and restricting use to favorable weather conditions.	
Recreation Element: Encourage and enhance safe and diverse recreation systems, while providing for expansion, equitable and sufficient access, balance and multi-purpose uses	**Beneficial:** Development of recreational facilities could result in a reduction of impervious surfaces thus reducing urban runoff and stormwater pollutant discharges to surface waters (beneficial impact on flooding and water quality). **Neutral:** This element also includes objectives and performance criteria that are neutral with respect to impacts on hydrology and water quality (e.g., educating the public about catch and release fishing, establishing design standards for trails). **Potentially Adverse:** Construction of recreation related facilities (e.g., interpretive centers, trails and trail amenities, signs, kiosks) would result in ground disturbance, which could have a temporary adverse impact on water quality, if appropriate measures are not taken to minimize the release of sediments from disturbed surfaces or pollutant releases from construction equipment or vehicles. Preparation of SWPPPs including implementation of standard erosion control measures that would contain sediment on-site and minimize sedimentation to adjacent waterways would reduce impacts to less than significant levels (**Section 4.6.5**). Projects that involve construction of parking facilities, buildings, roads, and/or paved trails could have adverse impacts on flooding and water quality if they caused an increase in impervious surfaces or otherwise altered the existing drainage pattern and increased the amount of runoff leaving the site. However, the Master Plan includes the Flood Protection Element and Water Supply and Water Quality Element (see below), which would encourage projects designed to result in an overall reduction of stormwater runoff and associated pollutants.	Potentially significant for construction related soil disturbance; less than significant with mitigation Less than significant to beneficial for operations-related effects
Open Space Element: Enhance and protect open space systems through conservation, aesthetics, connectivity, stewardship, and multi-purpose uses.	**Beneficial:** Open space enhancements could result in a reduction of impervious surfaces thus reducing urban runoff and stormwater pollutant discharges to surface waters (beneficial impact on flooding and water quality). Adoption of this element would also encourage volunteer cleanup activities, which would reduce the amount of trash in the river corridor (beneficial impact on surface water quality). **Neutral:** This element also includes objectives and performance criteria that are neutral with respect to impacts on hydrology and water quality (e.g., identifies historical sites and cultural landscapes). **Potentially Adverse:** Use of existing open space areas	Potentially significant for construction related soil disturbance; less than significant with mitigation Beneficial (no adverse impact) for operations-related effects

Master Plan Elements	Impacts on Hydrology and Water Quality	Impact Summary
	for active recreational facilities and activities would result in ground disturbance, which could have a temporary adverse impact on water quality, if appropriate measures are not taken to minimize the release of sediments from disturbed surfaces or pollutant releases from construction equipment or vehicles. Preparation of SWPPPs including implementation of standard erosion control measures that would contain sediment on-site and minimize sedimentation to adjacent waterways would reduce impacts to less than significant levels (**Section 4.6.5**).	
Flood Protection Element: Maintain flood protection and existing water and other rights while enhancing flood management activities through the integration with recreation, open space and habitat systems.	**Beneficial:** Adoption of this element would encourage projects that maintain existing flood protection, develop stormwater detention facilities, and/or reduce impermeable surfaces, which would improve surface water quality and reduce flooding. **Neutral:** This element also includes objectives and performance criteria that are neutral with respect to impacts on hydrology and water quality (e.g., establishes visual design standards for flood control devices). **Potentially Adverse:** Construction of new flood control facilities (e.g., stormwater detention areas) would result in ground disturbance, which could have a temporary adverse impact on water quality, if appropriate measures are not taken to minimize the release of sediments from disturbed surfaces or pollutant releases from construction equipment and vehicles. Preparation of SWPPPs including implementation of standard erosion control measures that would contain sediment on-site and minimize sedimentation to adjacent waterways would reduce impacts to less than significant levels (**Section 4.6.5**).	Potentially significant for construction related soil disturbance; less than significant with mitigation Beneficial (no adverse impact) for operations-related effects
Water Supply and Water Quality Element: Maintain existing water and other rights while enhancing water quality, water supply, groundwater recharge, and water conservation through the integration with recreation, open space and habitat systems.	**Beneficial:** Adoption of this element would encourage projects that reduce runoff discharges into waterways, expand reclaimed water use, and/or treat stormwater runoff, which would improve surface water quality and reduce flooding. **Potentially Adverse:** Construction of new facilities for enhancing water quality and/or water supply (e.g., stormwater infiltration facilities, constructed wetlands, pipelines for reclaimed water distribution) would result in ground disturbance, which could have a temporary adverse impact on water quality, if appropriate measures are not taken to minimize the release of sediments from disturbed surfaces or pollutant releases from construction equipment and vehicles. Preparation of SWPPPs including implementation of standard erosion control measures that would contain sediment on-site and minimize sedimentation to adjacent waterways	Potentially significant for construction related soil disturbance; less than significant with mitigation Potentially significant for groundwater quality and hydrology related effects from stormwater infiltration; less than significant with mitigation

Master Plan Elements	Impacts on Hydrology and Water Quality	Impact Summary
	would reduce impacts to less than significant levels (**Section 4.6.5**). Adoption of this element would encourage projects that involve stormwater infiltration. In most cases, infiltration is a desirable way of managing urban runoff since it contributes to groundwater recharge, reduces pollutant discharges to downstream surface waters, and reduces downstream flooding. However, as discussed in **Section 4.6.4.4**, if site-specific conditions are not taken into account in designing and operating stormwater infiltration facilities, stormwater infiltration projects have the potential to degrade groundwater quality. Implementation of **MP-W6** would reduce this impact by monitoring to assess the ongoing effectiveness of the stormwater treatment methods and provision of additional treatment or project redesign if monitoring results indicate substantial water quality degradation. Projects that increase recharge of stormwater or recycled water would generally result in beneficial impacts on groundwater elevations of the underlying groundwater basins. However, projects that involve large amounts of groundwater recharge could have adverse effects on groundwater hydrology (groundwater elevations and flow directions). Potential adverse impacts include: the inundation of landfill materials and leaching of contaminants into the groundwater basin; and change in groundwater flow directions and consequently change in the shape and configuration of the existing VOC contamination plumes (see **Section 4.6.4.5**). Implementation of **MP-W7** would reduce this impact by evaluation of proximity to known hazardous materials sites and potential for inundation of contamination sources and siting infiltration facilities away from these potential contamination sources or partially lining infiltration basins.	
Economic Development Element: Pursue economic development opportunities derived from and compatible with the natural aesthetic and environmental qualities of the river.	**Neutral:** This element includes objectives and performance criteria that are neutral with respect to impacts on hydrology and water quality (e.g., providing incentives to participating adjacent land owners). **Potentially Adverse:** This element promotes the pursuit of economic development opportunities which consider connectivity to the river corridor and establishment of development standards. Minor modifications of existing or new business development in the river corridor needed for consistency with Master Plan elements (e.g., trail connections and aesthetic features and compliance with design guidelines) are anticipated to have minimal or no impacts on hydrology and water quality.	Less than significant

4.6.4 Impacts of Implementing the Concept Design Studies

4.6.4.1 Flood Control

Projects Involving Stormwater Retention. The Master Plan Concept Design Studies for the Woodland Duck Farm, the San Gabriel River Discovery Center at Whittier Narrows, Lario Creek, and El Dorado Regional Park include constructed wetlands. These wetlands may be designed with retention, reuse, and/or infiltration of stormwater. These and other future projects that involve stormwater retention would have beneficial impacts on flood control by reducing the amount of runoff and/or the peak flow entering existing storm drains and flood control channels (i.e., the San Gabriel River and tributaries). Projects with these elements may be designed to allow inundation of project facilities during flood flows. Since specifically designed as part of the project, flooding impacts on project-related structures (i.e., parking lots, fields, wetlands, etc.) would be considered less than significant.

Projects that Increase Impervious Surfaces or Change Drainage Patterns. The Master Plan Concept Design Studies for the San Gabriel Canyon Spreading Grounds, Woodland Duck Farm and the San Gabriel River Discovery Center at Whittier Narrows involve construction of parking facilities or buildings. These and other future projects that involve construction of parking facilities, buildings, roads, and/or paved trails could have adverse impacts on flooding if they caused an overall increase in impervious surfaces or otherwise altered the existing drainage pattern and increased the amount of runoff leaving the site. However, since the Master Plan encourages the following practices as part of the Master Plan performance criteria for the Flood Protection and Water Supply and Water Quality goals (see Tables 3.3-4 and 3.3-5 in Section 3), it is anticipated that these projects will be designed to include stormwater management features (e.g., dry wells, swales, etc.) to result in a net decrease in runoff from the site:

- Reduces volume and velocity of storm water runoff where feasible
- Reduces the amount of precipitation that is converted to urban runoff (decreases the acreage of impermeable surfaces)
- Reduces dry weather urban runoff discharge into waterways
- Utilizes on-site opportunities to reduce impermeable surfaces and increase infiltration
- Encourages onsite collection of stormwater for irrigation and percolation, where consistent with water rights
- Utilizes open spaces and landscaped areas to filter and cleanse runoff

Projects Involving Modifications to an Existing Channel. The Master Plan Concept Design Study for El Dorado Regional Park considers removal of concrete from the bottom and the eastern slope of the San Gabriel River channel as an alternative that may be implemented in the long-term. Concrete removal will increase the roughness of the channel, which increases the area required to convey the same amount of flow. If channel modifications exposed people or structures to flooding, the impact would be significant. However, since the Master Plan Flood Protection Element includes maintenance of existing flood protection as an objective and performance criterion, project design will increase channel width such that there will be no reduction in overall channel flood capacity. Since it is expected that it will be designed in this manner, impacts on flooding would be less than significant.

The Lario Creek Concept Design Study also proposes channel modifications. Neither of the options proposed for the Concept Design Study would reduce channel capacities. Therefore, the impact on flooding is less than significant.

The Woodland Duck Farm Concept Design Study may include diversion of flows from Avocado Creek to an off-channel wetland. Minor modifications to the channel, if any, would not reduce channel capacities. Therefore, the impact on flooding is less than significant.

4.6.4.2 Construction Impacts on Surface Water Quality

Projects Involving Soil Disturbance during Construction. Construction activities that involve soil disturbance (e.g., excavation, grading, and filling) would temporarily increase the potential for soil erosion. In addition, during the rainy season, construction materials, equipment, and maintenance supplies (e.g., fuels, lubricants, paints, solvents, and adhesives) may come in contact with runoff. If appropriate measures are not taken to minimize the release of sediments and other materials from construction sites, this could result in a temporary impact on surface water quality. All five Concept Design Studies involve varying amounts of soil disturbing activities during construction.

As required by the EPA and the Regional Board, a Stormwater Pollution Prevention Plan (SWPPP) will be developed and implemented during construction of project components greater than 1 acre in area. This plan is required as part of the NPDES Permit for discharge of stormwater associated with construction activities. Incorporation of stormwater best management practices in the SWPPP would reduce the potential for soil erosion and release of other pollutants during construction. Specific control measures to be considered for inclusion in site-specific SWPPPs are listed below in **Mitigation Measure CD-W1**. These measures would minimize the amount of runoff and associated pollutants (e.g., sediments) leaving the construction site by containing the runoff onsite (e.g., sedimentation basins), containing the sediments onsite (e.g., silt fences and hay bales), or minimizing the potential for stormwater to come in contact with pollutants (e.g., conduct activities during the dry season, control pollutant releases (oils, grease, etc.) from construction equipment). With the incorporation of such control measures in the SWPPPs, construction impacts on surface water quality are expected to be less than significant.

Projects Involving Modifications to an Existing Channel. The Master Plan Concept Design Studies for El Dorado Regional Park, Lario Creek, and potentially Woodland Duck Farm include channel modifications. These and other future projects that propose earth moving activities within the channel of the River or tributaries could result in a temporary increase in the potential for soil erosion and release of sediments. The resultant increase in turbidity (and potential release of pollutants in the soils underlying the concrete) in river flows could be a significant water quality impact. For projects involving channel modifications, COE, Regional Board, U.S. Fish and Wildlife Service, and California Department of Fish and Game will be consulted (**Mitigation Measure CD-W6**). All necessary federal and state approvals, including CWA Section 404 permits and CWA Section 401 water quality certifications or waivers will be obtained prior to the implementation of construction activities. Any conditions of agency approvals (e.g., measures to minimize the potential water quality impacts associated with the channel modification) will be incorporated into the project design to reduce impacts to below a level of significance. Water quality mitigation options for use during construction of in-channel improvements include diversion of flows around the construction site to prevent flows from coming in contact with the disturbed areas, installation of in-stream silt curtains to prevent sediments from flowing downstream, or use of off-channel sediment retention ponds or tanks to capture sediments from the disturbed areas.

4.6.4.3 Operational Impacts on Surface Water Quality

Projects that Reduce or Treat Stormwater Runoff. The Master Plan Concept Design Studies for the Woodland Duck Farm, Lario Creek, the San Gabriel River Discovery Center at Whittier Narrows, and El Dorado Regional Park include collection and treatment of stormwater runoff. Operation of these and other projects involving stormwater collection and treatment would reduce the amount of stormwater pollutants currently discharged into the San Gabriel River. In addition, projects that reduce soil erosion potential (e.g., by planting vegetation on currently unimproved surfaces prone to erosion thus reducing sediment load in stormwater runoff) or increase onsite percolation of runoff (e.g., by replacing concrete or asphalt surfaces with more porous materials thus reducing overall stormwater runoff volumes) would have beneficial operational impacts on surface water quality.

Projects that Increase Impervious Surfaces or Change Drainage Patterns. As discussed in **Section 4.6.3.1** above, individual components of future projects may increase impervious surfaces over existing conditions, potentially increasing stormwater pollutants discharged to the receiving water. However, since the Master Plan includes the performance criteria outlined above, it is anticipated that these projects will be designed for an overall improvement in surface water quality.

Use of Pesticides or Herbicides in Landscaped Areas or for Exotic Species Removal. All five Master Plan Concept Design Studies could include landscaping/habitat restoration as potential project elements. In addition, the Concept Design Studies for San Gabriel River Discovery Center, Lario Creek, and El Dorado Regional Park propose removal of exotic plant species. With incorporation of **Mitigation Measure CD-W2,** use of chemical herbicides/pesticides will be minimized, and impacts from this type of chemical use would be less than significant. As described in Mitigation Measure CD-W2, use of chemicals will be limited to approved herbicides and pesticides, and application will be conducted in accordance with manufacturers' recommendations and general standards of use, e.g., restricted application before and during rain storms.

Projects Involving Modifications to an Existing Channel. The Master Plan Concept Design Study for El Dorado Regional Park considers removal of concrete from the bottom and the eastern slope of the San Gabriel River channel as an alternative that may be implemented in the long-term. If concrete removal results in substantial erosion, water quality impacts could be significant. However, project design will consider necessary slope stabilization (via terracing, landscaping, limiting steep slopes, installation of retaining walls) and scour control (via measures to hold soils in place by covering soils with vegetation, river rock, or other materials to control soil erosion.

4.6.4.4 Groundwater Quality Impacts of Stormwater Infiltration

The Master Plan Concept Design Studies for the Woodland Duck Farm, Lario Creek, the San Gabriel River Discovery Center at Whittier Narrows, and El Dorado Regional Park include constructed wetlands, which may be unlined and designed to allow infiltration to the groundwater. Additionally, other future projects may include groundwater recharge of stormwater (e.g., at former gravel pits). In most cases, infiltration is a desirable way of managing urban runoff since it contributes to groundwater recharge, reduces pollutant discharges to downstream surface waters, and reduces downstream flooding. However, as discussed above in **Section 4.6.1.4**, urban runoff can contain various pollutants, and therefore stormwater infiltration practices need to address the potential adverse effects on groundwater quality. Review of previous studies indicates that infiltration of stormwater generally does not pose considerable risk of groundwater contamination, given sufficient soil depth and proper design and maintenance of infiltration facilities (LASGRWC, 2002). However, if site-specific conditions are not taken into account in designing and operating stormwater infiltration facilities, certain pollutants do have the potential to reach groundwater (LASGRWC, 2002).

Whether or not stormwater infiltration can have an adverse effect on groundwater quality depends on the pollutants of concern and site-specific factors including: drainage area land use and associated stormwater quality, distance to groundwater from the point of infiltration, soil characteristics, and level of treatment that occurs prior to infiltration (Pitt et al., 1996). Below is a description of these factors.

Pollutants of Concern. Pitt, et al. (1996) conducted an extensive literature review of studies investigating the potential groundwater impacts from infiltrating stormwater. Based on the literature review and consideration of factors such as solubility, mobility, and general abundance in stormwater, the authors evaluated the groundwater contamination potential of various pollutants associated with stormwater infiltration practices. In general, stormwater pollutants that present higher risks of groundwater contamination are those that are highly soluble and have high mobility in the vadose zone (Pitt, et al., 1996). Such pollutants are more likely to remain dissolved in water and travel through the soil and reach the water table. Based on solubility and mobility, pollutants with high groundwater contamination potential are nitrate, certain organics such as VOCs and polyaromatic hydrocarbons (PAHs), viruses, some metals, and chloride.

Organics, and metals are known to be present in stormwater from county-wide samples (**Table 4.6-12**). However, chloride and nitrate are not anticipated to be pollutants of concern in infiltrated stormwater for the proposed project. The primary manmade source of chloride in stormwater is road salts used in colder climates. Observed levels of nitrate in stormwater in county-wide samples are well below Basin Plan objectives and the drinking water maximum contaminant level (MCL). Filtration and adsorption during stormwater treatment and infiltration under the proposed project will further remove nitrate.

Although high levels of bacteria can be found in stormwater, bacteria are intercepted during the infiltration process by filtration, adsorption, and microbial decomposition, and are prevented from reaching the underlying groundwater in most cases (Pitt et al., 1996).

Drainage Area Land Use. Runoff generated from residential areas is generally less polluted than runoff from other land uses, and is considered appropriate for infiltration, especially if surface infiltration is used (Pitt, et al., 1996). Runoff from industrial land uses can contain high concentrations of soluble toxicants such as metals and organics, and require caution and pretreatment if it is used for infiltration (Pitt, et al., 1996).

Depth to Groundwater. The vadose zone (layer of soil above the water table and below the ground surface; also called the unsaturated zone) provides an important pollutant removal mechanism and protects the water table from direct contamination. Therefore, the bottom of the infiltration area should be well above the seasonal high water table. Sites where the groundwater surface is less than 4 feet below the infiltration surface, or where very sandy soils with low organic content exist, are the least suitable for groundwater recharge unless runoff is first treated to remove pollutants (Urbonas and Stahre, 1993). In areas where background metals are present in the soil, depth to groundwater should not be less than 10 feet below the infiltration device (Hathhorn and Yonge, 1995). Surface devices are generally preferable to subsurface infiltration systems (e.g., dry wells) since surface infiltration takes greater advantage of pollutant removal processes in the vadose zone (Pitt, et al., 1996).

Vadose Zone Soil Properties. Properties of the vadose zone soil can affect its effectiveness in pollutant removal. Sandy soils with low organic matter content have lower pollutant removal capacities than clayey soils with high organic content (Pitt, et al., 1996). Soils with a higher proportion of clay and organic matter have greater capacity for removing metals and organic compounds by sorption processes.

Treatment Prior to Infiltration. Many types of stormwater pollutants, including metals and organics, are bound to particulates that can be removed through settling or filtering processes. Therefore, treatment methods designed to remove particulate pollutants (e.g., stormwater separation devices, sedimentation basins, and vegetated surfaces) reduce the risk of groundwater contamination (Pitt, et al., 1996). In addition, treating for sediment removal prior to infiltration prevents infiltration systems from becoming clogged and maintains their performance. Typical pollutant removal rates of various stormwater treatment methods are summarized in **Table 4.6-15.**

Table 4.6-15
Typical Pollutant Removal Rates of Stormwater Treatment Methods

Type of Treatment Method	Typical Pollutant Removal (Percent)				
	Suspended Solids	Nitrogen	Phosphorus	Pathogens	Metals
Sedimentation Basins	30 - 65	15 - 45	15 - 45	< 30	15 – 45
Constructed Wetlands	50 - 80	< 30	15 - 45	< 30	50 – 80
Infiltration Basins	50 - 80	50 - 80	50 - 80	65 - 100	50 – 80
Dry Wells	50 - 80	50 - 80	15 - 45	65 - 100	50 - 80
Grassed Swales	30 - 65	15 - 45	15 - 45	< 30	15 - 45
Surface Sand Filters	50 - 80	< 30	50 - 80	< 30	50 - 80
Other Media Filters	65 - 100	15 - 45	< 30	< 30	50 - 80

Source: EPA, 1999.

Conclusion. With treatment prior to infiltration (including constructed wetlands), recharge of stormwater is not expected to result in significant groundwater contamination. Treatment methods designed to remove suspended solids and floatables (e.g., oil and grease) are expected to remove many of the pollutants (e.g., heavy metals and organics) that are sorbed onto particulates. For projects that include industrial land uses in the drainage areas, additional treatment, including constructed wetlands and use of proprietary stormwater filters, could be used to further improve water quality. Some of the dissolved constituents that are not removed in treatment processes prior to infiltration will be further removed in the vadose zone as water infiltrates into the soils, provided that the vadose zone below the infiltration site is sufficiently deep. With appropriate treatment and monitoring (see **Section 4.6.5.4**), impacts on groundwater quality from pollutants in stormwater are anticipated to be less than significant.

4.6.4.5 Impacts Related to Groundwater Hydrology

The Master Plan Concept Design Studies for the Woodland Duck Farm, Lario Creek, the San Gabriel River Discovery Center at Whittier Narrows, and El Dorado Regional Park include constructed wetlands. Groundwater recharge is a potential use of stormwater collected at these and other future projects. Projects that increase recharge of stormwater or recycled water would generally result in beneficial impacts on groundwater elevations of the underlying groundwater basins. However, projects that involve large amounts of groundwater recharge could have adverse effects on groundwater hydrology (groundwater elevations and flow directions). Potential adverse impacts include the following:

- Substantial rise in groundwater levels underneath existing active or historical landfills could cause inundation of landfill materials (if unlined) and potential leaching of contaminants into the groundwater basin or impact landfill gas (methane) releases.
- Groundwater recharge may affect the groundwater flow directions and consequently change the shape and configuration of the existing VOC contamination plumes in the San Gabriel Valley Groundwater Basin (see **Section 4.6.1.4** above). If such an effect on the contamination plumes occurred, it could interfere with the ongoing remediation and cleanup efforts.

The significance of impacts on groundwater hydrology would be site-specific, and depend on the volume and rate of water infiltrated and proximity to contamination plumes and landfills. Note, there are no known active landfills in the immediate vicinity of the corridor. However, since historical landfills cannot be excluded from the project area, **Mitigation Measures CD-W3 and CD-W4** will be implemented to reduce impacts to a less than significant level. Under Mitigation Measure CD-W3, a site-specific assessment will be conducted to identify active or abandoned landfills or other land uses with the potential for contaminated soils which would be incompatible with infiltration. If the results of the investigation in Mitigation Measure CD-W3 indicate that a closed landfill (either municipal solid waste or inert construction waste) is located within 500 feet of the project site boundary, then a site-specific geotechnical study (Mitigation Measure CD-W4) will be conducted to estimate the potential for project infiltration to result in interaction between infiltrated stormwater and landfill materials. Under Mitigation Measure CD-W4, project infiltration would cease when monitoring indicates that groundwater levels have risen to the alert level (defined as within 10 feet of landfill materials), which would prevent infiltrated stormwater from interacting with the landfill materials.

4.6.4.6 Potential Soil Contamination at Infiltration Sites

The Master Plan Concept Design Studies for the Woodland Duck Farm, Lario Creek, the San Gabriel River Discovery Center at Whittier Narrows, and El Dorado Regional Park include collection and treatment of urban runoff. Groundwater recharge is a potential use of stormwater collected at these and other future projects. Due to the highly urbanized environment and the presence of industrial land uses in the Master Plan study area, there is potential for contaminated soils to be present at these and other future project sites. If stormwater were infiltrated in large amounts through contaminated soils and caused pollutants to leach out into the underlying groundwater, this would be considered a significant impact on groundwater quality. Implementation of **Mitigation Measure CD-W3** (site-specific investigation of soil contamination potential and proper disposal of contaminated soil, if any) would reduce this potential impact to a less than significant level.

4.6.4.7 Water Supply and Water Rights

Future projects that propose to use treated stormwater or recycled water for groundwater recharge will have a beneficial impact on water supply. Similarly, El Dorado Regional Park Concept Design Study proposes use of recycled water in onsite lakes, thus conserving potable water. As is the current practice, swimming will not be allowed in the lakes. Other projects that include irrigation of landscaped areas with recycled water would have a similar benefit. Quantification of water supply benefits will be conducted, if relevant, as each project is more specifically defined.

The groundwater basins in the Master Plan study area are fully adjudicated. Therefore, pumping groundwater for seasonal make-up of wetlands, if included as part of project design, would be implemented within the confines of existing groundwater rights. Similarly, water consumption associated with future projects that include planting of riparian vegetation in existing channels (i.e., increased evapotranspiration) would be implemented within the confines of existing surface water rights.

4.6.4.8 Dam Safety

The Master Plan Concept Design Studies for the Woodland Duck Farm, Lario Creek, the San Gabriel River Discovery Center at Whittier Narrows, and El Dorado Regional Park include collection and treatment of stormwater runoff using treatment wetlands or other retention facilities. Depending on their dimensions, the proposed basins and associated berms may be considered "jurisdictional dams" and require approval from CDWR Division of Safety of Dams (DSOD). Jurisdictional dams are defined as structures that are 25 feet or higher from the lowest point at the downstream toe with a reservoir storage capacity of more than 15 acre-feet, or higher than 6 feet with a storage capacity of 50 acre-feet or more (California Water Code, Sections 6002 and 6003). Prior to construction of dams within the jurisdiction of the DWR, plans and specifications must be reviewed and approved by the DSOD. All dam safety related issues must be resolved prior to approval of the application, and the work must be performed under the supervision of a civil engineer registered in California (S. Verigin, pers. comm., 2002).

During detailed design of projects involving large basins, the project proponent would determine whether each proposed structure would be jurisdictional according to DSOD criteria. If structures were determined to be jurisdictional, the project proponent would file the plans and specifications with DSOD and consult with DSOD staff regarding any dam safety related issues. With consultation and incorporation of any design recommendations from the DSOD, impacts related to dam safety are expected to be less than significant.

4.6.5 Master Plan Program Mitigation Measures

4.6.5.1 Flood Control

MP-W1 Future projects that propose modifications to an existing flood control channel will include detailed engineering studies, including hydrologic and hydraulic modeling as applicable, to assess potential impacts on the channel's flood control capacities and effects on upstream and downstream floodplain properties and recommendations to avoid or minimize these impacts. Recommendations of the engineering studies will be incorporated into project design. Modifications to Federal Emergency Management Agency (FEMA) floodplain maps will be made as needed.

4.6.5.2 Construction Impacts on Surface Water Quality

MP-W2 For future projects involving constructing, clearing, grading or excavation on areas over 1 acre in size, develop and implement a Storm Water Pollution Prevention Plan (SWPPP) to minimize the amount of runoff and associated pollutants (e.g., sediments) leaving the construction site by containing the runoff onsite, containing the sediments onsite, and/or minimizing the potential for stormwater to come in contact with pollutants. The following are possible measures to be incorporated into site-specific SWPPPs as applicable. Additional sample measures and guidelines for developing SWPPPs are available in California Stormwater Quality Association's Stormwater Best Management Practice Handbook – Construction (CASQA, 2003). Measures to reduce fugitive dust generated during construction (see Section 4.1.5 – Air Quality) will also minimize the potential for soil erosion.

- Install perimeter silt fences or hay bales.
- Stabilize soils through hydroseeding and use of soil stabilizers.
- Install temporary sedimentation basins.
- Conduct earth moving activities during the dry season (April through October), as feasible.
- Designate storage areas for construction materials, equipment, and maintenance supplies (e.g., fuels, lubricants, paints, solvents, adhesives) to keep these materials out of the rain and minimize contact with stormwater.
- Conduct regular inspections to ensure compliance with the SWPPP.

MP-W3 For future projects involving channel modifications, COE, Regional Board, U.S. Fish and Wildlife Service, and California Department of Fish and Game will be consulted. All necessary federal and state approvals, including CWA Section 404 permits and CWA Section 401 water quality certifications or waivers will be obtained prior to the implementation of construction activities. Any conditions of agency approvals (e.g., measures to minimize the potential water quality impacts associated with the channel modification) will be incorporated into the project design. Water quality mitigation options for use during construction of in-channel improvements include diversion of flows around the construction site, installation of in-stream silt curtains, or use of off-channel sediment retention ponds or tanks.

4.6.5.3 Operational Impacts on Surface Water Quality

MP-W4 For future projects involving landscaping, habitat restoration, and/or removal of exotic plant species, select biological or non-chemical means of controlling exotics and pests unless not feasible because biological or non-chemical controls are not readily available for the specific exotics to be controlled. If chemical pesticide or herbicide use is necessary, compounds that are less persistent in the environment will be selected, and application will be conducted in accordance with manufacturers' recommendations and general standards of use, e.g., restricted application before and during rain storms.

MP-W5 For future projects involving channel modifications, detailed engineering studies (including sediment transport as applicable) will be conducted to assess the impact of the proposed changes on the channel's stability and erodability and will include recommendations to avoid or minimize the impact. Recommendations of the engineering studies will be incorporated into project design to minimize impacts on surface water quality associated with potential increase in erosion of channel banks from proposed modifications.

4.6.5.4 Groundwater Quality Impacts of Stormwater Infiltration

MP-W6 For projects that involve stormwater infiltration, a comprehensive stormwater and groundwater quality monitoring program will be designed and implemented, or the results of existing monitoring programs will be considered. Monitoring results will be used to assess the ongoing effectiveness of the proposed stormwater treatment methods in protecting both surface and groundwater. If monitoring results indicate substantial water quality degradation associated with project infiltration, the following strategy will be followed:

- Provide additional treatment prior to infiltration, or
- Redesign project to reduce or eliminate infiltration (e.g., lining), or
- Identify an alternative water source (e.g., reclaimed water).

4.6.5.5 Impacts Related to Groundwater Hydrology

MP-W7 For projects involving groundwater recharge, the project site's proximity to existing groundwater contamination plumes and landfills (or other known hazardous materials sites that could become a contamination source if inundated with groundwater) will be evaluated. If a project site is located within or adjacent to a plume or in the vicinity of a contamination source, the effect of the proposed recharge on groundwater hydrology (changes in flow direction and levels) will be evaluated. As applicable, groundwater modeling would be conducted to determine whether the rate and amount of recharge proposed by the project could result in substantial changes to the location or shape of existing contamination plumes, or in the inundation of landfills or other contamination sources. As part of the investigation, relevant agencies, including the Regional Board, Watermasters, and agencies involved in groundwater clean-up activities (e.g., EPA and WQA), will be consulted. As applicable, **Mitigation Measure CD-W4** will be implemented to prevent interaction of infiltrated water with landfill materials.

4.6.5.6 Potential Soil Contamination at Infiltration Sites

MP-W8 For projects involving substantial ground disturbance where prior land use is unknown and the potential for soil contamination from previous land uses exists, a Phase I Environmental Site Assessment (ESA) will be conducted to determine the site-specific potential for soil contamination. The Phase I ESA will be conducted in accordance with the latest version of the American Society of Testing and Materials (ASTM) 1527 "Standard Practice for Environmental Site Assessments: Phase I Environmental Assessment Process." This document outlines the customary practice for performing ESA's in the United States. Phase I ESA will consist of a review of site-specific documents and historical maps to determine past uses of the site, a site visit to visually inspect the property for signs of potential environmental contamination, and investigation of state and federal environmental regulatory databases to identify recognized hazardous materials usage or spills. For project sites with infiltration, the boundary of the Phase I ESA will include parcels located within 500 feet of the project site boundary to identify active or abandoned landfills or other land uses with the potential for contaminated soils which would be incompatible with infiltration (to be cross-referenced with Mitigation Measure CD-W4). If the Phase I ESA concludes that there is no substantial potential for soil contamination, no further action would be required. If the Phase I ESA indicates that there is potential for soil to be contaminated, additional investigation (Phase II ESA, including soil sampling and analysis) will be conducted to determine the presence and extent of the contamination. If the proposed project would involve disturbance of soil in the contaminated area, soil would be removed and disposed of in compliance with applicable regulations at approved disposal sites.

4.6.6 Mitigation Measures for Concept Design Studies

CD-W1 Develop and implement a Storm Water Pollution Prevention Plan (SWPPP) for projects that involve constructing, clearing, grading or excavation on areas over 1 acre in size to minimize the amount of runoff and associated pollutants (e.g., sediments) leaving the construction site by containing the runoff onsite, containing the sediments onsite, and/or minimizing the potential for stormwater to come in contact with pollutants. The following are possible measures to be incorporated into site-specific SWPPPs. Additional sample measures and guidelines for developing SWPPPs are available in California Stormwater Quality Association's *Stormwater Best Management Practice Handbook – Construction* (CASQA, 2003). Measures to reduce fugitive dust generated during construction (see **Section 4.1.5 – Air Quality**) will also minimize the potential for soil erosion.

- Install perimeter silt fences or hay bales.
- Stabilize soils through hydroseeding and use of soil stabilizers.
- Install temporary sedimentation basins.
- Conduct earth moving activities during the dry season (April through October), as feasible.
- Designate storage areas for construction materials, equipment, and maintenance supplies (e.g., fuels, lubricants, paints, solvents, adhesives) to keep these materials out of the rain and minimize contact with stormwater.
- Conduct regular inspections to ensure compliance with the SWPPP.

CD-W2 For projects involving landscaping, habitat restoration, and/or removal of exotic plant species, select biological or non-chemical means of controlling exotics and pests unless not feasible because biological or non-chemical controls are not readily available for the specific exotics to be controlled. If chemical pesticide or herbicide use is necessary, compounds that are less persistent in the environment shall be selected, and application shall be conducted in accordance with manufacturers' recommendations and general standards of use, e.g., restricted application before and during rain storms.

CD-W3 For projects involving substantial ground disturbance, conduct a Phase I Environmental Site Assessment (ESA) to determine the site-specific potential for soil contamination. The Phase I ESA shall be conducted in accordance with the latest version of the American Society of Testing and Materials (ASTM) 1527 "Standard Practice for Environmental Site Assessments: Phase I Environmental Assessment Process." This document outlines the customary practice for performing ESA's in the United States. Phase I ESA shall consist of a review of site-specific documents and historical maps to determine past uses of the site, a site visit to visually inspect the property for signs of potential environmental contamination, and investigation of state and federal environmental regulatory databases to identify recognized hazardous materials usage or spills. For project sites with infiltration, the boundary of the Phase

I ESA shall include parcels located within 500 feet of the project site boundary to identify active or abandoned landfills or other land uses with the potential for contaminated soils which would be incompatible with infiltration (to be cross-referenced with Mitigation Measure CD-W4). If the Phase I ESA concludes that there is no substantial potential for soil contamination, no further action would be required. If the Phase I ESA indicates that there is potential for soil to be contaminated, additional investigation (Phase II ESA, including soil sampling and analysis) shall be conducted to determine the presence and extent of the contamination. If the proposed project would involve disturbance of soil in the contaminated area, soil would be removed and disposed of in compliance with applicable regulations at approved disposal sites.

CD-W4 If the site-specific Phase I ESA (Mitigation Measure CD-W3) indicates that an active or closed landfill (either municipal solid waste or inert construction waste) is located within 500 feet of the project site boundary, then a site-specific geotechnical study shall be conducted to: 1) characterize the extent and composition of landfill materials; 2) determine whether the landfill materials are releasing methane; 3) and estimate the potential mounding effect from the proposed stormwater infiltration. The results of the geotechnical study shall be incorporated into the project design to minimize the potential for project infiltration to result in interaction between infiltrated stormwater and landfill materials or to impact landfill gas releases, if any. Potential design modifications include siting the infiltration facilities away from the landfill and/or partially lining the facilities to direct infiltration away from the landfill. For sites with stormwater infiltration within 500 feet of an active or closed landfill, a groundwater monitoring program shall be developed and implemented to ensure that infiltration does not result in interaction between infiltrated stormwater and landfilled materials or impact landfill gas releases. Infiltration would cease at any site where groundwater levels rose to within 10 feet of landfilled materials to prevent interaction of infiltrated water with landfill materials.

CD-W5 For projects that involve stormwater infiltration, conduct vadose zone and groundwater quality monitoring. If monitoring results indicate substantial water quality degradation, pursue the following general strategy:

- Provide additional treatment prior to infiltration, or
- Redesign project to reduce or eliminate infiltration (e.g., lining), or
- Identify an alternative water source (e.g., reclaimed water).

CD-W6 For projects involving channel modifications, COE, Regional Board, U.S. Fish and Wildlife Service, and California Department of Fish and Game shall be consulted. All necessary federal and state approvals, including CWA Section 404 permits and CWA Section 401 water quality certifications or waivers shall be obtained prior to the implementation of construction activities. Any conditions of agency approvals (e.g., measures to minimize the potential water quality impacts associated with the channel modification) shall be incorporated into the project design. Water quality mitigation options for use during construction of in-channel improvements include diversion of flows around the construction site, installation of in-stream silt curtains, or use of off-channel sediment retention ponds or tanks.