3.15 Water Resources

This chapter describes the existing water resources in the SCAG region, identifies the potential impacts of the RTP on these resources, suggests mitigation measures for the impacts and evaluates the residual impacts.

Environmental Setting

This section describes water resources and quality in the SCAG region, including a review of the regulatory framework under which water resources and supply are managed. It also describes existing conditions and infrastructures, and regional supply and demand.

Physical Setting

Climate

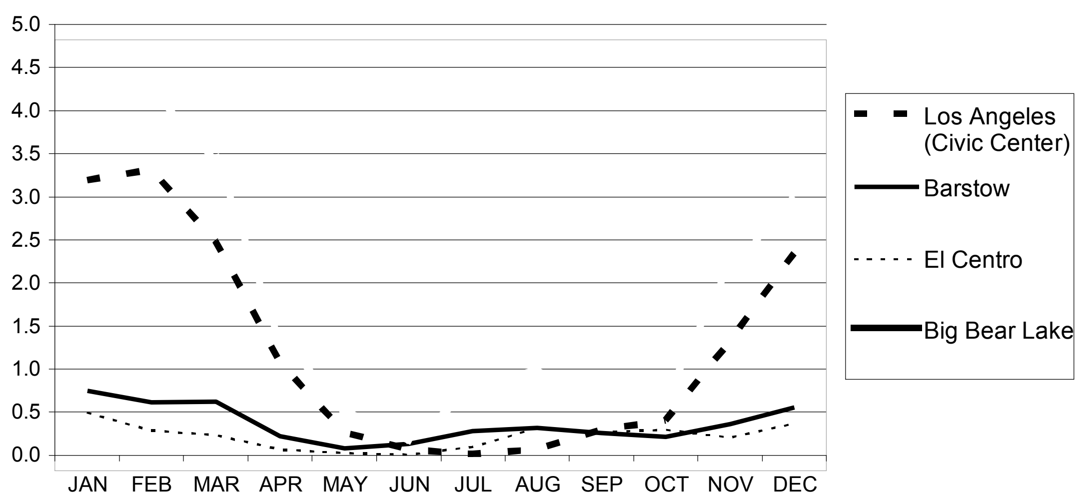
The climate of the SCAG region varies widely between the coastal and inland areas. Coastal areas are characterized by long, hot, dry summers, and short, mild, relatively wet winters, also known as Mediterranean climate, while inland areas experience more extreme temperatures and little precipitation. Storms that have the potential to produce significant amounts of precipitation and flooding are extra-tropical cyclones of North Pacific origin, which normally occur from December through March. As the large winter storms move south over the ocean, they encounter colder air masses and the orographic effect of the mountains, producing widespread precipitation. These storms often last for several days. In addition to the extra-tropical cyclones, the SCAG region receives thunderstorms, which can occur at any time of the year. Comparatively, thunderstorms cover small areas, but result in high-intensity precipitation, usually lasting for shorter periods. As such, thunderstorms can produce flash flooding, which are more common than widespread flooding within the region. **Table 3.15-1** shows annual total precipitation from 1970 – 2005 throughout the SCAG region.

Most precipitation within the SCAG region occurs as rainfall, although snowfall is common at higher elevations. Historically, the region receives most of its rainfall during the month of January and the least of its rainfall during the month of June. For the entire region, annual rainfall can range from 2 to 5 inches, 10 to 18 inches on the coastal plains, and 20 to 40 inches in the mountains. The region is also subject to multi-year cycles of wet (El Nino) and dry (La Nina) weather. **Figure 3.15-1** shows average monthly precipitation for selected areas in the SCAG region.

TABLE 3.5-1
AVERAGE TOTAL PRECIPITATION FOR SELECTED AREAS WITHIN THE SCAG REGION (1970-2005), IN INCHES

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANNUAL
Los Angeles (Civic Center)	3.29	4.02	2.93	2.67	0.31	0.08	0.01	0.11	0.28	0.49	1.16	2.17	17.52
Mountain Pass	0.93	1.15	1.05	0.44	0.28	0.21	0.99	1.09	0.57	0.50	0.65	0.74	8.60
El Centro	0.46	0.44	0.29	0.05	0.03	0.01	0.06	0.35	0.30	0.33	0.17	0.37	2.86
Redlands	2.71	2.85	2.43	0.84	0.39	0.11	0.09	0.20	0.36	0.64	1.47	1.47	13.57
Ventura	2.43	3.48	2.52	0.67	0.19	0.02	0.01	0.03	0.29	0.51	1.43	1.96	13.54
Laguna Beach	2.64	3.19	2.42	0.87	0.25	0.14	0.04	0.10	0.30	0.55	1.15	1.89	13.53
Eagle Mountain	0.54	0.64	0.45	0.07	0.07	0.05	0.26	0.83	0.41	0.23	0.18	0.42	4.15

FIGURE 3.15-1
AVERAGE MONTHLY PRECIPITATION
FOR SELECTED AREAS WITHIN THE SCAG REGION (1960-2001



Source: Western Regional Climate Center, 2001. www.wrcc.com, accessed November 2007.

Hydrologic Regions

The Department of Water Resources (DWR) has divided the state into ten hydrologic regions (HR), corresponding to the state's major water drainage basins. Of the ten hydrologic regions, four are – in whole or in part – within the SCAG region: Central Coast (part of Ventura County), South Lahontan (parts of Los Angeles and San Bernardino counties), South Coast (Orange County, along with parts of Los Angeles, Ventura, San Bernardino, and Riverside counties), and Colorado River (parts of Imperial, Riverside, and San Bernardino counties). These four regions are described below.

Central Coast Hydrologic Region

The Central Coast Hydrologic Region is located, as its name implies, along the central coast of California, extending from Santa Cruz in the north to Santa Barbara in the south and from the Pacific Ocean in the west to the edge of the Central Valley in the east. It includes all of Santa Cruz, Monterey, San Luis Obispo, and Santa Barbara counties, and parts of San Benito, San Mateo, Santa Clara, and Ventura counties. The most significant geological features are the Coast Range and the Santa Barbara Coastal Plain.

Water Supply and Use in the Central Coast Hydrologic Region

The Coastal Branch California Aqueduct – part of the SWP – brings approximately 30,000 acre-feet of water annually into Southern California through the Central Coast Region.[1] This hydrologic region currently uses more water resources than it gains throughout the year. Groundwater is the major source of water in the region, which experiences annual reductions in its groundwater storage. The region therefore battles the threat of saltwater intrusion into its aquifers; a problem documented as far back as the 1930s.[2]

South Lahontan Hydrologic Region[3]

The South Lahontan Hydrologic Region is located in the southeast portion of California and is characterized by desert, sand dunes and dry lakes. The northern half of the region includes Mono Lake, Owens Valley, Panamint Valley, Death Valley, and the Amargosa River Valley. The Mojave Desert occupies the southern half of the hydrologic region, and is characterized by many small mountain ranges and valleys with playas, or dry lakes. The southern half falls within the SCAG region in San Bernardino and Los Angeles counties.

Water Supply and Use in the South Lahontan Hydrologic Region

The Los Angeles Aqueduct is the region's major water development feature. The initial 223-mile long aqueduct was completed by the Los Angeles Department of Water and Power (LADWP) and began diverting water from Owens Valley into the City of Los Angeles. The aqueduct was extended 115 miles in 1940 and 137-miles in 1970. The Los Angeles Aqueduct system passes through 12 hydropower plants in its way to Los Angeles. The annual energy generated is more than 1 billion kilowatt-hours (enough to supply the energy demand of approximately 220,000 homes).

As shown in **Table 3.15-2**, five water agencies in the southwest portion of this region have contracts with the State Water Project (SWP) for a total of about 250,000 acre-feet of surface water annually. Four of these agencies are located within SCAG region. The East Branch of the SWP is used to recharge groundwater in the Mojave River Valley.

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1 25 TAF in 1998, 31 TAF in 2000, and 28 TAF in 2001. http://www.waterplan.water.ca.gov/docs/regions/map_stats_wbs_CC.pdf

2 DWR, California's Groundwater Update. 2003. Chapter 7, *Central Coast Hydrologic Region*. Page 140. http://www.dpla2.water.ca.gov/publications/groundwater/bulletin118/Bulletin118_3-CC.pdf

3 DWR. California Water Plan Update. Chapter 10,Volume 3, page. 10-1.2005.

TABLE 3.15-2
WATER AGENCIES IN THE SOUTH LAHONTAN HYDROLOGIC REGION

Water Agency	State Water Project Description
Mojave Water Agency (MWA)	MWA relies predominately from groundwater; it also receives water as one of the 29 SWP contractors, per their new Integrated Regional Water Management Plan update (IRWMP).
Antelope Valley-East Kern Water Agency (AVEK)	Largest SWP contractor; provides water to five major municipal agencies and 16 smaller water service agencies.
Palmdale Water District (PWD) & Little Rock Irrigation District (LRID)	Littlerock Reservoir has 2,700 acre-fee capacity and provides water to LRID. Water from Littlerock Reservoir is releases into PWD's Lake Palmdale (a 42,000 acre-foot lake reservoir).
Arrowhead Lake Association	Lake Arrowhead, owned by Arrowhead Lake Association is a 48,000 acre-foot reservoir providing recreational opportunities and water to Arrowhead Woods property owners.

SOURCE: DWR, California Water Plan 2005. Page 10-5.

South Coast Hydrologic Region[4]

The South Coast Hydrologic Region compromises the southwest portion of the state and is California's most urbanized and populous region. The topography includes a series of nearly flat coastal plains and valley, broad interior valleys, and several mountains of low and moderate elevation. The region extends from the Santa Barbara-Ventura County line south to San Diego and the US international border with Mexico. Most of this area is within the SCAG region, including portions of Ventura County, Orange County, Los Angeles, San Bernardino, and Riverside County. Several prominent rivers exist within the region including Ventura River, Santa Clara River, Los Angeles River, San Gabriel River, Santa Ana River, San Jacinto Rivers, and Santa Margarita River.

Water Supply and Use in the South Coast Hydrologic Region

The region has a diverse mix of both local and imported water supply sources. Local water sources include water recycling, groundwater storage and conjunctive use, conservation, brackish water desalination, water transfer and storage, and infrastructure enhancements. The region imports water through the SWP, the Colorado River Aqueduct (CRA), and the Los Angeles Aqueduct (LAA). These resources allow the region flexibility in managing supplies and resources in wet and dry years.

The Metropolitan Water District of Southern California (MWD) wholesales the water to a consortium of 26 cities, water districts, and a county authority that serves 18 million people living in six counties stretching from Ventura to San Diego. MWD imported an average of 703,000 acre-feet per year of water from the SWP from 1972 to 2003, and 680,000 acre-feet or more of water from the CRA.

Colorado River Hydrologic Region

The Colorado River Hydrologic Region covers the southeast portion of California and contains 12 percent of the state's land area. The Colorado River, the main tributary of this hydrologic

4 DWR. California Water Plan Update. Chapter 5, Volume 3, page. 5-1.2005.

region, forms most of the region's eastern boundary and international boundary with Mexico. The region includes all of Imperial County, the eastern two-thirds of Riverside County, the southeastern one-third of San Bernardino County and about one-fourth of San Diego County. It has a variety of arid desert terrain that includes many bowl-shaped valleys, broad alluvial fans, sandy washes, and hills and mountains.

Water Supply and Use in the Colorado River Hydrologic Region

About 85 percent of the region's urban and agricultural water supply comes from surface water deliveries from the Colorado River. Water from the river is delivered in the region via the All American and Coachella canals, local diversions, and the Colorado River Aqueduct by means of an exchange for SWP water. The Colorado River is an interstate and international river whose use is apportioned among the seven Colorado River Basin states and Mexico by a complex body of statues, decrees, court decisions known collectively as the "Law of the River." Local surface water, groundwater and the SWP provide the reminder of water to the region. In addition, many of the alluvial valleys in the regions are underlain by groundwater aquifers that are the sole source of water for many local communities. However, some alluvial valleys contain groundwater of such poor quality it is not suitable for potable uses.

Surface Hydrology

Surface water hydrology refers surface water systems, including watersheds, floodplains, rivers, streams, lakes and reservoirs, and the inland Salton Sea.

Watersheds

Watersheds refer to areas of land, or basin, in which all waterways drain to one specific outlet, or body of water, such as a river, lake, ocean, or wetland. Watersheds have topographical divisions such as ridges, hills or mountains. All precipitation that falls within a given watershed, or basin, eventually drains into the same body of water.

There are 20 major watersheds within the SCAG region (**Map 3.15-1**), all of which are outlined and shaped by the various topographic features of the region. Given the physiographic characteristics of the SCAG region, most of the watersheds are located along the Transverse and Peninsular Ranges, and only a small number are in the desert areas (Mojave and Colorado Desert). Bellow is a summary of each of the major watersheds, by county, with their corresponding Hydrologic Unit Code (HUC), which is assigned by the US Geological Survey.

***Antelope-Fremont Valleys Watershed (HUC 18090206*).** The Antelope-Fremont Valley Watershed straddles Kern and Los Angeles County, and is bordered on the southwest by the San Gabriel Mountains, on the northwest by the Tehachapi Mountains, and on the east by a series of hills and buttes that follow the San Bernardino County line. Numerous streams originate in the mountains and foothills surrounding the valley and flow across the valley floor before eventually pooling in the dry lakes adjacent to the county line. It's located in the South Lahontan Hydrologic region.

The watershed drains a total of 12,000 square miles within Los Angeles County. Three of the major tributaries are Big Rock Creek and Little Rock Creek that run from the San Gabriel Mountains and Oak Creek that runs from the Tehachapi Mountains. Los Angeles Aqueduct also runs 180 miles through the watershed. Reservoirs include the California Aqueduct, Fairmont Reservoir, and Littlerock Reservoir. Major cities within the Los Angeles County portion of the watershed include Lancaster and Palmdale.

Los Angeles River Watershed (HUC 18070105). Los Angeles River watershed is bounded by the Santa Susanna Mountains to the west, the San Gabriel Mountains to the north and east, and the Santa Monica Mountains and Los Angeles coastal plain to the south. The Los Angeles River is born at the confluence of Bell Creek and Calabasas Creek in the San Fernando Valley. It drains eastward from its headwaters to the northern corner of Griffith Park where the channel then turns southward through the rocky bottleneck of Glendale Narrows. After crossing the coastal plain, the river finally drains into San Pedro Bay near Long Beach. The drainage area of Los Angeles Watershed is 834 square miles and the entire watershed falls within the South Coast Hydrologic Region.

Major tributaries of the watershed are Burbank Western Channel, Pacoima Wash, Tujunga Wash, and Verdugo Wash in the San Fernando Valley and the Arroyo Seco, Compton Creek, and Rio Hondo south of the Glendale Narrows. There are numerous lakes and reservoirs in the watershed to include Big Tujunga Reservoir, Chatsworth Reservoir, Encino Reservoir, Echo Park Lake, Los Angeles Reservoir, and Silverlake Reservoir. The upper 57 percent of the watershed is covered by forest and open space, while the remaining 43 percent is highly developed with residential and urban use. Major cities within the watershed include Long Beach, Los Angeles, and East Los Angeles.

San Gabriel River Watershed (HUC 18070106). San Gabriel Watershed lies mostly in Los Angeles County. It is bounded by the San Gabriel Mountains to the north, Puente-Chino Hills to the southeast, the division of the Los Angeles River from the San Gabriel River to the west, and the Pacific Ocean to the south. From the mouth of San Gabriel Canyon in the city of Azusa, the San Gabriel River flows south across the San Gabriel Valley and passes through Whittier Narrows, a natural gap in the hills that form the southern boundary of the San Gabriel Valley. It continues across the Pacific Coastal Plain, through the cities of Pico Rivera, Downey, Bellflower, and Lakewood to eventually meet the Pacific Ocean. Geology of the San Gabriel Valley creates an unusual flow pattern that keeps the San Gabriel River along the western edge of the watershed for most of its length. Major tributaries are San Jose Creek, San Dimas Creek, and Walnut Creek. The watershed falls within the South Coast Hydrologic Region.

The watershed drains 640 square miles. Twenty-six percent of the watershed is developed, leaving 64 percent as open space. The river system runs through lands in the Angeles National forest as well as highly urbanized lands in the San Gabriel, Walnut, and Pomona Valleys. Major cities include Covina, Pomona, Whittier, Los Angeles, and Long Beach.

Santa Monica Bay Watershed (HUC 18070104). The majority of Santa Monica Bay Watershed is in Los Angeles County, and contained within the South Coast Hydrologic Region. In the north, the watershed reaches eastward from the Santa Monica Mountains to downtown Los Angeles. From there, it extends south and west across the Los Angeles plain to include the area east of Ballona Creek and north of the Baldwin Hills. South of Ballona Creek the natural drainage area is a narrow strip of wetlands between Playa del Rey and Palos Verdes. The watershed is comprised of many sub-watersheds that cover broad alluvial valleys, coastal dunes, coastal mountains, and a number of deep and narrow canyons that flow to the Pacific Ocean. The major sub-watersheds include Ballona Creek, Malibu Creek, Topanga Canyon Creek, and Solstice Creek Watersheds. The total drainage area is 414 square miles. Santa Monica Bay Watershed is one of the nation's most highly urbanized watersheds. Major cities within the watershed include Agoura Hills, Calabasas, Malibu, Los Angeles, Culver City, Beverly Hills, Inglewood, Santa Monica, and West Hollywood.

Newport Bay Watershed (HUC 18070204). The Newport Bay Watershed is sandwiched between the San Joaquin Hills to the north and the Santiago Hills to the south, which force surface flow onto the central, flat Tustin plain. The Pacific Ocean comprises 13.5 miles of the watersheds western border. Coastal foothills accent the alluvial and coastal plains between the two mountain ranges. In total, the watershed drains 150 square miles, which encompasses all water draining to Newport Bay. Peters Canyon Wash, San Diego Creek, and Santa Ana Delhi Channel are the watershed's major tributaries. Newport Bay Watershed falls within the South Coast Hydrologic Region.

Land in the Newport Bay Watershed is highly developed. Forty-seven percent of the landscape is urban, 4 percent agriculture, and 49 percent open space. Major cities include Santa Ana, Tustin, Irvine, Costa Mesa, and Newport Beach.

Seal Beach - Westminster Watershed (HUC 1807020). Westminster Watershed lies on a flat coastal plain in the northwestern corner of Orange County. Three main tributaries drain a total of 74 square miles in the watershed. The Los Alamitos Channel drains into the San Gabriel River, the Bolsa Chica Channel empties into the Anaheim Bay-Huntington Harbour complex, and the East Garden Grove-Wintersburg Channel drains through Bolsa Bay into Huntington Harbour. Seal Beach – Westminster Watershed falls in the South Coast Hydrologic Region.

Westminster Watershed is almost entirely urbanized with residential and commercial development. The watershed comprises portions of the cities of Anaheim, Cypress, Fountain Valley, Garden Grove, Huntington Beach, Los Alamitos, Santa Ana, Seal Beach, Stanton, and Westminster.

Aliso-San Onofre Watershed (HUC 18070301). Aliso-San Onofre Watershed lies within Orange County, in the South Coast Hydrologic Region. The major waterway is Aliso Creek, which drains to the Pacific Ocean. Aliso Creek is one of three significant waterbodies in the watershed, including also Lake Mission Viejo and San Juan Creek. This watershed is highly urbanized, with over fifty percent of the land area classified as urban.

Mojave Watershed (HUC 18090208). The Mojave Watershed – comprised of high desert, mountains, and valleys - is located entirely within San Bernardino County and within the South

Lahontan Hydrologic Region. It drains a total of 1,600 square miles. The San Bernardino, Granite, and Barstol Mountains form the southwestern borders of the watershed. Mountains in this region are the highest and include Butler Peak, which is the highest point of elevation at 8,500 feet. The San Bernardino Mountains are the headwaters for the Mojave River system which is born of Deep Creek and West Fork, the two perennial tributaries to the Mojave River. The Mojave River traverses the watershed for 120 miles until its terminus at Soda Lake and Silver Dry Lake. Flow is from the southwest to the northeast.

Land in the Mojave Watershed is largely recreational areas and rangeland. A small amount of the land is irrigated agricultural land and 'rural urban' areas. Major population centers in the watershed include Victorville, Hesperia, Apple Valley, and Adelanto.

Southern Mojave Watershed (HUC 18100100). The Southern Mojave Watershed lies in San Bernardino and Riverside Counties and within the Colorado River Hydrologic Region. It is bordered by a mountainous region of the Mojave Watershed to the north. The watershed is comprised of mountains, valleys, and dry lakes. A significant geographical feature of the region is the Salton Trough, which contains the Salton Sea and Imperial and Coachella Valleys. The two valleys are separated by the Salton Sea, which covers the lowest area of the depression. Major tributaries include Antelope Creek, Arrastre Creek, Homer Wash, and Pipes Canyon Creek.

Santa Ana River Watershed (HUC 18070203). The Santa Ana River Watershed includes much of Orange County, the northwestern corner of Riverside County, the southwestern corner of San Bernardino County, and a small portion of Los Angeles County, draining a total of 2,065 square miles. The Watershed is located within the South Coast Hydrologic Region. The watershed is bounded on the south by the San Jacinto Watershed, on the east by the Salton Sea and Southern Mojave watersheds, and on the north/west by the Mojave and San Gabriel watersheds. The highest elevation in the watershed occurs in the San Bernardino Mountains at San Gorgonio Peak at 11,485 feet and the eastern San Gabriel Mountains at Mt. Baldy at 10,080 feet. Surface waters start in this mountainous zone and flow northeast to southwest. Further downstream, the Santa Ana Mountains and the Chino Hills form a topographic high before the river flows onto the Coastal Plain in Orange County and outlets into the Pacific Ocean in Huntington Beach. Major tributaries to the Santa Ana River include San Timoteo Creek and Santiago Creek.

Santa Ana Watershed is home to the most developed portion of Orange County and much of the built-up portions of Riverside and San Bernardino Counties. Major Cities include Santa Ana, Rancho Cucamonga, Corona, and San Bernardino.

San Jacinto Watershed (HUC 18070202). The San Jacinto Watershed is in Riverside County, and is centered roughly on the city of Hemet. It includes Lake Elsinore, as well as Sun City.

Calleguas Creek Watershed (HUC 18070103). Calleguas Creek and its tributaries are located in southeast Ventura County and a small portion of western Los Angeles County. The watershed falls within the South Coast Hydrologic Region. Calleguas Creek drains an area of approximately 343 square miles from the Santa Susana Pass in the east to Mugu Lagoon in the southwest. The watershed drains from the mountains in the northeast part of the watershed toward the southwest where it flows through the Oxnard Plain before emptying into the Pacific Ocean through Mugu Lagoon. The Santa Susana Mountains, South Mountain, and Oak Ridge form the northern boundary of the watershed; the southern boundary is formed by the Simi Hills and Santa Monica Mountains.

The watershed is characterized by three major sub-watersheds: the Arroyo Simi/Las Posas in the north, Conejo Creek in the south, and Revolon Slough in the west. Major tributaries of Callegua Creek include Arroyo Simi, Arroyo Conejo, and Arroyo Santa Rosa. The watershed includes the cities of Simi Valley, Moorpark, Thousand Oaks, and Camarillo. Most of the agriculture is located in the middle and lower watershed with the major urban areas (Thousand Oaks and Simi Valley) located in the upper watershed. The current land use in the watershed is approximately 26 percent agriculture, 24 percent urban, and 50 percent open space.

Santa Clara River Watershed (HUC 18070102). Santa Clara River and its tributaries run through Ventura County and the northwestern part of Los Angeles County, and it located in the South Coast Hydrologic Region. The portion of the watershed within Los Angeles County is referred to as Upper Santa Clara and the portion within Ventura County is referred to as Lower Santa Clara. Santa Clara River drains an area of 1,634 square miles from the mountains in northern Los Angeles County to the Pacific Ocean. The watershed drains from Pacifico Mountain in the San Gabriel Mountains westward through the Angeles National Forest System before emptying into the Pacific Ocean near the City of Ventura. Ninety percent of the watershed consists of rugged mountains. The remainder of the watershed consists of valley floor and coastal plains.

Land uses in the Santa Clara watershed is 62 percent open space, 29 percent agriculture, and 9 percent urban. Major cities include Acton, Santa Clarita, Fillmore, Santa Paula, venture, and Oxnard.

Ventura River Watershed (HUC 18070101). Ventura River Watershed lies entirely in Ventura County. Rugged mountains comprise the upper basin and give way to flat valleys in the lower downstream areas. Nearly half of the watershed is in Los Padres National Forest. Ventura Watershed drains 223 square miles, from its headwaters in the mountains to its outlet in the Pacific Ocean. The Ventura River bisects the watershed, flowing from north to south. Major tributaries are Matilija Creek, North Fork Matilija Creek, San Antonio Creek, Coyote Creek, and Cañada Larga. Lake Casitas and Matijila Reservoir are two major reservoirs within the watershed. The Ventura River watershed falls within the South Coast Hydrologic Region.

Land in Ventura Watershed is largely open space with little urbanization. Eighty-seven percent is open space, ten percent agriculture, and three percent urban. Major communities are Ojai, Oak View, and the western portion of the City of San Buenaventura.

Lower Colorado Watershed (HUC 15030107). The lower Colorado Watershed straddles the border between Imperial County in California and Yuma County in Arizona, and extends into the State of Sonora in northern Mexico.

The lower Colorado River is heavily dammed for agricultural, municipal, and industrial uses, including the Imperial, Laguna, and Morelos Dams. The Imperial Dam provides water for the All American Canal, which carries over five million acre-feet of water into California every year, mostly for agricultural uses.

Salton Sea Watershed (HUC 18100200). Immediately west of the Lower Colorado Watershed, Salton Sea Watershed extends from just north of the Salton Sea, in Riverside County, to the Mexicali Valley, near the US-Mexico border, in Imperial County. This watershed makes up the lower part of the Coachella Valley, bordered by mountains to the east and west, and extending south to the Colorado Delta in the Sea of Cortez. The main geographic feature in this watershed is California's largest lake, the Salton Sea, an inland saltwater lake approximately 380 square miles in size.

In 2001, the Imperial Valley Irrigation District, the largest recipient of Colorado River water in California, agreed to a plan to transfer up to 200,000 acre-feet of water per year to San Diego for municipal water uses.

Imperial Reservoir Watershed (HUC 15030104). North of the Lower Colorado Watershed is Imperial Reservoir Watershed, which lies on both sides of the California-Arizona border along the Colorado River. It extends north to Lake Havasu, created by the construction of Parker Dam, which was completed in 1938.

Floodplains

Much of the SCAG region's urbanized area lies within alluvial fan floodplains. Since the region is so mountainous, development often occurs in the valleys, and newer development extends into the foothills of those mountains. Floodplains in Southern California are a unique hazard area; although flooding from rain-swollen rivers can occur in valley bottoms, a more common floodplain hazard is debris flow. Debris flows are common in mountain foothill areas, especially after fire and heavy rain events, when wet, heavy soils and rock flow like water down steep slopes and into the valley below. Areas with a history of such slides can often be identified by sloping, fan-shaped landforms at the base of mountains and hillsides.

Rivers

Because the climate of Southern California is predominantly arid, many of the natural rivers and creeks are intermittent or ephemeral, drying up in the summer or flowing only after periods of precipitation. For example, annual rainfall amounts vary depending on elevation and proximity to the coast. Some waterways such as Ballona Creek and the Los Angeles River maintain a perennial flow due to agricultural irrigation and urban landscape watering.

Major natural streams and rivers in the SCAG region include the Ventura River, Santa Clara River, Los Angeles River, San Gabriel River, Santa Ana River, San Jacinto River, and upstream portions of the Santa Margarita River.

The Ventura River is fed by Lake Casitas on the western border of Ventura County and empties out into the ocean. It is the northern-most river system in Southern California, supporting a large number of sensitive aquatic species. Water quality decreases in the lower reaches due to urban and industrial impacts.

The Santa Clara River flows through the center of Ventura County and remains in a relatively natural state. Threats to water quality include increasing development in floodplain areas, flood control measures such as channeling, erosion, and loss of habitat.

The Los Angeles River is a highly disturbed system due to the flood control features along much of its length. Due to the high urbanization in the area around the Los Angeles River, runoff from industrial and commercial sources as well as illegal dumping contribute to reduce the channel's water quality.

The San Gabriel River is similarly altered with concrete flood control embankments and impacted by urban runoff.

The Santa Ana River drains the San Bernardino Mountains, cuts through the Santa Ana Mountains, and flows onto the Orange County coastal plain. Recent flood control projects along the river have established reinforced embankments for much of the river's path through urbanized Orange County.

The Santa Margarita River begins in Riverside County, draining portions of the San Jacinto Mountains and flowing to the ocean through northern San Diego County.

Complete lists of surface water resources within the SCAG region along with the beneficial uses associated with them are contained in each of the five Basin Plans prepared by the Regional Water Quality Control Boards of the region.

Lakes and Reservoirs

Since Southern California is a semi-arid region, many of its lakes are drinking water reservoirs, created either through damming of rivers, or manually dug and constructed. Reservoirs also serve as flood control for downstream communities. Some of the most significant lakes, including reservoirs, in the SCAG region are Big Bear Lake, Lake Arrowhead, Lake Casitas, Castaic Lake, Pyramid Lake, Lake Elsinore, Diamond Valley Lake, and the Salton Sea.

Big Bear Lake is a reservoir in San Bernardino County, in the San Bernardino Mountains. It was created by a granite dam in 1884, which was expanded in 1912, and holds back approximately 73,000 acre-feet of water. The lake has no tributary inflow, and is replenished entirely by snowmelt. It provides water for the community of Big Bear, as well as nearby communities.

Lake Arrowhead is also in San Bernardino County, at the center of an unincorporated community also called Lake Arrowhead. The lake is a man-made reservoir, with a capacity of approximately 48,000 acre-feet. The Lake Arrowhead Dam was completed in 1922, with the intention of turning the area into a resort for wealthy Angelinos. It is now used for recreation and as a potable water source for the surrounding community.

Lake Casitas is in Ventura County, and was formed by the Casitas Dam on the Coyote Creek just before it joins the Ventura River. The dam, completed in 1959, holds back nearly 255,000 acre-feet of water. The water is used for recreation, as well as drinking water and irrigation. Castaic Lake is on the Castaic Creek, and was formed by the completion of the Castaic Dam. The lake is in northwestern Los Angeles County. It is the terminus of the West Branch of the California Aqueduct, and holds over 323,000 acre-feet of water. Much of the water is distributed throughout northern Los Angeles County, though some is released into Castaic Lagoon, which feeds Castaic Creek. The creek is a tributary of the Santa Clara River. Pyramid Lake is just above Castaic Lake, and water flows from Pyramid into Castaic through a pipeline, generating electricity during the day. At night, when electricity demand and prices are low, water is pumped back up into Pyramid Lake. Pyramid Lake is on Piru Creek, and holds 180,000 acre-feet of water.

Lake Elsinore is in the City of Lake Elsinore, in Riverside County. The lake has dried and up and been replenished throughout the last century, it is now managed to maintain a consistent water level, with outflow piped into the Temescal Canyon Wash.

Diamond Valley Lake is Southern California's newest and largest reservoir. Located in Riverside County, it was a project of the Metropolitan Water District (MWD) to expand surface storage capacity in the region. A total of three dams were required to create the lake. Completed in 1999, it was full by 2002, holding 800,000 acre-feet of water, effectively doubling MWD's surface water stores in the region. The lake is connected to the existing water infrastructure of the SWP. The lake is situated at approximately 1,500 feet above sea level, well above most of the users of the lake's water; this enables the lake to also provide hydroelectric power, as water flows through the lowest dam.

The Salton Sea is California's largest lake, nearly 400 square miles in size. The basin is over 200 feet below sea level, and has therefore flooded and evaporated many times over, when the Colorado overtops its banks during extreme flood years. This cycle of flooding and evaporation has re-created the Sea several times over at least the last thousand years. Its most recent formation occurred in 1905 after an irrigation canal was breached and the Colorado River flowed into the basin for 18 months, creating the current lake.

The principle inflow to the Sea is from agricultural drainage, which is high in dissolved salts; approximately four million tons of dissolved salts flow into the Sea every year. The evaporation of the Sea's water, plus the addition of highly saline water from agriculture, has created one of the saltiest bodies of water in the world. The Sea has been a highly successful fishery and is a habitat and migratory stopping and breeding area for 380 different bird species; however, the high, and ever-increasing, salinity of the Sea is a continual challenge for the fish and birds that inhabit it.

The 2001 agriculture to city water transfer agreement, between the Imperial Valley Irrigation District and San Diego will have significant implications for the Salton Sea, and the watershed.

The reduction in agricultural water flowing into the Sea will significantly lower water levels, shrinking the overall size of the Sea.

The major surface waters in this section are presented in **Table 3.15-3**, as well as shown on **Map 3.15-2** in the Map Chapter at the end of this document.

Groundwater Hydrology[5]

Groundwater is the part of the hydrologic cycle representing underground water sources. Groundwater is present in many forms: in reservoirs, both natural and constructed, in underground streams, and in the vast movement of water in and through sand, clay and rock beneath the earth's surface. The place where groundwater comes closest to the surface is called the water table, which in some areas may be very deep, and in others may be right at the surface. Groundwater hydrology is therefore connected to surface water hydrology, and cannot truly be treated as a separate system. One example of this is surface streams that are partly filled by groundwater. When that groundwater is pumped out and removed from the system, the stream levels will fall, or even dry up entirely, even though no water was removed from the stream itself.

Groundwater represents most of the SCAG region's fresh water supply, making up between 23 and 29 percent of total water use, depending on precipitation levels.[6] Groundwater basins are replenished mainly through infiltration – precipitation soaking into the ground and making its way into the groundwater. Two threats to the function of this system are increases in impervious surface and overdraft.

Impervious surface decreases the area available for groundwater recharge, as precipitation runoff flows off of streets, buildings, and parking lots directly into storm sewers, and straight into either river channels or into the ocean. This prevents the natural recharge of groundwater, effectively removing groundwater from the system without any pumping. Impervious surface also deteriorates the quality of the water, as it moves over streets and buildings, gathering pollutants and trash before entering streams, rivers, and the ocean.

Overdraft is the condition where the rate of water withdrawal exceeds the rate of water recharge in a particular basin over a period of time. Within the SCAG region, the Ventura Central Basin has been identified as being in a critical condition of overdraft.[7] In the late 1940s, increased groundwater use for agriculture and related processing operations in the Oxnard Plain reduced groundwater elevations, resulting in seawater intrusion into Ventura County as far as Moorpark and Fillmore. In an effort to provide alternatives to groundwater extraction, water is diverted from the Santa Clara River and provided for agricultural use. The water is also used to as groundwater

5 Burr Consulting. Regional Infrastructure Evaluation. Unpublished document prepared for SCAG, February, 2007.
6 Department of Water Resources, *California 's Groundwater - Bulletin 118*. Update 2003. Located at http://www.groundwater.water.ca.gov/bulletin118/update2003/index.cfm
7 Critical overdraft is defined by the DWR as *"…when continuation of present water management practices would probably result in significant adverse overdraft-related environmental, social, or economic impacts."* Department of Water Resources, *2005 Water Plan Update*, Vol. 1, Ch. 3.

TABLE 3.15-3
MAJOR SURFACE WATERS

Wetlands	Rivers, Creeks, and Streams	Lakes and Reservoirs
Los Angeles Basin (4)		
Wetlands	**Rivers, Creeks, and Streams**	**Lakes and Reservoirs**
Ventura River Estuary	Sespe Creek	Lake Casitas
Santa Clara River Estuary	Piru Creek	Lake Piru
McGrath Lake	Ventura River	Pyramid Lake
Ormond Beach Wetlands	Santa Clara River	Castaic Lake
Mugu Lagoon	Los Angeles River	Bouquet Reservoir
Trancas Lagoon	Big Tahunga Canyon	Los Angeles Reservoir
Topanga Lagoon	San Gabriel River	Chatsworth Reservoir
Los Cerritos Wetlands		Sepulveda Reservoir
Ballona Lagoon		Hansen Reservoir
Los Angeles River		San Gabriel Reservoir
Ballona Wetlands		Morris Reservoir
		Whittier Narrows Reservoir
		Santa Fe Reservoir
Lahontan Basin (6)		
Wetlands	**Rivers, Creeks, and Streams**	**Lakes and Reservoirs**
	Mojave River	Silver Lake
	Amargosa River	Silverwood Lake
		Mojave River Reservoir
		Lake Arrowhead
		Soda Lake
Colorado River Basin (7)		
Wetlands	**Rivers, Creeks, and Streams**	**Lakes and Reservoirs**
	Colorado River	Lake Havasu
	Whitewater River	Gene Wash Reservoir
	Alamo River	Copper Basin Reservoir
	New River	Salton Sea
		Lake Cahulla
Santa Ana Basin (8)		
Wetlands	**Rivers, Creeks, and Streams**	**Lakes and Reservoirs**
Hellman Ranch Wetlands	Santa Ana River	Prado Reservoir
Anaheim Bay	San Jacino River	Big Bear Lake
Bolsa Chica Wetlands		Lake Perris
Huntington Wetlands		Lake Matthews
Santa Ana River		Lake Elsinore
Laguna Lakes		Vail Lake
San Juan Creek		Lake Skinner
Upper Newport Bay		Lake Hemet
San Joaquin Marsh		
Prado Wetlands		
San Diego Basin (9)		
Wetlands	**Rivers, Creeks, and Streams**	**Lakes and Reservoirs**
	Santa Margarita River	Vail Lake
	Aliso Creek	Skinner Reservoir

SOURCE: Regional Water Quality Control Boards, as amended as of 2003. Water Quality Control Basin Plans for Regions 4,6, 7,8,9.

recharge to help offset groundwater demand and prevent further reduction of the water table. Currently, groundwater extractions approximately equal recharge, and the saltwater intrusion has been halted.

To prevent seawater intrusion in coastal basins in Orange County, recycled water is injected into the ground to form a mound of groundwater between the coast and the main groundwater basin. In Los Angeles County, imported and recycled water is injected to maintain a seawater intrusion barrier.

A comprehensive assessment of overdraft in California groundwater basins has not been conducted since 1980. The most recent (2003) DWR report on California's groundwater found that in most cases, there is insufficient quantitative information to identify overdrafted groundwater basins.[8] The report encourages local groundwater managers and DWR to seek funding and work cooperatively to evaluate groundwater basins for overdraft. The report recommends that local agencies take the lead in collecting and analyzing data to understand groundwater basin conditions, and points out that much of the data are needed by the agencies to effectively manage groundwater. Despite the lack of local data, DWR does provide overdraft estimates for the State as a whole, which are on the order of one to two million acre-feet per year, during average precipitation years.

The Natural Resources Defense Council issued a 2001 report that found California's groundwater resources face a serious long-term threat from contamination. Subsequent legislation required a comprehensive assessment of groundwater quality. The evaluation is being conducted by the U.S. Geological Survey, U.S. Department of the Interior and SWRCB. Groundwater wells throughout the SCAG region are being studied for contaminants; the evaluation is scheduled for completion in 2010. The only portion of the SCAG region completed to date is the Temecula Valley area in southwestern Riverside County. In the Temecula area, the study found perchlorate, pesticides, and other contaminants in water wells, but none exceeding drinking water quality standards (i.e., primary standards for maximum contaminant loads).

Volatile organic compounds have created groundwater impairments in industrialized portions of the San Gabriel and San Fernando Valley groundwater basins, where some locations have been declared federal Superfund sites. Subsequently, perchlorate contamination was found in the San Gabriel Valley. As of 2003, $99 million had been spent removing contaminants from affected aquifers. The EPA continues to oversee installation of a groundwater cleanup system, components of which are being installed beneath the cities of La Puente and Industry in 2006. Groundwater continues to be used as the predominant source of water supply in the valley. Similar problems exist in the Bunker Hills subbasin of the Upper Santa Ana Valley groundwater basin. Perchlorate contamination is emerging as an important contaminant, and has been found in wells in the Rialto, Colton and Fontana areas of San Bernardino County.

The presence of contamination in the source water does not necessarily require the closure of a groundwater well. Water systems can implement water treatment accompanied by monthly

8 California Department of Water Resources, *Draft Bulletin 118*. Updated 2003.

monitoring for contaminants and/or may blend the problematic water with other "cleaner" water in order to reduce the concentration of the contaminants of concern in the water that is ultimately to be delivered to the end-users.

Water Supply and Demand

Water Demand

Water demand in California can generally be divided between urban, agricultural, and environmental uses. In the SCAG region, approximately 75 percent of potable water is provided from imported sources. Annual water demand fluctuates in relation to available supplies. During prolonged periods of drought, water demand can be reduced significantly through conservation measures, while in years of above average rainfall, demand for imported water usually declines. In 2000, a 'normal' year in terms of annual precipitation, the demand for water in the State was between 82 and 83 million acre feet (maf).[9] Of this total, the SCAG region accounted for approximately 9.8 maf.[10]

The increase in California's water demand is due primarily to the increase in population. According the California Water Plan Update 2005, under a baseline scenario following current trends in use and growth, water demand in California will increase by approximately 3.5 maf by 2030.[11] If SCAG maintains its share of 12 percent of the state's water demand, the SCAG region could be expected to require an additional 500,000 af by 2030.

Demographics, Land Use, and Water Use

Water demand is influenced not only by population size, but also by socio-economic characteristics, geographical distribution of the population, and water conservation practices. MWD estimates that average residential per capita use ranges from 97 gallons per person per day in coastal areas, to 162 gallons per person per day in desert areas.[12] **Table 3.15-4** provides factors that influence water demand.

TABLE 3.15-4
FACTORS INFLUENCING PER CAPITA WATER USE

Factors that increase per capita water use	Factors that decrease per capita water use
increased household income	increased household size
increased labor force	increased proportion of multi-family housing
increased commercial development	changes in the industrial mix
growth in the inland region	urban water conservation

SOURCE: SCAG. (1996). *Regional Comprehensive Plan and Guide*. Los Angeles, CA.

9 Department of Water Resources, *2005 Water Plan Update*, Vol. 1, Ch. 3.
10 Ibid.
11 Department of Water Resources, *2005 Water Plan Update*, Vol. 1, Ch. 4.
12 Southern California Association of Governments. (1996). *Regional comprehensive plan and guide*. Los Angeles, CA.

Water Conservation

The results of conservation in Los Angeles have been remarkable; the Los Angeles Department of Water and Power (DWP) reported in their *2005 Urban Water Management Plan* that "water conservation continues to play an important part in keeping the city's water use equivalent to levels seen 20 years ago." [13] During this same period, DWP's service area grew in population by more than 750,000 people.[14]

Urban conservation measures include reducing landscape water use and installing low flow toilets and showerheads in new development. In September of 1991, during a state-wide drought, the MWD and other California water agencies signed a Memorandum of Understanding Regarding Urban Water Conservation Best Management Practices. Best Management Practices (BMPs) to conserve water in commercial, institutional, and industrial uses could further reduce demand by an estimated three to five percent. Encouragement of the use of native and drought-proof plants, increased water conservation credits, funding for innovative conservation ideas in industry, tiered water rate structures, "smart" irrigation controllers and rebates for conservation hardware are all methods being implemented for increased conservation.[15]

In the winter of 2006/2007, the SCAG region received its lowest rainfall in recorded history. As a result of this drought, combined with ongoing drought in the Colorado River basin and unpredictability of future water supply due to global warming, conservation has shifted from a purely temporary measure to a long-term water management strategy. In 2007, the City of Long Beach passed a water conservation ordinance requiring individual reductions and behavioral changes regarding water use. According to the Long Beach Water Department, these measures are not intended to be temporary, but to form the basis for ongoing management of the city's water resources. Agricultural water conservation options are growing as irrigation techniques improve and as water transf agreements create new pressures for more efficient water management and the growth of higher value and less water-intensive crops. As a result of these developments, DWR expects agricultural water consumption to decline materially by 2030 throughout the SCAG area.

Local Water Supply

Local sources of water account for approximately 25 percent of the total volume consumed annually in the SCAG region.[16] Local sources include surface water runoff, groundwater, and water reclamation. Water balance summaries for each of the hydrologic regions in the SCAG region are provided in **Table WATER-1** in the Technical Appendix.

13 Los Angeles Department of Water and Power. See http://www.ladwp.com/ladwp/cms/ladwp001354.jsp.
14 Castaic Lake Water Agency estimates that conservation will reduce their total future demand by 10 percent. See Castaic Lake Water Agency, *2005 Urban Water Management Plan*, p. 2-1. See http://www.clwa.org/about/pdfs/2005UWMPCh2WaterUse.pdf.
15 Metropolitan Water District. (2003). *Report on Metropolitan's water supplies*. Los Angeles, CA.
16 Department of Water Resources, *2005 Water Plan Update.* Vol. 1.

Local Surface Water (within each HU Region)

The infiltration of surface runoff augments groundwater and surface water supplies. However, the regional water demand exceeds the current natural recharge of runoff water. The arid climate, summer drought, and increased impervious surface associated with urbanization contribute to this reduction in natural recharge. Urban and agricultural runoff often contains pollutants that decrease the quality of local water supplies. Runoff captured in storage reservoirs varies widely from year to year depending on the amount of local precipitation. On average precipitation contributes 55,000 acre-feet per year (afy) within the Metropolitan Water District service area (not including San Diego County).[17] Within the desert regions, the amount is considerably less, owing to climatic differences.

Local Groundwater

Groundwater represents most of the SCAG region's fresh water supply, making up between 23 and 29 percent of total water use, depending on precipitation levels.[18] In California, ground water typically provides 30 percent of the urban and agricultural water used. This proportion increases to 40 percent in dry years.[19] The hydrologic regions vary in their dependence on groundwater for urban and agricultural uses. These differences are reflected in **Table 3.15-5**. **Map 3.15-3** shows the groundwater basins within the SCAG region. The California Department of Water Resources estimates that the state has a groundwater overdraft of approximately 1 to 2 maf in average years.[20] Changes in groundwater storage for the hydrologic regions included in the SCAG region are shown in **Table WATER-1** in the Technical Appendices.

TABLE 3-15-5
GROUNDWATER DEPENDENCE IN THE SCAG REGION

Hydrologic Region	Percentage of the Total Urban and Agricultural Water Supply Provided by Groundwater
Central Coast[1]	83%
South Coast[2]	23%
South Lahonton[3]	50%
Colorado River[4]	8%

[1] Includes part of Ventura County. The remainder is outside of the SCAG Region.
[2] Includes Orange County, most of San Diego and Los Angeles counties, parts of Riverside, San Bernardino, Ventura, Kern and Santa Barbara counties.
[3] Includes most of San Bernardino County, as well as Inyo, and parts of Mono, Kern and Los Angeles counties.
[4] Includes all of Imperial County, most of Riverside, and parts of San Bernardino and San Diego counties.

Recent efforts to store recycled water and surplus water in groundwater basins for use during drought periods have proven successful. MWD has entered into 19 agreements with various water agencies for groundwater storage, resulting in approximately 87,000 af of added supply per

17 Metropolitan Water District. (2003). Appendix A: Metropolitan water demands. In *Report on Metropolitan water supplies*. Los Angeles, CA..

18 Department of Water Resources, *California 's Groundwater - Bulletin 118*. Update 2003. Located at http://www.groundwater.water.ca.gov/bulletin118/update2003/index.cfm

19 California Department of Water Resources. (2003). DRAFT bulletin 118: Draft California groundwater update. Sacramento, CA.

20 California Department of Water Resources. (2003). *DRAFT California Water Plan Update*. Sacramento, CA.

year.[21] A number of agencies within the region are also active in the recharge of surface water, including the Orange County Water District, Los Angeles County Department of Water and Power, Foothill Municipal Water District, San Bernardino Count Water and Flood Control District, Coachella Valley Water District, the Water Replenishment District of Southern California, the San Gabriel Valley Municipal Water District and the Calleguas Municipal Water District.

Reclaimed/Recycled Water (Regional Wastewater Management)

Water reclamation and recycling involves the secondary, and sometimes tertiary, treatment of polluted groundwater and wastewater effluent. Recycled water is used for three main purposes: ocean outfall, in-stream discharge, or reuse. Recycled water may be reused for many purposes, including landscape irrigation, surface water amenities in public places, including parks, industrial processes, groundwater recharge, and non-potable interior uses such as toilets. The use of recycled water for these various purposes augments the region's local water supplies and reduces reliance on water imports. According to MWD, current recycled water projects, either planned or in operation in the SCAG region, account for approximately 355,000 af annually. The agency estimates that by 2025, this amount could be as high as 480,000 af, with an additional 130,000 af by 2050.[22]

Recycled water could be a significant source of water for industry, which often needs highly processed, but non-potable water for industrial processes. Recycled water can also play a major role in replenishing saltwater intrusion barriers and other groundwater sources, but there are still significant hurdles to these uses with regards to health regulations, cost, and public acceptance of water recycling.

Storage

Water agencies in the region are also modifying existing reservoirs or creating new reservoirs to accommodate the expected future growth in water demand. MWD has recently completed filling Diamond Valley Lake near Hemet in Riverside County. This reservoir provides approximately 800,000 acre-feet of additional storage. In addition to surface storage, MWD is implementing various groundwater storage projects both within the SCAG area and in other areas of California. These "conjunctive use" projects store excess water during wet years in underground basins and can be accessed during dry years when surface water supplies are limited.

The SCAG region currently has more than 3.5 maf of storage capacity in all of its reservoirs; however, the anticipated increase in the region's population and growing uncertainty regarding water imports make increasing storage capacity a priority for the region. Increasing storage capacity can be a difficult process, with associated social and environmental impacts.

21 Metropolitan Water District. (2003). Appendix A: Metropolitan water demands. In *Report on Metropolitan water supplies*. Los Angeles, CA.

22 Metropolitan Water District of Southern California, *The Regional Urban Water Management Plan*, p. III-24. November 2005.

Imported Water

Imported sources of water (including the Colorado River Aqueduct, the State Water Project's California Aqueduct, and the Los Angeles Aqueduct) currently supply more than 6 maf of water to the SCAG region annually, accounting for nearly three quarters of the total water used in the region.[23]

Access to water in the SCAG region has traditionally been a potential constraint to growth, since local supplies alone are unable to support expansive development. Beginning with the completion of the Los Angeles Aqueduct (LAA) in 1913, the region has imported water from other parts of the state to supplement local supplies.

The All-American Canal and Coachella Canal were completed in 1940, supplying water to irrigation districts in the Imperial and Coachella Valleys for agricultural operations. The Colorado River Aqueduct, completed in 1941 by the Metropolitan Water District of Southern California (MWD), brings Colorado River water to the urban coastal areas, ranging from Ventura County to San Diego County. The California Aqueduct completed in the 1970s delivers water from the Sacramento Delta to MWD for distribution to retail agencies throughout southern California. **Maps 3.15-4** through **3.15-6** in the Map Chapter at the end of this document depict the areas served by these imported water supplies.

Colorado River

The Colorado River is a major source of water for Southern California, and is imported via the Colorado River Aqueduct, owned and operated by MWD.

Under water delivery contracts with the United States, California entities have enjoyed legal entitlements to Colorado River water since the early 20th century. There have been several compacts, treaties, and negotiations between the seven states that use Colorado River water, beginning with the 1922 Colorado River Compact. California was entitled to 4.4 maf, as well as half on any surplus, as defined by the Federal Department of the Interior. Typically the River's surplus has allowed California entities to take an additional 800,000 af annually.

However, with increased urbanization in the Colorado River Basin states and recent limitation agreements between those states, surplus water for California was eliminated; the State will gradually return to its original allotment of 4.4 maf. Given these new terms, California water agencies are pursuing various strategies to offset this gradual, but certain loss of future water supply. Examples of these strategies include additional reservoir and storage agreements, new water transfers between agricultural and urban users, and more water conservation and recycling.[24]

State Water Project (SWP)

The SWP supplies water to Southern California via the California Aqueduct, with delivery points in Los Angeles, San Bernardino, and Riverside counties. SWP was constructed and is managed by

23 Department of Water Resources, *2005 Water Plan Update.* Vol. 1.
24 Metropolitan Water District. (2003). Report on Metropolitan's water supplies. Los Angeles, CA.

DWR, and is the largest state-owned multi-purpose water project in the country. SWP has historically provided 25 to 50 percent of MWD's water, anywhere from 360,000 af to 1.3 maf annually.[25] Southern California's maximum SWP yield is about 2.0 maf per year. SWP provides water to approximately 23 million people and irrigation water for roughly 750,000 acres of agricultural lands annually.

In 2007, a federal judge ordered the pumps that bring water from the Sacramento Bay Delta into Southern California be shut off, to protect an endangered fish species, the Delta smelt. Although pumping later resumed, it did so at only two-thirds of capacity, reducing by one-third the amount of water coming into Southern California through that system. It is unclear when or even if full capacity pumping will resume. The situation in the Bay Delta highlights the uncertainty and vulnerability of the region's dependence on imported water. Although the situation in the Delta will eventually be resolved, it will likely be a matter of decades before a satisfactory new system is in place.

Los Angeles Aqueduct

The Los Angeles Aqueduct, originally built in 1913, carries water 233 miles south from Owens Valley to Los Angeles. The original aqueduct project was extended in 1940 to the Mono Basin. The system was supplemented by a second project, parallel to the first, completed in 1970. These two aqueducts have historically supplied an average of almost 500,000 af per year in normal years, and as little as 150,000 af per year in drier years.[26] Recent deliveries have been cut almost in half due to dwindling Sierra snow pack and a court decision restricting the amount of water that can be removed from the Owens Valley and Mono Basin in order to restore their damaged ecosystems.

Transfers

In an effort to diversify water sources and reduce reliance on specific water imports, water agencies have engaged in water transfer agreements. These contractual agreements, made with irrigation districts, reduce water use on agricultural lands either through agricultural conservation or fallowing land.[27] The water 'freed' by these reductions is transferred to a municipal water district, where it may be used or stored in aquifers for future use, a practice called *water banking*. Water banking is also done during wet years, when rainwater is collected and directed toward recharge facilities for future use.

Water Suppliers

The SCAG region is served by many water suppliers, both retail and wholesale; the largest of these agencies is MWD. Created by the California State legislature in 1931, MWD serves the urbanized coastal plain from Ventura to the Mexican border in the west to parts of the rapidly urbanizing counties of San Bernardino and Riverside in the east. It provides water to about 90

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25 Metropolitan Water District. (2003). Appendix C: California aqueduct deliveries. In Report on Metropolitan's Water Supplies. Los Angeles, CA.

26 Ibid.

27 Some urban agencies also have the ability to enter "spot" water markets and to purchase water on an "as needed" basis.

percent of the urban population of Southern California. MWD is comprised of 26 member agencies, 12 of which supply wholesale water to retail agencies and other wholesalers, and 14 of which are individual cities which directly supply water to their residents.[28] The Imperial Irrigation District (IID) in Imperial County, the largest irrigation district in the country, and the Palo Verde Irrigation District primarily serve agricultural users. A list of major water suppliers operating within the SCAG region is given in **Table 3.15-6**.[29]

TABLE 3.15-6
MAJOR WATER SUPPLIERS IN THE SCAG REGION

Water Agency	Land Area (square miles)	Sources of Water Supply
Antelope Valley and East Kern District	2,350	SWP, groundwater, reclaimed water
Bard Irrigation District (including the Yuma Project Reservation Division)	23	Colorado River
Casitas Municipal Water District	150	Groundwater
Castaic Lake Water Agency	125	SWP
Coachella Valley Water District	974	SWP, Colorado River, local
Crestline Lake Arrowhead	53	SWP
Desert Water Agency	324	SWP[1], Colorado River groundwater
Imperial Irrigation District	1,658	Colorado River
Littlerock Creek Irrigation	16	SWP, groundwater, surface water
Metropolitan Water District of Southern California	5,200	SWP, Colorado River
Mojave Water Agency	4,900	SWA, groundwater
Palmdale Water Agency	187	SWP, groundwater
Palo Verde Irrigation District	188	Colorado River
San Bernardino Municipal Water	328	SWP, groundwater
San Gorgonio Pass Water Agency	214	Groundwater

SOURCE: Environmental Science Associates, Los Angeles, California. 2000.

Water Quality

The quality of the SCAG region's surface waters, groundwater, and coastal waters are discussed below.

Surface Water

Surface water resources in the SCAG region include creeks and rivers, lakes and reservoirs, and the inland Salton Sea. Reservoirs serving flood control and water storage functions exist throughout the region. Because the climate of Southern California is predominantly arid, many of the natural rivers and creeks are intermittent or ephemeral, drying up in the summer or flowing only in reaction to precipitation. For example, annual rainfall amounts vary depending on elevation and proximity to the coast. Some waterways such as Ballona Creek and the

28 Metropolitan's service area includes San Diego County.
29 This table excludes retail agencies supplied by a regional wholesaler.

Los Angeles River maintain a perennial flow due to agricultural irrigation and urban landscape watering.

The Colorado River watershed includes seven states on the western slope of the Rocky Mountains, traversing the arid southwest to the Gulf of California in Mexico. The river, supplies water to 25 million people in both the U.S. and Mexico and forms the eastern border of the SCAG region. The Salton Sea, the largest inland body of water in California, was formed around 1905 when the Colorado River was diverted from its natural course. At present, the Sea serves as a drainage reservoir for agricultural runoff in the Imperial Valley and Mexico. The Salton Sea is fed by the New River and Alamo River and would dry up entirely without agricultural runoff.

Other major natural surface waters in the SCAG region include the Ventura River, Santa Clara River, Los Angeles River, San Gabriel River, Santa Ana River, San Jacinto River, and upstream portions of the Santa Margarita River. The Ventura River is fed by Lake Casitas on the western border of Ventura County and empties out into the ocean. It is the northern-most river system in Southern California, supporting a large number of sensitive aquatic species. Water quality decreases in the lower reaches due to urban and industrial impacts. The Santa Clara River flows through the center of Ventura County and remains in a relatively natural state. Threats to water quality include increasing development in floodplain areas, flood control measures such as channeling, erosion, and loss of habitat.

The Los Angeles River is a highly disturbed system due to the flood control features along much of its length. Due to the high urbanization in the area around the Los Angeles River, runoff from industrial and commercial sources as well as illegal dumping contribute to reduce the channel's water quality. The San Gabriel River is similarly altered with concrete flood control embankments and impacted by urban runoff.

The Santa Ana River drains the San Bernardino Mountains, cuts through the Santa Ana Mountains, and flows onto the Orange County coastal plain. Recent flood control projects along the river have established reinforced embankments for much of the river's path through urbanized Orange County. The Santa Margarita River begins in Riverside County, draining portions of the San Jacinto Mountains and flowing to the ocean through northern San Diego County.

Complete lists of surface water resources within the SCAG region along with the beneficial uses associated with them are contained in each of the five Basin Plans prepared by the Regional Water Quality Control Boards of the region.

Non-Point Source Pollution

Portions of the Los Angeles River in Los Angeles County and the Santa Ana River in Orange County have been lined with concrete for flood control purposes. One of the effects of these projects has been to reduce the natural recharge of groundwater basins. A second has been to make these rivers conveyance systems that concentrate and transfer urban pollutants and waste to the ocean. With regard to the rivers themselves, the State's Water Quality Assessment Report estimated in 1992 that approximately two-thirds of California's water bodies were threatened or impaired by non-point sources of pollution.

Point source pollution refers to contaminants that enter a watershed, usually through a pipe. The location of the end of the pipe is documented and the flow out of that pipe is subject to a discharge permits issued by a Regional Water Quality Control Board. Examples of point source pollution are discharges from sewage treatment plants and industrial facilities. Because point sources are much easier to regulate than non-point sources, they were the initial focus of the 1972 Clean Water Act. Regulation of point sources since then has dramatically improved the water quality of many rivers and streams throughout the country.

In contrast to point source pollution, non-point source pollution, also known as "pollution runoff," is defuse. Non-point pollution comes from everywhere in a community and is significantly influenced by land uses. A driveway or the road in front of a house may be a source of pollution if spilled oil, leaves, pet waste or other contaminants leave the site and runoff into a storm drain.

> "A recent study in the City of Irvine showed that the use of automated irrigation controllers reduced dry season runoff by 50 percent. Notably, the decrease in runoff did not appear to increase the concentration of pollutants in the runoff. It therefore appears that a reduction in non-point source pollution can be achieved by increasing irrigation efficiency. See http://www.irwd.com/Conservation/water_conservation_research.php)"

Non-point source pollution is now considered one of the major water quality problems in the United States.

Runoff Pollutants

The problem of non-point source pollution is especially acute in urbanized areas where a combination of impermeable surfaces, landscape irrigation, highway runoff and illicit dumping increase the pollutant loads in stormwater. The California State Water Quality Control Board (SWQCB) has identified the following pollutants found in urban runoff as being a particular concern.[30]

- *Sediment*. Excessive sediment loads in streams can interfere with photosynthesis, aquatic life respiration, growth and reproduction.
- *Nutrients*. Nitrogen and phosphorus can result in eutrophication of receiving waters (excessive or accelerated growth of vegetation or algae), reducing oxygen levels available for other species.
- *Bacteria and viruses*. Pathogens introduced to receiving waters from animal excrement in the watershed and by septic systems can restrict water contact activities.

30 The following sections are excerpted from Metropolitan Water District of Southern California, *The Regional Urban Water Management Plan*, Chapter IV. November 2005.

- *Oxygen demanding substances.* Substances such as lawn clippings, animal excrement and litter can reduce dissolved oxygen levels as they decompose.
- *Oil and grease.* Hydrocarbons from automobiles are toxic to some aquatic life.
- *Metals*. Lead, zinc, cadmium and copper are heavy metals commonly found in stormwater. Other metals introduced by automobiles include chromium, iron, nickel and manganese. These metals can enter waterways through storm drains along with sediment, or as atmospheric deposition.
- *Toxic pollutants*. Pesticides, phenols and polynuclear aromatic hydrocarbons (PAHs) are toxic organic chemicals found in stormwater.
- *Floatables*. Trash in waterways increases metals and toxic pollutant loads in addition undesirable aesthetic impacts.

Salinity

The general quality of groundwater in the SCAG region tends to be degraded as a result of land uses and water management practices. Fertilizers and pesticides typically used on agricultural lands infiltrate and degrade groundwater. Septic systems and leaking underground storage tanks can also impact groundwater. Over-pumping can result in saltwater intrusion from the ocean, further degrading groundwater quality. In addition, wastewater discharges in inland regions can result in salt buildup from fertilizer and dairy waste.

To address the salinity problem, an increasing number of water agencies are working with other water, groundwater and wastewater agencies, state and local government agencies and interested associations on researching and developing salinity management goals and action plans. Strategies currently in use include blending low and high salinity water and the desalination of brackish water.

Perchlorate

Ammonium perchlorate is a primary ingredient of solid rocket propellant and is used in the manufacture of some types of munitions and fireworks. Ammonium perchlorate and other perchlorate salts are readily soluble in water, dissociating into the perchlorate ion that is highly mobile in groundwater. Small amounts of perchlorate have been found in the Colorado River with higher concentrations in a number of groundwater basins in Southern California. The primary human health concern related to perchlorate is its effects on the thyroid.[31]

While perchlorate cannot be removed using conventional water treatment, nanofiltration and reverse osmosis do work effectively, but at very high cost. Rancho Cordova is using a fluidized bed biological treatment and is re-injecting the treated water back into the ground. A number of companies have developed an ion exchange process that removes perchlorate but creates hazardous waste brine. Nonetheless, a number of sites in Southern California have successfully installed ion exchange systems. Thus, while effective treatment options are available, the

31 Perchlorate interferes with the thyroid gland's ability to produce hormones required for normal growth and development.

overriding consideration in decisions about whether to recover perchlorate-contaminated groundwater is the cost-effectiveness of available technologies.

Total Organic Carbon and Bromide

When source water containing high levels of total organic carbon (TOC) and bromide is treated with disinfectants such as chlorine or ozone, disinfection byproducts (DBPs) form. Studies have shown a link between certain cancers and DBP exposure. In addition, some studies have shown an association between reproductive and developmental effects and chlorinated water. In December 1998, the U.S. Environmental Protection Agency (EPA) adopted more stringent regulations for DPBs.

Existing levels of TOCs and bromide in Delta water supplies present challenges to agencies receiving water from the SWP to monitor and maintain safe drinking water supplies. A primary objective of the CALFED Bay-Delta process is protection and improvement of the water quality of the SWP to ensure future drinking water regulations. Although exact future drinking water standards are unknown, significant source water protection of SWP water supplies will almost certainly be a necessary component of meeting these requirements cost-effectively.

Methyl Tertiary Butyl Ether and Tertiary Butanol

The use of MTBE (and other oxygenates) in gasoline was mandated to achieve reductions in air pollution, including emissions of benzene, a known human carcinogen. However, this reduction in air pollution has been achieved at the expense of creating a serious groundwater and surface water problem. MTBE is very soluble in water and moves quickly into the groundwater. It is introduced into surface water bodies from the motor exhausts of recreational watercraft. MTBE is also resistant to chemical and microbial degradation in water, making treatment more difficult than the treatment of other gasoline components.

MTBE presents a significant problem for local groundwater basins. Leaking underground storage tanks and poor fuel-handling practices at local gas stations may provide a large source for MTBE. One gallon of MTBE alone (11 percent MTBE by volume) is enough to contaminate about 16.5 million gallons of water at 5 μg/L. Such contamination has caused some water agencies to close wells. The City of Santa Monica, for example, lost about 50 percent of its production wells as a result of MTBE contamination during the 1990s.

A combination of advanced oxidation processes followed by granular activated carbon has been found to be effective in reducing the levels of MTBE contaminants by 80 to 90 percent. This may make it possible for local water agencies to treat their groundwater sources to comply with water quality standards. The cost of such treatment, however, could some agencies to increase imports as a means of avoiding this cost.

Arsenic

Arsenic, a naturally occurring substance in drinking water, has been identified as a risk factor for lung and urinary bladder cancer. A number of Southern California water sources have been identified as containing arsenic concentrations exceeding the current federal standard of 10 μg/L.

Monitoring results submitted to the California Department of Health Services in 2001-2003 showed that the effected areas include San Bernardino (61 sources), Los Angeles (50 sources), Riverside (24 sources) and Orange (4 sources).

Currently it appears likely that current treatment standards will increase cost but not necessarily decrease local water supplies. However, if treatments cost increases are sufficient, some water agencies in Southern California may choose to increase their use of imported water to avoid this additional cost.

Radon

Radon, a naturally occurring substance in groundwater, has not been a significant problem for most water agencies with the SCAG region. Where radon is a problem, air-stripping through aeration is the cost-effective treatment option. However, stripping results in outgassing of radon to the air. Currently, the U.S EPA has determined that the risk posed by this outgassing is less than that posed by radon in the water.

Uranium

A ten-and-a-half-million-ton pile of uranium mine tailings at Moab, Utah lies 600 feet from the Colorado River. Rainwater has been seeping through the pile and contaminating the local groundwater, causing a flow of contaminants into the river. It also has the potential to wash millions of tons of material containing uranium into the Colorado River as a result of a flood or other natural disaster.

Operations and maintenance activities at the site include intercepting some of the contaminated groundwater before it discharges into the river. The interim action became fully active in September 2003 and is currently being evaluated.

At the recommendation of the National Research Council the Department of Energy (DOE) conducted a study to evaluate remediation actions and released an environmental impact statement in July 2005. The DOE has agreed to move the tailings, but remediating the site will require Congressional appropriations, and maintaining support for a cleanup will require close coordination and cooperation with other Colorado River users.

Land Use and Water Quality

Buildings, roads, sidewalks, parking lots and other impervious surfaces define the urban landscape. But impervious surfaces also alter the natural hydrology and prevent the infiltration of water into the ground. Impervious surfaces change the flow of stormwater over the landscape. In underdeveloped areas, vegetation holds down soil, slows the flow of stormwater over land, and filters out some pollutants by both slowing the flow of the water and trapping some pollutants in the root system. Additionally, some stormwater filters through the soil, replenishing underground aquifers.

As land is converted to other uses such as commercial developments, many of these natural processes are eliminated as vegetation is cleared and soil is paved over. As more impervious surface coverage is added to the landscape, more stormwater flows faster off the land. The greater volume of stormwater increases the possibility of flooding, and the high flow rates of stormwater do not allow for pollutants to settle out, meaning that more pollution gets concentrated in the stormwater runoff.

Research on urban stream protection has found that stream degradation occurs at relatively low levels of imperviousness—in the range of 10 to 20 percent. Wetlands suffer impairment when impervious surface coverage surpasses 10 percent. Fish habitat, spawning and diversity suffer when imperviousness is greater than 10 to 12 percent. Wetland plants and amphibian populations diminish when impervious surfaces are greater than 10 percent. Generally, the higher the percentage of impervious surface, the greater the degradation in stream water quality. Based on this research, streams can be considered stressed in watersheds when the impervious coverage exceeds 10 to 15 percent.

The link between impervious surfaces and degraded water quality points to the need for careful comparisons between dispersed and compact development strategies. On a regional or watershed level, greater overall water quality protection is achieved through more concentrated or clustered development. Concentrated development protects the watershed by leaving a larger percentage of it in its natural condition.

Groundwater

The general quality of groundwater in the SCAG region is degraded as a result of land uses and water management practices in the Basins. Fertilizers and pesticides typically used on agricultural lands infiltrate and degrade groundwater. Septic systems and leaking underground storage tanks can also impact groundwater quality. Urban runoff is also a significant source of pollutants. Pollutants in urban runoff include urban debris, suspended solids, bacteria, viruses, heavy metals, pesticides, petroleum hydrocarbons, and other organic compounds. In addition to these impairments, excessive groundwater pumping allows saltwater intrusion from the ocean to further degrade groundwater quality. Also of note, the impacts on groundwater caused by the natural infiltration of surface waters decrease with a growth in urban development and the creation of impervious surfaces.

Coastal Waters

Coastal waters in the region include bays, harbors, estuaries, beaches, and open ocean. Deep draft commercial harbors include the Los Angeles/Long Beach Harbor complex and Port Hueneme. Shallower small craft harbors are prevalent along the coast line including Dana Point Harbor, Newport Beach Harbor, Huntington Harbor, Marina Del Rey Harbor, and Ventura Harbor. Several small estuaries and saltwater marshes exist along the coast and are generally considered sensitive ecological areas. These include Newport Bay, Bolsa Chica Wetlands, Ballona Wetlands, Malibu Lagoon, and Mugu Lagoon. These coastal waters are impacted by previously described wastewater discharges, non-point source runoff, dredging, bilge water discharges, illicit discharges, and spills. Impaired coastal areas are shown in the map of SWRCB 303(d) impaired waterbodies (**Map 3.15-7**).

Wastewater

Wastewater flows and capacities of major treatment facilities are shown in **table 3.15-7**. Much of the urbanized areas of Los Angeles and Orange Counties are serviced by three large publicly owned treatment works (POTWs): the City of Los Angeles Bureau of Sanitation Hyperion Facility, the Joint Outfall System of the Los Angeles County Sanitation Districts, and the Orange County Sanitation District treatment plant. These three facilities handle more than 70 percent of the wastewater generated in the entire SCAG region.

In addition to these large facilities, medium sized POTWs (greater than 10 mgd) and small treatment plants (less than 10 mgd) service smaller communities in Ventura County, southern Orange County, and in the inland regions. Many of these treatment systems recycle their effluent through local landscape irrigation and groundwater recharge projects. Other treatment systems discharge to local creeks on a seasonal basis, effectively matching the natural conditions of ephemeral and intermittent stream habitats.

Many rural communities utilize individually owned and operated septic tanks rather than centralized treatment plants. The Regional Water Quality Control Board (RWQCB) generally delegates oversight of septic systems to local authorities. However, Water Discharge Requirements (WDRs) are generally required for multiple-dwelling units and in areas where groundwater is used for drinking water. These WDRs are only issued to properties greater than one acre and are not required for properties greater than five acres in size.

Regulatory Setting

Federal Agencies and Regulations

The U.S. Environmental Protection Agency (EPA)

The EPA is the federal agency responsible for water quality management and administration of the CWA. The EPA has delegated most of the administration of the CWA in California to the SWRCB. Much of the responsibility for implementation of the SWRCB's policies is delegated to the nine Regional Water Quality Control Boards (RWQCB), as described below. EPA conducts groundwater protection and contaminated site remediation programs, such as installation of groundwater cleanup systems in the San Gabriel Valley.

Clean Water Act

The Clean Water Act (CWA) (33 U.S.C Section 1251 et seq), formerly the Federal Water Pollution Control Act of 1972, was enacted it the intent of restoring and maintaining the chemical, physical, and biological integrity of the water of the United States. The CWA requires states to set standards to protect, maintain, and restore water quality through the regulation of point source pollution and certain non-point source discharges to waters of the U.S. Those discharges are regulated by the National Pollutant Discharge Elimination System (NPDES) permit process (CWA Section 402). In California, NPDES permitting authority is delegated to, and administered by, the nine RWQCBs.

TABLE 3.15-7
WASTEWATER FLOW AND CAPACITY OF MAJOR TREATMENT FACILITIES IN THE SCAG REGION

Wastewater Agency	Current Flow (mgd)	Capacity Flow (mgd)
Imperial County		
City of El Centro	3.9	8.0
City of Brawley	3.6	5.9
City of Calexico	2.7	4.2
Los Angeles County		
Los Angeles County Sanitation Districts –		
– Joint Outfall System	316.0	385.0
– Lancaster Water Reclamation Plant	12.8	16.0
– Palmdale Water Reclamation Plant	9.8	15.0
– Santa Clarita Water Reclamation Plant	20.5	28.1
City of Los Angeles	550.0	560.0
Las Virgenes Municipal Water District	9.5	16.0
City of Burbank	9.0	9.0
Orange County		
Orange County Sanitation District	229.0	366.0
Irvine Ranch Water District	12.3	23.5
South Orange County Wastewater Authority	26.5	37.7
El Toro Water District	5.4	6.0
Riverside County		
Eastern Municipal Water District	31.3	49.0
City of Riverside	32.0	40.0
Coachella Valley Water District	18.0	31.0
San Bernardino County		
Inland Empire Utilities Agency	59.0	68.0
City of San Bernardino	25.5	33.0
Victor Valley Wastewater Reclamation Authority	12.5	14.5
City of Redlands	6.0	9.5
Ventura County		
City of Oxnard	31.7	39.7
City of Simi Valley	12.5	18.0
City of Thousand Oaks	11.0	12.0
City of Ventura	9.0	12.0
Camarillo Sanitation District	4.0	7.3

SOURCE: SCAG 2007

Safe Drinking Water Act

The Safe Drinking Water Act (SDWA) ensures the quality of Americans' drinking water. The law requires actions to protect drinking water and its sources—rivers, lakes, reservoirs, springs and groundwater wells—and applies to public water systems serving 25 or more people. It authorizes the EPA to set national health-based standards for drinking water to protect against both naturally occurring and man-made contaminants. In addition, it oversees the states, municipalities and water suppliers that implement the standards.

EPA standards are developed as a Maximum Contaminant Level (MCL) for each chemical or microbe. The MCL is the concentration that is not anticipated to produce adverse health effects after a lifetime of exposure, based upon toxicity data and risk assessment principles. EPA's goal in setting MCLs is to assure that even small violations for a period of time do not pose significant risk to the public's health over the long run. National Primary Drinking Water Regulations (NPDWRs or primary standards) are legally enforceable standards that limit the levels of contaminants in drinking water supplied by public water systems.

Secondary standards are non-enforceable guidelines regulating contaminants that may cause cosmetic effects (such as skin or tooth discoloration) or aesthetic effects (such as taste, odor, or color) in drinking water. EPA recommends secondary standards to water systems but does not require systems to comply. However, states may choose to adopt them as enforceable standards.[32]

The U.S. Army Corps of Engineers (USACE)

Section 404 of the CWA obligates the USACE to issue permits for the movement of dredge and fill material into and from "waters of the United States." Additionally Section 404 requires permits for activities affecting hydrologically important areas. For example, alterations of wetlands, rivers or ephemeral creek beds resulting from construction activities require Section 404 permits.

The Federal Emergency Management Agency (FEMA)

The U.S. Congress passed the National Flood Insurance Act in 1968 and the Flood Disaster Protection Act in 1973 in order to restrict certain types of development on floodplains and provide for a national flood insurance program. The purpose of these programs is to reduce the need for large publicly funded flood control structures and disaster relief.

FEMA administers the National Flood Insurance Program. **Map 3.15.8** identifies federally designated flood hazard zones in the SCAG region.

FEMA classifies flood hazard zones as follows:

- Zone A – Areas of 100 year flood. Base flood elevations and flood hazard factors are not determined.
- Zone B – Areas between the limits of the 100-year flood and 500 year flood; or certain areas subject to the 100 year flooding with average depth of less than one foot; or where the contributing drainage area is less than one square mile; or areas protected by levees from the base flood.

32 Burr Consulting, 2006.

- Zone C – Areas of minimal flooding not requiring flood insurance.

The U.S. Bureau of Reclamation (USBR)

The USBR operates the Colorado River project, an extensive network of dams, canals and related facilities. USBR serves as Watermaster overseeing contentious water rights issues, and runs drought protection programs.

State Agencies and Regulations

The California State Water Resources Control Board (SWRCB)

As described above, the EPA has delegated most of the administration of the CWA in California to the SWRCB. In turn, much of the responsibility for the implementation of the SWRCB's policies is delegated to the nine RWQCBs. The nine RWQCBs develop and enforce water quality objectives and implementation plans.

Section 303(d) of the CWA requires the SWCB to list impaired water bodies in the Sate and determine total maximum daily loads (TMDLs) of pollutants or other stressors that are contributing excessively to these impaired waters. SWRCB is also responsible for granting water rights permits, approving water right transfers, investigating violations and may reconsider or amend water rights.

Five RWQCBs have jurisdiction in the SCAG region:

- Los Angeles
- Lahontan
- Colorado River Basin
- Santa Ana
- San Diego

The Los Angeles, Lahontan and Colorado River Basin RWQCBs also have jurisdiction in counties outside the SCAG region. The San Diego RWQCB has jurisdiction in portions of Orange County and Riverside County.

The federal CWA directs states to review water quality standards every three years and, as appropriate, modify and adopt new standards. CWA also regulates wastewater operation through state boards. CWA authorizes the EPA to administer requirements primarily to deal with the quality of effluent which may be discharged from treatment facilities, the recycling of residual solids generated in the process, the reuse of reclaimed water for irrigation and industrial uses to conserve potable water, and the nature of waste material (particularly industrial) discharged into the collection system.

The Department of Water Resources (DWR)

The DWR is responsible for the planning, construction and operation of State Water Project (SWP) facilities, including the California Aqueduct, and sets conditions on use of SWP facilities. In addition, DWR is responsible for statewide water planning, evaluating urban water management plans, overseeing dam safety and flood control, and transfer of certain water rights permits (e.g., pre-1914).

The California Department of Public Health[33] (DPH)

DPH implements the SDWA. In addition, it oversees the operational permitting and regulatory oversight of public water systems. DPH requires public water systems to perform routine monitoring for regulated contaminants that may be present in their drinking water supply. To meet water quality standards and comply with regulations, a water system with a contaminant exceeding an MCL must notify the public and remove the source from service or initiate a process and schedule to install treatment for removing the contaminant. Health violations occur when the contaminant amount exceeds the safety standard (MCL) or when water is not treated properly. In California, compliance is usually determined at the wellhead or the surface water intake. Monitoring violations involve failure to conduct or to report in a timely fashion the results of required monitoring.[34]

In addition, DPH conducts water source assessments, oversees water recycling projects, permits water treatment devices, certifies water system employees, promotes water system security, and administers grants under the State Revolving Fund and State bonds for water system improvements.

The California Department of Toxic Substances Control (DTSC)

DTSC is responsible for oversight of hazardous substances and remediation of contaminated sites, including in some cases water sources.

The California Department of Fish and Game (DFG)

DFG has jurisdiction over conservation and protection of fish, wildlife, plants and habitat. DFG determines stream flow requirements in certain streams, acts as permitting agency for streambed alterations, presents evidence at water rights hearings on the needs of fish and wildlife, and enforces the California Endangered Species Act.

Porter Cologne Water Quality Control Act

The Porter Cologne Water Quality Control Act of 1967 (Water Code Section 13000 et seq.), requires the SWRCB and the nine RWQCBs to adopt water quality criteria to protect State

33 As of July 1, 2007, Senate Bill 162, Chapter 241, Statutes of 2006, also known as the California Public Health Act of 2006, is in effect. This bill separates the Department of Health Services into two agencies: the Department of Public Health (DPH) and the Department of Health Care Services (DHCS).

34 Burr Consulting, 2006.

waters. These criteria include the identification of beneficial uses, narrative to the applicable and numerical water quality standards, and implementation procedures.

The Porter-Cologne Water Quality Control Act authorizes the state boards to adopt, review and revise policies for all waters of the state (including both surface and ground waters) and directs the regional boards to develop Basin Plans. The act also authorizes state boards to adopt Water Quality Control Plans. In the event of inconsistencies among state and regional board plans, the more stringent provisions apply.

Methodology

The PEIR identifies the potential impacts of the proposed Plan on water resources. The water quality analysis evaluates the regional-scale impact of the RTP and the cumulative impact of the RTP projects and the associated growth on water quality. The analysis includes a programmatic-level assessment of the expected urbanized land use and the associated impervious surfaces. In addition, the PEIR identifies transportation projects that are located in targeted watersheds, adjacent to impaired water bodies, or in flood hazard areas and considers the potential environmental effects of associated housing and employment growth. Subsequent, project-specific water quality assessments will be conducted by implementing agencies to determine site-specific water quality impacts for individual transportation projects, as projects in the 2008 RTP are implemented.

The methodology for determining the significance of the impacts on water quality, water supply, and wastewater compares the future Plan conditions to the existing setting, as required in *CEQA Guidelines* § 15126.2(a).

Determination of Significance

Direct impacts to water quality were evaluated using Geographic Information Systems (GIS) to overlay projects in the RTP upon water resources. The proposed projects of the 2008 RTP and associated growth were plotted on maps of the SCAG region's water resources. Additional data relating to water resources compiled within the GIS format included surface hydrology, 100-year flood plains, impaired water bodies identified by the SWRCB, and regional groundwater basins.

Long-term, regional-scale, cumulative impacts of the RTP on water quality were evaluated based on relative estimates of vacant land consumption based on the long-term regional growth forecast for 2035. Impacts to water supply were assessed by comparing the existing water supplies to the expected water demand in 2035 with the Plan. Likewise, the PEIR analyzes impacts to wastewater services by comparing existing capacity of wastewater systems to the expected demand in future Plan conditions.

Comparison with the No Project

The analysis of water resources includes a comparison of the expected future conditions with the 2008 RTP to the expected future conditions if no Plan were adopted. This evaluation is not included in the determination of the significance of impacts (which is based on a comparison to existing conditions), however it provides a meaningful perspective on the expected effects of the 2008 RTP.

Significance Criteria

A potentially significant adverse impact on water resources would occur if the proposed Plan would:

- Substantially degrade water quality compared to the existing conditions;
- Violate any water quality standards or waste discharge requirements;
- Substantially deplete groundwater supplies or interfere substantially with groundwater recharge;
- Substantially alter the existing drainage patterns, including through the alteration of the course of a stream or river, or substantially increase the rate or amount of surface runoff in a manner that would result in flooding;
- Create or contribute runoff water which would exceed the capacity of existing or planned stormwater drainage systems;
- Place within a 100-year flood hazard area structures that would impede or redirect flood flows;
- Expose people or structures to a significant risk of loss, injury or death involving flooding, including flooding as a result of the failure of a levee or dam;
- Substantially alter the existing drainage patterns, including through the alteration of the course of a stream or river, in a manner which would result in substantial erosion or siltation;
- Generate a substantial amount of wastewater that exceeds the region's available infrastructure's capacity to handle and dispose of the wastewater;
- Generate a substantial increase in the amount of potable water demand that exceeds the region's existing available supply and/or infrastructure capacity to provide water service; or
- Result in the need to construct new water supply infrastructure.

Impacts and Mitigation Measures

Project-specific studies will be necessary to determine the actual potential for significant impacts on water resources resulting from implementation of the Plan. However, the following analysis identifies general program-level impacts. Below are descriptions of the types of direct impacts foreseeable from new transportation projects proposed in the 2008 RTP. Indirect impacts due to the changes in population distribution expected to occur due to the 2008 RTP's transportation investments, and transportation and land use policies are also discussed.

All mitigation measures should be included in project-level analysis as appropriate. The project proponent or local jurisdiction shall be responsible for ensuring adherence to the mitigation measures prior to construction. For regionally significant projects SCAG shall be provided with documentation of compliance with mitigation measures through its Intergovernmental Review Process in which all regionally significant projects, plans, and programs must be consistent with regional plans and policies.

Impact 3.15-1: Local surface water quality could be degraded by increased roadway runoff created by RTP projects, potentially violating water quality standards associated with wastewater and stormwater permits. RTP projects could alter the existing drainage patterns in ways that would result in substantial erosion or siltation.

Projects that increase impervious surface areas increase urban runoff, resulting in the transport of greater quantities of contaminants to receiving waters that may currently be impaired. Construction activities related to Plan projects may increase pollutant loads carried by storm water runoff. For example, road cut erosion can increase long-term siltation in local receiving waters. Recent studies from across the country report that roads, parking lots, and sidewalks comprise 55 to 75 percent of existing impervious surface areas. Residential, commercial, and industrial structures constitute the remaining 25 to 45 percent. These factors explain the inverse relationship between water quality and impervious area, which tends to become problematic when impervious surfaces within a watershed exceed 10 percent of land area. Where this percentage is greater than 25 percent, water quality is generally degraded and inhospitable for habitat or for recreation activities.[35] In addition, many of the pollutants in urban runoff are attributable to landscape irrigation, highway runoff, and illicit dumping. Highway runoff is a component of urban runoff contributing oil and grease, sediment, nutrients, heavy metals, and toxic substances. **Table 3.15-8** lists the pollutants commonly associated with transportation.

Map 3.15-7 shows the impaired water bodies identified within the SCAG region. The SWRCB has developed a TMDL for trash in Ballona Creek, and is proposing a trash TMDL for the LA River. It has also begun the process of assigning TMDLs for metals in both of those bodies. The TMDLs will provide a numerical threshold for each pollutant within each watershed to be used for regulating both point and non-point source discharges. Future methods for quantifying highway runoff will assist regulators with applying appropriate management practices in areas where highway runoff impacts impaired water bodies. The inclusion of runoff control measures in the design of future roadway projects will improve water quality and eliminate further impairments of the local receiving waters.

As discussed above, the proposed highway, arterial and other improvement projects proposed in the 2008 RTP would increase impervious surfaces in the SCAG region. **Table 3.15-9** provides the lane mile additions planned for each county. Assuming an average lane width of 12 feet, approximately 105,000 additional acres of impervious surface could be added. Some of the lane additions may be constructed using re-striping and existing right of way, reducing the contribution to increased impervious surfaces. The High Speed Rapid Transit (HSRT) projects would add

[35] Center for Watershed Protection. (1988). *Rapid watershed planning handbook – A resource guide for urban subwatershed management.* Ellicott City, MD.

approximately 269 route miles, along with associated stations and other maintenance structures. Rail lines and their associated structures, as well as proposed goods movement enhancement projects, would be expected to increase the amount of impervious surfaces as well, although many of the proposed alignments are within existing rights-of-way. Additional impervious surfaces would increase the potential for highway and other runoff pollutants to enter impaired receiving waters. Each project contributing to new impervious area would be subject to a Municipal Separate Storm Sewer System (MS4) permit requiring that pollutants be removed from the runoff to the maximum extent practicable. Under new permit regulations, TMDL requirements are now included in all MS4 permits, further strengthening a permit's controls of runoff.

TABLE 3.15-8
POLLUTANTS ASSOCIATED WITH TRANSPORTATION

Pollutant	Source
Asbestos	Clutch plates, brake linings
Cadmium	Tire wear and insecticides
Copper	Thrust-bearing, bushing, rbake linings, and fungicides and insecticides
Chromium	Pavement materials, metal plating, rocker arms, crankshafts, rings, and brake linings
Cyanide	Anti-caking compound in de-icing salt
Lead	Leaded gasoline, motor oil, transmission babbit metal bearings, tire wear
Iron	Auto body rust, steel highway structures, moving engine parts
Manganese	Moving engine parts
Nickel	Diesel fuel and gasoline, pavement materials, lubricating oil, metal plating, bushing wear, and brake linings
Nitrogen and Phosphorus	Motor oil additives, fertilizers
Sulphates	Roadway beds, fuel, and de-icing salt
Zinc	Motor oil and tires
Grease and Hydrocarbons	Spills and leaks of oil and n-parafin lubricants, antifreeze, hydraulic fluids
Rubber	Tire wear
Sediment Particulates	Pavement wear, construction and maintenance activities

SOURCE: USEPA Office of Water. (1995) *Controlling Nonpoint Source Runoff Pollution from Roads, Highways, and Bridges.* (EPA-841-F-95-008a). Washington DC.

Most of the proposed Plan projects would occur within watersheds that have impaired water bodies. Any increase in contaminant loading in these water bodies by constituents of concern appearing in a 303(d) list and contributed by a Plan project would be considered a significant impact. **Table 3.15-10** lists many of the impaired water bodies located within 150 feet of freeway, transit and freight rail projects proposed in the 2008 RTP. Several projects may impact water bodies by placing fill material within a stream channel. For example, several of the lane widening projects and new facilities could cross existing creeks or be expanded into wetland areas. These potential intrusions would be subject to permitting by the USACE and a RWQCB pursuant to Sections 404 and 401 of the CWA.

TABLE 3.15-9
NEW REGIONAL LANE MILES BY COUNTY*

County	Imperial	Los Angeles	Orange	Riverside	San Bernardino	Ventura	SCAG total
Freeway Lane Miles	412	4,749	1,422	1,949	2,710	555	**11,798**
Principal Arterial Lane Miles	543	9,118	3,202	1,666	2,966	908	**18,402**
Minor Arterial Lane Miles	648	9,340	3,168	4,000	4,678	1,040	**22,874**
Major Collector Lane Miles	2,353	3,355	439	4,256	5,907	623	**16,934**
HOV Lane Miles	0	570	243	132	206	7	**1,159**
Toll Lane Miles	0	144	541	13	0	0	**698**
Total Lane Miles in each County	3,956	27,276	9,016	12,016	16,467	3,134	**71,866**
Average Potential Additional Impervious Acreage**	5,765	39,749	13,139	17,511	23,998	4,567	**104,729**

SOURCE: SCAG. (2007). Regional Travel Demand Model. Los Angeles, CA.
*This analysis does not include transit projects or HSRT projects.
**Assumes an average lane width of 12 feet

TABLE 3.15-10
IMPAIRED WATER BODIES (303(D)) OCCURRING WITHIN 150 FEET OF A FREEWAY, TRANSIT, OR FREIGHT RAIL PROJECT IN THE 2008 RTP

Impaired Water Body	Pollutants
Aliso Creek	Indicator bacteria, Phosphorus, Toxicity
Ballona Creek	Cadmium (sediment), Coliform Bacteria, Copper, Dissolved, Cyanide, Lead, Selenium, Shellfish Harvesting Advisory, Silver (sediment), Toxicity, Trash, Viruses (enteric), Zinc
Ballona Creek Estuary	Cadmium, Chlordane (tissue & sediment), Copper, DDT, Lead, PAHs, PCBs, Sediment Toxicity, Shellfish Harvesting Advisory, Silver, Zinc (sediment)
Burbank Western Channel	Ammonia, Copper, Cyanide, Lead, Trash
Calleguas Creek Reach 7 (was Arroyo Simi Reaches 1 and 2 on 1998 303d list)	Ammonia, Boron, Chloride, Chlorpyrifos, Diazinon, Fecal Coliform, Organophosphorus Pesticides, Sedimentation/Siltation, Sulfates, Total Dissolved Solids, Toxicity
Calleguas Creek Reach 11 (Arroyo Santa Rosa, was part of Conejo Creek Reach 3 on 1998 303d list)	Ammonia, ChemA (tissue), Chlordane, DDT, Dieldrin, Endosulfan (tissue), Fecal Coliform, PCBs, Sedimentation/Siltation, Sulfates, Total Dissolved Solids, Toxaphene (tissue & sediment), Toxicity
Calleguas Creek Reach 12 (was Conejo Creek/Arroyo Conejo North Fork on 1998 303d list)	Ammonia, Chlordane (tissue), DDT (tissue), Dieldrin, PCBs, Sulfates, Total Dissolved Solids, Toxaphene

TABLE 3.15-10 (Continued)
IMPAIRED WATER BODIES (303(D)) OCCURRING WITHIN 150 FEET OF A FREEWAY, TRANSIT, OR FREIGHT RAIL PROJECT IN THE 2008 RTP

Impaired Water Body	Pollutants
Calleguas Creek Reach 13 (Conejo Creek South Fork, was Conejo Cr Reach 4 and part of Reach 3 on 1998 303d list)	Ammonia, ChemA (tissue), Chlordane, Chloride, DDT, Dieldrin, Endosulfan (tissue), Fecal Coliform, PCBs, Sulfates, Total Dissolved Solids, Toxaphene (tissue & sediment), Toxicity
Compton Creek	Coliform Bacteria, Copper, Lead, pH, Trash
Coyote Creek	Ammonia, Coliform Bacteria, Copper, Dissolved, Diazinon, Lead, pH, Toxicity, Zinc
Imperial Valley Drains	DDT, Dieldrin, Endosulfan (tissue), PCBs, Sedimentation/Siltation, Selenium, Toxaphene
Laguna Canyon Channel	Sediment Toxicity
Los Angeles River Reach 1 (Estuary to Carson Street)	Ammonia, Cadmium, Coliform Bacteria, Copper, Dissolved, Cyanide, Diazinon, Lead, Nutrients (Algae), pH, Trash, Zinc, Dissolved
Los Angeles River Reach 2 (Carson to Figueroa Street)	Ammonia, Coliform Bacteria, Copper, Lead, Nutrients (Algae), Oil, Trash
Los Angeles River Reach 3 (Figueroa St. to Riverside Dr.)	Ammonia, Copper, Lead, Nutrients (Algae), Trash
Los Angeles River Reach 4 (Sepulveda Dr. to Sepulveda Dam)	Ammonia, Coliform Bacteria, Copper, Lead, Nutrients (Algae), Trash
Los Angeles River Reach 6 (Above Sepulveda Flood Control Basin)	1,1-Dichloroethane (1,1-DCE)/Vinylidene chlori, Coliform Bacteria, Selenium, Tetrachloroethylene/PCE, Trichloroethylene/TCE
Lytle Creek	Pathogens
San Jose Creek Reach 2 (Temple to I-10 at White Ave.)	Coliform Bacteria
Sawpit Creek	Bis(2ethylhexyl)phthalate/DEHP, Fecal Coliform
Tujunga Wash (LA River to Hansen Dam)	Ammonia, Coliform Bacteria, Copper, Trash
Verdugo Wash Reach 1 (LA River to Verdugo Rd.)	Coliform Bacteria, Trash
Walnut Creek Wash (Drains from Puddingstone Res)	pH, Toxicity
Dominguez Channel Estuary (unlined portion below Vermont Ave)	Ammonia, Benthic Community Effects, Benzo(a)pyrene (PAHs), Benzo[a]anthracene, Chlordane (tissue), Chrysene (C1-C4), Coliform Bacteria, DDT (tissue & sediment), Lead (tissue), PCBs, Phenanthrene, Pyrene, Zinc (sediment)

Source: SCAG analysis of California State Water Resources Control Board 2006 303d List of Water Quality Limited Segments that: 1) require TMDLS, 2) are being addressed by USEPA approved TMDLs, and 3) are being addressed by actions other than TMDLs

Construction activities can be a major source of sediment loading and hydrocarbon contamination in local waterways. Unprotected soil easily erodes with rain water. In addition, fueling procedures and maintenance of heavy equipment on construction sites can spill diesel and oil and grease. In 2003, the SWRCB adopted a state-wide storm water permit for construction sites that downsized compliance requirements from sites over five acres to sites over one acre. Prior to commencement of construction activities, a project applicant must submit a Storm Water Pollution Prevention Plan (SWPPP) to the SWRCB that identifies the Best Management Practices (BMPs) that will be used in the planned project construction. The applicant must receive approval of the SWPPP and submit a Notice of Intent prior to initiating construction. Each individual project in the 2008 RTP is expected to adopt BMPs appropriate to local conditions and to the proposed construction techniques that will reduce pollution runoff.

The proposed Plan's new roadway projects would create new impervious areas. Without mitigation, the runoff from these new impervious areas would contribute to local water impairments by degrading the water quality of the receiving waters, both in the short term (during project construction) and in the long term (during the project's operation). This would be a **significant** impact.

Mitigation Measures

The following mitigation measures are recommended:

MM-W.1: Transportation improvements shall comply with federal, state, and local regulations regarding storm water management. State-owned highways and other transportation facilities are subject to compliance with a statewide stormwater permit issued to Caltrans.

MM-W.2: Project implementation agencies shall ensure that new facilities include structural water quality control features such as drainage channels, detention basins, oil and grease traps, filter systems, and vegetated buffers to prevent pollution of adjacent water resources by polluted runoff where required by applicable urban storm water runoff discharge permits.

MM-W.3: Structural storm water runoff treatment shall be provided according to the applicable urban storm water runoff permit where facilities will be operated by a permitted municipality or county. Where Caltrans is the operator, the statewide permit applies.

MM-W.4: Implementation agencies shall consult with the RWQCB and Storm Water Management Plan permit holders as projects are designed to ensure that projects protect the goals of the Clean Water Act and comply with federal storm water NPDES permits.

MM-W.5: Implementation agencies shall ensure that operational best management practices for street cleaning, litter control, and catch basin cleaning are implemented to prevent water quality degradation in compliance with applicable storm water runoff discharge permits. Efforts shall be made to assure treatment controls are in place as early as possible, such as during the acquisition process for rights-of-way, not just later during the facilities design and construction phase.

MM-W.6: Implementation agencies shall comply with the State-wide construction storm water discharge permit requirements including preparation of Storm Water Pollution Prevention Plans for transportation improvement construction projects. Roadway construction projects shall comply with the Caltrans storm water discharge permit. Best Management Practices shall be identified and implemented to manage site erosion, wash water runoff, and spill control.

MM-W.7: Projects requiring the discharge of dredged or fill materials into U.S. waters, including wetlands, shall comply with sections 404 and 401 of the Clean Water Act including the requirement to obtain a permit from the U.S. Army Corps of Engineers and the governing Regional Water Quality Control Board.

MM-W.8: In compliance with applicable municipal separate storm sewer system discharge permits as well as Caltrans' storm water discharge permit, long-term sediment control shall be effected through erosion control and revegetation programs designed to allow reestablishment of native vegetation on slopes and undeveloped areas.

MM-W.9: Drainage of roadway runoff shall comply with Caltrans' storm water discharge permit. Wherever possible, roadways shall be designed to convey storm water through vegetated median strips that provide detention capacity and allow for infiltration before reaching culverts.

The infiltration capacity of storm water runoff detention facilities shall be sized to minimize, to the greatest extent possible, the effect of increased impervious surfaces.

Significance after Mitigation

The mitigation measures would not fully mitigate water quality degradation, violation of water quality standards, or prevent erosion or siltation. The impact remains **significant**.

Impact 3.15-2: Increased impervious surfaces due to transportation projects would reduce groundwater infiltration.

The proposed 2008 RTP would include additional impervious surfaces installed through new roadway projects. **Table 3.15-9** provides information on the lane mile additions expected in each county. With the implementation of the 2008 RTP, approximately 72,000 new lane miles would be added to the region. These additions would include new facilities, additional right-of-way on existing facilities and/or re-striping of existing facilities. The specifics of each project are unknown at this time. Conservatively, each lane addition was assumed to have an average width of 12 feet. The area of additional impervious surface has been calculated and appears in **Table 3.15-9**. Rail projects involving construction of new rail lines, new stations, and upgrades to existing stations are not included in this calculation. Where these projects involve installation of additional impervious surfaces they would potentially have adverse impacts on groundwater infiltration.

Under natural conditions, vegetation intercepts and retains rainfall before infiltration or runoff occurs. Without hard-surfaced land areas, this hydrology cycle favors groundwater recharge. With the hard surface of a roadway this infiltration dynamic is significantly impeded. The magnitude of this effect is reported by studies indicating that the volume of storm water washed off one-acre of roadway is about sixteen times greater than that of a comparably sized meadow.[36]

The increase in impervious surfaces due to additional miles of roadway, in addition to urban development associated with the population distribution in 2035 would increase runoff and potentially affect groundwater recharge rates.

Mitigation Measures

MM-W.10: Project implementation agencies shall avoid designs that require continual dewatering where feasible.

MM-W.11: Project implementation agencies shall ensure that projects that do require continual dewatering facilities implement monitoring systems and long-term administrative procedures to ensure proper water management that prevents degrading of surface water and minimizes, to the greatest extent possible, adverse impacts on groundwater for the life of the project. Construction designs shall comply with appropriate building codes and standard practices including the Uniform Building Code.

MM-W.12: Treatment and control features such as detention basins, infiltration strips, and other features to control surface runoff and facilitate groundwater recharge shall be incorporated into the design of new transportation projects early on in the process to ensure that adequate acreage and elevation contours are provided during the right-of-way acquisition process.

MM-W.13: Where feasible, transportation facilities shall not be sited in groundwater recharge areas, to prevent conversion of those areas to impervious surface.

Significance After Mitigation

Implementation of these mitigation measures would reduce the regional impact but impacts would remain **significant** due to the large areas of additional impermeable surfaces.

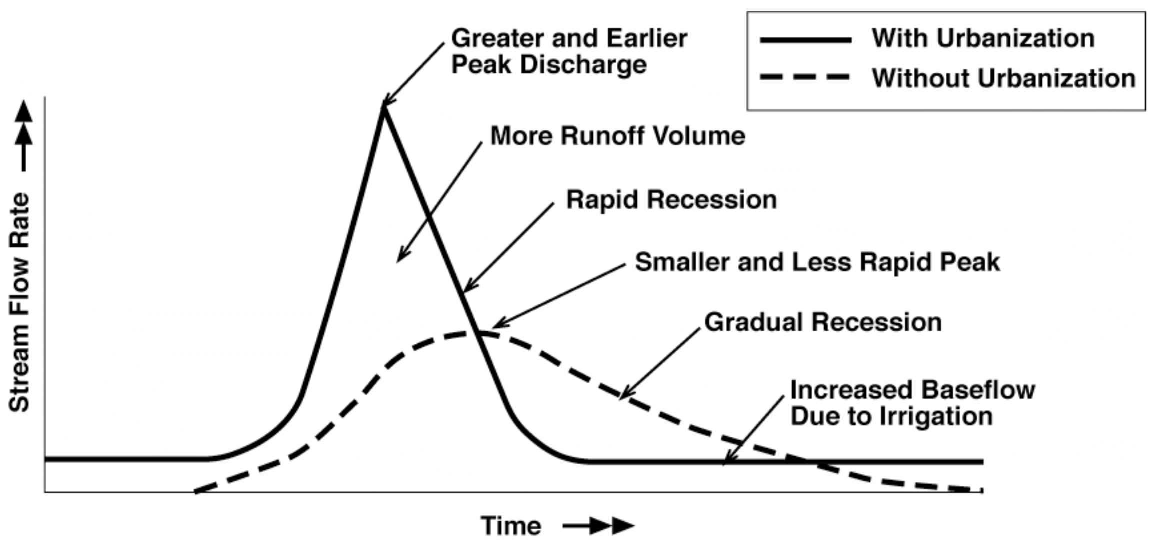
Impact 3.15-3: The 2008 RTP could increase flooding hazards, by placing transportation investments, on alluvial fans and within 100-year flood hazard areas.

[36] Scheuler, T.R. (1994). The importance of imperviousness. *Watershed Protection Techniques 1(3)*: 100-111. Retrieved August 28, 2003, from http://www.stormwatercenter.net/Practice/1-Importance%20of%20Imperviousness.pdf

The proposed 2008 RTP could alter existing drainage patterns or substantially increase the rate or amount of surface runoff in a manner that would result in flooding or produce or contribute runoff water that would exceed the capacity of existing or planned storm water drainage systems.

Storm water runoff is influenced by rainfall intensity, ground surface permeability, watershed size and shape, and physical barriers. The introduction of impermeable surfaces greatly reduces natural infiltration, allowing for a greater volume of runoff. In addition, paved surfaces and drainage conduits can accelerate the velocity of runoff, concentrating peak flows in downstream areas faster than under natural conditions. Significant increases to runoff and peak flow can overwhelm drainage systems and alter flood elevations in downstream locations. Increased runoff velocity can promote scouring of existing drainage facilities, reducing system reliability and safety. **Figure 3.15-2** depicts a typical hydrograph showing the effects of urbanization on peak flow rates.

FIGURE 3.15-2
HYDROGRAPH COMPARISON OF URBANIZED AND NON-URBANIZED LAND COVER



SOURCE: Schueler, Thomas. (1997). *Controlling urban runoff: A practical manual for planning and designing urban BMPs.* Metropolitan Washington Council of Governments, Washington, D.C.

The 2008 RTP transportation projects would result in increased impervious surfaces. Additional impervious surfaces increases storm water runoff volumes and peak flow rates. This increase has the potential to create or contribute runoff flows that would exceed the capacity of existing or planned storm water drainage systems. In addition, placing new structures within an existing floodplain can impede flood waters, altering the flood risks both upstream and downstream.

Natural desert conditions promote runoff that can cause flash flooding. In those areas of the SCAG region where soils have naturally low permeability and are subject to quick saturation, high rain volumes remain on the surface as runoff. When highways are placed within these areas of an existing flood plain the public is exposed to the hazards of flash flooding. **Map 3.15-9** shows the location of the major floodplains in the SCAG region. Many of the proposed highway projects would pass through these floodplain areas as currently delineated.

The highway and arterial projects proposed in the 2008 RTP mostly include widening existing highways, constructing new interchanges, new highway segments, new rail lines and the HSRT projects. **Table 3.15-9** summarizes additional lane miles proposed for each county and provides a conservative calculation (as some lane additions may be accomplished through lane re-striping) of increased impervious surfaces proposed by the projects based on lane miles only. Some of the proposed transit projects would involve construction of new rail lines, new stations, and upgrades to existing stations, and are not included in the calculation presented in **Table 3.15-9.**

Placing new structures within an existing floodplain can impede flood waters, altering the flood risks both upstream and downstream. Road improvements in the Plan are located within 150 feet of approximately 4,500 acres of identified 100-year flood zones and 7,200 acres of identified 500-year flood zones. The flooding risks associated with projects located in these flood zones can be modified with appropriate design and alignment considerations.

Mitigation Measures

The following mitigation measures are recommended:

MM-W.14: Natural riparian conditions near projects shall be maintained, wherever feasible, to minimize the effects of stormwater flows at stream crossings. Where feasible, riparian areas should be restored or expanded to mitigate additional impervious surface and associated runoff.

MM-W.15: Implementing agencies shall assure projects mitigate for changes to the volume of runoff, where any downstream receiving waterbody has not been designed and maintained to accommodate the increase in flow velocity, rate, and volume without impacting the water's beneficial uses. Pre-project flow velocities, rates, and volumes must be not be exceeded. This applies not only to increases in storm water runoff from the project site, but also to hydrologic changes induced by flood plain encroachment. Projects should not cause or contribute to conditions that degrade the physical integrity or ecological function of any downstream receiving waters.

MM-W.16: Impacts shall be reduced to the extent possible by providing culverts and facilities that do not increase the flow velocity, rate, or volume and/or acquiring sufficient storm drain easements that accommodate an appropriately vegetated earthen drainage channel, as required in MM-W.15.

MM-W.17: All roadbeds for new highway and rail facilities should be elevated at least one foot above the 100-year base flood elevation. Since alluvial fan flooding is not often identified on FEMA flood maps, the risk of alluvial fan flooding shall be evaluated and projects shall be sited to avoid alluvial fan flooding where feasible. Delineation of floodplains and alluvial fan boundaries should attempt to account for future hydrologic changes caused by global climate change.

MM-W.18: Transportation improvements shall comply with local, state, and federal floodplain regulations. Projects requiring federal approval or funding shall comply with Executive Order 11988 on Floodplain Management, which requires avoidance of incompatible floodplain development, restoration and preservation of the natural and beneficial floodplain values, and maintenance of consistency with the standards and criteria of the National Flood Insurance Program.

MM-W.19: Improvement projects on existing facilities shall include upgrades to stormwater drainage facilities to accommodate any increased runoff volumes. These upgrades may include the construction of detention basins or structures that will delay peak flows and reduce flow velocities, including expansion and restoration of wetlands and riparian buffer areas. System designs shall be completed to eliminate increases in peak flow rates from current levels.

Significance after Mitigation

After implementation of the mitigation measures, the 2008 RTP projects would regionally have a **less than significant impact.**

Cumulative Impact 3.15-4: Urbanization in the SCAG region will increase substantially by 2035. The 2008 RTP, by increasing mobility and by including land-use-transportation measures, influences the pattern of this urbanization. The 2008 RTP's influence on growth would contribute to the conversion of undeveloped land to urban uses, resulting in impacts to water quality.

The growth projection associated with the 2008 RTP would substantially increase the amount of urbanized land in the SCAG region. With the 2008 RTP, the amount of new urbanized acreage (consuming previously vacant land) would be approximately 200,000 acres.[37] Pollutant loading in surface and groundwater correlates closely with land use patterns. Suspended sediments, oxygen demanding substances, and oil and grease would constitute a substantial part of these pollutant loads. Total nitrogen and total phosphorous would increase less than these other pollutants, but would have the potential for influencing algal growth, reducing dissolved oxygen, and affecting aquatic species abundance and composition.[38]

Mitigation Measures

Mitigation Measures W.1 through W.9 shall be applied to all urban development projects, as feasible, in addition to the following measures:

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[37] SCAG 2007
[38] Keller, Arturo A. and Yi Zheng. (2003). Personal communication. University of California. Santa Barbara, CA.

MM-W.20: Local governments should encourage Low Impact Development and natural spaces that reduce, treat, infiltrate and manage stormwater runoff flows in all new developments.

MM-W.21: Local governments should implement green infrastructure and water-related green building practices through incentives and ordinances. Green building resources include the U.S. Green Building Council's Leadership in Energy and Environmental Design, Green Point Rated Homes, and the California Green Builder Program.

MM-W.22: Local governments should integrate water resources planning with existing greening and revitalization initiatives, such as street greening, tree planting, development and restoration of public parks, and parking lot conversions, to maximize benefits and share costs.

MM-W.23: Developers, local governments, and water agencies should maximize permeable surface area in existing urbanized areas to protect water quality, reduce flooding, allow for groundwater recharge, and preserve wildlife habitat. New impervious surfaces should be minimized to the greatest extent possible, including the use of in-lieu fees and off-site mitigation.

MM-W.24: SCAG shall continue to work with local jurisdictions and water quality agencies, through its Water Policy Task Force and other means, to encourage regional-scale planning for improved water quality management and pollution prevention. Future impacts to water quality shall be avoided through cooperative planning, information sharing, and comprehensive pollution control measure development within the SCAG region. This cooperative planning shall occur during as part of SCAG's ongoing regional planning efforts.

Significance After Mitigation

The urban development expected by 2035 would create adverse water quality and waste discharge conditions and/or unfavorably alter existing drainage patterns in a manner that would result in substantial erosion or siltation. The 2008 RTP's influence on growth distribution is a cumulatively considerable contribution to this **significant impact**.

Cumulative Impact 3.15-5: Urbanization in the SCAG region will increase substantially by 2035. The 2008 RTP, by increasing mobility and by inclusion of land-use-transportation measures, influences the pattern of this urbanization. The 2008 RTP's influence on growth would contribute to the conversion of undeveloped land to urban uses, resulting in impacts to stormwater infiltration and groundwater recharge.

The addition of approximately 5.14 million people to the SCAG region would require increased urban development for housing, employment centers, and other services. The amount of new urbanized acreage (consuming previously vacant land) would be on the order of 200,000 acres.[39] The enlarged impervious surfaces associated with this urban development would potentially reduce groundwater recharge.

Mitigation Measures

Mitigation Measures W.10 through W.13 shall be applied to all urban development projects, as feasible, in addition to the following measure:

MM-W.25: SCAG shall continue to work with local jurisdictions and water agencies, to encourage regional-scale planning for improved stormwater management and groundwater recharge. Future adverse impacts shall be avoided through cooperative planning, information sharing, and comprehensive implementation efforts within the SCAG region. Meetings of SCAG's Water Policy Task Force and Regional Council offer an opportunity for local jurisdictions and water agencies to share information and strategies for improving regional performance in these efforts.

Significance after Mitigation

The urban development expected by 2035 would potentially affect stormwater infiltration and groundwater recharge. Future planning and implementation efforts may reduce the significance of this impact. However, given current conditions, the 2008 RTP's cumulative effects on stormwater infiltration and groundwater recharge would contribute to a **significant impact** on regional water resources.

Cumulative Impact 3.15-6: Urbanization in the SCAG region will increase substantially by 2035. The 2008 RTP, by increasing mobility and including land-use-transportation measures, influences the pattern of this urbanization. The 2008 RTP's influence on growth would contribute to the conversion of undeveloped land to urban uses, resulting in flooding hazard impacts.

The amount of new urbanized acreage (consuming previously vacant land) would be on the order of 200,000 acres.[40] The additional urbanized acreage expected by 2035 could increase stormwater runoff, and could be located in areas with the potential for alluvial fan flooding or other flood hazards.

Mitigation Measures

Mitigation Measures W.14 through W.19 shall be applied to all urban development projects, as feasible, in addition to the following measure:

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39 Fregonese, Calthorpe, and Associates. (2007). Unpublished data. Los Angeles, CA.
40 SCAG 2007.

MM-W.26: Local governments should prevent development in flood hazard areas that do not have appropriate protections, especially in alluvial fan areas of the region.

Significance after Mitigation

Urban development expected by 2035 would potentially result in additional structures in areas with flood hazards. Future planning efforts may reduce the significance of this impact; however, to assume that all flood hazards would be avoided would be speculative. The 2008 RTP's effect on population distribution and its associated contribution to the impact of flooding hazards is **significant**.

Cumulative Impact 3.15-7: Urbanization in the SCAG region will increase substantially by 2035. The 2008 RTP, by increasing mobility and by including land-use-transportation measures, influences the pattern of this urbanization. The 2008 RTP's influence on growth would contribute to the need for increased wastewater treatment capacity in the region by 2035. The proposed Plan influences population growth, resulting in an indirect and cumulative impact on wastewater treatment services.

The average wastewater generation rate in each county[41] was applied to the expected population growth in each county and compared to the remaining wastewater treatment capacity derived from the data in **Table 3.15-7**. Broadly assuming that wastewater capacity can be shared among the agencies in each county, it is estimated that Imperial, Riverside, and San Bernardino counties would outgrow their wastewater treatment capacity by the year 2035.

To determine the significance of the impact, wastewater treatment capacities needed in 2035 must be compared to the existing capacities only. (This analysis does not consider existing plans to build new facilities.)

Mitigation Measures

MM-W.27: Local jurisdictions should encourage new development and industry to locate in those service areas with existing wastewater infrastructure and treatment capacity, making greater use of those facilities prior to incurring new infrastructure costs.

MM-W.28: Wastewater treatment agencies are encouraged to have expansion plans, approvals and financing in place once their facilities are operating at 80 percent of capacity. SCAG shall provide opportunities for information sharing and program development.

MM-W.29: Local jurisdictions should promote reduced wastewater system demand by: designing wastewater systems to minimize inflow and increase upstream treatment and infiltration to the extent feasible, reducing overall source water generation by domestic and industrial users, deferring development approvals for industries that

41 SCAG. (1994). *Regional Transportation Plan and Chapters of the Regional Comprehensive Plan Final Environmental Impact Report*. Los Angeles, CA.

generate high volumes of wastewater until wastewater agencies have expanded capacity.

Significance after Mitigation

The mitigation measures would lessen the impacts on wastewater treatment capacity in the region; however, they are not expected to prevent an imbalance between the demand for regional capacity and existing regional capacity. The 2008 RTP would make a cumulatively considerable contribution to this **significant impact.**

Cumulative Impact 3.15-8: Urbanization in the SCAG region will increase substantially by 2035. The 2008 RTP, by increasing mobility and by inclusion of land-use-transportation measures, influences the pattern of this urbanization. The 2008 RTP's influence on growth would contribute to an increased demand for water supply and its associated infrastructure. Water agencies in the SCAG region produce many long-range planning studies to provide a system adequate to supply water demand, however the *existing* water supplies and infrastructure would not be sufficient to meet the expected demand in 2035.

The volume of water and water delivery infrastructure currently available within the SCAG region would not be sufficient to meet the future multiple dry year or average year demand at 2035. As population increases in the SCAG region, the demand for municipal water will increase. Increased commercial and industrial land uses will also increase water demand. As water demand increases, water supply may potentially decrease. Reduction in supply – combined with uncertainty in the reliability of that supply – could result from increased temperatures due to global climate change, as well as regulatory or legislative decisions that affect the availability of imported water.

Meeting future water demand is the responsibility of local and regional water agencies. Water supplies are either produced locally from groundwater and surface water sources or are imported by the Los Angeles Aqueduct, the California Aqueduct, the Colorado River Aqueduct, the All American Canal, or the Coachella Canal. Other means of providing water without increasing imported supplies include reclamation and recycling, conservation, water transfers, groundwater banking, and ocean desalination.

The Urban Water Management Plan Act of 1990 requires that local water agencies prepare plans showing projected water supplies and demands for average years and multiple dry years. These plans are updated every five years. Some water agencies project average year water deficits by the year 2020 if current management and supply efforts are not augmented. Other agencies project no deficits owing to the development of new supplies and management efforts. These projections all face the same uncertainty in regard to the long-term affects of global climate change on the region's water supply. Metropolitan Water District (MWD) is currently planning an update to its water supply projections in response to these challenges. Over 80 percent of the projected population in the SCAG region in 2035 is within the MWD service area.

Supplying the water necessary to meet future demand and/or minimizing that demand would mitigate the effect to less than significant levels. Each water district develops its own policy for determining its planning horizon and for acquiring and building water facilities. Water districts provide water for the growth planned and authorized by the appropriate land use authority. However, given the challenges to imported water supplies, areas currently projecting future deficits, and since local replacement measures are not yet in place, the impact remains significant.

Mitigation Measures

MM-W.30: Project developers and agencies should consider potential climate change hydrology and attendant impacts on available water supplies and reliability in the process of creating or modifying systems to manage water resources for both year-round use and ecosystem health.

MM-W.31: Local water agencies should continue to evaluate future water demands and establish the necessary supply and infrastructure to meet that demand, as documented in their Urban Water Management Plans.

MM-W.32: Developers, local governments, and water agencies should include conjunctive use as a water management strategy when feasible.

MM-W.33: SCAG shall encourage the kind of regional coordination throughout California and the Colorado River Basin that develops and supports sustainable policies in accommodating growth.

MM-W.34: SCAG shall facilitate information sharing about the management and status of the Sacramento River Delta, the Colorado River Basin, and other water supply source areas of importance to local water supply.

MM-W.35: Developers and local governments should reduce exterior uses of water in public areas, and should promote reductions in private homes and businesses, by shifting to drought-tolerant native landscape plantings (xeriscaping), using weather-based irrigation systems, educating other public agencies about water use, and installing related water pricing incentives.

MM-W.36: Future impacts to water supply shall be minimized through cooperation, information sharing, and program development as part of SCAG's on-going regional planning efforts. SCAG's Water Policy Task Force presents an opportunity for local jurisdictions and water agencies to share information and strategies (such as those listed above) about their on-going water supply planning efforts, including the following types of actions:[42]

[42] Bullets one through four are existing SCAG policies.

Minimize impacts to water supply by developing incentives, education and policies to further encourage water conservation and thereby reduce demand. Involve the region's water supply agencies in planning efforts in order to make water resource information, such as water supply and water quality, location of recharge areas and groundwater, and other useful information available to local jurisdictions for use in their land use planning and decisions.

Provide, as appropriate, legislative support and advocacy of regional water conservation, supply and water quality projects.

Promote water-efficient land use development.

The Water Policy Task Force and other ongoing regional planning efforts present an opportunity for SCAG to partner with the region's water agencies in outreaching to local governments, special water districts, and the California Department of Water Resources on important water supply issues. SCAG provides a unique opportunity to increase two-way communication between land use and water planners. The goals of the Task Force would not be to duplicate existing efforts of the water agencies.

Significance after Mitigation

Full implementation of these water supply mitigation measures may provide an adequate and reliable future water supply and infrastructure. The various water agencies update their Urban Water Management Plans to ensure that planning for the water needs of future growth is accommodated in a timely manner. However, CEQA requires the determination of significance to be based on a comparison between *existing* water supply and infrastructure and expected future demand. Although ensuring a reliable water supply for urban and other water demands in 2035 may be possible, the current, existing water supply and infrastructure would not be able to support the population in the Plan in 2035, and the specific, detailed solutions necessary to assure adequate water supply in 2035 have not yet been developed. Through its influence on regional growth, the 2008 RTP would make a cumulatively considerable contribution to this **significant impact.**

Comparison With The No Project Alternative

In the No Project alternative, the population of the SCAG region grows by 5.14 million people, however no regional transportation investments are made above the existing programmed projects. The population distribution follows past trends, uninfluenced by additional transportation investments. The number of households and the employment are less than the Plan due to the absence of the economic benefits conferred by the Plan.

Direct Impacts

With fewer transportation projects than the 2008 RTP, the direct effects of the No Project Alternative on water resources would be reduced when compared with the 2008 RTP. As the currently planned projects included in the No Project alternative (those transportation projects that would occur regardless of the 2008 RTP adoption) are built, the impacts owing to increased roadway runoff and drainage patterns would remain significant. The impacts to groundwater infiltration caused by the increased impervious surfaces of roadway projects, and to increased flooding hazards would be less than significant (with the mitigation measures described for Impacts 3.15-1 through 3.15-3).

The proposed Plan's transportation project related impacts to water quality, groundwater recharge, and flooding would be greater than the No Project Alternative.

Cumulative Impacts

Cumulatively, both the Plan and the No Project would potentially impact water quality, groundwater recharge, flood hazards, wastewater treatment capacity, and water supply. In the No Project alternative, new development would occur to accommodate the same increase in population as projected for the proposed Plan. To reduce land consumption, the Plan includes land use measures that encourage centers-based development, re-development and in-fill where feasible. These measures are largely absent in the No Project alternative. The impacts to water quality would be different in the No Project alternative, as seen in **Table 3.15-11**, which shows the impaired waters impacted by the No Project alternative developments (compared to **Table 3.15-10**, which shows impaired waters impacted by the Plan). The difference in projected urbanized acreage between the Plan and No Project is significant, with the Plan adding approximately ten percent of the existing urbanized land in the region. In comparison, No Project is projected to add over 30 percent to existing urbanized land. Because of the significant difference in urbanization and vacant land consumption, the cumulative impacts associated with urban development would be reduced in the Plan compared with the No Project alternative.

The cumulative impacts on wastewater service capacity, due to the growth expected between the base year and 2035, would be approximately the same in the No Project alternative and the Plan. Because the total population in each county is constant between the No Project alternative and the Plan, Imperial, Los Angeles, Riverside and San Bernardino counties would be at or above their existing wastewater treatment capacities. Though it is expected that new treatment capacities will be added as future demand requires, the relation between future growth and current treatment capacities in the No Project alternative and in the Plan creates a finding of significant impact on wastewater services.

**Table 3.15-11:
Impaired Water Bodies (303(d) Occurring Within 150 Feet of a Freeway, Transit, or Freight Rail Project in the No Project Alternative**

Impaired Water Body	Pollutants
Aliso Creek	Indicator bacteria, Phosphorus, Toxicity
Ballona Creek	Cadmium (sediment), Coliform Bacteria, Copper, Dissolved, Cyanide, Lead, Selenium, Shellfish Harvesting Advisory, Silver (sediment), Toxicity, Trash, Viruses (enteric), Zinc
Ballona Creek Estuary	Cadmium, Chlordane (tissue & sediment), Copper, DDT, Lead, PAHs, PCBs, Sediment Toxicity, Shellfish Harvesting Advisory, Silver, Zinc (sediment)
Burbank Western Channel	Ammonia, Copper, Cyanide, Lead, Trash
Calleguas Creek Reach 7 (was Arroyo Simi Reaches 1 and 2 on 1998 303d list)	Ammonia, Boron, Chloride, Chlorpyrifos, Diazinon, Fecal Coliform, Organophosphorus Pesticides, Sedimentation/Siltation, Sulfates, Total Dissolved Solids, Toxicity
Calleguas Creek Reach 11 (Arroyo Santa Rosa, was part of Conejo Creek Reach 3 on 1998 303d list)	Ammonia, ChemA (tissue), Chlordane, DDT, Dieldrin, Endosulfan (tissue), Fecal Coliform, PCBs, Sedimentation/Siltation, Sulfates, Total Dissolved Solids, Toxaphene (tissue & sediment), Toxicity
Calleguas Creek Reach 12 (was Conejo Creek/Arroyo Conejo North Fork on 1998 303d list)	Ammonia, Chlordane (tissue), DDT (tissue), Dieldrin, PCBs, Sulfates, Total Dissolved Solids, Toxaphene
Calleguas Creek Reach 13 (Conejo Creek South Fork, was Conejo Cr Reach 4 and part of Reach 3 on 1998 303d list)	Ammonia, ChemA (tissue), Chlordane, Chloride, DDT, Dieldrin, Endosulfan (tissue), Fecal Coliform, PCBs, Sulfates, Total Dissolved Solids, Toxaphene (tissue & sediment), Toxicity
Compton Creek	Coliform Bacteria, Copper, Lead, pH, Trash
Coyote Creek	Ammonia, Coliform Bacteria, Copper, Dissolved, Diazinon, Lead, pH, Toxicity, Zinc
Imperial Valley Drains	DDT, Dieldrin, Endosulfan (tissue), PCBs, Sedimentation/Siltation, Selenium, Toxaphene
Laguna Canyon Channel	Sediment Toxicity
Los Angeles River Reach 1 (Estuary to Carson Street)	Ammonia, Cadmium, Coliform Bacteria, Copper, Dissolved, Cyanide, Diazinon, Lead, Nutrients (Algae), pH, Trash, Zinc, Dissolved
Los Angeles River Reach 2 (Carson to Figueroa Street)	Ammonia, Coliform Bacteria, Copper, Lead, Nutrients (Algae), Oil, Trash
Los Angeles River Reach 3 (Figueroa St. to Riverside Dr.)	Ammonia, Copper, Lead, Nutrients (Algae), Trash
Los Angeles River Reach 4 (Sepulveda Dr. to Sepulveda Dam)	Ammonia, Coliform Bacteria, Copper, Lead, Nutrients (Algae), Trash
Los Angeles River Reach 6 (Above Sepulveda Flood Control Basin)	1,1-Dichloroethane (1,1-DCE)/Vinylidene chlori, Coliform Bacteria, Selenium, Tetrachloroethylene/PCE, Trichloroethylene/TCE
Lytle Creek	Pathogens
San Jose Creek Reach 2 (Temple to I-10 at White Ave.)	Coliform Bacteria
Sawpit Creek	Bis(2ethylhexyl)phthalate/DEHP, Fecal Coliform
Tujunga Wash (LA River to Hansen Dam)	Ammonia, Coliform Bacteria, Copper, Trash

Table 3.15-11 (Continued)
Impaired Water Bodies (303(d) Occurring Within 150 Feet of a Freeway, Transit, or Freight Rail Project in the No Project Alternative

Impaired Water Body	Pollutants
Verdugo Wash Reach 1 (LA River to Verdugo Rd.)	Coliform Bacteria, Trash
Walnut Creek Wash (Drains from Puddingstone Res)	pH, Toxicity
Dominguez Channel Estuary (unlined portion below Vermont Ave)	Ammonia, Benthic Community Effects, Benzo(a)pyrene (PAHs), Benzo[a]anthracene, Chlordane (tissue), Chrysene (C1-C4), Coliform Bacteria, DDT (tissue & sediment), Lead (tissue), PCBs, Phenanthrene, Pyrene, Zinc (sediment)

SOURCE: SCAG analysis of California State Water Resources Control Board 2006 303d List of Water Quality Limited Segments that: 1) require TMDLS, 2) are being addressed by USEPA approved TMDLs, and 3) are being addressed by actions other than TMDLs

Due to this pattern of greater urban development, the No Project alternative's cumulative impacts to both water quality and flood risk would be greater than those associated with the 2008 RTP.

The No Project Alternative would distribute growth among water supply agencies similarly to the Plan (see **Table 3.15-6**). The *existing* water supply and infrastructure would not be able to support the population in the No Project alternative in 2035. The proposed Plan's impacts on water supply would be approximately the same as the No Project alternative, with the possible exception of increased multi-family housing in the Plan; multi-family housing is traditionally more water efficient than single-family housing.

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