3.4 Air Quality

This section addresses potential air quality impacts that could result from implementation of the proposed program—specifically, emissions of criteria air pollutants, hazardous air pollutants (toxic air contaminants), and odors. This section is composed of the following subsections:

- Section 3.4.1, "Environmental Setting," describes the physical conditions in the study area as they apply to air quality.
- Section 3.4.2, "Regulatory Setting," summarizes federal, State, and regional and local laws and regulations pertinent to evaluation of the proposed program's impacts on air quality.
- Section 3.4.3, "Analysis Methodology and Thresholds of Significance," describes the methods used to assess the environmental effects of the proposed program and lists the thresholds used to determine the significance of those effects.
- Section 3.4.4, "Environmental Impacts and Mitigation Measures for NTMAs," discusses the environmental effects of near-term management activities (NTMAs) and identifies mitigation measures for significant environmental effects.
- Section 3.4.5, "Environmental Impacts, Mitigation Measures, and Mitigation Strategies for LTMAs," discusses the environmental effects of long-term management activities (LTMAs) and identifies mitigation measures for significant environmental effects.

NTMAs and LTMAs are described in detail in Section 2.4, "Proposed Management Activities."

See Section 3.7, "Climate Change and Greenhouse Gas Emissions," for a discussion of greenhouse gas emissions.

3.4.1 Environmental Setting

Information Sources Consulted

Sources of information used to prepare this section include the following:

- The California Air Resources Board (CARB) and U.S. Environmental Protection Agency (EPA) ambient air quality standards (CARB 2010)
- Air data reports compiled by EPA (2009)

- CARB's iADAM Air Quality Data Statistics Web site (CARB 2009a)
- Air quality data compiled by local air districts

Geographic Areas Discussed

Air quality is discussed for the following geographic areas within the study area:

- Extended systemwide planning area (Extended SPA) divided into the Sacramento and San Joaquin Valley and foothills and the Sacramento–San Joaquin Delta (Delta) and Suisun Marsh
- Sacramento and San Joaquin Valley watersheds
- SoCal/coastal Central Valley Project/State Water Project (CVP/SWP) service areas

The discussion of air quality in the study area, however, is presented by air basin because several air basins extend across two or more geographic areas within the study area. The geographic area of each air basin is identified below. None of the management activities included in the proposed program would be implemented in the SoCal/coastal CVP/SWP service areas. In addition, implementation of the proposed program would not result in any substantial or long-term reductions in water or renewable electricity deliveries to the SoCal/coastal CVP/SWP service areas (see Section 2.6, "No Near- or Long-Term Reduction in Water or Renewable Electricity Deliveries"). Given these conditions, only negligible effects on air quality are expected in the portions of the SoCal/coastal CVP/SWP service areas located outside of the Sacramento and San Joaquin Valley watersheds and Sacramento and San Joaquin Valley and foothills. Therefore, the air basins located in those portions of the SoCal/coastal CVP/SWP service areas are not discussed at the same level of detail as air basins in which program activities would be implemented.

Topography, Climate, and Meteorology of the Study Area

Ambient concentrations of air pollutants, contaminants, and odors are determined by the amounts and types of emissions released by sources and the atmosphere's ability to transport, dilute, and transform such emissions. Natural factors that affect transport, dilution, and transformation include terrain, wind, atmospheric stability, and sunlight. Therefore, existing air quality conditions in the study area are determined by such natural factors as topography, climate, and meteorology, in addition to the amounts and types of emissions released by existing sources.

The Extended SPA and the Sacramento and San Joaquin Valley watersheds are located in several air basins: the Sacramento Valley, Lake County, Mountain Counties, San Joaquin Valley, San Francisco Bay Area, Great Basin Valleys, and Northeast Plateau air basins. The locations of these air basins are shown in Figure 3.4-1. Twenty-two air districts are located within the study area (Figure 3.4-1). Although California generally has a cool, wet winter and hot, dry summer, the climate of these air basins varies considerably with topography, latitude, and distance from the coast, and thus varies considerably among air basins (Table 3.4-1). An overview of each air basin in the Extended SPA and Sacramento and San Joaquin Valley watersheds is provided below.

Air Basins Located Entirely or Substantially within the Extended Systemwide Planning Area All or a substantial part of each of the following air basins is located within either the Sacramento and San Joaquin Valley and foothills or the Delta and Suisun Marsh. Other geographic areas in which these basins are located are identified below.

Sacramento Valley Air Basin The Sacramento Valley Air Basin (SVAB) is located within both the Sacramento and San Joaquin Valleys and portions of the Sierra Nevada foothills. With respect to water resources, the SVAB encompasses the Sacramento and San Joaquin Valley watersheds. The SVAB is relatively flat, bordered by the North Coast Ranges to the west and the northern Sierra Nevada to the east. Air flows into the SVAB through the Carquinez Strait, the only breach in the western mountain barrier, and moves across the Delta from the San Francisco Bay Area Air Basin (SFBAAB).

Summer high temperatures are hot (Table 3.4-1), often exceeding 100 degrees Fahrenheit (ºF). Winter temperatures are cool to cold, with minimum temperatures often dropping into the high 30s. Most of the precipitation occurs as rainfall during winter storms. The rare occurrence of precipitation during summer is in the form of convective rain showers. Also characteristic of the SVAB are winters with periods of dense and persistent low-level fog that are most prevalent between storms. Prevailing wind speeds are moderate. The mountains surrounding the SVAB create a barrier to airflow, which leads to the entrapment of air pollutants when meteorological conditions are unfavorable for transport and dilution. Poor air movement occurs most frequently in fall and winter when high-pressure cells are present over the SVAB. The lack of surface wind during these periods, combined with the reduced vertical flow because of less surface heating, reduces the influx of air. Surface concentrations of air pollutants are highest when these conditions combine with agricultural burning activities or temperature inversions, which hamper dispersion by creating a ceiling over the area and trapping air pollutants near the ground.

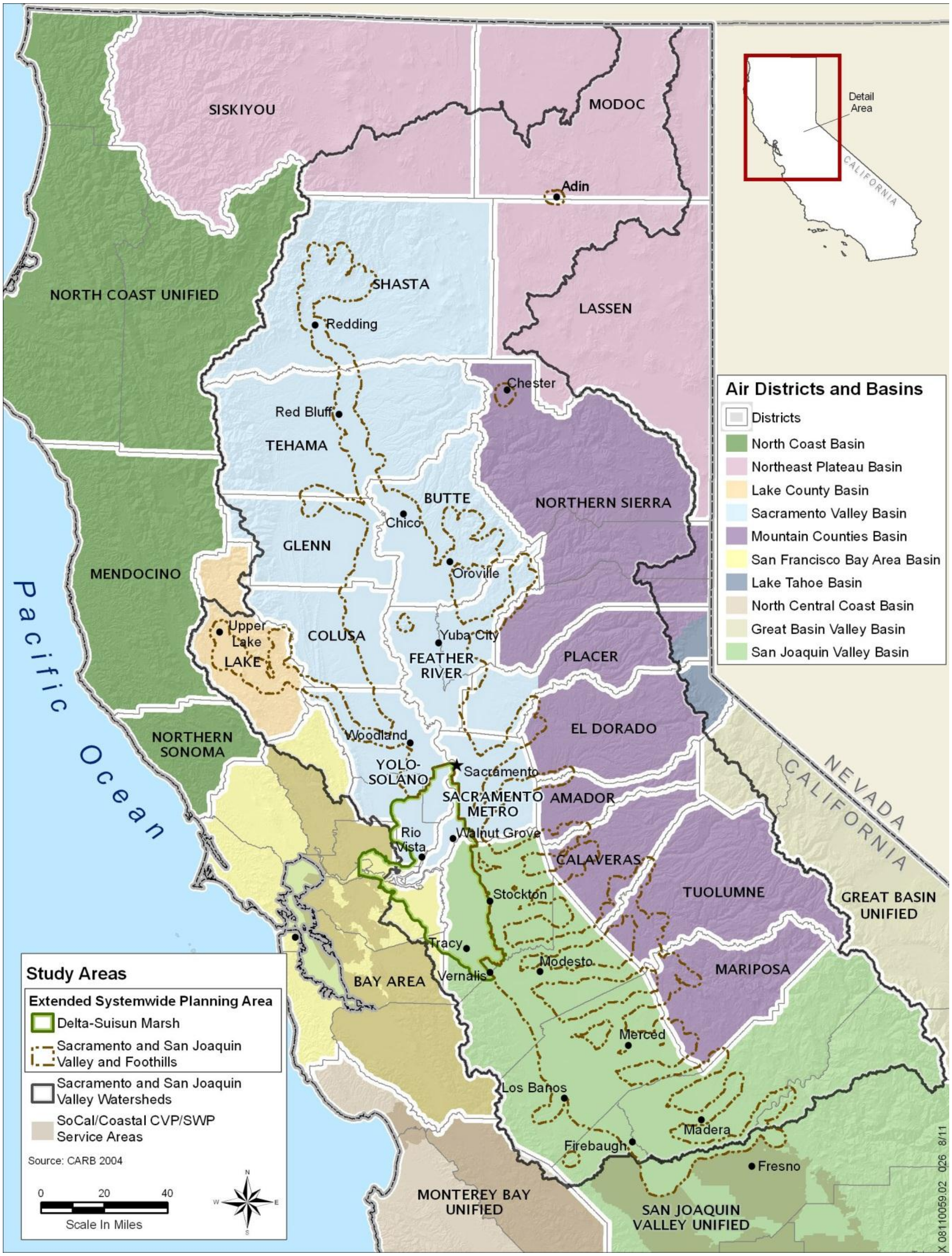

Figure 3.4-1. Overview of Air Basins and Districts in the Extended SPA and Sacramento and San Joaquin Valley Watersheds

Table 3.4-1. Temperature and Precipitation of Representative Cities in Air Basins of the Extended SPA and Sacramento and San Joaquin Valley Watersheds[1]

Air Basin	City	Temperature Avg. Daily Min–Max (°F)		Precipitation Mean Annual (inches)
		January	July	
Sacramento Valley	Davis	37–53	56–93	19
Lake County	Lakeport	33–54	54–92	31
Mountain Counties	Auburn	38–54	63–91	37
	Truckee	16–41	42–83	31
San Joaquin Valley	Stockton	38–54	60–93	14
	Fresno	38–54	66–97	11
	Bakersfield	39–56	69–97	7
San Francisco Bay Area	Fairfield	38–55	56–89	24
Great Basin Valleys	Bishop	22–54	56–98	5
Northeast Plateau	Yreka	23–45	51–91	20

Source: NOAA 2004
Note:
[1] Values rounded to nearest degree or inch.
Key:
°F = degrees Fahrenheit

May through October is ozone season in the SVAB. This period is characterized by poor air movement in the mornings and the arrival of the Delta sea breeze from the southwest in the afternoons. Typically, the Delta breeze transports air pollutants northward out of the SVAB; however, a phenomenon known as the Schultz Eddy prevents this from occurring during approximately half of the time between July and September. The Schultz Eddy causes the wind pattern to shift southward, causing air pollutants that have moved to the northern end of the Sacramento Valley to be blown back toward the south before leaving the valley. This phenomenon exacerbates concentrations of air pollutants in the area and contributes to violations of the ambient air quality standards (Solano County 2008:4.2-1 through 4.2-2).

Air quality within the SVAB is regulated by the Shasta County, Butte County, Feather River, Sacramento Metropolitan, and Yolo-Solano air quality management districts; and by the Tehama County, Glenn County, and Colusa County air pollution control districts.

Lake County Air Basin The Lake County Air Basin (LCAB) is located within the North Coast Ranges. Like the SVAB, the LCAB includes portions of the Sacramento and San Joaquin valleys and Sierra Nevada foothills. The water resources located within the LCAB include both the Sacramento and San Joaquin Valley watersheds. The North Coast Ranges consist of long, parallel ridges that run north and south, generally paralleling the coastline. In Lake County, the mountain pattern is conspicuously interrupted by the Clear Lake Basin. Clear Lake occupies this basin in approximately the middle one-third of the county. The northern third of the county is largely unoccupied, much of it lying within Mendocino National Forest. Mountains are also predominant in the southern one-third of Lake County. The topography ranges from approximately 1,100 feet in elevation to more than 7,000 feet at the peaks of the surrounding Coast Ranges.

The climate in Lake County reflects the county's mountainous character and its location in a climatic zone that is transitional from a coastal climate more influenced by the Pacific Ocean. Consequently, Lake County has greater precipitation and colder winters than the Central Valley. Winds are generally light because of the sheltering effect of surrounding mountains with predominant winds from the northwest, particularly in summer (Lake County 2010:5.3-1).

Air quality within the LCAB is regulated by the Lake County Air Quality Management District.

Mountain Counties Air Basin The Mountain Counties Air Basin (MCAB) is located within both the Sacramento and San Joaquin Valley and foothills and the Sacramento and San Joaquin Valley watersheds. The MCAB is an area of approximately 11,000 square miles that encompasses Amador, Calaveras, Mariposa, Nevada, Plumas, Sierra, and Tuolumne counties, as well as portions of El Dorado and Placer counties. Most of the MCAB is located in the northern Sierra Nevada, although the western boundary of the MCAB extends into the Sacramento Valley.

The general climate of the MCAB varies considerably with elevation and proximity to mountains. The mountains and hills are primarily responsible for wide variations in rainfall, temperatures, and localized winds that occur throughout the region. The temperature variations have a substantial influence on wind flow, dispersion along mountain ridges, vertical mixing, and photochemistry within the MCAB. Climates vary from alpine in the eastern areas to more arid at the western edge of the MCAB (Amador County 2009:4.2-1).

Air quality within the MCAB is regulated by the Northern Sierra, El Dorado, and Calaveras County air quality management districts; and by the Placer County, Amador County, Tuolumne County, and Mariposa County air pollution control districts.

San Joaquin Valley Air Basin The San Joaquin Valley Air Basin (SJVAB), which occupies the southern half of California's Central Valley, is located within both the Sacramento and San Joaquin Valley and foothills and the Sacramento and San Joaquin Valley watersheds. Approximately 250 miles long and 35 miles wide on average, the SJVAB is a well-defined climatic region with distinct topographic features on three sides. The Coast Ranges, which have an average elevation of 3,000 feet, are located on the western border of the SJVAB. The San Emigdio Mountains, which are part of the Coast Ranges, and the Transverse Ranges, which are part of the Sierra Nevada, are both located on the south side of the SJVAB. The Sierra Nevada forms the eastern border of the SJVAB. No topographic feature delineates the northern edge of the basin. The SJVAB can be considered a "bowl" open only to the north.

The SJVAB is basically flat with a downward gradient in terrain to the northwest. Air flows into the SJVAB through the Carquinez Strait, the only breach in the western mountain barrier, and moves across the Delta from the San Francisco Bay Area. The mountains surrounding the SJVAB create a barrier to airflow, which leads to entrapment of air pollutants when meteorological conditions are unfavorable for transport and dilution. As a result, the SJVAB is highly susceptible to pollutant accumulation over time.

Temperature and precipitation in the SJVAB are similar to meteorological conditions in the Sacramento Valley, but with somewhat less precipitation (as indicated by the cities listed in Table 3.4-1). The amount of precipitation in the SJVAB decreases from north to south (Table 3.4-1).

The winds and unstable atmospheric conditions associated with the passage of winter storms result in periods of low air pollution and excellent visibility. Precipitation and fog tend to reduce or limit some pollutant concentrations. For instance, clouds and fog block sunlight, which is required to fuel photochemical reactions that form ozone. Precipitation and fog also can reduce concentrations of water-soluble gases in the atmosphere. In addition, respirable particulate matter with an aerodynamic diameter of 10 micrometers or less (PM_{10}) can be washed from the atmosphere through wet deposition processes (e.g., rain). However, between winter storms, high pressure and light winds lead to the creation of low-level temperature inversions and stable atmospheric conditions. These conditions, in turn, result in the concentration of air pollutants, particularly localized primary pollutants such as carbon monoxide (CO) from vehicles and PM_{10} from wood burning.

Summer is considered the ozone season in the SJVAB. This season is characterized by poor air movement in the mornings and longer daylight hours. The longer daylight hours provide a plentiful amount of sunlight to fuel photochemical reactions between reactive organic gases (ROG) and oxides of nitrogen (NO_X), resulting in ozone formation. Data on wind speed and direction indicate that summer winds usually originate at the north end of the San Joaquin Valley and flow in a south-southeasterly direction through Tehachapi Pass and into the Southeast Desert Air Basin (SJVAPCD 2002).

Air quality within the SJVAB is regulated by the San Joaquin Valley Air Pollution Control District (SJVAPCD).

San Francisco Bay Area Air Basin The SFBAAB is located primarily within the Delta and Suisun Marsh and the Sacramento and San Joaquin Valley watersheds, but a very small part of the basin extends into the Sacramento and San Joaquin Valley and foothills geographic area. The SFBAAB is characterized by complex terrain consisting of coastal mountain ranges, inland valleys, and bays, which distorts normal wind flow patterns. In this area the Coast Ranges split, resulting in the western (Golden Gate) coast gap and the eastern (Carquinez Strait) coast gap. These gaps allow air to flow out of the SFBAAB. Air flows into Solano County through the Carquinez Strait, moving across the Delta and transporting pollution from the Bay Area. Regional flow patterns affect air quality patterns by moving pollutants downwind of sources. Localized meteorological conditions, such as moderate winds, disperse pollutants and reduce pollutant concentrations. During summer mornings and afternoons, inversions are present over much of the basin. During summer's longer daylight hours, plentiful sunshine results in ozone formation.

The ocean's influence on climate in the San Francisco Bay Area results in cooler summers than in central and eastern California (as indicated by the summer temperatures of cities listed in Table 3.4-1). Precipitation is greater than in nonmountainous areas to the interior (Solano County 2008:4.2-1 through 4.2-2).

Air quality within the SFBAAB is regulated by the Bay Area Air Quality Management District.

Air Basins Located Entirely or Substantially within the Sacramento and San Joaquin Valley Watersheds As described above under "Air Basins Located Entirely or Substantially within the Extended Systemwide Planning Area," the SVAB, LCAB, MCAB, SJVAB, and SFBAAB are also partially located within the Sacramento and San Joaquin Valley watersheds. The additional air basins described below are also located within the watersheds.

Great Basin Valleys Air Basin The Great Basin Valleys Air Basin (GBVAB) is bounded by the Inyo Mountains to the east and the Sierra

Nevada to the west. Because the basin is located in the rain shadow of the Sierra Nevada, annual rainfall is low. Winds can be high in the basin, exceeding average speeds of 40 miles per hour (mph). High southerly winds typically blow when a storm front is approaching, and strong northerly winds result from the passing of the storm. These general wind directions are sometimes complicated by local eddy effects that can cause 180-degree differences in wind direction from the west side to the east side of the basin.

Eleven sensitive airsheds exist in the region: John Muir Wilderness; Golden Trout Wilderness; Kings Canyon National Park; Sequoia National Park; Ancient Bristlecone Pine Forest; South Sierra Wilderness; Dome Land Wilderness; Naval Air Weapons Center, China Lake, and Mojave Range B; Fort Irwin National Training Center; Edwards Air Force Base; and Death Valley National Park. Four of these airsheds (the John Muir and Dome Land wilderness areas, Kings Canyon and Sequoia national parks) are designated as Class I Prevention of Significant Deterioration areas, which are afforded more stringent protection from visibility degradation and impacts from air pollutants.

Visibility in the GBVAB generally ranges from 37 to 93 miles, with the best visibility during winter. When dust storms occur (particularly from Owens Lake), typically from September through May, visibility is limited; these dust storms can reduce visibility to zero and obscure visibility up to 150 miles away. The primary cause of visibility degradation in the basin is fine particulates in the atmosphere. In addition to dust created by dust storms, visibility is degraded by air pollutants transported from the SJVAB, located to the west, and the South Coast Air Basin (SCAB), located to the south. Most of the visibility degradation can be attributed to interbasin transport of air pollutants.

The GBVAB is semiarid, with annual precipitation for most of the area ranging from 5 to 10 inches per year. Temperatures in the basin are typical of the high desert with cold winters and hot summers. The annual predominant wind direction and mean speed are from the southwest at 8 mph, according to the monitoring conducted at Armitage Field at the China Lake Naval Air Weapons Center (LADWP 2009:3.2-1 through 3.2-2).

Air quality within the GBVAB is regulated by the Great Basin Unified Air Pollution Control District.

Northeast Plateau Air Basin The Northeast Plateau Air Basin (NPAB) has a climate regime distinct from all other air basins in California. The basin has distinctly defined seasons that follow a continental pattern, rather than a marine pattern. Winters are cold and snowy; summers are warm and dry.

The NPAB includes a portion of the Klamath Mountains at the western edge of the basin and the Cascade Range and Modoc Plateau along the eastern edge. Mount Shasta rises 14,162 feet, dominating views in much of the basin. Extensive forestland straddles areas between peaks in the basin (e.g., Lassen, Shasta). The volcanic Modoc Plateau extends across the northeastern expanse with an average elevation above 4,500 feet.

The NPAB receives no transported air pollution from major urban areas. However, particulates from dust and wood can become a problem. Only the city of Yreka experiences occasional ozone concentrations approaching "near exceedances" (Carle 2006).

Air quality within the NPAB is regulated by the Siskiyou County, Modoc County, and Lassen County air pollution control districts.

Overview of Criteria Air Pollutants

CARB and EPA focus on the following air pollutants as indicators of ambient air quality: ozone, CO, nitrogen dioxide (NO_2), sulfur dioxide (SO_2), PM_{10}, fine particulate matter with an aerodynamic resistance diameter of 2.5 micrometers or less ($PM_{2.5}$), and lead. Because these are the most prevalent air pollutants known to be deleterious to human health, and extensive health-effects criteria documentation is available for these pollutants, they are commonly referred to as "criteria air pollutants."

Health-based air quality standards have been established for these pollutants by CARB at the State level, and by EPA at the federal level. These standards were established to create a margin of safety protecting the public from adverse health impacts caused by exposure to air pollution. California has also established standards for sulfates, visibility-reducing particles, hydrogen sulfide, and vinyl chloride.

A brief description of each criteria air pollutant (source types, health effects, and future trends) is provided below along with the most current monitoring station data and attainment designations for the study area. Table 3.4-2 presents the California ambient air quality standards (CAAQS) and the national ambient air quality standards (NAAQS) for these criteria pollutants as well as four other categories of pollutants regulated by the State and mentioned briefly later in this section. A brief description of source types, health effects, and future trends associated with each criteria air pollutant is provided below along with the most current attainment area designations and monitoring data for basins in the Extended SPA and Sacramento and San Joaquin Valley watersheds.

Table 3.4-2. Ambient Air Quality Standards

Pollutant	Averaging Time	California Standards [b,c]	National Standards [a]	
			Primary [c,d]	Secondary [c,e]
Ozone	1-hour	0.09 ppm (180 µg/m^3)	–	–
	8-hour	0.07 ppm (137 µg/m^3)	0.075 ppm (157 µg/m^3)	Same as Primary Standard
Carbon Monoxide (CO)	1-hour	20 ppm (23 mg/m^3)	35 ppm (40 mg/m^3)	–
	8-hour	9 ppm (10 mg/m^3)	9 ppm (10 mg/m^3)	
Nitrogen Dioxide (NO_2)	Annual Arithmetic Mean	0.030 ppm (57 µg/m^3)	0.053 ppm (100 µg/m^3)	Same as Primary Standard
	1-hour	0.18 ppm (339 µg/m^3)	–	
Sulfur Dioxide (SO_2)	Annual Arithmetic Mean	–	0.030 ppm (80 µg/m^3)	–
	24-hour	0.04 ppm (105 µg/m^3)	0.14 ppm (365 µg/m^3)	–
	3-hour	–	–	0.5 ppm (1,300 µg/m^3)
	1-hour	0.25 ppm (655 µg/m^3)	–	–
Respirable Particulate Matter (PM_{10})	Annual Arithmetic Mean	20 µg/m^3	-	Same as Primary Standard
	24-hour	50 µg/m^3	150 µg/m^3	
Fine Particulate Matter ($PM_{2.5}$)	Annual Arithmetic Mean	12 µg/m^3	15 µg/m^3	Same as Primary Standard
	24-hour	–	35 µg/m^3	
Lead [f]	30-day Average	1.5 µg/m^3	–	–
	Calendar Quarter	–	1.5 µg/m^3	Same as Primary Standard
Sulfates	24-hour	25 µg/m^3	**No National Standards**	
Hydrogen Sulfide	1-hour	0.03 ppm (42 µg/m^3)		
Vinyl Chloride [f]	24-hour	0.01 ppm (26 µg/m^3)		

Table 3.4-2. Ambient Air Quality Standards (contd.)

Pollutant	Averaging Time	California	National Standards [a]	
		Standards [b,c]	Primary [c,d]	Secondary [c,e]
Visibility-Reducing Particle Matter	8-hour	Extinction coefficient of 0.23 per kilometer—visibility of 10 miles or more (0.07—30 miles or more for Lake Tahoe) because of particles when the relative humidity is less than 70 percent.		

Source: CARB 2010

Notes:

[a] National standards (other than ozone, particulate matter, and those based on annual averages or annual arithmetic means) are not to be exceeded more than once a year. The ozone standard is attained when the fourth highest 8-hour concentration in a year, averaged over 3 years, is equal to or less than the standard. The PM_{10} 24-hour standard is attained when 99 percent of the daily concentrations, averaged over 3 years, are equal to or less than the standard. The $PM_{2.5}$ 24-hour standard is attained when 98 percent of the daily concentrations, averaged over 3 years, are equal to or less than the standard. Contact the U.S. Environmental Protection Agency for further clarification and current federal policies.

[b] California standards for ozone, CO (except Lake Tahoe), SO_2 (1- and 24-hour), NO_2, particulate matter, and visibility-reducing particles are values that are not to be exceeded. All others are not to be equaled or exceeded. California ambient air quality standards are listed in the Table of Standards in Section 70200 of Title 17 of the California Code of Regulations.

[c] Concentration expressed first in units in which it was issued (i.e., ppm or $\mu g/m^3$). Equivalent units given in parentheses are based on a reference temperature of 25 degrees Celsius (°C) and a reference pressure of 760 torr. Most measurements of air quality are to be corrected to a reference temperature of 25°C and a reference pressure of 760 torr; ppm in this table refers to ppm by volume, or micromoles of pollutant per mole of gas.

[d] National Primary Standards: The levels of air quality necessary, with an adequate margin of safety, to protect the public health.

[e] National Secondary Standards: The levels of air quality necessary to protect the public welfare from any known or anticipated adverse effects of a pollutant.

[f] The California Air Resources Board has identified lead and vinyl chloride as toxic air contaminants with no threshold of exposure for adverse health effects determined. These actions allow for the implementation of control measures at levels below the ambient concentrations specified for these pollutants.

Key:
$\mu g/m^3$ = micrograms per cubic meter
ppm = parts per million.

Ozone Ozone is a photochemical oxidant (a substance whose oxygen combines chemically with another substance in the presence of sunlight) and the primary component of smog. Ozone is not directly emitted into the air but is formed through complex chemical reactions between precursor emissions of ROG and NO_X in the presence of sunlight. ROGs are volatile organic compounds that are photochemically reactive. ROG emissions result primarily from incomplete combustion and the evaporation of chemical solvents and fuels. NO_X are a group of gaseous compounds of nitrogen and oxygen that result from the combustion of fuels.

Ozone located in the upper atmosphere (stratosphere) acts in a beneficial manner by shielding the earth from harmful ultraviolet radiation that is emitted by the sun. However, ozone located in the lower atmosphere (troposphere) is a major health and environmental concern. Meteorology and terrain play a major role in ozone formation. Generally, low wind speeds or stagnant air coupled with warm temperatures and clear skies provide the optimum conditions for formation. As a result, summer is generally the peak ozone season. Because of the reaction time involved, peak ozone concentrations often occur far downwind of the precursor emissions. Therefore, ozone is a regional pollutant that often affects large areas. In general, ozone concentrations over or near urban and rural areas reflect an interplay of emissions of ozone precursors, transport, meteorology, and atmospheric chemistry (Godish 2004:51–55).

Carbon Monoxide CO is a colorless, odorless, and poisonous gas produced by incomplete burning of carbon in fuels, primarily from mobile (transportation) sources. Motor vehicles are the largest source of CO emissions in many of the air basins in the study area. CO indicator values throughout California have decreased substantially since 1991. Much of the decline in ambient CO concentrations is attributable to the introduction of cleaner fuels and motor vehicles (CARB 2009b).

The highest concentrations of CO are generally associated with cold, stagnant weather conditions that occur during winter. In contrast to ozone, which tends to be a regional pollutant, CO tends to cause only localized problems.

Nitrogen Dioxide NO_2 is one of the group of highly reactive gases known as NO_X. NO_2 forms quickly from emissions from cars, trucks and buses, power plants, and off-road equipment. In addition to contributing to the formation of ground-level ozone and fine particle pollution, NO_2 is linked with a number of adverse effects on the respiratory system (EPA 2010). The combined emissions of NO and NO_2 are referred to as NO_X and are reported as equivalent to NO_2. Because NO_2 is formed and depleted by reactions associated with photochemical smog (ozone), the NO_2 concentration in a particular geographic area may not be representative of the local sources of NO_X emissions.

Sulfur Dioxide SO_2 is produced by such stationary sources as coal and oil combustion, steel mills, refineries, and pulp and paper mills. In addition, SO_2 is emitted by land-based, on- and off-road engines, and vehicles fueled by gasoline and diesel. It is also contained in fuel used by commercial harbor craft such as tugboats and fishing vessels.

Particulate Matter Respirable particulate matter with an aerodynamic diameter of 10 micrometers or less is referred to as PM_{10}. Fine particulate matter ($PM_{2.5}$) includes a subgroup of smaller particles that have an aerodynamic diameter of 2.5 micrometers or less.

PM_{10} emissions are dominated by emissions from area sources, primarily fugitive dust from vehicle travel on unpaved and paved roads, farming operations, construction and demolition, and particles from residential fuel combustion. Emissions of $PM_{2.5}$ are dominated by the same sources as emissions of PM_{10} (CARB 2009b:4-62 through 4-65).

Lead Lead is a metal found naturally in the environment and in manufactured products. The major sources of lead emissions have historically been mobile and industrial sources. As a result of the phase-out of leaded gasoline, metal processing is currently the primary source of lead emissions. The highest levels of lead in air are generally found near lead smelters. Other stationary sources are waste incinerators, utilities, and lead-acid battery manufacturers.

The decrease in lead emissions and ambient lead concentrations over the past 25 years is California's most dramatic success story with regard to air quality management. The rapid decrease in lead concentrations can be attributed primarily to phasing out lead in gasoline. Subsequent CARB regulations have virtually eliminated all lead from gasoline now sold in California. All areas of the state are currently designated as attainment for the State lead standard (EPA does not designate areas for the national lead standard). Although the ambient lead standards are no longer violated, lead emissions from stationary sources still pose "hot spot" problems in some areas. As a result, CARB has identified lead as a toxic air contaminant (TAC) (see "Toxic Air Contaminants," below).

Greenhouse Gases A discussion of greenhouse gases is presented in Section 3.7, "Climate Change and Greenhouse Gas Emissions." It should be noted that greenhouse gases are not considered criteria air pollutants, but may include criteria air pollutants (e.g., ROG may contain volatile organic compounds that have a small direct greenhouse gas effect).

Monitoring Station Data and Attainment Area Designations

Concentrations of criteria air pollutants are measured at several monitoring stations throughout the study area. Table 3.4-3 summarizes air quality data from monitoring stations throughout the Extended SPA and Sacramento and San Joaquin Valley watersheds for the most recent 3 years where data is available, 2007 through 2009, by air basin.

Both CARB and EPA use this type of monitoring data to designate area attainment status for criteria air pollutants, relative to applicable standards (listed in Table 3.4-2). The purpose of these designations is to identify areas with air quality problems and thereby initiate planning efforts for improvement. The three basic designation categories are nonattainment, attainment, and unclassified.

A pollutant is designated "nonattainment" if there was at least one violation of a State standard for that pollutant in the area, or "attainment" if the State standard for that pollutant was not violated at any site in the area during a 3-year period. The category of "unclassified" is used in an area that cannot be classified on the basis of available information as meeting or not meeting standards. In addition, the California designations include a subcategory of the nonattainment designation, called nonattainment-transitional. The nonattainment-transitional designation is given to nonattainment areas that are progressing and nearing attainment. The most current attainment designations for air basins of the Extended SPA and Sacramento and San Joaquin Valley watersheds are shown in Figures 3.4-2 and 3.4-3 for each criteria air pollutant in accordance with State and federal standards, respectively (listed in Table 3.4-2). Because the proposed program would not directly involve activities and associated emissions within the SoCal/coastal CVP/SWP service areas, the attainment statuses for these areas are not shown in Figures 3.4-2 and 3.4-3. Because the proposed program would not generate emissions in the SoCal/coastal CVP/SWP service areas, it would not affect the area's ability to attain NAAQS or CAAQS.

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Table 3.4-3. Summary of Annual Ambient Air Quality Data for the Extended SPA and Sacramento and San Joaquin Valley Watersheds (by Basin)

Pollutant	2007							2008							2009						
	SJVAB	GBVAB	SFBAAB	LCAB	SVAB	MCAB	NPAB	SJVAB	GBVAB	SFBAAB	LCAB	SVAB	MCAB	NPAB	SJVAB	GBVAB	SFBAAB	LCAB	SVAB	MCAB	NPAB
OZONE																					
Maximum concentration (1-hour/8-hour, ppm)	0.138/ 0.110	0.107/ 0.094	0.120/ 0.091	0.070/ 0.064	0.138/ 0.122	0.115/ 0.107	0.072/ 0.065	0.157/ 0.132	0.098/ 0.094	0.141/ 0.110	0.080/ 0.071	0.166/ 0.123	0.149/ 0.118	0.086/ 0.076	0.135/ 0.110	0.098/ 0.086	0.113/ 0.094	0.070/ 0.068	0.122/ 0.104	0.113/ 0.096	0.076/ 0.063
Number of days State standard exceeded (1-hour/8-hour)	69/138	3/35	4/9	0/0	15/61	19/88	0/0	95/150	1/21	9/20	0/1	41/78	34/84	0/1	82/122	1/4	11/13	0/0	29/65	14/67	0/0
Number of days national standard exceeded (1-hour/8-hour)[a]	3/110	0/18	0/2	0/0	1/34	0/57	0/0	19/127	0/5	2/12	0/0	9/54	4/59	0/0	4/98	0/2	0/8	0/0	0/45	0/41	0/0
CARBON MONOXIDE (CO)																					
Maximum concentration (1-hour/8-hour, ppm)	3.6/ 3.16	*	3.0/ 2.71	*	4.3/ 5.58	*/ 0.68	*	2.5/ 2.34	*	2.6/ 2.48	*	3.1/ 2.84	*	*	*/ 2.41	*	*/ 2.86	*	*/ 2.84	*	*
Number of days State standard exceeded (8-hour)	0	*	0	*	0	0	*	0	*	0	*	0	*	*	0	*	0	*	0	*	*
Number of days national standard exceeded (1-hour/8-hour)	*/0	*	*/0	*	*/0	*/0	*	*/0	*	*/0	*	*/0	*	*	*/0	*	*/0	*	*/0	*	*
NITROGEN DIOXIDE (NO_2)																					
Maximum concentration (1-hour, ppm)	0.101	*	0.069	*	0.127	0.010	*	0.098	*	0.080	*	0.115	0.048	*	0.076	*	0.069	*	0.068	0.026	*
Number of days State standard exceeded	0	*	0	*	0	0	*	0	*	0	*	0	0	*	0	*	0	*	0	0	*
Annual average (ppm)	0.013	*	0.012	*	0.011	*	*	0.013	*	0.012	*	0.010	*	*	0.011	*	0.012	*	0.009	*	*
SULFUR DIOXIDE (SO_2)																					
Maximum concentration (24-hour, ppm)	0.007	*	0.005	*	0.004	*	*	0.003	*	0.005	*	0.002	*	*	0.005	*	0.004	*	0.002	*	*
FINE PARTICULATE MATTER ($PM_{2.5}$)																					
Maximum concentration (µg/m^3) (National/California)[b]	103.8/ 154.0	57.0/ 57.0	57.5/ 57.5	9.5/ 9.5	61.0/ 83.7	72.0/ 134.0	*	100.3/ 118.8	58.0/ 58.0	60.3/ 74.9	96.6/ 96.6	200.2/ 200.2	142.2/ 142.2	15.1/ 15.1	195.5/ 195.5	69.0/ 69.0	45.7/ 49.8	7.8/ 7.8	49.8/ 71.7	51.2/ 76.5	16.5/ 16.5
Number of days national standard exceeded (measured/calculated)[c,d]	77/ 65.6	2/ 6.3	14/ 12.1	0/ 0.0	27/ 27.6	7/ 13.0	*	81/ 66.7	4/ 12.1	12/ 7.1	2/ 12.2	20/ 36.5	14/ 26.3	0/ *	65/ 50.6	2/ 6.7	11/ 5.4	0/ 0.0	6/ 8.9	3/ 6.8	0/ 0.0
Annual average (µg/m^3) (National/California)	22.0/ 825.2	5.8/ 5.8	10.7/ 13.3	3.3/ 3.3	12.3/ 14.4	13.0/ 14.2	*	23.5/ 21.2	7.1/ 7.1	11.5/ 13.7	7.3/ 7.3	16.4/ 18.9	15.2/ *	*	22.5/ 21.2	6.4/ *	10.1/ 10.1	3.3/ 3.3	10.7/ 15.5	10.4/ 13.8	5.1/ 5.1
RESPIRABLE PARTICULATE MATTER (PM_{10})																					
Maximum concentration (µg/m^3) (National/California)[b]	172.0/ 135.0	10020.0 /8338.0	72.9/ 77.8	*/ 19.0	119.0/ 119.0	127.0/ 116.0	205.0/ 189.0	358.8/ 353.5	2769.0/ 2342.0	78.2/ 77.0	*/ 123.9	236.7/ 232.0	135.7/ 118.4	176.8/ 162.4	423.8/ 139.5	1506.0/ 433.0	51.7/ 55.4	*/ 17.6	76.0/ 76.0	90.2/ 82.2	33.4/ 30.8
Number of days State standard exceeded (measured/calculated)[c]	28/ 145.1	26/ 3.2	4/ 24.2	0/ 0.0	6/ 36.4	2/ 0.0	2/ 0.0	33/ 182.2	24/ 23.6	3/ 18.3	3/ 18.2	11/ 68.7	2/ 6.1	5/ 24.9	31/ 123.4	25/ 26.0	1/ 6.5	0/ 0.0	3/ 18.4	3/ 18.5	0/ *
Number of days national standard exceeded (measured/calculated[d])[c]	1/1.4	14/26.3	0/0.0	*/*	0/*	0/*	1/6.1	3/4.8	7/25.7	0/0.0	*/*	1/*	0/*	1/3.1	1/ 1.9	5/30.9	0/0.0	*/*	0/ *	0/*	0/0.0
State annual average (µg/m^3) (National/California)	54.8/ 48.5	114.9/ 14.5	24.8/ 25.6	*/ 8.8	27.5/ 28.1	24.1/ 16.2	18.0/ 4.6	59.7/ 55.9	60.0/ 21.9	23.6/ 24.1	*/ 13.3	32.9/ 33.4	23.8/ 15.7	22.4/ 18.8	*/ 46.5	*/ 22.6	*/ 20.3	*/ 9.3	*/ 26.4	*/ 23.6	*/ *

Sources: CARB 2009a; EPA 2009

Notes:
[a] The 8-hour national ozone standard was revised to 0.075 ppm in March 2008. Statistics shown are based on the previous 0.08 ppm standard. The 1-hour national ozone standard was revoked on June 15, 2005. Statistics for the 1-hour national ozone standard are shown for informational purposes.
[b] State and national statistics may differ for the following reasons: State statistics are based on California-approved samplers, whereas national statistics are based on samplers using federal reference or equivalent methods. State and national statistics may therefore be based on different samplers. State statistics are based on local conditions while national statistics are based on standard conditions. State criteria for ensuring that data are sufficiently complete for calculating valid annual averages are more stringent than the national criteria.
[c] Measured days are those days that an actual measurement was greater than the level of the State daily standard or the national daily standard. Measurements are typically collected every 6 days. Calculated days are the estimated number of days that a measurement would have been greater than the level of the standard had measurements been collected every day. The number of days above the standard is not necessarily the number of violations of the standard for the year.
[d] The national $PM_{2.5}$ 24-hour standard was revised from 65 µg/m^3 to 35µg/m^3 in 2006. Statistics shown are based on the 65 µg/m^3 standard.

Key:
µg/m^3 = micrograms per cubic meter
GBVAB = Great Basin Valleys Air Basin
LCAB = Lake County Air Basin
MCAB = Mountain Counties Air Basin
NPAB = Northeast Plateau Air Basin
ppm = parts per million
SFBAAB = San Francisco Bay Area Air Basin
SJVAB = San Joaquin Valley Air Basin
SPA = systemwide planning area
SVAB = Sacramento Valley Air Basin

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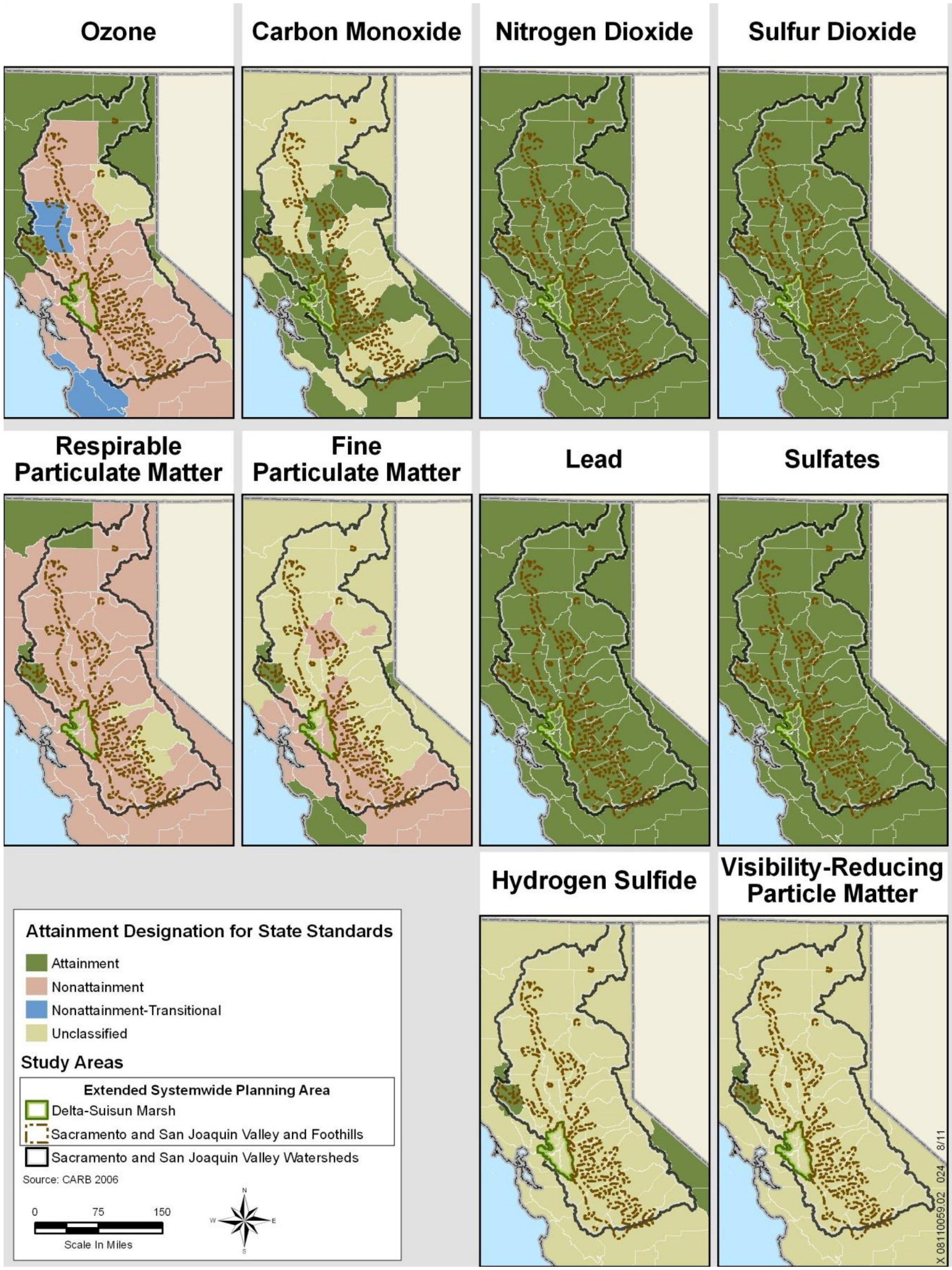

Figure 3.4-2. Attainment Designations for Air Basins in the Extended SPA and Sacramento and San Joaquin Valley Watersheds—State Standards

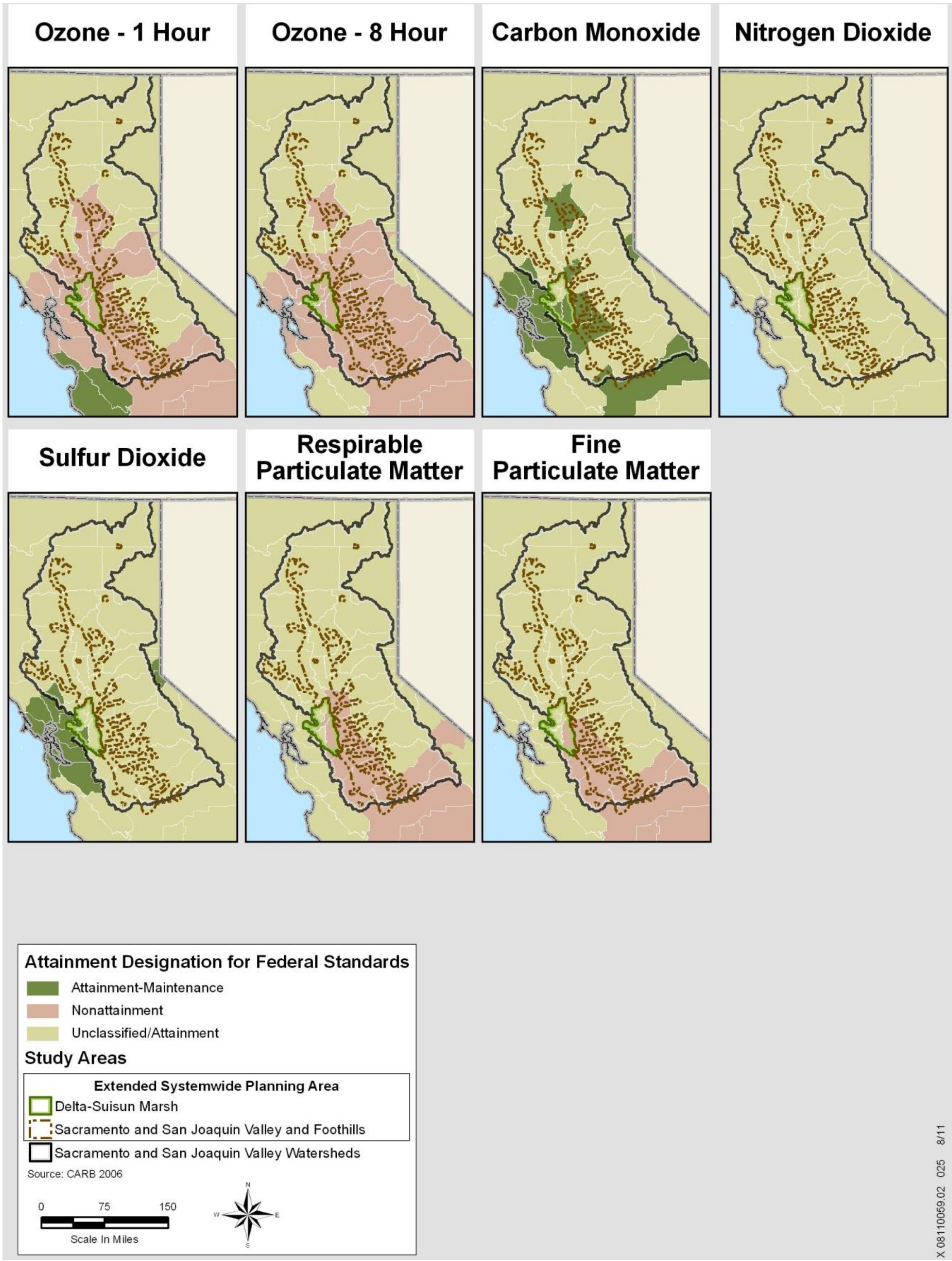

Figure 3.4-3. Attainment Designations for Air Basins in the Extended SPA and Sacramento and San Joaquin Valley Watersheds—Federal Standards

Emissions Sources With respect to emissions of criteria air pollutants within the air basins of the Sacramento and San Joaquin Valley watersheds (including the Extended SPA), mobile sources such as on-road motor vehicles are the largest contributor to estimated annual average levels of CO and NO_X. Mobile sources account for approximately 70 percent and 84 percent of total CO and PM_{10} emissions, respectively, in the air basins of the Sacramento and San Joaquin Valley watersheds (including the Extended SPA). Areawide sources (e.g., solvent evaporation from consumer products, miscellaneous processes such as farming operations) account for approximately 33 percent, 87 percent, and 73 percent of the total ROG, PM_{10}, and $PM_{2.5}$ emissions, respectively (Figure 3.4-4) (CARB 2008).

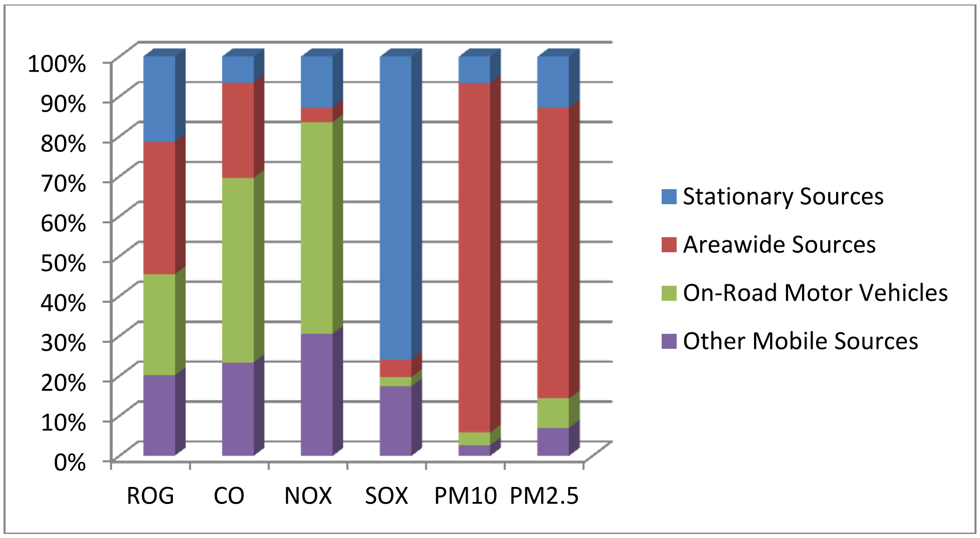

Figure 3.4-4. Criteria Pollutants by Emission Source for Air Basins in the Extended SPA and Sacramento and San Joaquin Valley Watersheds

Toxic Air Contaminants

Concentrations of TACs, or in federal parlance, hazardous air pollutants (HAPs), are also used to indicate the quality of ambient air. A TAC is defined as an air pollutant that may cause or contribute to an increase in mortality or in serious illness, or that may pose a hazard to human health. TACs are usually present in minute quantities in the ambient air; however, their high toxicity or health risk may pose a threat to public health even at low concentrations.

According to the *California Almanac of Emissions and Air Quality*, most of the estimated health risks from TACs can be attributed to relatively few compounds, the most important being particulate matter from diesel-fueled engines (diesel PM). Diesel PM differs from other TACs in that it is not a single substance, but rather a complex mixture of gases, vapors, and particles, many of which are known human carcinogens. Most researchers believe that diesel exhaust particles contribute most of the risk because the particles in the exhaust carry many harmful organics and metals. Unlike the other TACs, no ambient monitoring data are available for diesel PM because no routine measurement method currently exists. However, CARB has made preliminary concentration estimates based on a PM exposure method. This method uses the CARB emissions inventory's PM_{10} database, ambient PM_{10} monitoring data, and the results from several studies to estimate concentrations of diesel PM. In addition to diesel PM, the TACs for which data are available that pose the greatest existing ambient risk in California are benzene, 1,3-butadiene, acetaldehyde, carbon tetrachloride, hexavalent chromium, para-dichlorobenzene, formaldehyde, methylene chloride, and perchloroethylene (CARB 2009b:5-2).

Diesel PM poses the greatest health risk among the 10 TACs mentioned. CARB estimates that 79 percent of the statewide cancer risk from outdoor air toxics is attributable to diesel PM. Based on receptor modeling techniques, CARB's 2009 air quality almanac estimated health risks associated with diesel PM in the major air basins to be 360 excess cancer cases per million people in the SVAB, 480 excess cancer cases per million people in the SFBAAB, and 390 excess cancer cases per million people in the SJVAB in the year 2000 (CARB 2009b:5-60, 5-67, 5-83). Since 1990, the health risk associated with diesel PM has been reduced by 52 percent. Overall, levels of most TACs, except para-dichlorobenzene and formaldehyde, have decreased since 1990 (CARB 2009b:5-6 through 5-45).

Naturally Occurring Asbestos

Naturally occurring asbestos (NOA), which was identified as a TAC by CARB in 1986, is located in many parts of California and is commonly associated with ultramafic rocks (Clinkenbeard et al. 2002). Asbestos is the common name for a group of naturally occurring fibrous silicate minerals that can separate into thin but strong and durable fibers. Ultramafic rocks form in high-temperature environments well below the surface of the earth. By the time they are exposed at the surface by geologic uplift and erosion, ultramafic rocks may be partially to completely altered into a type of metamorphic rock called serpentinite. Sometimes the metamorphic conditions are right for the formation of chrysotile asbestos or tremolite-actinolite asbestos in the bodies of these rocks or along their boundaries (Churchill and Hill 2000).

For individuals living in areas of NOA, there are many potential pathways for airborne exposure. Exposures to soil dust containing asbestos can occur under a variety of scenarios: children playing in the dirt, dust rising from unpaved roads and driveways covered with crushed serpentine, grading and ground disturbance associated with construction activity, rock blasting, quarrying, gardening, and other human activities. For homes built on asbestos outcroppings, asbestos can be tracked into the home and can also enter as fibers suspended in outdoor air. Once such fibers are indoors, they can be entrained into the air by normal household activities, such as vacuuming (many respirable fibers will simply pass through vacuum cleaner bags).

People exposed to low levels of asbestos may be at elevated risk (e.g., above background rates) of lung cancer and mesothelioma. The risk is proportional to the cumulative inhaled dose (quantity of fibers), and also increases with the time since first exposure. Although several factors influence the disease-causing potency of any given asbestos, such as fiber length and width, fiber type, and fiber chemistry, all forms are carcinogens.

At the request of the Sacramento Metropolitan Air Quality Management District, the California Geological Survey (formerly known as the California Division of Mines and Geology) prepared a report titled *Relative Likelihood for the Presence of Naturally Occurring Asbestos in Eastern Sacramento County, California* (Higgins and Clinkenbeard 2006). Portions of the study area contain “areas moderately likely to contain NOA” (i.e., areas containing ultramafic rock) (Figure 3.4-5); however, NOA areas occur mostly in the upper watersheds near reservoirs and rarely on the valley floor. Although geologic conditions are more likely for asbestos formation in particular areas, the presence of NOA is not certain in a particular area until confirmed by testing.

Odors

Odors are generally regarded as an annoyance rather than a health hazard. However, manifestations of a person’s reaction to foul odors can range from psychological (e.g., irritation, anger, anxiety) to physiological (e.g., circulatory and respiratory effects, nausea, vomiting, headache).

The ability to detect odors varies considerably among the population and overall is quite subjective. Some individuals have the ability to smell minute quantities of specific substances; others may not have the same sensitivity but may have sensitivities to odors of other substances. In addition, people may have different reactions to the same odor; an odor that is offensive to one person may be perfectly acceptable to another. It is important to also note that an unfamiliar odor is more easily detected and is more likely to cause complaints than a familiar one. This is because of the phenomenon known as odor fatigue, in which a person can become desensitized to almost any odor and recognition only occurs with an alteration in the intensity.

Figure 3.4-5. Areas More Likely to Contain Naturally Occurring Asbestos in the Extended SPA and Sacramento and San Joaquin Valley Watersheds

Quality and intensity are two properties present in any odor. The quality of an odor indicates the nature of the smell experience. For instance, if a person describes an odor as flowery or sweet, the person is describing the quality of the odor. Intensity refers to the strength of the odor. For example, a person may use the word "strong" to describe the intensity of an odor. Odor intensity depends on the odorant concentration in the air. When an odorous sample is progressively diluted, the odorant concentration decreases. As this occurs, the odor intensity weakens and eventually becomes so low that the detection or recognition of the odor is quite difficult. At some point during dilution, the concentration of the odorant reaches a detection threshold. An odorant concentration below the detection threshold means that the concentration in the air is not detectable by the average human.

Sensitive Receptors

Sensitive receptors are those people who are most vulnerable to the adverse effects of air pollutants, particularly children, the elderly, and people with health problems. Sensitive land uses are those places where sensitive receptors may be concentrated, and consist of residences, schools, playgrounds, medical facilities/hospitals, and nursing homes in the study area.

3.4.2 Regulatory Setting

The following text summarizes federal, State, and regional and local laws and regulations pertinent to evaluation of the proposed program's impacts on air quality. As described previously, the study area is located in multiple air basins. Air quality in the study area is regulated by EPA, CARB, and multiple air districts. These regulatory agencies develop rules, regulations, policies, and/or goals to comply with applicable legislation and to maintain and attain the NAAQS and CAAQS.

Federal

Criteria Air Pollutants EPA has been charged with implementing federal air quality programs. EPA's air quality mandates are drawn primarily from the federal Clean Air Act (CAA), which was enacted in 1970. The most recent major amendments were made by Congress in 1990.

The CAA required EPA to establish NAAQS. EPA has established primary and secondary NAAQS for ozone, CO, NO_2, SO_2, PM_{10}, $PM_{2.5}$, and lead. The primary standards protect the public health and the secondary standards protect public welfare. These standards are listed above in Table 3.4-2.

The CAA also required each state to prepare an air quality control plan referred to as a state implementation plan (SIP). The federal Clean Air Act

Amendments of 1990 (CAAA) added requirements for states with nonattainment areas to revise their SIPs to incorporate additional control measures to reduce air pollution. The SIP is modified periodically to reflect the latest emissions inventories, planning documents, and applicable rules and regulations. The SIP accounts for future development and emission-generating activities to include the appropriate level of reduction measures and strategies to achieve ambient air quality standards. For example, the SIP includes an emissions budget for various source types. If construction-related or operational activities and their associated emissions were to exceed what was planned for in the SIP, those activities or projects would conflict with or impede implementation of the SIP. However, if a plan or project was accounted for while the SIP was developed, its emissions would not conflict with the SIP because its emission levels would be less than those projected in the SIP.

EPA must review all SIPs to determine whether they conform to the mandates of the CAA and CAAA and whether SIP implementation will achieve air quality goals. If EPA determines that a SIP is inadequate, a federal implementation plan that imposes additional control measures may be prepared for the nonattainment area. Failure to submit an approvable SIP or to implement the plan within the mandated time frame may cause sanctions to be applied to transportation funding and stationary air pollution sources in the air basin.

CARB and local air pollution control districts are developing plans for meeting the most recent NAAQS for ozone and $PM_{2.5}$. On September 27, 2007, CARB adopted its State Strategy for the 2007 SIP. The State Strategy consists of the April 26, 2007, draft strategy and several changes that were made as CARB staff proceeded through the public comment and CARB adoption process. California's adopted 2007 State Strategy was submitted to EPA as a revision to the SIP in November 2007 (CARB 2011a).

On April 23, 2009, CARB adopted a staff proposal to consider a revision to the SIP reflecting implementation of the 2007 State Strategy. EPA requested this revision to aid its approval of the SIP. The proposed revision accounts for emission reductions from the regulations adopted in 2007 and 2008, clarifies CARB's legal commitments in light of EPA's approval criteria, and clarifies the discussion of the long-term strategy for identifying future technologies to achieve the last increment of reductions. The proposed revision does not change the emission reductions of NO_X, ROG, oxides of sulfur (SO_X), and direct $PM_{2.5}$ that CARB committed to achieve by specific years when it adopted the 2007 State Strategy. The proposed revision also includes a commitment to reduce emissions in the Sacramento area, which had not been quantified at the time the 2007 State Strategy was adopted.

In April 2011, CARB submitted a progress report and revisions for the State's $PM_{2.5}$ SIP. The revisions are specifically focused on the South Coast and San Joaquin Valley air basins' rulemaking calendars, transportation conformity budgets, and reasonable further progress tables and associated reductions for contingency purposes. At the same time, CARB also approved submittal of revisions to the $PM_{2.5}$ and ozone SIP for the South Coast Air Basin and Coachella Valley, which were adopted by the South Coast Air Quality Management District (CARB 2011b).

Toxic Air Contaminants EPA has programs for identifying and regulating TACs, or in federal parlance, HAPs. Title III of the CAAA of 1990 directed EPA to issue national emissions standards for HAPs (NESHAPs). The NESHAPs for major sources of HAPs may differ from those for area sources. Major sources are defined as stationary sources with potential to emit more than 10 tons per year (tpy) of any HAP or more than 25 tpy of any combination of HAPs; all other sources are considered area sources.

The CAAA also required EPA to issue vehicle or fuel standards containing reasonable requirements that control toxic emissions, at a minimum addressing benzene and formaldehyde. Performance criteria were established to limit mobile-source emissions of toxics, including benzene, formaldehyde, and 1,3-butadiene. In addition, Section 219 of the CAAA required the use of reformulated gasoline in selected areas with the most severe ozone nonattainment conditions to further reduce mobile-source emissions.

Odors Odors are typically considered a local air quality problem. EPA has not established regulations that deal with the generation of odors. However, local air districts have developed rules that apply to and regulate the generation of odors. As shown in Table 3.4-4 (see the discussion of regional and local regulations below), certain air districts enforces rules that specifically pertain to odors.

State

Criteria Air Pollutants CARB is responsible for coordinating and overseeing State and local air pollution control programs in California and for implementing the California Clean Air Act (CCAA). The CCAA, which was adopted in 1988, required CARB to establish CAAQS. CARB has established CAAQS for sulfates, hydrogen sulfide, vinyl chloride, visibility-reducing particulate matter, and the above-mentioned criteria air pollutants. These standards are listed above in Table 3.4-2. In most cases, the CAAQS are more stringent than the NAAQS. Differences in the standards are generally explained by health effects studies considered during the standard-setting process and interpretation of the studies. In addition, the CAAQS incorporate a margin of safety to protect sensitive individuals.

Toxic Air Contaminants TACs in California are regulated primarily through the Tanner Air Toxics Act (Assembly Bill (AB) 1807; Chapter 1047, Statutes of 1983, Health and Safety Code Sections 39650–39674) and the Air Toxics "Hot Spots" Information and Assessment Act of 1987 (AB 2588; Chapter 1252, Statutes of 1987, Health and Safety Code Section 44300 et seq., as amended). AB 1807 sets forth a formal procedure for CARB to designate substances as TACs. Research, public participation, and scientific peer review must occur before CARB can designate a substance as a TAC.

To date, CARB has identified more than 21 TACs and adopted EPA's list of HAPs as TACs. Most recently, diesel PM was added to the CARB list of TACs. CARB published the *Air Quality and Land Use Handbook: A Community Health Perspective*, which provides guidance regarding land use compatibility with TAC sources (CARB 2005). The handbook's contents are not law or adopted policy. The handbook offers recommendations for siting sensitive receptors near uses associated with TACs, such as freeways and high-traffic roads, commercial distribution centers, rail yards, ports, refineries, dry cleaners, gasoline stations, and industrial facilities.

With implementation of CARB's Diesel Risk Reduction Plan (2000), it is expected that diesel PM concentrations will be reduced by 75 percent in 2010 and 85 percent in 2020 from the estimated year-2000 level. The Diesel Risk Reduction Plan is a comprehensive plan to reduce diesel PM emissions, and consists of three major components:

- New regulatory standards for all new on-road, off-road, and stationary diesel-fueled engines and vehicles, to reduce diesel PM emissions by about 90 percent overall from current levels

- New retrofit requirements for existing on-road, off-road, and stationary diesel-fueled engines and vehicles, where determined to be technically feasible and cost effective

- New Phase 2 diesel fuel regulations to reduce sulfur content levels in diesel fuel to no more than 15 parts per million, to provide the quality of diesel fuel needed by the advanced diesel PM emission controls

Odors As discussed above, odors are considered to be a local problem. The regional and local regulatory framework for odors is listed below in Table 3.4-4.

Regional and Local

Elements of the proposed program could be subject to local air district rules and regulations in effect at the time of construction and operation. The air pollution control districts and air quality management districts in the Extended SPA and Sacramento and San Joaquin Valley watersheds, along with standards and rules for each district that could be applicable to the proposed program, are listed in Table 3.4-4. In addition, many of the air districts in the Extended SPA and Sacramento and San Joaquin Valley watersheds have developed CEQA guidelines for project-level analyses. The three largest air districts in the Extended SPA are the Bay Area Air Quality Management District, Sacramento Metropolitan Air Quality Management District, and SJVAPCD, which all have developed CEQA guidelines for evaluating air quality impacts within their jurisdictions (BAAQMD 2010; SMAQMD 2009; SJVAPCD 2002). The areas listed in Table 3.4-4 represent regions where CVFPP components potentially could occur and the rules and regulations would apply.

Should a place-based project be defined and pursued as part of the proposed program, and should the CEQA lead agency be subject to the authority of local jurisdictions, the applicable county and city policies and ordinances would be addressed in a project-level CEQA document, as necessary.

Table 3.4-4. Air Districts in the Extended SPA and Sacramento and San Joaquin Valley Watersheds and Standards Potentially Applicable to the Proposed Program

Air District	Applicable Standards
Sacramento and San Joaquin Valley and Foothills/ Sacramento and San Joaquin Valley Watersheds	
Amador County Air Pollution Control District	Regulation II (Prohibitions) Regulation IV (Authority to Construct) Regulation V (Permit to Operate) Regulation IX (Non-vehicular Airborne Toxic Control Measures)
Butte County Air Quality Management District	Regulation II (Prohibitions) Regulation IV (Permits) Regulation X (Air Toxic Contaminants)

Table 3.4-4. Air Districts in the Extended SPA and Sacramento and San Joaquin Valley Watersheds and Standards Potentially Applicable to the Proposed Program (contd.)

Air District	Applicable Standards
Calaveras County Air Pollution Control District	Regulation II (Prohibitions) Regulation IV (Authority to Construct) Regulation V (Permit to Operate) Regulation IX (Air Toxics Control Measure)
Colusa County Air Pollution Control District	Regulation I (General Provisions) Regulation II (Prohibitions) Regulation III (Permits)
El Dorado County Air Quality Management District	Regulation II (Prohibitions) Regulation V (Permit to Operate) Regulation IX (Air Toxic Control Measure), Rule 223-2: Fugitive Dust—Asbestos Hazard Mitigation
Feather River Air Quality Management District	Regulation I (General Provisions) Regulation III (Prohibition—Stationary Emission Sources) Regulation IV (Stationary Emission Sources Permit System and Registration) Regulation XI (Air Toxic Control Measures)
Glenn County Air Pollution Control District	Article I (General Provisions) Article III (Construction Authorization and Registration) Article IV (Prohibitions)
Lake County Air Quality Management District	Chapter I (General Provisions) Chapter II, Article I (Visible Emissions) Chapter II, Article II (Particulate Matter Emission Standards) Chapter II, Article IV (Other Emissions or Contaminants) Chapter III (Maintenance) Chapter IV (Permits)
Mariposa County Air Pollution Control District	Regulation II (Prohibitions) Regulation IV (Authority to Construct) Regulation V (Permit to Operate) Regulation IX (Non-vehicular Airborne Toxic Control Measures)
Northern Sierra Air Quality Management District	Regulation I (General Provisions) Regulation II (Prohibitions) Regulation IV (Authority to Construct) Regulation V (Permit to Operate) Regulation IX (Toxic Air Contaminants)

Table 3.4-4. Air Districts in the Extended SPA and Sacramento and San Joaquin Valley Watersheds and Standards Potentially Applicable to the Proposed Program (contd.)

Air District	Applicable Standards
Placer County Air Pollution Control District	Regulation 1 (General Provisions) Regulation 2 (Prohibitions) Regulation 4 (Miscellaneous Provisions) Regulation 5 (Permits) Regulation 9 (Toxic Air Contaminants)
Sacramento Metropolitan Air Quality Management District	Regulation 1 (General) Regulation 2 (Permits) Regulation 4 (Prohibitory Rules) Regulation 8 (New Source Performance Standards) Regulation 9 (National Emission Standards for Hazardous Air Pollutants) Regulation 10 (Mobile Sources)
San Joaquin Valley Air Pollution Control District	Regulation I (General Provisions) Regulation II (Permits) Regulation IV (Prohibitions) Regulation VII (Toxic Air Pollutants) Regulation VIII (Fugitive PM_{10} Prohibition) Regulation IX (Mobile and Indirect Sources), Rule 902: Asbestos
Shasta County Air Quality Management District	Rule II (Permits) Rule III (Prohibitions and Enforcement)
Tehama County Air Pollution Control District	Regulation I (General Provision) Regulation II (Permit and Registration) Regulation IV (Provisions)
Tuolumne County Air Pollution Control District	Regulation II (Prohibitions) Regulation IV (Authority to Construct) Regulation V (Permit to Operate) Regulation IX (Non-vehicular Airborne Toxic Control Measures)
Yolo-Solano Air Quality Management District	Rule 2-5 (Nuisance) Rule 2-9 (Open Burning) Rule 2-11 (Particulate Matter) Rule 2-14 (Architectural Coatings) Rule 2-28 (Cutback and Emulsified Asphalt) Rule 2-40 (Wood Burning Appliances) Rule 3-1 (General Permit Requirements) Rule 9-9 (Asbestos)

Table 3.4-4. Air Districts in the Extended SPA and Sacramento and San Joaquin Valley Watersheds and Standards Potentially Applicable to the Proposed Program (contd.)

Air District	Applicable Standards
Delta and Suisun Marsh/Sacramento and San Joaquin Valley Watersheds	
Bay Area Air Quality Management District	Bay Area Air Quality Management District
Sacramento and San Joaquin Valley Watersheds	
Great Basin Unified Air Pollution Control District	Regulation II (General Provisions) Regulation II (Permits) Regulation IV (Prohibitions) Regulation IX (New Source Performance Standards) Regulation X (Emission Standards for Hazardous Air Pollutants) Regulation XII (Transportation Conformity) Regulation XIII (General Conformity)
Lassen County Air Pollution Control District	Regulation I (General Provision) Regulation II (Permits) Regulation IV (Prohibitions) Regulation VI (New Source Siting)
Modoc County Air Pollution Control District	Regulation I (General Provision) Regulation II (Permit System) Regulation IV (Prohibitions) Regulation VI (New Source Siting) Regulation VIII (Airborne Toxic Control Measures)
Siskiyou County Air Pollution Control District	Regulation I (General Provisions) Regulation II (Permit System) Regulation IV (Prohibitions) Regulation VI (New Source Siting) Regulation VIII (Airborne Toxic Control Measures)

Source: Data compiled by AECOM in 2010

3.4.3 Analysis Methodology and Thresholds of Significance

This section provides a program-level evaluation of the direct and indirect effects on air quality of implementing management actions included in the proposed program. These proposed management actions are expressed as NTMAs and LTMAs. The methods used to assess how different categories of NTMAs and LTMAs could affect air quality are summarized in "Analysis Methodology"; thresholds for evaluating the significance of potential impacts are listed in "Thresholds of Significance." Potential effects related to each significance threshold are discussed in Section 3.4.4, "Environmental Impacts and Mitigation Measures for NTMAs," and Section 3.4.5, "Environmental Impacts, Mitigation Measures, and Mitigation Strategies for LTMAs."

Analysis Methodology

Impact evaluations were based on a review of the management actions proposed under the CVFPP, expressed as NTMAs and LTMAs, to determine whether these actions could potentially result in air quality impacts. NTMAs and LTMAs are described in more detail in Section 2.4, "Proposed Management Activities." The overall approach to analyzing the impacts of NTMAs and LTMAs and providing mitigation is summarized below and described in detail in Section 3.1, "Approach to Environmental Analysis"; analysis methodology specific to air quality is described below. NTMAs can consist of any of the following types of activities:

- Improvement, remediation, repair, reconstruction, and operation and maintenance of existing facilities
- Construction, operation, and maintenance of small setback levees
- Purchase of easements and/or other interests in land
- Operational criteria changes to existing reservoirs that stay within existing storage allocations
- Implementation of the vegetation management strategy included in the CVFPP
- Initiation of conservation elements included in the proposed program
- Implementation of various changes to DWR and Statewide policies that could result in alteration of the physical environment

All other types of CVFPP activities fall within the LTMA category. NTMAs are evaluated using a typical "impact/mitigation" approach. Where impact descriptions and mitigation measures identified for NTMAs also apply to LTMAs, they are also attributed to the LTMAs, with modifications or expansions as needed.

Implementation of the proposed program would result in construction-related, operational, and maintenance-related impacts on air quality. This analysis evaluates emissions associated with construction and operations/maintenance that could result in violations of air quality standards; contribute substantially to an existing or projected air quality violation; or affect sensitive receptors, which are described in Section

3.4.1, "Environmental Setting." The impact analysis presented in this PEIR is primarily qualitative because the timing, duration, and geographic location of the proposed actions are unknown at the time of this writing. It is anticipated that, as needed, individual components of the proposed program would undergo future project-level environmental review that would quantitatively evaluate their air quality impacts relative to the applicable thresholds of significance. Therefore, this analysis focuses on the total actions of the program to determine whether they could result in significant air quality impacts.

Implementing the NTMAs and LTMAs would involve construction and operational activities that could result in local and regional air quality impacts. (Proposed construction activities would include activities such as demolition and earth moving; operational activities would include activities such as maintenance, water pumping, and environmental conservation commitments.) Construction emissions typically cease after the project is completed. Nevertheless, these temporary emissions—especially emissions of criteria air pollutants (e.g., PM_{10} and $PM_{2.5}$), ozone precursors (i.e., ROG and NO_X), TACs, and odors—still have the potential to cause a significant air quality impact. Conversely, operational activities and associated emissions would occur for the lifetime of the project.

Under the proposed program, most of the potential for direct air quality impacts would be associated with construction activities. Some direct impacts could also result from operational activities such as occasional testing and use of backup generators. Other direct operational impacts on air quality could result from fossil fuel combustion for building heating (i.e., natural gas combustion for water and space heating), landscaping, and other maintenance activities involving vehicle trips or use of nonelectrical equipment.

Indirect operational impacts on air quality are not typically evaluated in CEQA analyses. For example, most development indirectly results in emissions at power plants because the development uses electricity produced at those plants. However, emissions from the power plant are evaluated in the CEQA analysis of that facility and are not then assessed again for each project that uses electricity generated by the plant. With the proposed program, however, it could be reasonable to consider the indirect effects on emissions if the program were to reduce generation of hydroelectric power, resulting in greater use of nonrenewable energy sources to meet existing electricity demands. However, as described in Section 2.6, "No Near- or Long-Term Reduction in Water or Renewable Electricity Deliveries," the proposed program would not have a significant impact on production of hydroelectric power, and could result in a net overall increase in such power production. Therefore, potential effects related to hydroelectric production and air quality are not evaluated further.

Additionally, if the proposed program were not implemented (i.e., under "no-project" conditions), more frequent or severe flooding could occur because new flood protection improvements included in the proposed program would not be in place. If additional flood events were to occur, the associated emissions of criteria air pollutants, TACs, and odors in a given airshed or air district could be substantial. For example, direct emissions of air pollutants and odors would result from emergency response, repair, and recovery and reconstruction of entire communities.

Short-term construction-generated emissions were not quantified specifically for activities included in the proposed program, but were evaluated by comparing a proposed action to a comparable construction project where CEQA analysis had already been completed. Emissions calculated for these comparison projects were used to indicate the magnitude of emissions that might result from the proposed program. The purpose of this approach is to disclose potential impacts and identify the rough magnitude of the impacts.

Long-term operational emissions were evaluated using the same approach as that used for short-term construction-generated emissions.

The exact locations of the proposed program actions were not known at the time of this writing. Therefore, air quality impacts were compared with the thresholds for the various air districts where the comparison projects were implemented or in locations where the proposed actions would most likely occur.

Thresholds of Significance

The following applicable thresholds of significance have been used to determine whether implementing the proposed program would result in a significant air quality impact. These thresholds of significance are based on Appendix G of the CEQA Guidelines, as amended, and standards adopted by the applicable air districts. An impact on air quality is considered significant if implementation of the proposed program would do any of the following when compared against existing conditions:

- Conflict with or obstruct implementation of the applicable air quality plan

- Violate any air quality standard (e.g., NAAQS or CAAQS) or contribute substantially to an existing or projected air quality violation

- Result in a cumulatively considerable net increase of any criteria pollutant for which the project region is nonattainment under an applicable federal or State ambient air quality standard (including releasing emissions which exceed quantitative thresholds for ozone precursors)

- Expose sensitive receptors to substantial pollutant concentrations

- Create objectionable odors affecting a substantial number of people

As stated in Appendix G, the significance criteria established by the applicable air quality management or air pollution control districts may be relied on to make the impact determinations for specific program elements. Therefore, implementing the proposed program would also cause a significant air quality impact if it would do the following:

- Exceed or be inconsistent with any applicable air district thresholds of significance

Air districts establish districtwide thresholds to help achieve and/or maintain CAAQS and NAAQS within their jurisdictions. Thus, implementing the program elements could result in significant air quality impacts if these thresholds were to be exceeded.

3.4.4 Environmental Impacts and Mitigation Measures for NTMAs

This section describes the physical effects of NTMAs on air quality. For each impact discussion, the environmental effect is determined to be either less than significant, significant, potentially significant, or beneficial compared to existing conditions and relative to the thresholds of significance described above. These significance categories are described in more detail in Section 3.1, "Approach to Environmental Analysis." Feasible mitigation measures are identified to address any significant or potentially significant impacts. Actual implementation, monitoring, and reporting of the PEIR mitigation measures would be the responsibility of the project proponent for each site-specific project. For those projects not undertaken by, or otherwise subject to the jurisdiction of, DWR or the Board, the project proponent generally can and should implement all applicable and appropriate mitigation measures. The project proponent is the entity with primary responsibility for implementing specific future projects and may include DWR; the Board; reclamation districts; local flood control agencies; and other federal, State, or local agencies. Because various agencies may ultimately be responsible for implementing (or ensuring implementation of) mitigation measures identified in this PEIR, the text describing mitigation measures below does not refer directly to

DWR but instead refers to the "project proponent." This term is used to represent all potential future entities responsible for implementing, or ensuring implementation of, mitigation measures.

Impact AQ-1 (NTMA): ***Construction-Related Emissions of Criteria Air Pollutants and Ozone Precursors Resulting from Conveyance and Other NTMA Components that Could Exceed Local CEQA Thresholds of Significance***

Implementing the proposed NTMAs would result in construction-related emissions of criteria air pollutants and ozone precursors. However, an intended benefit of the proposed program is flood prevention; thus, if the program were implemented, emissions of criteria pollutants associated with emergency response, excavation, and recovery/repair/reconstruction of flooded communities would be avoided. The projected construction-related emissions of criteria pollutants and regional precursors are discussed below, with several other projects of similar scale used as examples to analyze the effects of conveyance management activities on emissions. This discussion is followed by an analysis of emissions that would be avoided as a result of flood prevention, as well as a summary of conveyance management activities proposed under NTMAs. Finally, the overall significance conclusion for this impact is presented.

Construction Emissions

Construction under the proposed NTMAs would result in temporary emissions of ROG, NO_X, CO, SO_X, PM_{10}, and $PM_{2.5}$. Emissions would be generated by the use of construction equipment, on-site generators, material haul trucks, and construction worker vehicles, and by ground-disturbing activities. These emissions would occur intermittently and at varying intensities depending on the daily construction activities. However, if sufficient activity were to occur during a particular period, emissions of criteria air pollutants and precursors could potentially exceed the thresholds of significance established by the applicable air districts. If emissions were to exceed what was planned for in a SIP, those activities or projects could conflict with or impede implementation of the SIP. However, if a plan or project was accounted for while the SIP was developed, its emissions would not conflict with the SIP because its emission levels would be less than those projected in the SIP.

Emissions of fugitive PM dust would be generated by ground-disturbing construction activities, and exhaust emissions would be generated by fuel combustion for on- and off-road construction equipment and vehicles (e.g., bulldozers, excavators, haul trucks, and employee vehicles). Emissions of fugitive PM dust associated with ground disturbance would depend on factors such as the acres of land disturbed per day, type of disturbance activity, silt content, soil moisture, and wind speeds. Fugitive dust is identified as either PM_{10} or $PM_{2.5}$. Exhaust emissions (including exhaust PM emissions) would depend on factors such as vehicle and equipment types, hours of operation, and intensity of use (i.e., load factor). Specific project-level data for proposed ground-disturbing activities and construction equipment and vehicle requirements are unavailable at the time of this analysis. However, from considering other similar projects, it can be reasonably assumed that emissions generated during large earth-moving and restoration operations have the potential to exceed thresholds established by any applicable air district.

To support this assumption, estimates of emissions generated by construction actions like those anticipated for the proposed program were evaluated. Those estimates are presented below by NTMA type: conveyance activities and other management activities. Storage-related NTMAs, which primarily involve reservoir operations without construction activities, would not generate substantial construction emissions and are evaluated separately below in Impact AQ-2 (NTMA).

When impacts were identified for the example projects described below, applicable mitigation measures were prescribed. These measures are not specific to a particular air district, but are commonly implemented throughout California. In addition, for each of these projects, the project proponent did not dispose of excess materials generated during site preparation or other project activities (e.g., removed trees and other vegetation) by open burning. Emissions calculations reflect this approach. Such open burning is often prohibited by air quality management districts, and as indicated previously in Section 2.7.4, “Construction Activities,” this practice would not be implemented by CVFPP project proponents.

To put NTMA construction emissions into context, comparable example projects are presented for their potential to violate applicable air district thresholds of significance. It is understood that some of the proposed management activities would be greater or less than the example projects in intensity and size. However, the example projects provide a comparable conveyance management activity or other NTMA with quantified emissions modeling. Therefore, these example projects represent the potential of the proposed program to cause a significant construction-related impact on air quality.

Construction Emissions from Conveyance Management Activities

Near-term conveyance management activities are those related to in-place levee improvements or reconstruction and include the following activities:

- Raising levees by adding earthen material or by constructing floodwalls
- Strengthening levees to enhance their integrity by improving the embankment soil properties and geometry to resist slope and seepage failures
- Implementing bank protection and erosion repair projects
- Addressing seepage with seepage berms, stability berms, impermeable barrier curtains (slurry cutoff walls) in the levee and/or its foundation, and relief wells and toe drains
- Armoring the landside of the levees to improve levee resiliency during overtopping episodes
- Setting back small sections of levees

It is anticipated that conveyance-related construction activities could range from remediation of small portions of levees to relatively large-scale levee construction. The following example levee improvement and repair projects represent a range of comparable projects that would occur under conveyance management activities.

Example Project 1: Reclamation District 17 Levee Improvement Project The EIS/EIR analysis of the Reclamation District (RD) 17 Levee Improvement Project evaluated two potential construction scenarios—the minimum and maximum footprint—and construction emissions were evaluated for each (USACE and RD 17 2011). The annual construction emissions of NO_X associated with the minimum and maximum footprint alternatives are presented in Table 3.4-5 along with the operational thresholds of significance from SJVAPCD. Although the SJVAPCD has not officially established construction thresholds of significance, air quality analyses are recommended to use the operational thresholds of significance to evaluate annual construction emissions. The proposed program would include activities in the SJVAB and would therefore be under the jurisdiction of SJVAPCD. As shown in Table 3.4-5, NO_X emissions generated under both alternatives would exceed SJVAPCD's informal construction threshold of significance.

Table 3.4-5. Construction Emissions from Reclamation District 17 Levee Improvement Project and Applicable Thresholds of Significance

	ROG	NO_X	PM_{10}	$PM_{2.5}$
Minimum Footprint Alternative emissions (tons per year)	–	10.28	–	–
Maximum Footprint Alternative emissions (tons per year)	–	23.57	–	–
Applicable thresholds of significance (tons per year)[1]	10	10	15	–

Source: USACE 2011

Note:

[1] Thresholds shown are the SJVAPCD's operational thresholds of significance. These threshold have not been officially adopted as construction thresholds of significance. However, SJVAPCD informally recommends that environmental analyses use these thresholds to evaluate construction emissions.

Key:

NO_X = oxides of nitrogen

$PM_{2.5}$ = fine particulate matter with an aerodynamic resistance diameter of 2.5 micrometers or less

PM_{10} = respirable particulate matter with an aerodynamic diameter of 10 micrometers or less

ROG = reactive organic gases

Example Project 2: Feather River Levee Repair Project A recently completed levee improvement project is the Feather River Levee Repair Project. Three project alternatives were evaluated: levee repair and strengthening (Alternative 1), levee repair and strengthening with the addition of an additional setback levee (Alternative 2), and levee repair and strengthening with the addition of a smaller additional setback levee (Alternative 3) (TRLIA 2006). The emissions analysis focused on the first two alternatives because emissions from Alternative 3 would be similar to those from Alternative 2. Therefore, construction emissions are shown only for Feather River Levee Repair Project Alternative 1 and Alternative 2. Table 3.4-6 presents the daily level of emissions associated with Alternatives 1 and 2, along with the applicable thresholds of significance. The Feather River Levee Repair Project is located within the northern SVAB and under the jurisdiction of the Feather River Air Quality Management District (FRAQMD). FRAQMD's construction significance thresholds are 25 pounds per day for ROG and NO_X and 80 pounds per day for PM_{10}. As shown below, construction of Alternative 1 or Alternative 2 would generate daily emissions of ROG, NO_X, and PM_{10} that would exceed the established thresholds.

Table 3.4-6. Construction Emissions from Feather River Levee Repair Project and Applicable Thresholds of Significance

	ROG	NO_X	PM_{10}	$PM_{2.5}$
Alternative 1 emissions (pounds per day)	166	816	692	–
Alternative 2 emissions (pounds per day)	188	938	1,447	–
Applicable thresholds of significance (pounds per day)[1]	25	25	80	–

Source: TRLIA 2006

[1] Thresholds represent Feather River Air Quality Management District's daily construction thresholds of significance. Total annual emissions of ROG and NO_X should also not exceed 4.5 tons per year.

Key:
NO_X = oxides of nitrogen
$PM_{2.5}$ = fine particulate matter with an aerodynamic resistance diameter of 2.5 micrometers or less
PM_{10} = respirable particulate matter with an aerodynamic diameter of 10 micrometers or less
ROG = reactive organic gases

Emissions of Criteria Air Pollutants and Regional Precursors that Would Be Avoided as a Result of Flood Prevention

One of the major benefits of the proposed program is flood prevention. If the program were implemented, emissions of criteria air pollutants associated with emergency response, excavation, and recovery/repair/reconstruction of flooded communities would be avoided. In the near term, floods could potentially be avoided in the same air district (or multiple districts) in which NTMAs would be constructed under the proposed program. This analysis is most applicable to emissions of criteria pollutants and precursors of regional significance (ROG, NO_X, and $PM_{2.5}$). PM hotspots associated with construction dust would vary spatially; that is, NTMA construction would presumably occur in somewhat different areas than flood prevention. Violations of NAAQS or CAAQS for PM could result from implementing either NTMAs or flood recovery efforts in different areas of an air district. However, fewer exposures to PM dust would likely result from implementing NTMAs than the numerous exposures that could occur after a catastrophic flood, especially in an urban area.

To compare the emissions of criteria air pollutants under the proposed program with avoided emissions under "no-project" conditions, construction emissions associated with repairs after a catastrophic flood event were modeled for Sacramento County using URBEMIS. The modeling assumed a flood scenario where 5,000 homes would suffer 25 percent damage, which roughly equates to reconstruction of about 1,250 homes.

The assumption of 5,000 homes represents a levee failure in a moderately urbanized area. For example, a levee breach in the Three Rivers Levee

Improvement Authority's (TRLIA's) south Yuba County project area at a 100-year flood stage elevation was estimated to inundate approximately 4,000 homes. This is only a moderately developed area with extensive agricultural lands (9,500 acres) (USACE 2008). The RD 17 levee system protects approximately 10,670 residential units and substantial acreage of agricultural land (approximately 6,345 acres) (USACE 2011). Depending on the location of a levee failure and the water surface elevation at the time, a large number of these residential units could be inundated during a flood event. A flood event in a highly urbanized area, such as the Sacramento central city, could damage substantially more homes; however, for the flood-related emission scenario provided here, modeling of a moderate level of damage was desired rather than a worst-case scenario.

The assumption that the homes, on average, would experience 25 percent damage acknowledges the fact that different areas are exposed to different depths of floodwaters during a catastrophic flood event. Some homes and structures near the source of the floodwaters may be almost completely submerged and may be irreparable. In other areas, less than a foot of floodwaters may enter homes and repair costs could be relatively small compared to the total value of the residence. The actual average damage percentage experienced during a flood event is dependent on a variety of factors including topography in the flood area, whether homes are designed to be flood resistant (e.g., elevated), and the period of time that floodwaters are present. The 25 percent damage estimate was selected as a simple expression of the fact that partial damage to homes is more common during a flood event than total losses.

Emissions associated with emergency response, evacuation, and repairs to facilities and infrastructure other than homes were not estimated; however, construction-related emissions of criteria pollutants and ozone precursors were estimated, assuming that the flood damage scenario described above occurred in Sacramento County and that reconstruction occurred from 2015 to 2020. The results are summarized in Table 3.4-7. See Section 3.7.4, "Environmental Impacts and Mitigation Measures for NTMAs," in Section 3.7, "Climate Change and Greenhouse Gas Emissions," for further discussion of avoided greenhouse gas emissions associated with flood prevention.

Table 3.4-7. Construction-Related Emissions of Criteria Air Pollutants and Ozone Precursors Associated with Avoiding a 100-Year Flood in Sacramento County, 2015[1]

	ROG	NO_X	PM_{10}	$PM_{2.5}$
Construction emissions associated with reconstructing 1,250 homes (~5,000 homes suffering 25% damage) (pounds per day)[2]	89	81	1,182	249
Applicable SMAQMD thresholds of significance (pounds per day)[3]	–	85	–	–

Source: Data compiled by AECOM in 2011

Notes:

[1] See Section 3.7.4, "Environmental Impacts and Mitigation Measures for NTMAs," in Section 3.7, "Climate Change and Greenhouse Gas Emissions," for further discussion of avoided greenhouse gas emissions associated with flood prevention.

[2] Construction emissions represent those associated with rebuilding 1,250 homes in Sacramento County after a catastrophic flood. Maximum daily construction emissions were modeled for the year 2015 and are presented for illustrative purposes only. The exact locations of flood prevention, the number of homes with avoided damage, and the emissions of criteria air pollutants, toxic air contaminants, and odors associated with emergency response, evacuation, and reconstruction of facilities other than homes are unknown at the time of writing this PEIR.

[3] Thresholds represent the SMAQMD's construction threshold of significance.

Key:

NO_X = oxides of nitrogen

$PM_{2.5}$ = fine particulate matter with an aerodynamic resistance diameter of 2.5 micrometers or less

PM_{10} = respirable particulate matter with an aerodynamic diameter of 10 micrometers or less

ROG = reactive organic gases

SMAQMD = Sacramento Metropolitan Air Quality Management District

Emissions of criteria air pollutants and precursors avoided by flood prevention resulting from near-term levee repairs and improvements could not be fully estimated at the time of writing this PEIR. However, comparing Tables 3.4-5 through 3.4-7 shows that some of the emissions that could be avoided by implementing NTMAs could offset some of the construction emissions associated with the proposed program. This scenario could result if flood prevention were to occur in the same air district in which NTMAs were constructed and the avoided flood event were to occur relatively soon after construction emissions were generated.

Summary of Conveyance Management Activities

The three construction scenarios presented above identify different emission levels that could be expected when conducting similar activities as part of the conveyance management NTMAs. The proposed program could also involve components occurring in multiple air districts and could also be subject to multiple significance thresholds. The construction intensity and locations of construction (i.e., location determines applicable air district thresholds) for the example projects listed above are considered comparable to the intensity and locations anticipated under the proposed program. The example construction projects generated emissions that exceeded some of the applicable thresholds of significance. Furthermore, the projects listed above do not contain components that would require barges or marine vessels for implementation. By contrast, components of the conveyance-related NTMAs could require barges to move equipment, and barges can have greater emissions than trucks depending on distances traveled. Towboats that pull barges can range from a few hundred to 10,000 horsepower, which exceed the horsepower typically required for on-road truck hauling. Towboats have been estimated to generate approximately 0.18 kilograms of NO_X per gallon of fuel (kg/gal) versus heavy-heavy duty trucks at approximately 0.07 kg/gal (Corbett n.d.; CARB 2011c). In addition, towboats typically require further assistance such as rail or haul truck to move equipment to their final destination; therefore, barge and towboat emissions would not be the only emissions involved in their use. Therefore, construction emissions could be greater than those shown above.

The anticipated benefits of the conveyance-related NTMAs are related to avoiding floods. Construction emissions associated with conveyance-related NTMAs under the proposed program could be offset to a certain degree by avoiding flood damage and home repair/reconstruction. However, it cannot be determined when or whether flood avoidance resulting from NTMA implementation might occur relative to construction emissions, or whether flood avoidance benefits might occur in the same air district or air basin as construction emissions. Therefore, it cannot be assured that beneficial emissions offsets would have a direct nexus to construction emissions impacts.

Given these conditions, the air quality impacts of construction emissions generated by conveyance-related NTMAs would be potentially significant.

Construction Emissions from Other Management Activities

Other management activities include activities such as implementing the vegetation management strategy; integrating conservation strategies into all implementation actions to improve the overall sustainability of, and ecosystem benefits provided by, the flood management system; and implementing the urban level of flood protection in cities and counties.

Example Project: San Joaquin River Restoration Program An analysis was performed of construction-related activities associated with an example project, the San Joaquin River Restoration Program (SJRRP). This project was selected as an example because the SJRRP’s activities would be similar in nature and potential magnitude to those associated with the vegetation management strategy and the program’s goal to “integrate conservation strategies into all implementation actions to improve the overall sustainability of, and ecosystem benefits provided by, the flood management system.” The emissions estimates for the construction of SJRRP are shown in Table 3.4-8, along with the applicable (i.e., SJVAPCD) thresholds of significance.

Table 3.4-8. Construction Emissions from San Joaquin River Restoration Program (Example Project) and Applicable Thresholds of Significance

	ROG	NO_X	PM_{10}	$PM_{2.5}$
Construction emissions (tons per year)	5	40	1,314	–
Applicable thresholds of significance (tons per year)[1]	10	10	15	–

Source: Data compiled by AECOM in 2011
[1] Thresholds shown are the SJVAPCD's operational thresholds of significance. These threshold have not been officially adopted as construction thresholds of significance. However, SJVAPCD informally recommends that environmental analyses use these thresholds to evaluate construction emissions.
Key:
NO_X = oxides of nitrogen
$PM_{2.5}$ = fine particulate matter with an aerodynamic resistance diameter of 2.5 micrometers or less
PM_{10} = respirable particulate matter with an aerodynamic diameter of 10 micrometers or less
ROG = reactive organic gases

As shown in Table 3.4-8, construction-related activities of the SJRRP—which, again, are comparable to the projects that would be constructed under the proposed program—would generate emissions exceeding the applicable thresholds of significance (i.e., SJVAPCD thresholds). Therefore, it is assumed that the incremental air quality impacts of emissions generated by constructing "other" NTMAs under the proposed program could also exceed applicable thresholds, and thus would be potentially significant.

Conclusion

The levels of construction intensity, locations of construction activities, and duration of construction are unknown for the proposed conveyance and other management actions; therefore, the emissions associated with these actions cannot be accurately quantified or compared with a significance threshold at the time of this writing. As shown above in the discussions of various comparable construction projects, construction activities associated with these types of actions can result in one or more exceedences of applicable significance thresholds. In addition, because the proposed program's management activities would occur in some of the same air districts described above, it is possible that the proposed program's construction emissions could exceed applicable significance thresholds. Some quantity of NTMA construction emissions in the same air district could be offset by flood avoidance benefits, but this offset cannot be assured to have a nexus to the identified impacts either temporally or geographically. Therefore, the overall incremental impact relative to existing conditions would be **potentially significant**.

Mitigation Measure AQ-1 (NTMA): *Implement Measures to Reduce Construction-Related Emissions*

The following measures will be considered during project-level evaluation of specific management actions. Not all measures listed below may be applicable to each management action. Rather, these measures serve as an overlying mitigation framework to be used for specific management actions. The applicability of measures listed below would vary based on the lead agency, location, timing, and nature of each management action.

The mitigation measures described below are grouped according to whether they address construction in general, fugitive dust emissions, or exhaust emissions.

General Construction Mitigation

The following measures are designed to reduce all construction-related emissions:

- Comply with and implement applicable air district rules and regulations that pertain to construction activities (e.g., asphalt ROG requirements, administrative requirements, fugitive dust management practices). As applicable, implement construction-related requirements from air districts or local governments with authority over the project at the commencement of and during each construction activity.
- Do not use open burning to dispose of any excess materials generated during site preparation or other project activities.

Fugitive Dust Emissions

The following measures may be used to reduce fugitive dust emissions:

- Submit a dust control plan to the local air district, and obtain approval of the plan before the grading permit is issued. Implement the plan during construction. The dust control plan will specifically identify measures that would demonstrate that earth-moving activities in areas of the site would comply with applicable requirements of the local air district.
- Phase long-duration construction activities to reduce the size of the disturbed area at any given time.
- Water all exposed surfaces three times a day or sufficiently to prevent visible dust emissions from exceeding 20 percent opacity beyond the construction boundaries.

- Apply water, nontoxic chemical stabilizers, or dust suppressants or use tarps or other suitable material (e.g., vegetative ground cover) in all disturbed areas that will not be used for 10 days or more.
- Suspend excavation and grading activities when winds exceed 15 mph.
- Restrict the speed of construction vehicles to 15 mph on any unpaved surface.
- Prevent carryout and trackout of fugitive dust on construction vehicles. Methods to limit carryout and trackout include using wheel washers; sweeping any trackout on adjacent public streets at the end of each workday; and lining access points with gravel, mulch, or wood chips.
- Cover access roads within 100 feet of paved roads with a 6- to 12-inch layer of wood chips or mulch or a 6-inch layer of gravel to reduce the generation of road dust and road dust carryout onto public roads.
- Clean up carryout and trackout using any of the following methods:
  - Manually sweeping and picking up
  - Operating a rotary brush or broom accompanied or preceded by sufficient wetting to limit visible dust emissions to 20 percent opacity
  - Operating a PM_{10}-efficient street sweeper that has a pickup efficiency of at least 80 percent
  - Flushing with water if curbs or gutters are not present and if using water would not either result in a source of trackout material, result in adverse impacts on stormwater drainage systems, or violate any National Pollutant Discharge Elimination System permit program
- Cover or wet the filled cargo compartment of material transport trucks to limit visible dust emissions during transport, and maintain at least 2 feet of freeboard from the top of the container.
- Clean or cover the cargo compartment of empty material transport trucks before they leave the site.
- Install sandbags or other erosion control measures on sites with a slope greater than 1 percent to prevent runoff of silt to public roadways.
- Limit the number of areas subject to excavation, grading, and other ground-disturbing activities at any given time.

Exhaust Emissions

The following measures may be used to reduce exhaust emissions:

- Develop a comprehensive construction-activity management plan to minimize the amount of large construction equipment operating at any given time.
- Implement a shuttle service to and from retail services and food establishments during lunch hours, or employ a catering service to bring lunch to the project site.
- Use diesel-powered construction equipment that meets CARB's 1996 or newer certification standard for off-road heavy-duty diesel engines.
- Schedule construction truck trips during nonpeak traffic hours to reduce peak-hour emissions and traffic congestion to the extent feasible.
- Use alternative-fueled (e.g., compressed natural gas (CNG), liquefied natural gas (LNG), propane, biodiesel) or electricity-powered construction equipment, where feasible. Project-specific analysis should confirm that using any alternative fuel would not increase NO_X emissions.
- Install diesel oxidation catalysts, catalyzed diesel particulate filters, or other applicable air district–approved emission reduction retrofit devices where feasible.
- Use the newest equipment available to try to maintain a Tier 1 fleet equipment average.

The following measures from Mitigation Measure CLM-1a (NTMA) in Section 3.7, "Climate Change and Greenhouse Gas Emissions," could help to further reduce exhaust emissions of criteria air pollutants and ozone precursors:

- **BMP 6**—Minimize idling time by requiring that equipment be shut off after 5 minutes when not in use (as required by the State airborne toxics control measure (Title 13, Section 2485 of the California Code of Regulations)). Provide clear signage that posts this requirement for workers at the entrances to the site and provide a plan for the enforcement of this requirement.
- **BMP 7**—Maintain all construction equipment in proper working condition and perform all preventative maintenance. Required maintenance includes compliance with all manufacturer's

recommendations, proper upkeep and replacement of filters and mufflers, and maintenance of all engine and emissions systems in proper operating condition. Maintenance schedules shall be detailed in an air quality control plan prior to commencement of construction.

- **BMP 8**—Implement a tire inflation program on jobsite to ensure that equipment tires are correctly inflated. Check tire inflation when equipment arrives on-site and every 2 weeks for equipment that remains on-site. Check vehicles used for hauling materials off-site weekly for correct tire inflation. Procedures for the tire inflation program shall be documented in an air quality management plan prior to commencement of construction.

- **BMP 9**—Develop a project-specific ride share program to encourage carpools, shuttle vans, transit passes, and/or secure bicycle parking for construction worker commutes.

Implementing these mitigation measures would reduce the impact of emissions from construction activities. However, the extent to which emissions would be reduced is unknown, and uncertainty exists about proposed construction activities (e.g., duration, intensity, and location) and subsequent mitigation requirements. Therefore, it is not possible at the time of this writing to know whether the emissions associated with constructing management actions would be reduced below the established thresholds for all NTMAs. Consequently, until further project-level information on specific activities is available and project-level analysis is completed, Impact AQ-1 (NTMA) would be **potentially significant and unavoidable**. It should be noted that this conclusion would pertain to the larger NTMA projects and not all NTMA projects. It is likely that many smaller NTMA projects would generate air quality emissions below the applicable thresholds of significance and would be considered less than significant. Nevertheless, it is anticipated that larger NTMA projects would likely have air pollutant emissions exceeding local CEQA thresholds.

Impact AQ-2 (NTMA): ***Potential for Construction-Related Emissions of Criteria Air Pollutants and Ozone Precursors Resulting from Storage-Related NTMAs to Exceed Local CEQA Thresholds of Significance***

Proposed storage management activities would involve changing reservoir operations by altering the timing, magnitude, and frequency of releases to downstream channels. Storage-related NTMAs would focus on operation of the existing dams rather than on improvements to infrastructure. Operational changes to existing reservoirs are not anticipated to result in reduced hydropower production and associated indirect emissions of air pollutants. In addition, the weather-forecasting component is a research and development activity rather than an earth-moving or mechanical action. It is possible that some of the storage management activities would require additional vehicle trips to the dam control site; however, these emissions would be addressed in the operational emissions analysis. Therefore, it is not anticipated that storage management activities would result in construction emissions that would exceed any applicable threshold of significance. This impact would be **less than significant**. No mitigation is required.

Impact AQ-3 (NTMA): ***Potential for Long-Term Operational and Maintenance-Related Emissions of Criteria Air Pollutants and Ozone Precursors to Exceed Local CEQA Thresholds of Significance***

It is anticipated that after construction and initial implementation of the NTMAs, some existing operational and maintenance-related activities would change and new direct, long-term activities could begin. These operational activities could include vehicular travel for monitoring, maintenance, and/or adjustments to infrastructure and equipment associated with NTMAs; periodic use of off-road equipment to maintain NTMA-related infrastructure; and occasional testing and use of backup generators. However, implementing NTMAs is expected to result in only a minimal net change to existing operational and maintenance-related activities; most proposed activities would involve repairing, reconstructing, or improving existing facilities, then continuing the operations and maintenance practices already in place before NTMA implementation. None of the NTMAs would require existing operational and maintenance-related activities to increase substantially, although if a setback levee would be longer than the levee segment it would replace, a marginal increase in the area requiring inspection and maintenance would result. Operational and maintenance-related activities for NTMAs would occur at a low frequency and intensity (i.e., number of trips and hours of equipment operation) and are not anticipated to generate substantial direct emissions of criteria air pollutants or ozone precursors.

Because the NTMAs would result in only a minimal increase in operational emissions relative to existing conditions, it is highly unlikely that the significance thresholds of local air districts or other thresholds would be exceeded. This impact would be **less than significant**. No mitigation is required.

Impact AQ-4 (NTMA): ***Construction-Related and Operational Emissions from Conveyance and Other NTMAs that Could Result in Cumulatively Considerable Net Increases in Criteria Air Pollutants for Which the Project Region is Nonattainment under Applicable Federal or State Ambient Air Quality Standards***

As discussed for Impact AQ-1 (NTMA), temporary and short-term construction activities could generate emissions of criteria pollutants and precursors that could exceed the established thresholds in the applicable air districts. As discussed for Impact AQ-3 (NTMA), operation and maintenance of NTMAs would result in relatively small amounts of additional emissions relative to existing conditions, but insufficient emissions to result in significant project-specific impacts.

Construction under the proposed NTMAs would result in temporary emissions of ROG, NO_X, CO, SO_X, PM_{10}, and $PM_{2.5}$. Emissions would be generated by the use of construction equipment, on-site generators, material haul trucks, and construction worker vehicles, and by ground-disturbing activities. These emissions would occur intermittently and at varying intensities depending on the daily construction activities. However, if sufficient activity were to occur during a particular period, emissions of criteria air pollutants and precursors could potentially exceed the thresholds of significance established by the applicable air districts. If emissions were to exceed what was planned for in a SIP, those activities or projects could conflict with or impede implementation of the SIP. However, if a plan or project was accounted for while the SIP was developed, its emissions would not conflict with the SIP because its emission levels would be less than those projected in the SIP.

This impact would be **potentially significant**.

Mitigation Measure AQ-4 (NTMA): ***Implement Mitigation Measure AQ-1 (NTMA)***

Implementing this mitigation measure would reduce the emissions from construction-related activities. However, the extent to which emissions would be reduced for each NTMA is unknown, and uncertainty exists about proposed construction activities (e.g., duration, intensity, and location) and subsequent mitigation requirements. Therefore, it is not possible at the time of this writing to know whether the emissions from construction-related management actions would be reduced below the established thresholds for all NTMAs. Consequently, until further information on specific project-level activities is available and project-level analysis is completed, Impact AQ-4 (NTMA) would be **potentially significant and unavoidable**. As discussed above, this conclusion would pertain to the larger NTMA projects and not all NTMA projects. It is likely that many smaller NTMA projects would generate air quality emissions below the applicable thresholds of significance and would be considered less than significant. Nevertheless, it is anticipated that larger NTMA projects would likely have air pollutant emissions exceeding local CEQA thresholds.

Impact AQ-5 (NTMA): ***Potential for Construction-Related and Operational Emissions from Storage-Related NTMAs to Result in Cumulatively Considerable Net Increases in Criteria Air Pollutants for Which the Project Region is Nonattainment under Applicable Federal or State Ambient Air Quality Standards***

As discussed in Impact AQ-2 (NTMA), storage-related activities would not require improvements or additions to infrastructure. Therefore, construction emissions would be minimal or nonexistent for implementation of storage-related NTMAs. In addition, the operational changes associated with storage-related NTMAs would not require a substantial change in vehicle or equipment activities, building energy use, or other stationary and/or area sources. Thus, storage-related NTMAs are not anticipated to exceed any construction-related or operational thresholds of significance. Accordingly, these management activities would not generate a cumulatively considerable amount of emissions of criteria air pollutants or ozone precursors for which the applicable project region is nonattainment. This impact would be **less than significant**. No mitigation is required.

Impact AQ-6 (NTMA): ***Potential Construction-Related Exposure of Sensitive Receptors to Substantial Pollutant Concentrations through Diesel PM and Naturally Occurring Asbestos or Potential Generation of Substantial Concentrations of TACs during Operations***

The potential for NTMAs to generate emissions of TACs is addressed separately below for construction and operations, followed by a discussion of NOA.

Toxic Emissions During Construction

Construction under the proposed NTMAs would generate short-term emissions of diesel PM exhaust. Off-road diesel equipment required for site grading and excavation, paving, and other construction activities and diesel-fueled on-road trucks used to haul soil and materials would generate these emissions. CARB has identified diesel PM as a TAC. In considering health impacts from TACs, the dose to which the sensitive receptors are exposed, which is a function of concentration and duration of exposure, is the primary factor used to determine health risk (i.e., cancer risks and chronic and acute hazards). According to the Office of Environmental Health Hazard Assessment, health risk assessments, which determine the exposure and subsequent health risks of sensitive receptors to TAC emissions, should be based on a 70-year exposure period; however, such assessments should be limited to the period/duration of activities associated with the project.

The length of time that off-road diesel equipment would be used near sensitive receptors close to NTMA construction activities would be relatively short (less than 2 full years for projects qualifying as NTMAs). In addition, as levee work is completed, equipment typically would progress along the levee alignments and would not operate within approximately 500 feet of any one receptor for more than a few weeks at a time. Receptors located within 500 feet of the borrow areas could be exposed for longer periods than receptors located along the levee alignments. Even if the full 2-year construction period were evaluated for all nearby receptors, it would only be approximately 3 percent of the required 70-year exposure period for health risk assessments. In addition, as discussed above, many construction activities would move periodically, thereby reducing the diesel PM concentrations at a particular receptor in many instances. Furthermore, as discussed above in Impact AQ-1 (NTMA), construction activities would consist of multiple individual projects that would spread out over a large geographical area; therefore, the proposed program's overall construction emissions would not be concentrated in one particular area and would not result in an additive exposure mechanism.

Because the exposure period for receptors near construction sites for NTMAs would be substantially less than the required exposure period for health risk assessments (i.e., 70 years), and construction emissions would be spread over a large geographical area, a health risk assessment is not recommended. Because of the nature of the proposed activities, it is highly unlikely that construction of an NTMA would expose sensitive receptors to substantial diesel PM emissions during construction. Therefore, this impact would be **less than significant**. No mitigation is required.

Toxic Emissions During Operation and Maintenance

After construction of proposed NTMAs, operational activities could generate diesel PM emissions because diesel-fueled on-road vehicles and off-road equipment would be used for operations and maintenance. As discussed in Impact AQ-3 (NTMA), it is anticipated that the net change in operational and maintenance-related activities relative to existing conditions would be minimal.

If an NTMA were to require a new (or replacement) facility with a backup generator (e.g., pump facility), the project proponent would be required to obtain a permit for any new diesel-powered backup generator. The new generator must meet the conditions detailed in the CARB Air Toxics Control Measure for stationary compression combustion engines. In addition, the generators for new or replacement facilities built under NTMAs would be used only intermittently and over large geographical areas, and sensitive receptors would not be exposed to significant amounts of diesel PM.

The potential for an increase in operational and maintenance activities is minor because operational activities (i.e., stationary, mobile, and off-road) would be of low intensity and would occur in a large geographical area, and diesel PM is highly dispersive. Therefore, operational and maintenance-related NTMAs are not anticipated to expose sensitive receptors to substantial concentrations of TACs. This impact would be **less than significant**. No mitigation is required.

Exposure to Naturally Occurring Asbestos

Some proposed NTMAs might occur in areas known to contain serpentine or ultramafic rock, which is common to foothill areas of the Central Valley, although rare in other locations. As described in Section 3.4.1, "Environmental Setting," these areas sometimes contain NOA; therefore, NOA may be present in some of the proposed construction areas (CGS 2000). If soil containing NOA were to be disturbed during construction, construction employees and nearby sensitive receptors could be exposed to NOA. People exposed to even low levels of asbestos may be at elevated risk (e.g., above background rates) of lung cancer and mesothelioma. The risk is proportional to the cumulative inhaled dose (number of fibers) and increases with the time since first exposure. Although several factors influence the disease-causing potency of any given asbestos (such as fiber length and width, fiber type, and fiber chemistry), all forms are carcinogens. Because earth in known NOA areas could be excavated under the proposed program, sensitive receptors could be exposed to unsafe levels of NOA. This impact would be **potentially significant**.

Mitigation Measure AQ-6 (NTMA): ***Implement Strategies to Protect Sensitive Receptors from Substantial Construction-Related Emissions of Naturally Occurring Asbestos***

Not all measures listed below may be applicable to each management action. Rather, these measures serve as an overlying mitigation framework to be used for specific management actions. The applicability of measures listed below would vary based on the lead agency, location, timing, and nature of each management action.

It will be assumed that any construction within one-half mile of State-identified NOA areas is operating in serpentine or ultramafic rock and will comply with all requirements outlined in CARB's Asbestos Air Toxic Control Measures for Construction, Grading, Quarrying, and Surface Mining Operations. These requirements include all of the following:

- Prepare and implement an asbestos dust mitigation plan, which must be approved by the local air district before construction begins and must be implemented at the commencement and maintained throughout the duration of construction and grading activities in known NOA areas.

- Prepare and implement an asbestos health and safety program in known NOA areas, if required under California Code of Regulations Title 8, Section 1529(4), Asbestos.

The asbestos dust mitigation plan, as required by Title 17, Sections 93105(e)(2) and 93105(e)(4) of the California Code of Regulations, will identify dust mitigation practices that are sufficient to ensure that no equipment or operations emit dust that is visible and crossing property lines. The plan will also identify trackout prevention and control measures, control measures for disturbed surface areas and storage piles that would remain inactive for more than 7 days, postconstruction stabilization measures, and asbestos monitoring measures, if required. Examples of these measures include wetting, covering, or crusting the surface; applying chemical dust suppressants or stabilizers; installing wind barriers; enforcing speed limits in construction areas; controlling truck spillage; and establishing vegetative covers. In addition, the asbestos dust mitigation plan will include recordkeeping and reporting requirements that will be used to document the results of any air monitoring, geologic evaluation, and asbestos bulk sampling.

The asbestos health and safety program will be implemented if permissible exposure limits for airborne asbestos are found to be exceeded within the study area. Implementation will include applicable measures to protect construction employees as defined under Title 8, Section 1529(g) of the California Code of Regulations, and any additional measures required by the California Occupational Safety and Health Administration to reduce exposure of construction employees to airborne asbestos.

Implementing this mitigation measure would reduce Impact AQ-6 (NTMA) to a **less-than-significant** level.

Impact AQ-7 (NTMA): *Potential for Construction-Related and Operational Generation of Odors that Could Affect a Substantial Number of People*

During construction of the NTMAs, multiple pieces of off-road equipment could operate at any given time. In high concentrations, diesel exhaust could generate an odor. However, because of the dispersive nature of diesel exhaust, a large number of pieces of diesel construction equipment would need to operate concurrently in a relatively small area to generate a constant plume of diesel exhaust that would cause objectionable odors for a substantial number of people. These circumstances would not occur as part of NTMA construction activities. In addition, construction activities for NTMAs (e.g., construction of slurry cutoff wall along a levee) would often move on a regular basis, further minimizing the potential for a substantial exposure to objectionable odors.

As noted in the previous discussion for TACs under Impacts AQ-1 (NTMA) and AQ-6 (NTMA), operational and maintenance-related activities associated with NTMAs would not differ substantially from those implemented under existing conditions and would occur more intermittently than construction activities. Thus, they would not be expected to cause odor impacts from diesel PM emissions.

Construction-related, operational, and maintenance-related activities associated with NTMAs would not generate odor emissions that would affect a substantial number of people. This impact would be **less than significant**. No mitigation is required.

3.4.5 Environmental Impacts, Mitigation Measures, and Mitigation Strategies for LTMAs

This section describes the physical effects of LTMAs on air quality. LTMAs include a continuation of activities described as part of NTMAs and all other actions included in the proposed program, and consist of all of the following types of activities:

- Widening floodways (through setback levees and/or purchase of easements)
- Constructing weirs and bypasses
- Constructing new levees
- Changing operation of existing reservoirs
- Achieving protection of urban areas from a flood event with 0.5 percent risk of occurrence
- Changing policies, guidance, standards, and institutional structures
- Implementing additional and ongoing conservation elements

Actions included in LTMAs are described in more detail in Section 2.4, “Proposed Management Activities.”

Impacts and mitigation measures identified above for NTMAs would also be applicable to many of the LTMAs and are described below. The NTMA impact discussions are modified or expanded where appropriate, or new impacts and mitigation measures are included if needed, to address conditions unique to LTMAs. The same approach to future implementation of mitigation measures described above for NTMAs and the use of the term "project proponent" to identify the entity responsible for implementing mitigation measures also apply to LTMAs.

LTMA Impacts and Mitigation Measures

Impact AQ-1 (LTMA): ***Construction-Related Emissions of Criteria Air Pollutants and Ozone Precursors Resulting from Conveyance and Other LTMA Components that Could Exceed Local CEQA Thresholds of Significance***

Implementing the LTMAs' conveyance and other management components would entail construction activities similar to those for the NTMAs, although potentially at a larger scale. Conveyance-related LTMAs that would use construction methods identical or similar to those used for conveyance-related NTMAs would include widening floodways, modifying existing weirs and bypasses, reconstructing levees, raising and strengthening existing levees, constructing ring and training levees, and building new levees. Construction emission mechanisms for other LTMAs, such as implementing conservation actions, would also be similar to those described for NTMAs, including the use of diesel construction equipment and generation of fugitive PM_{10} from earth moving.

As concluded for Impact AQ-1 (NTMA), because construction intensity, locations, and duration are unknown for the conveyance and other management actions included in LTMAs, the resulting emissions cannot be accurately quantified or compared with a significance threshold at the time of this writing. However, as shown in the project examples provided in Impact AQ-1 (NTMA), construction activities associated with the types of projects that would qualify as NTMAs can result in one or more exceedences of applicable significance thresholds. Many LTMAs would result in more intensive or longer term construction activities than those included in NTMAs; as a result, the potential for exceedences of applicable air quality thresholds would be greater. As discussed in Impact AQ-1 (NTMA), some quantity of construction emissions generated by the proposed program in the same air district could be offset by flood avoidance benefits; however, this offset cannot be assured to have a nexus to the identified impacts either temporally or geographically. Therefore, the overall incremental impact relative to existing conditions would be **potentially significant**.

Mitigation Measure AQ-1 (LTMA): ***Implement Mitigation Measure AQ-1 (NTMA)***

Implementing this mitigation measure would reduce the impact of emissions from construction activities. However, the extent to which emissions would be reduced is unknown, and uncertainty exists about proposed construction activities (e.g., duration, intensity, and location) and subsequent mitigation requirements. Therefore, it is not possible at the time of this writing to know whether the emissions associated with constructing management actions would be reduced below the established thresholds for all LTMAs under all circumstances. Consequently, until further information on specific project-level activities is available and project-level analysis is completed, Impact AQ-1 (LTMA) would be **potentially significant and unavoidable**.

Impact AQ-2 (LTMA): ***Potential for Construction-Related Emissions of Criteria Air Pollutants and Ozone Precursors Resulting from Storage-Related LTMAs to Exceed Local CEQA Thresholds of Significance***

The size and scope of storage-related LTMAs would be similar to those described for storage-related NTMAs, and this impact, as it applies to air quality, would be similar to Impact AQ-2 (NTMA). This impact would be **less than significant**. No mitigation is required.

Impact AQ-3 (LTMA): ***Long-Term Operational and Maintenance-Related Emissions of Criteria Air Pollutants and Ozone Precursors that Could Exceed Local CEQA Thresholds of Significance***

The magnitude and frequency of the operational and maintenance-related activities that would follow construction of many LTMAs would be similar to those for NTMAs; these activities would involve the same type of projects with similar operations and maintenance requirements (e.g., reconstructed levees, new levees, setback levees). Therefore, in many instances, the emission sources (e.g., worker vehicle trips, haul trucks, off-road construction equipment, building heating and cooling), intensity of operations and maintenance, and subsequent emissions of criteria air pollutants and precursors generated by facility operations and maintenance for LTMAs would be similar to those described above for NTMAs. In addition, as discussed in Chapter 2.0, "Program Description," some LTMAs would be designed to minimize future operational and maintenance needs for facilities, resulting in a postproject reduction in air pollutant emissions associated with operations and maintenance.

However, LTMAs could include substantial new facilities, such as flood bypasses. Adding these facilities could result in new sources of emissions from operations and maintenance. The extent of these new emissions would depend greatly on factors such as facility location (e.g., length of vehicle trips needed for maintenance staff to reach facilities), size, and maintenance needs (e.g., periodic sediment removal in a bypass). Therefore, the operations and maintenance emissions from new facilities associated with LTMAs cannot be accurately quantified or reasonably determined at this time.

The nature and intensity of operations and maintenance activities for LTMA facilities and their associated emissions cannot be quantified or reasonably determined at this time. However, given the size and extent of some potential LTMA projects, it is reasonable to assume that an applicable threshold of significance could be exceeded in one or more instances. Therefore, this impact would be **potentially significant**.

Mitigation Measure AQ-3 (LTMA): ***Implement Measures to Reduce Operational Emissions***

The following measures will be considered during project-level evaluation of specific management actions. Not all measures would be applicable to each management activity. Rather, these measures serve as an overlying mitigation framework to be used when individual projects are evaluated. The applicability of measures listed below would vary based on the lead agency, location, timing, and nature of each management action.

The following measures may be implemented to reduce exhaust emissions from vehicles and equipment where operations and maintenance activities for specific projects exceed applicable emissions thresholds:

- Develop and implement a comprehensive maintenance-activity management plan to minimize the amount of vehicle travel associated with maintenance actions.

- Develop and implement a worker trip reduction plan to achieve average vehicle ridership of 1.5 persons or greater where applicable.

- Maintain all equipment (including maintenance trucks) to the manufacturers' specifications. The equipment should be checked by a certified mechanic on a regular basis.

- Minimize idling time either by shutting off equipment when it is not in use or by reducing the time of idling to no more than 5 minutes. Provide clear signage regarding idling at locations visible to maintenance staff.

- Schedule maintenance trips during nonpeak traffic hours to reduce peak-hour emissions and traffic congestion to the extent feasible.

- Use alternative-fueled (e.g., CNG, LNG, propane), electricity-powered, or catalyst-equipped diesel vehicles where feasible.

The following measures from Mitigation Measure CLM-1b (NTMA) in Section 3.7, “Climate Change and Greenhouse Gas Emissions,” could help to further reduce operational emissions of criteria air pollutants and ozone precursors:

- Implement all current standards and/or requirements as part of any DWR sustainability plan or guidelines.

- Use renewable energy generated on site (i.e., solar, wind, hydroelectric) where feasible.

- Use alternative fuels for maintenance vehicles and equipment.

- Use energy-efficient equipment for operation and maintenance of proposed facilities (e.g., pumps, hydraulic equipment, maintenance equipment). Equipment and operation of equipment will conform to U.S. Department of Energy best practices, Consortium for Energy Efficiency initiatives and guidance, and National Electrical Manufacturers Association standards where feasible.

- Require proposed buildings to exceed California Building Standards Code Title 24 energy efficiency standards by 20 percent or more.

Implementing these mitigation measures would reduce the emissions impacts from operational and maintenance-related activities; however, the extent to which they would be applicable and reduce emissions cannot be confirmed at the time of this writing, and it cannot be assured that emissions will be reduced below threshold levels under all circumstances. Consequently, until further information on specific project-level activities is available and project-level analysis is completed, Impact AQ-3 (LTMA) would be **potentially significant and unavoidable**. Similar to NTMAs, this conclusion would pertain to the larger LTMA projects and not all LTMA projects. It is likely that many smaller NTMA projects would generate air quality emissions below the applicable thresholds of significance and would be considered less than significant. Nevertheless, it is anticipated that larger NTMA projects would likely have air pollutant emissions exceeding local CEQA thresholds.

Impact AQ-4 (LTMA): ***Construction-Related and Operational Emissions from LTMAs that Could Result in Cumulatively Considerable Net Increases in Criteria Air Pollutants or Precursors for Which the Project Region is Nonattainment under Applicable Federal or State Ambient Air Quality Standard***

As discussed above in Impact AQ-1 (LTMA) and Impact AQ-3 (LTMA), construction-related and operational emissions associated with LTMAs could generate emissions of criteria air pollutants and precursors that would exceed the applicable thresholds of significance.

These emissions would occur intermittently and at varying intensities depending on the daily construction activities. However, if sufficient activity were to occur during a particular period, emissions of criteria air pollutants and precursors could potentially exceed the thresholds of significance established by the applicable air districts. If emissions were to exceed what was planned for in a SIP, those activities or projects could conflict with or impede implementation of the SIP. However, if a plan or project was accounted for while the SIP was developed, its emissions would not conflict with the SIP because its emission levels would be less than those projected in the SIP.

This temporary impact would be **potentially significant**.

Mitigation Measure AQ-4 (LTMA): ***Implement Mitigation Measure AQ-1 (NTMA) and Mitigation Measure AQ-3 (LTMA)***

Implementing this mitigation measure would reduce the emissions from construction-related and operational activities. However, the extent to which emissions would be reduced is unknown, and uncertainty exists about proposed construction-related and operational activities (e.g., duration, intensity, and location) and subsequent mitigation requirements. Therefore, it is not possible at the time of this writing to know whether the emissions from construction-related and operational management activities would be reduced below the established thresholds for all NTMAs. Consequently, until further information on specific project-level activities is available and project-level analysis is completed, Impact AQ-4 (NTMA) would be **potentially significant and unavoidable**.

Impact AQ-5 (LTMA): ***Potential for Construction-Related and Operational Emissions from Storage-Related LTMAs to Result in Cumulatively Considerable Net Increases in Criteria Air Pollutants for Which the Project Region is Nonattainment under Applicable Federal or State Ambient Air Quality Standards***

The size and scope of storage-related LTMAs would be similar to those described for storage-related NTMAs, and this impact, as it applies to air quality, would be similar to Impact AQ-5 (NTMA). This impact would be **less than significant**. No mitigation is required.

Impact AQ-6 (LTMA): ***Potential Construction-Related Exposure of Sensitive Receptors to Substantial Pollutant Concentrations through Diesel PM and Naturally Occurring Asbestos or Potential Generation of Substantial Concentrations of TACs during Operations***

LTMAs may include projects of a larger size and scope than described for NTMAs; however, any larger scale projects (e.g., new bypasses) would be located in rural areas with few, if any, sensitive receptors with potential for substantial exposure to diesel PM or other TACs. This impact would be similar to Impact AQ-6 (NTMA). Impacts related to exposure to diesel PM during project construction, operation, and maintenance would be less than significant. However, impacts related to exposure to NOA would be **potentially significant**.

Mitigation Measure AQ-6 (LTMA): ***Implement Mitigation Measure AQ-6 (NTMA) to Address Naturally Occurring Asbestos***

Implementing this mitigation measure would reduce the potentially significant impacts related to NOA for LTMAs in Impact AQ-6 (LTMA) to a **less-than-significant** level.

Impact AQ-7 (LTMA): ***Potential for Construction-Related and Operational Generation of Odors that Could Affect a Substantial Number of People***

As discussed in Impact AQ-7 (NTMA), implementing the LTMAs could include diesel fuel combustion that would generate odors during construction and operations. In many instances, the construction activities associated with LTMAs would be similar to those associated with NTMAs with respect to intensity, frequency, and movement of construction sites. Therefore, it is not anticipated that construction activities for these LTMAs would expose a large population to odor sources continuously for an extended period of time, resulting in a significant odor impact. LTMAs also include larger projects that could involve more intensive construction activities over a longer period (e.g., flood bypasses); however, these types of large projects would be located in rural settings away from concentrations of potential sensitive odor receptors. Therefore, construction-related odor impacts would remain less than significant.

For operational activities, LTMAs would also be similar in intensity and frequency to NTMAs in many instances. Where operations and maintenance may be more intensive for some LTMAs, these would also be concentrated in rural areas with few sensitive odor receptors. Therefore, it is not anticipated that day-to-day operational activities associated with LTMAs would generate odors that would affect a substantial number of people.

Construction-related, operational, and maintenance-related activities associated with LTMAs would not generate odor emissions that would affect a substantial number of people. This impact would be **less than significant**. No mitigation is required.

LTMA Impact Discussions and Mitigation Strategies

The impacts of the proposed program's NTMAs and LTMAs related to air quality and the associated mitigation measures are thoroughly described and evaluated above. The general narrative descriptions of additional LTMA impacts and mitigation strategies that are included in other sections of this draft PEIR are not required for air quality.

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