CHAPTER 12 – HYDROLOGY AND WATER QUALITY

INTRODUCTION

This chapter describes the environmental setting (existing conditions and regulatory setting) for hydrology and water quality in the MTP Plan Area, the impacts on hydrology and water quality that may result from implementation of the proposed MTP 2035 projects, and mitigation measures to reduce these impacts where necessary. Please refer to Chapter 19, *Utilities and Service Systems*, for further discussion of water supply.

The study area consists of transportation routes, including highways, rail alignments, bicycle trails, state routes, roads, and Caltrans rights-of-way in the MTP Plan Area. The key sources of data and information used in the preparation of this section are listed below:

- Sacramento County General Plan 1993 (Sacramento County 1993)
- Yolo County General Plan (Yolo County 1983)
- Sutter County General Plan (Sutter County 1993)
- Yuba County General Plan (Yuba County 2004)
- Placer County General Plan (Placer County 2005)
- El Dorado County General Plan (El Dorado County 2004)
- California Department of Water Resources Groundwater Bulletin 118 (DWR 2003)
- 2006 Clean Water Act Section 303(d) List of Water Quality Limited Segments (State Water Board 2006)
- Sacramento River and San Joaquin River Basin Plans (RWQCB 1998)
- Sacramento Area of Council of Governments Metropolitan Transportation Plan for 2025 PEIR (SACOG 2002)

The information presented in this chapter is based on a review of existing and available information and is regional in scope. Data provided in this section should be considered preliminary and appropriate for general policy planning and tiering of subsequent environmental documents. Site-specific evaluations will be necessary to determine future project-level environmental effects and appropriate mitigation.

SETTING

Climate and Topography

The topography in the MTP Plan Area varies from relatively flat areas in the Sacramento-San Joaquin Delta and the northern portion of the California Central Valley to steeper slopes and greater elevations in the Sierra Nevada foothills in the east and the Coast Range foothills in the west. Elevations in the MTP Plan Area along the Sacramento River and in the southern portion in the Sacramento-San Joaquin Delta are generally at or below sea level (Topozone 1999). Near the foothills of the Coast Range and the Sierra Nevada, elevations in the MTP Plan Area range from greater than 2,000 feet above mean sea level (amsl) to greater than 7,000 feet amsl, respectively (Topozone 1999).

In general, the MTP Plan Area experiences a typical Mediterranean climate with hot, dry summers and cool, wet winters. Average high temperatures during the summer range from 80 to 90 degrees Fahrenheit in the coastal and Sierra Nevada foothills to 90 to 100 degrees Fahrenheit in the Sacramento Valley (NOAA 2006). During winter, average low temperatures range from approximately the low 30s (degrees Fahrenheit) in the Sierra Nevada foothills to the low 50s (degrees Fahrenheit) in the Sacramento Valley (NOAA 2006).

Precipitation varies in the MTP Plan Area. Average precipitation for the 2-year, 24-hour storm event in the Sierra Nevada foothills ranges from 35 to 80 inches (WRCC 1973). Precipitation for this same type of storm event is substantially less in the Sacramento Valley (20 to 25 inches) and in the Coastal foothills (25 to 55 inches) (WRCC 1973). Similarly, the average precipitation during a 100-year, 24-hour storm event is lowest in the Sacramento Valley (approximately 40 to 50 inches) and higher in the Sierra Nevada foothills (approximately 70 to 160 inches) and Coastal foothills (approximately 40 to 120 inches) (WRCC 1973).

Hydrology

Surface Waters

The Sacramento River Hydrologic Region encompasses an area of approximately 17.4 million acres (27,200 square miles) and contains all or large portions of Modoc, Siskiyou, Lassen, Shasta, Tehama, Glenn, Plumas, Butte, Colusa, Sutter, Yuba, Sierra, Nevada, Placer, Sacramento, El Dorado, Yolo, Solano, Lake and Napa counties (DWR 2003). Most of northern California is located in the Sacramento River Hydrologic Region, which encompasses several watersheds of various sizes.

Major watersheds in the Sacramento River Hydrologic Region and in the MTP Plan Area include: the American River; Bear River; Cache Creek; Cosumnes River; Feather River; Mokelumne River; Putah Creek; Sacramento River; and Yuba River (Figure 12-1). These watersheds and their major surface waters, including average annual flows and reservoir capacities, are summarized in Tables 12 -1 and 12-2. Ultimately, these watersheds drain to the Sacramento-San Joaquin River Delta.

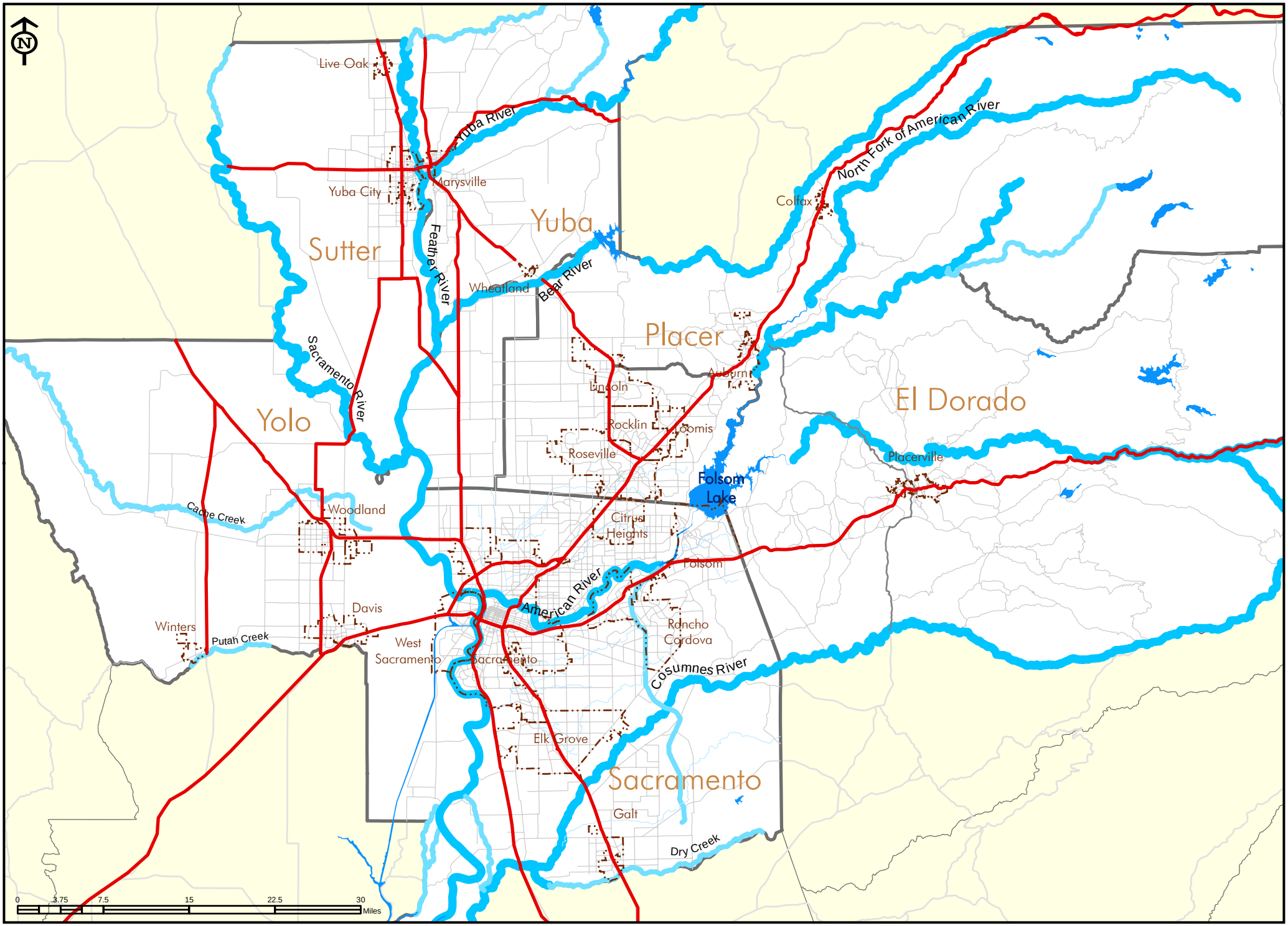

Figure 12-1: Major Watersheds in the MTP Plan Area

Table 12-1. Major Rivers, Creeks, and Drainage Canals in the MTP Plan Area and the Sacramento River Hydrologic Region

	Annual Average Flows (cfs)[a]	Drains/Tributary to
American River Watershed		
North Fork American River	2,300	Main Branch American River
Middle Fork American River	1,300	Main Branch American River
South Fork American River	1,500	Main Branch American River
Main Branch American River	3,800	Sacramento River
Rubicon River	400	Middle Fork American River
Silver Fork	N/A	South Fork American River
Bear River Watershed		
Bear River	450	Feather River
Cache Creek Watershed		
Cache Creek	540	Sacramento River / Yolo Bypass
Cosumnes River Watershed		
Cosumnes River	600	Mokelumne River
Laguna Creek	15	Sacramento River
Folsom South Canal	3,500	Lake Natomas
Feather River Watershed		
Feather River	8,500	Sacramento River
Honcut Creek	600	Feather River
Yuba River	2,400	Feather River
Bear River	450	Feather River
Mokelumne River Watershed		
Mokelumne River	760	Sacramento-San Joaquin Delta
Cosumnes River	600	Mokelumne River
Dry Creek (Sacramento County)	78	Mokelumne River
Putah Creek Watershed		
Putah Creek	490	Sacramento River / Yolo Bypass
Sacramento River Watershed		
Sacramento River	24,200	Sacramento-San Joaquin Delta
Feather River	8,500	Sacramento River
Dry Creek	78	Sacramento River
Arcade Creek	19	Sacramento River
American River	3,800	Sacramento River
Morrison Creek	22	Sacramento River
Laguna Creek	15	Sacramento River
Yuba River Watershed		
Yuba River	2,400	Feather River
Dry Creek (Yuba County)	72	Yuba River

[a] USGS 2007.

Table 12-2. Major Lakes and Reservoirs in the MTP Plan Area and the Sacramento River Hydrologic Region

	Reservoir Location	Reservoir Capacity (acre-feet)[a]
American River Watershed		
Folsom Lake	Convergence of the North and South Forks of the American River	977,000
North Fork Dam/ Lake Clementine	Convergence of the North and Middle Forks of the American River	
Lake Natoma	Main branch of the American River	9,000
Union Valley Reservoir	South Fork American River	277,300
Ice House Reservoir	South Fork Silver Creek	46,960
Bear River Watershed		
Camp Far West Reservoir	Bear River	104,000
Cache Creek Watershed		
N/A		
Cosumnes River Watershed		
Sly Park Reservoir	Cosumnes River	41,000
Rancho Seco Lake	Folsom Canal	160
Feather River Watershed		
N/A		
Mokelumne River Watershed		
N/A		
Putah Creek Watershed		
N/A		
Sacramento River Watershed		
N/A		
Yuba River Watershed		
Collins Lake	Dry Creek	1,000
Bullard's Bar Reservoir	Yuba River	170,000
Englebright Reservoir	Yuba River	70,000

[a] DWR 2007a.
N/A = Not applicable.

The American River Watershed is one of the largest watersheds in the MTP Plan Area and overlies Placer, El Dorado and Sacramento counties. This watershed originates in the high Sierra Nevada, west of Lake Tahoe, and drains east until it ultimately discharges into the Sacramento River near the city of Sacramento. Major rivers and tributaries draining the watershed include the North, Middle, and South Forks of the American River; the Rubicon River, and Silver Fork Creek. Several major reservoirs in this watershed provide water storage and flood control, including Folsom Lake, Lake Natoma, Lake Clementine, Union Valley Reservoir, and Ice House Reservoir.

The Bear River watershed's boundary forms the northwestern border for the MTP Plan Area. The watershed overlies portions of Placer and Yuba counties. This watershed originates in the lower Sierra Nevada foothills and drains to the Feather River. The Bear River is the major surface water in this

watershed. Bear River flows are affected by Camp Far West Reservoir, which is located along the river on the northwestern border of Yuba and Placer counties.

The Cache Creek watershed is located in the eastern portion of the MTP Plan Area and is entirely within Yolo County. The major surface water in the watershed is Cache Creek, which is a large stream that originates in the Coastal Ranges. The creek drains to the Sacramento River and, during heavy storms, to the Yolo Bypass.

The Cosumnes River watershed overlies the southwestern portion of the MTP Plan Area and is located in El Dorado and Sacramento counties. Major surface waters in this watershed include the Cosumnes River, Laguna Creek, Sly Park Reservoir, Folsom South Canal, and Rancho Seco Lake. The Cosumnes River originates on the western slopes of the central Sierra Nevada and converges with the Mokelumne River in San Joaquin County before draining to the Sacramento-San Joaquin River Delta. Laguna Creek is a major tributary to the Cosumnes River. The Folsom South Canal is a major human-made canal that distributes water from Lake Natoma south of Folsom Dam to residents in eastern Sacramento County. Rancho Seco Lake provides minor water storage along the canal.

The Feather River watershed originates high in the northern Sierra Nevada Mountains and drains into Lake Oroville. This watershed is mostly outside of the MTP Plan Area; however, the major surface water of the watershed, the Feather River, passes through the northern portion of the MTP Plan Area. This portion of the Feather River converges with the Sacramento River approximately 20 miles north of Sacramento. Major tributaries that drain to the Feather River include Honcut Creek, the Yuba River, and the Bear River.

The Mokelumne River watershed is mostly outside of the MTP Plan Area; however, the eastern portion of this watershed overlies the southern border. The Cosumnes River and Dry Creek drain into the Mokelumne River, which drains to the Sacramento-San Joaquin River Delta.

The Putah Creek watershed overlies the southeastern border of the MTP Plan Area and is located in Yolo County. Putah Creek, the primary surface water in the watershed, originates in the Coastal Ranges. The creek is a major tributary to the Yolo Bypass.

The largest watershed in the MTP Plan Area is the Sacramento River watershed, which encompasses the entire MTP Plan Area. The Sacramento River is the main drainage in this watershed and originates near Mount Shasta in the Cascades Range (Domagalski 2000). Tributaries to the Sacramento River include the Feather River, Cache Creek, Putah Creek, Dry Creek, American River, Arcade Creek, Morrison Creek, and Laguna Creek. The Sacramento River drains an area of approximately 70,000 square kilometers including all or parts of six landforms or physiographic provinces—the Great Basin, the Middle Cascade Mountains, the Sierra Nevada, the Klamath Mountains, the Coast Ranges, and the Sacramento Valley (Domagalski 2000). It flows south from the northern mountain ranges through the MTP Plan Area before discharging into the Sacramento-San Joaquin River Delta.

The Yuba River watershed originates in the Sierra Nevada and drains to the Feather River near Yuba City. The portion of the watershed in the MTP Plan Area is in Yuba County. The Yuba River is the main surface water of this watershed. Reservoirs affecting flows in the Yuba River include Dry Creek, Collins Lake, Englebright Reservoir, and Bullard's Bar Reservoir.

The Sacramento-San Joaquin River Delta receives runoff from approximately 40 percent of the state's land area, including through discharges from surface waters traversing the MTP Plan Area, and covers an area of approximately 738,000 acres (DWR 1995). Generally, lands in the Delta are at or below sea level

and are protected from flooding by over a 1,000 miles of levees. The Delta is the terminus for the Sacramento and Mokelumne Rivers, as well as the Sacramento Deep Water Ship Channel. The Sacramento-San Joaquin River Delta provides habitat for several species of fish, birds, mammals, and plants; supports agriculture; provides recreational activities; and is key for water distribution throughout the State (DWR 1995).

Navigable Surface Waters

In the MTP Plan Area, several rivers are navigable for recreation purposes, including the Sacramento and American Rivers. However, the only waterway navigable by commercial vessels in the MTP Plan Area is the Sacramento Deep Water Ship Channel. The Deep Water Ship Channel, which is approximately 30 feet deep, 200 wide, and 43 miles long, begins in the Sacramento-San Joaquin River Delta and ultimately divides from Delta waterways, including the Sacramento River, to become its own canal and end at the Port of Sacramento.

Flooding

Potential flood hazards in the MTP Plan Area are related to 100-year flood events, the failure of levees located along several of the major rivers and in the Delta, and dam failures. A portion of the MTP Plan Area lies in a FEMA-identified 100-year floodplain, as shown in Figure 12-2. Recently, the U.S. Army Corps of Engineers and California Department of Water Resources have advised local communities that there is a greater potential for levee failure than previously thought. This is as a result of preliminary tests of levees for potential below levee seepage. Dams and some of the levees that provide flood protection to the region could potentially fail and inundate portions of the SACOG MTP Plan Area.

Flood events can result in damage to structures or infrastructure, injury or loss of human and animal life, and the spread of waterborne diseases. In addition, standing floodwater can destroy agricultural crops, and contaminate groundwater. Flooding can also contribute to mudslides and slope instability. In urbanized areas, flood events can also overwhelm stormwater drainage systems resulting in additional flooding.

Because of the potential flood hazards in the MTP Plan Area and the severe consequences of flooding, flood protection features have been implemented in and upstream of the MTP Plan Area. Along the Sacramento and American Rivers and various other rivers and creeks in the MTP Plan Area is a system of flow bypasses, dams, levees, and reservoirs to control flooding. Two key elements of this flood protection system are the Yolo and Sutter Bypasses, which function as flood basins and divert floodwaters away from populated areas during the winter storm season. The Sacramento River and Putah and Cache Creeks drain floodwaters into these bypasses. There are several dams located in and around the MTP Plan Area that provide flood protection. The most significant of these dams are Folsom, Natoma, Englebright Narrows, Sly Park, Ice House, Camp Far West North Fork, Union Valley Reservoir, and New Bullards Bar dams.

Several federal, state, and local agencies are responsible for maintaining flood protection features in the MTP Plan Area. The U.S. Army Corps of Engineers (USACE) is a federal agency responsible for maintaining and repairing several levees and flood protection devices in the MTP Plan Area. The California Department of Water Resources (DWR) provides dam safety and flood control services and is responsible for reducing the flood risk to Californians, developing a sustainable flood management system, and reducing the consequences of floods when they occur (DWR 2007c). Reclamation districts and local flood control agencies are also responsible for flood control and maintenance activities. These agencies include the Sacramento Area Flood Control Agency (SAFCA); West Sacramento Flood Control

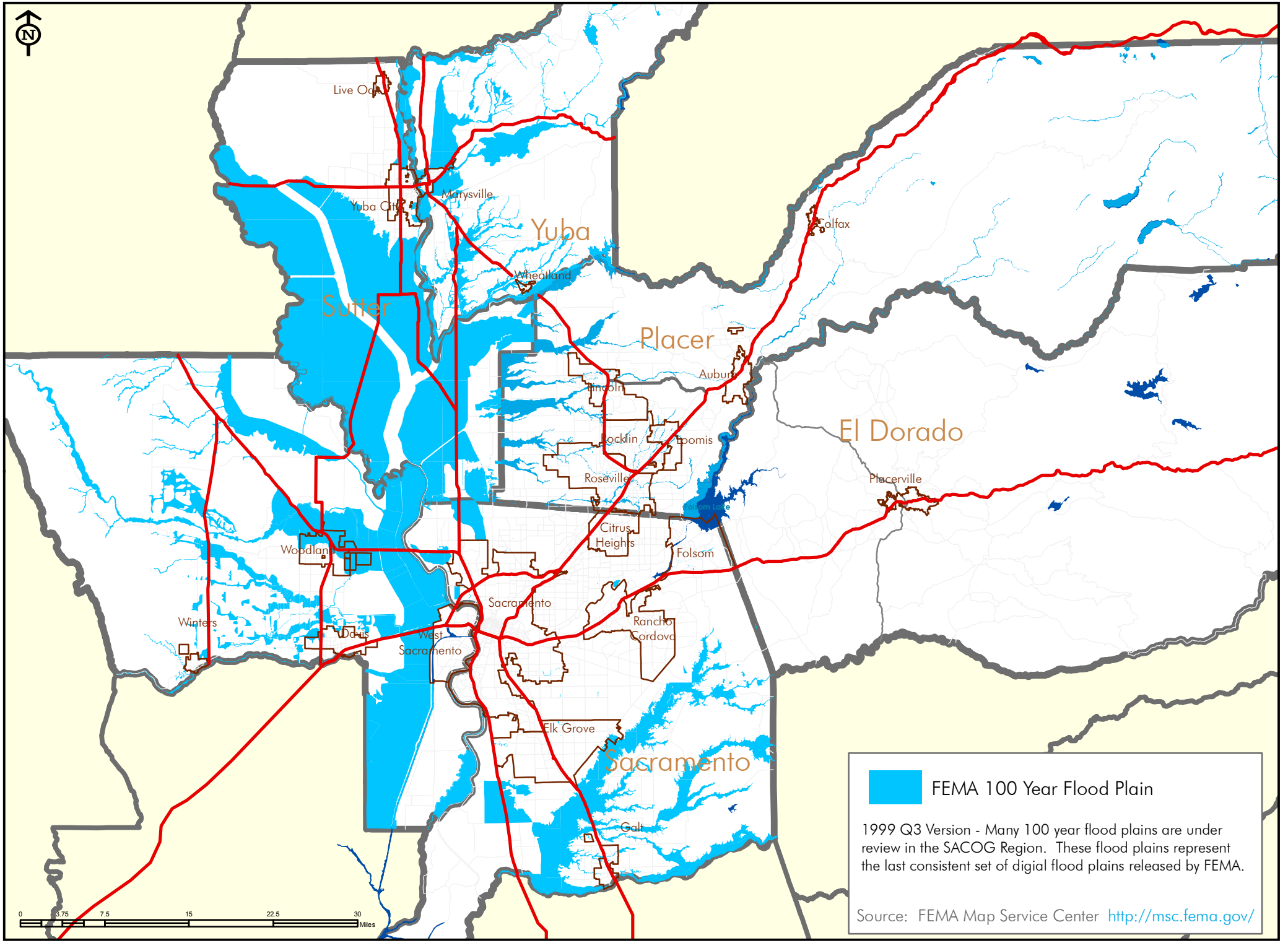

Figure 12-2: 100 Year Flood Plain

Agency; American River Flood Control District; Yolo County Flood Control and Water Conservation District; Sutter County Flood Control and Water Conservation District; Placer County Flood Control and Water Conservation District; Yuba County Water Agency; and El Dorado County Water Agency.

Groundwater

The Sacramento groundwater basin makes up the northern part of the great Central Valley groundwater basin. The Sacramento groundwater basin is bound on the east by the Sierra Nevada and southern Cascades, and on the west by the crest of the Coast Range and Klamath Mountains (DWR 2003). It extends north past Redding and south to the Sacramento-San Joaquin River Delta. The Sacramento groundwater basin includes 24 of 88 groundwater basins underlying the Sacramento River Hydrologic Region (DWR 2003). The MTP Plan Area overlies seven of the 24 Sacramento groundwater basins, namely the North Yuba, South Yuba, Sutter, North American, South American, Yolo, and Capay Valley basins.

The North Yuba basin is located in the eastern central portion of the Sacramento groundwater basin and has a surface area of 78 square miles (DWR 2006a). This basin is bound on the west by the Feather River, on the south by the Yuba River, on the east by the Sierra Nevada and on the north by Honcut Creek (DWR 2006a). The North Yuba basin is recharged from stream channel and floodplain deposits along the Yuba River and Honcut Creek (DWR 2006a). Water bearing formations in this basin consist of continental deposits of Quaternary to Late Tertiary (Pliocene) age including recent valley sedimentary deposits, Pleistocene Victor Formation, Pleistocene floodplain deposits, Pleistocene alluvium, Pliocene Laguna Formation, and Miocene-Pliocene Mehrten Formation (DWR 2006a). Groundwater levels have remained relatively constant over the last 50 years at approximately 20 feet below the surface (DWR 2006a; DWR 2007b).

The South Yuba basin is located in the southern portion of the Sacramento groundwater basin and has a surface area of 138 square miles (DWR 2006b). This basin is recharged from stream channel and floodplain deposits along the Yuba River, Feather River and the Honcut Creek (DWR 2006b). The South Yuba basin is bound on the west by the Feather River, on the south by the Bear River, on the east by the Sierra Nevada and on the north by the Yuba River (DWR 2006b). Water bearing formations in this basin consist of continental deposits of Quaternary (Recent) to Late Tertiary (Miocene) age including Holocene dredger tailings, Holocene stream channel and floodplain deposits, Pleistocene Victor Formation, Pleistocene floodplain deposits, Pleistocene alluvium, Pliocene Laguna Formation, and Miocene-Pliocene Mehrten Formation (DWR 2006b). The thickness of these deposits changes from a few hundred feet at the Sierra Nevada foothills in the east to well over 1,400 feet in the western margin of the basin (DWR 2006b). Beneath the South Yuba groundwater basin exists a well-developed cone of depression with water levels at approximately 10 feet above sea level (DWR 2006b). However, due to surface water irrigation and reduction in groundwater pumping, these groundwater levels have shown continual increases (DWR 2006b). Existing groundwater levels in this basin range from 40 to 120 feet below the ground surface (DWR 2007b).

The Sutter basin is located in the eastern central portion of the Sacramento groundwater basin and has a surface area of 366 square miles (DWR 2006c). This basin is recharged from local streams and rainwater (DWR 2006c). It is bounded on the west by the Sacramento River, on the south by the confluence of the Sacramento River and the Sutter Bypass, on the east by the Feather River, and on the north by confluences of Butte Creek and the Sacramento River and the Sutter Buttes (DWR 2006c). Water bearing formations in this basin consist of continental deposits of Quaternary (Recent) to Late Tertiary (Miocene) age, including Holocene stream channel and floodplain deposits, Pleistocene Victor formation, Pleistocene floodplain deposits, Pleistocene alluvium, Pliocene Laguna formation, Miocene-

Pliocene Mehrten Formation and Oligocene-Miocene Valley Springs Formation (DWR 2006c). The thickness of these deposits changes from a few hundred feet at Sierra Nevada foothills in the east to well over 2,000 feet in the western margin of the basin (DWR 2006c). Groundwater levels for this basin have remained relatively constant with average levels approximately 10 feet below the surface (DWR 2006c).

The North American basin is located in the eastern central portion of the Sacramento groundwater basin and has a surface area of 548 square miles (DWR 2006d). It is bound on the west by the Feather River, on the south by the Sacramento River, on the east and north by the Bear River (DWR 2006d). Water bearing formations in this basin consist of continental deposits of Quaternary and Late Tertiary age, including younger alluvium, older alluvium, and Miocene/Pliocene volcanics (DWR 2006d). The cumulative thickness of these deposits changes from 0 to 1,200 feet in the center margin of the basin (DWR 2006d). Groundwater levels in northern Sacramento County and southern Placer County have been declining at a rate of one and a half feet per year for the last 40 years (DWR 2006d), while groundwater levels in northern Placer and northern Sutter counties have remained relatively stable (DWR 2006d). Existing groundwater levels in this basin range from 10 to 70 feet below the ground surface (DWR 2007b).

The South American groundwater basin is located in the southeastern portion of the Sacramento groundwater basin and has a surface area of 388 square miles (DWR 2004a). It is bounded on the west by the Sacramento River, on the south by the Cosumnes and Mokelumne Rivers, on the east by the Sierra Nevada, and on the north by the American River (DWR 2004a). Water-bearing formations in this basin consist of continental deposits of Quaternary and Late Tertiary age, including flood basin deposits, dredger tailings, stream channel deposits, older alluvium, and Miocene/Pliocene volcanics (DWR 2004a). The thickness of these deposits changes from a few hundred feet at Sierra Nevada foothills in the east to well over 2,500 feet in the western margin of the basin (DWR 2004a). Groundwater levels in this basin have fluctuated over the last several years as a result of dry years and well activity. Existing groundwater levels are approximately 20 feet or less throughout the basin (DWR 2004a).

The Yolo groundwater basin is located in the southern portion of the Sacramento groundwater basin and has a surface area of 400 square miles (DWR 2004b). This basin is recharged by local streams, including Cache and Putah Creeks, and by rainwater (DWR 2004b). It is bounded on the west by the Coast Range, on the south by Putah Creek, on the east by the Sacramento River, and on the north by Cache Creek (DWR 2004b). Water-bearing formations in this basin consist of sedimentary continental deposits of Late Tertiary (Pliocene) to Quaternary (Holocene) age, including younger alluvium, older alluvium, and the Tehama Formation (DWR 2004b). The thickness of these deposits changes from a few hundred feet near the Coast Range in the west to more than 3,000 feet in the eastern margin of the basin (DWR 2004b). Groundwater levels in this basin are affected by dry years and drought; however, they recover quickly during wet years (DWR 2004b). Existing groundwater levels range from 20 to 420 feet below the surface (DWR 2004b).

The Capay Valley groundwater basin is located in the southwestern portion of the Sacramento groundwater basin and has a surface area of 39 square miles (DWR 2004c). This basin is primarily recharged by Cache Creek, but is also influenced by Bear Creek and rainwater (DWR 2004c). It is located within the Coastal Ranges and is bounded by the Yolo County boundary on the north end and the confluence of Salt Creek and Cache Creek on the south (DWR 2004c). Water-bearing formations in this basin consists of sedimentary continental deposits of Late Tertiary (Pliocene) to Quaternary (Holocene) age, including the Tehama Formation and Cretaceous marine rocks (DWR 2004c). The thickness of these deposits changes from 0 to over 200 feet in the eastern margin of the basin (DWR 2004c). Existing groundwater levels throughout most of the Capay Valley basin range from 10 to 40 feet below the ground surface and have remained relatively stable over the years (DWR 2004c).

Water Quality

Surface Water Quality

Generally, surface water quality in the MTP Plan Area is considered sufficient for municipal, agricultural, wildlife, and recreational uses (DWR 2003); however, several of the larger water bodies in the MTP Plan Area are listed as impaired according to Section 303(d) of the Clean Water Act (see Regulatory Setting section below). Beneficial use impairments can result from several factors but are generally a result of pollutant discharges from point and non-point sources. Point sources of pollutants include discharges of treated effluent from municipal wastewater treatment plants and wastewater discharges from industrial and commercial facilities. Non-point pollutant sources include urban runoff, construction runoff, livestock and animal wastes, and runoff from agricultural areas. Water quality is expected to reflect the land uses in the watershed. Land uses surrounding the project area include open space, urban, and agricultural uses. Open space is not anticipated to contribute pollutants to water bodies above background levels, except when it includes grazing. Urban and agricultural land uses typically contribute sediment, hydrocarbons and metals, pesticides, nutrients, bacteria, and trash. The proposed project would be expected to contribute similar contaminants. Table 12-3 summarizes water quality impairments in surface waters in the MTP Plan Area and the sources of these impairments.

Table 12 - 3. CWA Section 303(d) Listed Impairments in the MTP Plan Area

Surface Water	Water Quality Impairments	Suspected Sources
American River	Mercury and unknown toxicity	Abandoned mines
Arcade Creek	Copper	Urban runoff/ storm sewers
Bear River	Diazinon and mercury	Agriculture/abandoned mines
Cache Creek	Unknown toxicity	Unknown
Camp Far West Reservoir	Mercury	Abandoned mines
Cosumnes River	Exotic species	Unknown
Deer Creek (Sacramento County)	Iron	Unknown
Deer Creek (Yolo County)	pH	Internal nutrient cycling
Northern portion of the Delta Waterways	Chlorpyrifos, DDT, diazinon, exotic species, group A pesticides, mercury, PCBs, unknown toxicity, electrical conductivity and mercury	Agriculture, urban runoff, storm sewers, abandoned mines
Sacramento Deep Water Ship Channel	Chlorpyrifos, DDT, diazinon, dioxins, exotic species, group A pesticides, mercury, pathogens, PCBs and unknown toxicity	Agriculture, urban runoff, storm sewers, abandoned mines, contaminated sediments, unknown sources
Englebright Lake	Mercury	Abandoned mines
Feather River	Chlorpyrifos, group A pesticides, mercury, and unknown toxicity	Agriculture, abandoned mines, unknown sources
Mokelumne River	Copper and zinc	Abandoned mines
Putah Creek	Mercury	Abandoned mines
Sacramento River	Mercury and unknown toxicity	Abandoned mines, unknown sources

Source: State Water Board 2006.

Groundwater Quality

Groundwater in the Sacramento Groundwater Basin is generally excellent, with only local impairments in certain areas, and suitable for irrigation and municipal and domestic uses (DWR 2003). Water quality problems in the basin are a result of high total dissolved solids (TDS) from the underlying marine sedimentary rocks and high nitrates and organic compounds from fertilizers and septic tanks (DWR 2003). The majority of groundwater underlying the MTP Plan Area can generally be characterized as calcium-magnesium bicarbonate or magnesium-calcium bicarbonate rich (DWR 2006a; DWR 2006b; DWR 2006c; DWR 2006d; DWR 2004a; DWR 2004b; DWR 2004c).

The North American basin generally has acceptable water quality. However, high TDS levels are found in areas along the Sacramento River from the Sacramento International Airport northward to the Bear River (DWR 2006d). In addition, in this basin there are three sites with significant groundwater contamination issues: the former McClellan Air Force Base, Union Pacific Railroad Yard in Roseville, and the Aerojet Superfund Site (DWR 2006d). Of the 265 wells sampled from 1994 through 2000 throughout the basin, seven wells had primary inorganics above maximum contaminant levels (MCLs), two had radiological MCL exceedances and six had volatile organic carbons (VOCs) or semi-volatile organic carbons (SVOCs) MCL exceedances (DWR 2006d). This basin is predominantly characterized by calcium-magnesium bicarbonate or magnesium-calcium bicarbonate with some areas of magnesium bicarbonate (DWR 2006d).

Groundwater in the South American basin is generally of good to excellent quality. However, there are seven listed sites with significant groundwater contamination (DWR 2004a). These sites include three Superfund sites—Aerojet, Mather Field, and the Sacramento Army Depot. The other impaired sites are the Kiefer Boulevard Landfill, an old PG&E site on Jiboom Street near Old Sacramento, and the Southern Pacific and Union Pacific Rail yards in downtown Sacramento (DWR 2004a). Of the 144 wells sampled from 1994 through 2000, MCL exceedances were measured for primary inorganics (two wells), radiological constituents (one well), nitrates (one well), and VOCs and SVOCs (eight wells) (DWR 2004a). This basin is predominantly characterized by calcium-magnesium bicarbonate or magnesium-calcium bicarbonate with magnesium-sodium bicarbonate dominant in Elk Grove (DWR 2004a).

The Yolo basin's groundwater quality is generally good with localized groundwater impairments. These impairments include elevated boron concentrations along Cache Creek and the Cache Creek Settling Basin area, elevated selenium concentrations in the City of Davis, and several localized areas of nitrate contamination (DWR 2004b). Of the 61 wells sampled from 1994 through 2000, MCL exceedances were detected for primary inorganics (three wells), nitrates (one well), and VOCs (one well) (DWR 2004b). The Yolo basin is predominantly characterized by calcium-magnesium bicarbonate or sodium-magnesium bicarbonate with small areas of magnesium bicarbonate (DWR 2004b)

Groundwater in the Capay Valley basin is of good quality with moderate to high levels of boron surrounding Cache Creek (DWR 2004C). Several wells sampled in 2001 indicated that none of the wells' constituent levels exceeded the respective MCLs (DWR 2004c). This basin is dominated by calcium-sodium bicarbonate (DWR 2004c).

The North Yuba basin contains good to excellent groundwater quality and has not been listed for any major impairments (DWR 2006a). Of the 27 wells sampled from 1994 through 2000, MCL exceedances occurred for radiological constituents (one well), nitrates (one well), and VOCs (two wells) (DWR 2006a). This basin is predominantly characterized by calcium-magnesium bicarbonate or magnesium-calcium bicarbonate (DWR 2006a)

The South Yuba basin generally has good water quality characteristics and has not been listed for any major impairments (DWR 2006b). Of the 38 wells sampled from 1994 through 2000, two wells had MCL exceedances for primary inorganics, and one well had MCL exceedances for VOCs (DWR 2006b). This basin is predominantly characterized by calcium-magnesium bicarbonate or magnesium-calcium bicarbonate with some magnesium bicarbonate in the northern section of the basin (DWR 2006b).

The Sutter basin has not been listed for any major impairments and groundwater quality in this basin is generally good to excellent (DWR 2006c). Groundwater in this basin does have some portions with high levels of naturally occurring minerals. This basin is predominantly characterized by calcium-magnesium bicarbonate or magnesium-calcium bicarbonate with magnesium bicarbonate in some areas of the northwestern portion (DWR 2006c).

Regulatory Setting

Federal Regulations

Clean Water Act (CWA)

Enacted by Congress in 1972 as the first comprehensive national clean water legislation to protect our nation's waters, the Clean Water Act (CWA) mandates cooperative effort by federal, state, and local governments to implement its pollution control measures. The law is intended to improve the quality of the nation's waters using a framework of standards, technical tools, and financial assistance to address pollution and poor water quality.

The CWA is the primary federal law that protects the quality of the nation's surface waters, including lakes, rivers, and coastal wetlands. It operates on the principle that all discharges into the nation's waters are unlawful unless specifically authorized by a permit; permit review is the CWA's primary regulatory tool. The CWA requires that National Pollutant Discharge Elimination System (NPDES) permits be obtained for any discharges to surface waters by a point source and for municipal and industrial stormwater discharges. The following paragraphs provide additional details on NPDES permits and specific sections of the CWA that could apply to specific activities, related to projects in the MTP Plan Area, including construction and effluent discharge.

Impaired Water Bodies
Under CWA Section 303(d) and California's Porter-Cologne Water Quality Control Act of 1969 (Porter-Cologne Act) (see below), the State of California is required to establish beneficial uses of state waters and to adopt water quality standards to protect those beneficial uses. Section 303(d) establishes the total maximum daily load (TMDL) process to assist in guiding the application of state water quality standards, requiring the states to identify streams whose water quality is "impaired" (affected by the presence of pollutants or contaminants) and to establish the TMDL, or the maximum quantity of a particular contaminant that a water body can assimilate without experiencing adverse effects. CWA Section 303(d) also requires the state to identify water bodies that do not meet water quality standards and thus exhibit impaired beneficial uses. As such, every two years the State Water Board releases a list of impaired waters and proposes a completion date for a TMDL to address the identified impairment. Most of the MTP 2035 proposed projects would be located within areas that discharge to impaired waters, as identified in the *2006 Clean Water Act Section 303(d) List of Water Quality Limited Segments* (State Water Board 2006). Impaired waters in the MTP Plan Area are discussed in the *Water Quality* setting section above.

The following TMDLs have been developed and approved to address impaired waters within the Sacramento metropolitan area:

- Sacramento County Urban Creeks for diazinon and chlorpyrifos (RWQCB 2004a);
- Sacramento-San Joaquin River Delta: Water Quality Control Plan for diazinon and chlorpyrifos (RWQCB 2006);
- Sacramento and Feather Rivers for diazinon and chlorpyrifos (RWQCB 2003); and
- Upper Sacramento River for cadmium, copper and zinc (RWQCB 2002).

Projects are required to comply with requirements of approved TMDLs, as regulated in the MTP Plan Area by the Central Valley RWQCB through issuance of Waste Discharge Requirements and NPDES permit amendments.

Water Quality Certification
Under CWA Section 401, applicants for a federal license or permit to conduct activities that may result in the discharge of a pollutant into waters of the United States must obtain certification from the state in which the discharge would originate, or, if appropriate, from the interstate water pollution control agency with jurisdiction over affected waters at the point where the discharge would originate. Therefore, all projects that have a federal component and may affect the quality of the state's waters (including projects that require federal agency approval, such as issuance of a Section 404 permit) must also comply with CWA Section 401. Section 401 certification or waiver is under the jurisdiction of the RWQCB.

Surface Water Discharges
CWA Section 402 regulates discharges to surface waters through the NPDES program, administered by the EPA. In California, the State Water Board is authorized by the EPA to oversee the NPDES program through RWQCBs (see related discussion under "Porter-Cologne Water Quality Control Act" below). The NPDES program provides for both general permits (those that cover a number of similar or related activities) and individual permits.

Construction Activities
As of February 2003, EPA requires that a project proponent apply for an NPDES stormwater permit and develop a Storm Water Pollution Prevention Plan (SWPPP) for ground-disturbing activities that would affect 1 acre or more. The Central Valley RWQCB administers the NPDES stormwater permitting program for construction activities in the Central Valley Region. For the purposes of the NPDES, construction activities are defined as clearing, excavating, grading, or other land-disturbing activities. The Central Valley RWQCB authorizes stormwater discharges to waters of the United States under the State Water Board's General Construction Permit. For qualifying projects, the project applicant must submit to the Central Valley RWQCB a Notice of Intent (NOI) to be covered by the General Construction Permit before the beginning of construction. The General Construction Permit requires the preparation and implementation of a SWPPP, which must be completed before construction begins.

Dewatering Activities
While small amounts of construction-related dewatering are covered under the General Construction Permit, the Central Valley RWQCB has also adopted a General Order for Dewatering and Other Low Threat Discharges to Surface Waters (General Dewatering Permit). This permit applies to various categories of dewatering activities and would likely apply to the proposed MTP Plan Area, if construction of specific projects required dewatering in greater quantities than that allowed by the General Construction Permit and discharged the effluent to surface waters. The General Dewatering

Permit contains waste discharge limitations and prohibitions similar to those in the General Construction Permit.

Municipal Activities

The Clean Water Act Section 402 mandates permits for municipal stormwater discharges, which are regulated under the NPDES General Permit for Municipal Separate Storm Sewer Systems (MS4) (MS4 Permit). Several of the cities and counties within the MTP Plan Area issue their own NPDES municipal stormwater permits for the regulations of stormwater discharges. These permit holders include:

- Sacramento County and the cities of Citrus Heights, Elk Grove, Folsom, Galt and Sacramento;
- Sutter County and Yuba City;
- Placer County, El Dorado County, and the city of South Lake Tahoe; and
- Yolo County.

These permits require that controls are implemented to reduce the discharge of pollutants in stormwater discharges to the maximum extent possible, including management practices, control techniques, system design and engineering methods, and other measures as appropriate. As part of permit compliance, these permit holders have created Stormwater Management Plans for their respective locations. These plans outline the requirements for municipal operations, industrial and commercial businesses, construction sites, and planning and land development. These requirements may include multiple measures to control pollutants in stormwater discharge. During implementation of specific projects under the MTP, project applicants will be required to follow the guidance contained in the Stormwater Management Plans as defined by the permit holder in that location.

Fill Placement in Waters and Wetlands

CWA Section 404 regulates the discharge of dredged and fill materials into "waters of the United States," which include oceans, bays, rivers, streams, lakes, ponds, and wetlands. Project applicants must obtain a permit from the USACE) for all discharges of dredged or fill material into waters of the United States, including wetlands, before proceeding with a proposed activity. Before any actions that may adversely affect surface waters are carried out, a delineation of jurisdictional waters of the United States must be completed, following USACE protocols, to determine whether the permit study area encompasses wetlands or other waters of the United States that qualify for CWA protection. These include any or all of the following.

> Areas within the ordinary high water mark of a stream, including non-perennial streams with a defined bed and bank and any stream channel that conveys natural runoff, even if it has been realigned. Seasonal and perennial wetlands, including coastal wetlands.

Wetlands are defined for regulatory purposes as areas "inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions" (33 CFR 328.3, 40 CFR 230.3). Refer to the Biological Resources chapter for more information on wetlands regulation.

Federal Flood Insurance Program

Alarmed by increasing costs of disaster relief, Congress passed the National Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973. The intent of these acts was to reduce the need for large, publicly funded flood control structures and disaster relief by restricting development on floodplains.

FEMA administers the National Flood Insurance Program (NFIP) to provide subsidized flood insurance to communities that comply with FEMA regulations that limit development in floodplains. FEMA issues flood insurance rate maps (FIRMs) for communities participating in the NFIP. These maps delineate flood hazard zones in the community. The locations of FEMA-designated flood zones in the MTP Plan Area are illustrated in Figure 12-2.

FEMA also administers levee standards. Requirements for levee construction include embankment protection, embankment and foundation stability, settlement, and maintenance plans and criteria.

Executive Order 11988

Executive Order 11988 (Floodplain Management) addresses floodplain issues related to public safety, conservation, and economics. It generally requires federal agencies constructing, permitting, or funding to:

- avoid incompatible floodplain development,
- be consistent with the standards and criteria of the NFIP, and
- restore and preserve natural and beneficial floodplain values.

This order would apply to any MTP proposed projects, if outfall construction related to the CWA Section 404 permit falls under any of the bulleted categories list above, or if federal funds are used for construction.

State Regulations

Porter-Cologne Water Quality Control Act

The Porter-Cologne Water Quality Control Act (California Water Code Section 13000 et seq.), passed in 1969, articulates with the federal CWA (see "Clean Water Act" above) and provides the basis for water quality regulation within California. The act requires a Report of Waste Discharge for any discharge of waste (liquid, solid, or otherwise) to land or surface waters that may impair a beneficial use of surface water or groundwater of the State. Waste discharge requirements resulting from the report are issued by the RWQCB. In practice, these requirements are typically integrated with the NPDES permitting process.

The Porter-Cologne Water Quality Control Act established the State Water Board and divided the State into nine regions, each overseen by a Regional Water Quality Control Board (RWQCB). The State Water Board is the primary state agency responsible for protecting the quality of the State's surface and groundwater supplies, but much of its daily implementation authority is delegated to the nine RWQCBs, which are responsible for implementing CWA Sections 401, 402, and 303(d). In general, the State Water Board manages both water rights and statewide regulation of water quality, while the RWQCBs focus exclusively on water quality within their regions. The Central Valley RWQCB is responsible for regulating discharges in the MTP Plan Area.

Beneficial Uses and Water Quality Objectives

The Central Valley RWQCB is responsible for the protection of beneficial uses of water resources within the Central Valley Region. Beneficial uses are those desired resources, services, and qualities of the aquatic system that are supported by achieving and protecting high water quality. The Central Valley RWQCB uses planning, permitting, and enforcement authorities to meet this responsibility, and has adopted the fourth edition of the Basin Plan for the Sacramento River and San Joaquin River Basins (Basin Plan) (Central Valley Regional Water Quality Control Board 2006) to implement plans, policies, and provisions for water quality management. Beneficial uses are described in the Basin Plan and are designated for major surface waters and their tributaries, as well as groundwater.

In addition to the identification of beneficial uses, the Basin Plan contains water quality objectives that are intended to protect the beneficial uses of the basins. The Central Valley RWQCB has region-wide and water body/beneficial use–specific water quality objectives. The RWQCB has set water quality objectives for all surface waters in its region for the following substances and parameters: ammonia, bacteria, biostimulatory substances, chemical constituents, color, dissolved oxygen, floating material, oil and grease, pH, pesticides, radioactivity, salinity, sediment, settleable material, suspended material, tastes and odors, temperature, toxicity, and turbidity. Specific objectives for concentrations of chemical constituents are applied to bodies of water based on their designated beneficial uses (Central Valley Regional Water Quality Control Board 2006). Water quality objectives applicable to all groundwaters in the region have been set for bacteria, chemical constituents, radioactivity, tastes and odors, and toxicity (Central Valley Regional Water Quality Control Board 2006).

Basin plans are primarily implemented by using the NPDES permitting system to regulate waste discharges so that water quality objectives are met (see discussion of the NPDES permits in the "Clean Water Act" section above). Basin plans are updated every 3 years, and provide the technical basis for determining waste discharge requirements and taking enforcement actions**.**

State Water Board – Regulations to Protect the Delta

California Fish and Game Code Section 1600 et seq. (Lake- or Streambed Alteration Agreement Program)

Under Sections 1600–1616 of the California Fish and Game Code, DFG regulates projects that affect the flow, channel, or banks of rivers, streams, and lakes. Projects in the MTP 2035 that involve construction near or across a river, stream, or lake would be required to comply with these regulations. Section 1602 requires public agencies and private individuals respectively to notify and enter into a streambed or lakebed alteration agreement with DFG before beginning construction of a project that will:

- divert, obstruct, or change the natural flow or the bed, channel, or bank of any river, stream, or lake; or
- use materials from a streambed.

Section 1602 contains additional prohibitions against the disposal or deposition of debris, waste, or other material containing crumbled, flaked, or ground pavement where it can pass into any river, stream, or lake.

Sections 1601–1607 may apply to any work undertaken within the 100-year floodplain of any body of water or its tributaries, including intermittent stream channels. In general, however, it is construed as applying to work within the active floodplain and/or associated riparian habitat of a wash, stream, or lake that provides benefit to fish and wildlife. Sections 1601–1607 typically do not apply to drainages that

lack a defined bed and banks, such as swales, or to very small bodies of water and wetlands such as vernal pools.

Local Regulations

The Delta Protection Commission

The Delta Protection Act of 1992 established the Delta Protection Commission (Commission), which is comprised of 19 members of diverse composition. Representatives from SACOG and Sacramento County serve as members of the Commission. The Commission's purpose is to develop a long-term resource management plan for the Delta Primary Zone. As stated in the Act, the goals of this regional plan are to "protect, maintain and, where possible, enhance and restore the overall quality of the delta environment, including, but not limited to, agriculture, wildlife habitat, and recreational activities." The Act acknowledges the significance and irreplaceable natural resources of the Delta. Agricultural lands in the Delta are of value as open space and habitat for waterfowl using the Pacific Flyway. A goal of the regional plan is to protect agricultural land within the Primary Zone from the intrusion of nonagricultural uses. All local general plans for areas within the Primary Zone are required to be consistent with the regional plan. The Secondary Zone consists of areas within the statutory Delta (as defined in Section 12220 of the California Water Code) but not part of the Primary Zone. Local general plans for land use in the Secondary Zone are not required to conform to a regional plan (DPC 2005). However, the Commission may review and comment on projects in the Secondary Zone, including some of the proposed MTP 2035 projects in southern Sacramento County.

North Delta Water Agency

The North Delta Water Agency was established in 1973 as result of the separation of the Delta Water Agency into three separate sections (North, Central, and South Delta Water Agencies). These three agencies were formed to maintain agricultural water quality throughout the Delta. These agencies enter into contracts or agreements with the federal and state governments to protect the water supply of the lands against intrusion of ocean salinity and to ensure the lands within the agency have a dependable supply of suitable quality water to meet present and future needs. The North Delta Water Agency includes portions of lands in Sacramento, and Yolo counties. Proponents of specific MTP projects must comply with the applicable contracts or agreements established by the North Delta Water Agency.

County of Sacramento General Plan

The County of Sacramento General Plan has several policies and implementation measures to achieve their goal to "minimize the loss of life, injury, and property damage due to flooding hazards" within the Safety Element of the General Plan (County of Sacramento 1993). In addition, there are several policies and implementation measures related to water quality protection and wastewater runoff in the Public Facilities Element of the General Plan. Proponents of specific MTP projects within Sacramento County must comply with these policies and regulations related to flooding issues in the Safety Element and water quality issues in the Public Facilities Element of the County of Sacramento's General Plan.

Yolo County General Plan

The Yolo County General Plan includes several policies related to flood protection and safety as well as conservation measures to preserve water quality. Proponents of specific MTP projects within Yolo County must comply with the policies described in the Safety and Seismic and Conservation Policy sections of the Yolo County General Plan (Yolo County 1983).

Sutter County General Plan

The Sutter County General Plan has three policies and three implementation measures to achieve their goal to "minimize the risk of personal injury, property damage and the economic and social disruptions associated with floods" (Sutter County 1993). Proponents of specific MTP projects within Sutter County must comply with the policies and implementation measures related to flooding issues in the Health and Safety section of Sutter County's General Plan.

Yuba County General Plan

The Yuba County General Plan has several policies relating to water quality issues and flood hazards as described in the Hydrologic Conditions section of the General Plan (Yuba County 2004). Proponents of specific MTP projects within Yuba County must comply with the policies and implementation measures related to hydrologic issues in the General Plan.

Placer County General Plan

The Placer County General Plan has several policies and three implementation programs to achieve their goal to "minimize the risk of personal injury, property damage and the economic and social disruptions associated with floods" within its Health and Safety section of the General Plan (Placer County 1994). In addition, there are several policies and implementation programs related to stormwater drainage and water quality protection in the Public Facilities and Services section of the General Plan. Proponents of specific MTP projects within Placer County must comply with the policies and implementation measures related to water quality and flooding issues as describe in the General Plan.

El Dorado County General Plan

The El Dorado County General Plan has several objectives and policies relating to water quality, and surface water drainage as described in the Public Services and Utilities Element of the General Plan (El Dorado County 2004). In addition, there are two objectives and several policies to achieve the County's goal of "protecting the residents of El Dorado County from flood hazards" in the Health, Safety and Noise Element of the General Plan (El Dorado County 2004). Proponents of specific MTP projects within El Dorado County must comply with the objectives and policies stated in El Dorado County's General Plan.

IMPACTS AND MITIGATION MEASURES

Methods and Assumptions

The evaluation of hydrology and water quality effects is qualitative and is not based on reviews of potential project sites or site-specific sampling or laboratory analysis.

Criteria for Determining Significance

For the purposes of this analysis, an impact pertaining to hydrology and water quality was considered significant if it would result in any of the following, which are based on local General Plan elements and Appendix G of the CEQA Guidelines (14 CCR 15000 et seq.).

- Substantial degradation of water quality; violation of any water quality standards or waste discharge requirements.

- Substantial alterations of the existing drainage pattern of the site area, such that flood risk and/or erosion and siltation potential would increase.
- Placement of structures that would impede or redirect flood flows within a 100-year floodplain.
- Exposure of people, structures, or facilities to significant risk from flooding, including flooding as a result of the failure of a levee or dam.
- Creation of, or contribution to runoff that would exceed the capacity of an existing or planned stormwater management system.
- Substantial reduction in groundwater quantity or quality.

A preliminary review of the information concluded that the projects included in the MTP 2035 would not result in exposure of persons or property to increased risks involving seiche, tsunami, or mudflow because of the distant location of the MTP Plan Area from an ocean and the relatively flat topography of the Plan Area. Therefore, this criterion was not used in the impact analysis. The remaining thresholds identified above were used in the following impact discussion.

Environmental Impacts of he Proposed Project

This section describes potential impacts on hydrology and water quality that could result from the MTP 2035. Some projects within the MTP 2035 could significantly affect hydrology and water quality. However, prior to final approval of each project considered in the MTP 2035, the implementing agency will conduct the appropriate project-specific environmental review.

Impact HYD - 1: Construction-Related Impacts on Water Quality

Construction-related earth-disturbing activities of highway, interchange, street and other various improvement projects included in the MTP 2035 would introduce the potential for increased erosion and sedimentation, with subsequent effects on water quality and storm drain capacity. During site grading, trenching, and other construction activities, areas of bare soil are exposed to erosive forces during rainfall events. Bare soils are much more likely to erode than vegetated areas because of the lack of dispersion, infiltration, and retention properties created by covering vegetation. Construction activities involving soil disturbance, excavation, cutting/filling, stockpiling, and grading could result in increased erosion and sedimentation to surface waters.

The extent of the impacts is dependent on soil erosion potential, type of construction practice, extent of disturbed area, timing of precipitation events, and topography and proximity to drainage channels. In addition, construction equipment and activities would have the potential to leak hazardous materials, such as oil and gasoline, and potentially affect surface water or groundwater quality. Improper use or accidental spills of fuels, oils, and other construction-related hazardous materials, such as pipe sealant, solvents, and paints, could also pose a threat to the water quality of local waterbodies. These potential leaks or spills, if not contained, would be considered a potentially significant impact on groundwater and surface water quality. If precautions are not taken to contain or capture sediments and/or accidental hazardous spills, construction activities could produce substantial pollutants in stormwater runoff and result in a significant impact on the existing surface water quality.

Based upon the general planning nature of the MTP 2035, development of detailed, site-specific information on this impact at the program level is not feasible. As a result, SACOG does not have sufficient reliable data to permit preparation of a meaningful and accurate report on the

impact and no significance determination can be reasonably made. The implementing agency will conduct appropriate project-level environmental review and will be responsible for consideration of mitigation measures for significant effects on the environment. The following mitigation measure, and GEO-3 (see Chapter 10, *Geology, Seismicity and Soils*), as appropriate for site-specific projects, could be used by implementing agencies to address potential impacts during project-level review:

Mitigation Measure HYD - 1: Implement a Spill Prevention and Control Program

As part of requiring compliance with the NPDES General Construction Permit, develop and implement a spill prevention and control program to minimize the potential for, and effects from, spills of hazardous, toxic, or petroleum substances during all construction activities. The program will be completed before any construction activities begin.

Impact HYD - 2: Water Quality Impacts from Construction below the Water Table

Some projects included in the 2035 MTP would require extensive foundational support. Overpasses, underpasses, grade separations, highway interchanges, and other rail crossing structures would require excavation below the ground surface or support structures or foundations secured deep into the ground. Projects that excavate or secure foundations deep in the ground may encounter groundwater.

Depending on the location, trenching and excavation associated with these projects may reach depths that can expose the water table and create a direct path to the groundwater basin for contaminants to enter the groundwater system. Primary construction-related contaminants that could reach groundwater would include oil and grease, and construction-related hazardous materials and dewatering effluent. Based upon the general planning nature of the MTP 2035, development of detailed, site-specific information on this impact at the program level is not feasible. As a result, SACOG does not have sufficient reliable data to permit preparation of a meaningful and accurate report on the impact and no significance determination can be reasonably made. The implementing agency will conduct appropriate project-level environmental review and will be responsible for consideration of mitigation measures for significant effects on the environment. The following mitigation measure could be used by implementing agencies to address potential impacts during project-level review:

Mitigation Measure HYD - 2: Comply with Provisions for Dewatering

Before discharging any dewatered effluent to surface water, obtain an NPDES permit and Waste Discharge Requirement from the RWQCB. Depending on the volume and characteristics of the discharge, coverage under the NPDES General Construction Permit may be permissible. If coverage under the General Construction Permit is not allowed, projects must conform to requirements of the General Dewatering Permit, issued by the Central Valley RWQCB. Design and implement measures as necessary so that discharge limits identified in relevant permits are met.

Impact HYD - 3: Water Quality Degradation Due to Urban Runoff as a Result of Increased Impervious Surfaces

Proposed MTP 2035 project activities, such as road widenings, interchange reconstruction, railway crossings, and other projects, would create new impervious surfaces. This would result in an incremental reduction in the amount of natural soil surfaces available for infiltration of rainfall and runoff, potentially generating additional runoff during storm events. In addition, the increase in impervious surfaces, along with the increase in surface water runoff, could increase the non-point source discharge of pollutants. Anticipated runoff contaminants include sediment, pesticides, oil and grease, nutrients, metals, bacteria, and trash. Contributions of these contaminants to stormwater and non-stormwater runoff would degrade the quality of receiving waters. During the dry season, vehicles and other urban activities release contaminants onto the impervious surfaces, where they can accumulate until the first storm event. During this initial storm event, or first flush, the concentrated pollutants would be transported via runoff to stormwater drainage systems. Contaminated runoff waters could flow into the stormwater drainage systems that discharge into rivers, agricultural ditches, sloughs, and channels and ultimately could degrade the water quality of any of these water bodies.

Based upon the general planning nature of the MTP 2035, development of detailed, site-specific information on this impact at the program level is not feasible. As a result, SACOG does not have sufficient reliable data to permit preparation of a meaningful and accurate report on the impact and no significance determination can be reasonably made. The implementing agency will conduct appropriate project-level environmental review and will be responsible for consideration of mitigation measures for significant effects on the environment. The following mitigation measure could be used by implementing agencies to address potential impacts during project-level review:

Mitigation Measure HYD - 3: Implement Measures to Maintain Water Quality after Construction

Implement source and treatment control measures contained in their applicable Stormwater Management Plans. General site design control measures incorporated into the project design can include conserving natural areas, protecting slopes and channels, and minimizing impervious areas. Treatment control measures may include use of vegetated swales and buffers, detention basins, wet ponds, or constructed wetlands, infiltration basins, and other measures. Selection and implementation of these measures would occur on a project-by-project basis depending on project size and stormwater treatment needs.

Impact HYD - 4: Substantial Increased Runoff Resulting in Flooding

Some of the projects included in the MTP 2035 could potentially alter surface drainage patterns as a result of adding impermeable surfaces, directly altering flow patterns, or placing structures in a floodway, all of which could yield increased amounts of stormwater runoff. Proposed project activities, such as road widening, interchange reconstruction, railway crossings, and other projects that convert permeable surfaces or install permanent structures would require stormwater drainage management measures to avoid flooding impacts. The existing storm drainage network in the MTP Plan Area may not have sufficient capacity to convey the additional runoff from the proposed projects. If the storm drainage network is not appropriately

designed to accommodate post-project flows, the storm drainage system could become overwhelmed during a large storm event and result in flooding.

Based upon the general planning nature of the MTP 2035, development of detailed, site-specific information on this impact at the program level is not feasible. As a result, SACOG does not have sufficient reliable data to permit preparation of a meaningful and accurate report on the impact and no significance determination can be reasonably made. The implementing agency will conduct appropriate project-level environmental review and will be responsible for consideration of mitigation measures for effects on the environment. The following mitigation measures could be used by implementing agencies to address potential impacts during project-level review:

Mitigation Measure HYD - 3: Implement Measures to Maintain Water Quality after Construction

This mitigation measure is discussed above.

Mitigation Measure HYD - 4: Conduct Project-Level Drainage Studies

Conduct drainage studies on a site-specific basis. The studies will address the following topics.

- A calculation of pre-development runoff conditions and post-development runoff scenarios using appropriate engineering methods. This analysis will evaluate potential changes to runoff through specific design criteria, and account for increased surface runoff.
- An assessment of existing drainage facilities within the project area, and an inventory of necessary upgrades, replacements, redesigns, and/or rehabilitation, including the sizing of on-site stormwater detention features and pump stations.
- A description of the proposed maintenance program for the onsite drainage system.
- Standards for drainage systems to be installed on a project/parcel-specific basis.
- Proposed design measures to ensure structures are not located within 100-year floodplain areas.

Drainage systems will be designed on a site-specific basis in accordance with the findings of the studies and the requirements of the applicable local flood control agencies and flood control design criteria. As a performance standard, measures to be implemented will provide for no net increase in peak stormwater discharge relative to current conditions to ensure that 100-year flooding and its potential impacts are maintained at or below current levels and that people and structures are not exposed to additional flood risk.

Impact HYD - 5: Reduction in Groundwater Recharge as a Result of Increased Impervious Surfaces

Projects included in the MTP 2035, such as road widenings, interchange reconstruction, railway crossings, and other projects would result in new impervious surfaces and could reduce rainwater infiltration and groundwater recharge. Infiltration rates vary depending the overlying soil types. In general, sandy soils have higher infiltration rates and can contribute to significant amounts of ground water recharge; clay soils tend to have lower percolation potentials; and impervious surfaces such as pavement significantly reduce infiltration capacity and increase surface water runoff. The amount of new pavement and the extent to which it affects infiltration depends on the site-specific soil type. Projects located in urban areas would have less of an impact than projects converting open lands and spaces. Many of the MTP 2035 projects are located in urban areas and along existing highways, streets, and roads in which most of the surfaces are already paved or impervious. In addition, extensive storm drainage systems present in these areas currently intercept rainfall and runoff waters, thus limiting the amount of groundwater recharge that occurs.

Based upon the general planning nature of the MTP 2035, development of detailed, site-specific information on this impact at the program level is not feasible. As a result, SACOG does not have sufficient reliable data to permit preparation of a meaningful and accurate report on the impact and no significance determination can be reasonably made. The implementing agency will conduct appropriate project-level environmental review and will be responsible for consideration of mitigation measures for significant effects on the environment. The following mitigation measure could be used by implementing agencies to address potential impacts during project-level review:

Mitigation Measure HYD - 5: Design and Install Infiltration Systems

Include infiltration systems in project design. Infiltration devices will be installed to replace the natural recharge rate of the soil to be paved over.

Impact HYD - 6: Water Quality Impacts from Discharges to 303(d) Listed Water Bodies

Several waterbodies in the study area, including major rivers, creeks, and tributaries (refer to Table 12-3) have been identified under Clean Water Act Section 303(d) as being impaired by a variety of contaminants, including pesticides (chlorpyrifos, DDT, diazinon, and Group A pesticides), mercury, copper, zinc, pathogens, and exotic species. These constituents originate from a variety of sources, but generally include agricultural activities, such as irrigation runoff, and urban non-point sources of runoff from landscaping, rooftops, trash, and illicit dumping. Under the CWA listing, these water bodies have no remaining assimilative capacity or ability to accommodate additional quantities of these contaminants, irrespective of concentration. Projects are required to comply with requirements of approved TMDLs, as regulated in the MTP Plan Area by the Central Valley RWQCB through issuance of Waste Discharge Requirements and NPDES permit amendments.

Based upon the general planning nature of the MTP 2035, development of detailed, site-specific information on this impact at the program level is not feasible. As a result, SACOG does not have sufficient reliable data to permit preparation of a meaningful and accurate report on the impact and no significance determination can be reasonably made. The implementing agency

will conduct appropriate project-level environmental review and will be responsible for consideration of mitigation measures for significant effects on the environment. Implementing agencies should consider Mitigation Measure HYD-3, described above, which requires post-project water quality protection.

Impact HYD - 7: Impact Due to Construction in the Floodplain

Some of the projects included in the proposed MTP 2035 would be placed within the 100-year flood zone, thus increasing the potential to obstruct or exacerbate floodwaters. The construction of projects involving support structures in the floodway could obstruct floodwaters at some locations. Placement of structures within a floodplain can displace floodwaters and alter the base flood elevations in the surrounding areas. Structures can form a backwater effect, resulting in increased in the flood elevation level upstream and in neighboring areas. Likewise, floodwater can cause scour effects, resulting in erosion and sedimentation problems downstream from structures. Drainage areas could be altered by highway corridors, in which floodwaters could be detained by medians and along the roadside. Proposed bridge supports could block debris in waterways, creating obstructions and further elevating upstream flood levels.

As described in the setting section, numerous federal, state, and local agencies are responsible for maintaining flood protection features in the MTP Plan Area, including USACE and DWR at the federal and state level, as well as local reclamation districts and flood control agencies. All transportation network improvements would be required to comply with the floodplain regulations imposed by these agencies. In addition, implementation of Mitigation Measure HYD-6 would reduce this impact to a less-than-significant level.

Mitigation Measure HYD - 6: Avoid Restriction of Floodflows and Obtain Agency Approval of Construction with 100-Year Floodplains

Proponents of specific projects included in the proposed MTP 2035 that require federal approval or funding must comply with Executive Order 11988 for floodplain management. Proponents of these projects must avoid incompatible floodplain development designs, restore and preserve the natural and beneficial floodplain values, and maintain consistency with the standards and criteria of the National Flood Insurance Program. In addition, a Letter of Map Revision (LOMR) will be prepared and submitted to FEMA if unavoidable construction would occur within 100-year floodplains. The LOMR will include revised local base flood elevations for projects constructed within flood-prone areas. Potential impacts due to flooding as a result of specific projects included in the MTP 2035 would be alleviated through the FEMA LOMR approval process, as well as the jurisdiction of the Reclamation Board, when applicable, and the Reclamation District affected. Project design will proceed in accordance with the latest available mapping by DWR and USACE.

Impact HYD - 8: Impact Due to Inundation by Dam or Levee Failure

Significant precipitation or major storm events has the potential to cause levee failure within the MTP Plan Area. Specific projects included in the MTP 2035 may create structures or obstructions to flood flows from levee or dam failures. However, any projects constructed within areas subject to flooding due to dam failure, as mapped by FEMA, would be built following standard building codes and federal, state, and local regulations, all of which would be adequate to protect against further personal injury or death. Some projects included in the MTP

2035 may cause flood flows to expand to areas not previously mapped as an inundation area under levee or dam failure scenarios.

Based upon the general planning nature of the MTP 2035, development of detailed, site-specific information on this impact at the program level is not feasible. As a result, SACOG does not have sufficient reliable data to permit preparation of a meaningful and accurate report on the impact and no significance determination can be reasonably made. The implementing agency will conduct appropriate project-level environmental review and will be responsible for consideration of mitigation measures for significant effects on the environment. The following mitigation measure could be used by implementing agencies to address potential impacts during project-level review:

Mitigation Measure HYD - 7: Design Projects to Pass Flows in the Event of Levee or Dam Failure

If the project has the potential to impede or redirect flows from a levee or dam failure, such that there would be less than a one percent chance that flooding would extend to areas not previously mapped as inundation areas, redesign project, to the maximum extent practicable, such that the site would exhibit pre-project inundation conditions. This may be achieved through incorporation of culverts or bridges into the project design. Consult with their respective flood control agencies to ensure that the flooding risks of pre-project conditions would not increase.