7.5 Air Quality

This section describes the environmental setting, potential impacts, and mitigation measures for air quality impacts that may result from changes in hydrology or changes in water supply. Activities that generate emissions in excess of established thresholds would be expected to have significant impacts on air quality because an exceedance of the thresholds is anticipated to conflict with applicable air quality plans, contribute to national ambient air quality standards (NAAQS) and California ambient air quality standards (CAAQS) violations, and result in project-level and cumulative air quality impacts. Therefore, the analysis is focused on activities that could result in increased emissions.

Changes in hydrology could result in increased emissions associated with replacement of hydropower. In addition, reoperation of reservoirs could result in drawdown that leaves unvegetated soil exposed to wind, resulting in minor windblown dust emissions. Further, changes in reservoir levels and flows could increase harmful algal bloom (HAB) formation, which may generate odor.

Changes in water supply include reduced Sacramento/Delta supply to agriculture that could result in agricultural land fallowing and post-harvest rice burning, which could cause dust and increased emissions, respectively. Changes in water supply include groundwater pumping and other water management actions in response to reduced Sacramento/Delta supply, including groundwater storage and recovery, water transfers, and water recycling, that could generate emissions. Water recycling could also generate odor.

Section 7.1, *Introduction, Project Description, and Approach to Environmental Analysis*, describes reasonably foreseeable methods of compliance and response actions, including actions that would require construction. These actions are analyzed for potential environmental effects in Section 7.21, *Habitat Restoration and Other Ecosystem Projects*, and Section 7.22, *New or Modified Facilities*.

7.5.1 Environmental Checklist

III. Air Quality	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less-than-Significant Impact	No Impact
Where available, the significance criteria established by the applicable air quality management or air pollution control district may be relied upon to make the following determinations. Would the project:				
a. Conflict with or obstruct implementation of the applicable air quality plan?	☒	☐	☐	☐
b. Violate any air quality standard or contribute substantially to an existing or projected air quality violation?	☒	☐	☐	☐

III. Air Quality	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less-than-Significant Impact	No Impact
c. Result in a cumulatively considerable net increase of any criteria pollutant for which the project region is non-attainment under an applicable federal or state ambient air quality standard (including releasing emissions which exceed quantitative thresholds for ozone precursors)?	☒	☐	☐	☐
d. Expose sensitive receptors to substantial pollutant concentrations?	☐	☐	☒	☐
e. Create objectionable odors affecting a substantial number of people?	☐	☐	☒	☐

7.5.2 Environmental Setting

This section describes the air quality conditions and relevant regulatory setting to inform the impact discussion in this section and in Section 7.21, *Habitat Restoration and Other Ecosystem Projects*; Section 7.22, *New or Modified Facilities*; and Chapter 9, *Proposed Voluntary Agreements*.

7.5.2.1 Climate and Topography

California is divided into 15 air basins based on geographic features that create distinctive regional climates. Meteorological and topographical conditions, as well as atmospheric conditions (e.g., wind speed, wind direction, air temperature gradients), interact with the physical features of the landscape (e.g., mountains) to determine the movement and dispersal of air pollutants within and between air basins.

The Coast Ranges to the west and Sierra Nevada to the east influence wind directions, wind speeds, and atmosphere inversion layers. Because of these mountain ranges, temperature inversions occur frequently in some air basins, particularly those located in the Central Valley and Southern California (e.g., San Joaquin Valley and South Coast Air Basins). Inversions occur when the upper air is warmer than the air beneath it, thereby trapping pollutant emissions near the surface and not allowing them to disperse upward. Inversions occur frequently throughout the year in the study area, though they are more prevalent and of a greater magnitude in late summer and fall when there are longer daylight hours, high temperatures, and stagnant air conditions. As a result of the combination of topographical and climate factors, a higher potential exists for regional and local accumulation of pollutants in the Central Valley and Southern California. The drier and warmer conditions in the Central Valley and Southern California exacerbate air quality impacts (e.g., pollutant nonattainment) by trapping more pollutants and increasing the intensity of windblown fugitive dust (SJVAPCD 2016).

7.5.2.2 Pollutants of Concern and Air Quality Regulations

Concentrations of ozone, carbon monoxide (CO), nitrogen dioxide, sulfur dioxide, lead, and particulate matter (including fugitive dust) less than 10 microns in aerodynamic diameter (PM10) and less than 2.5 microns in aerodynamic diameter (PM2.5) are commonly used as indicators of ambient air quality conditions (CARB 2023). These pollutants are known as *criteria pollutants* and are regulated by the U.S. Environmental Protection Agency (USEPA) and California Air Resources Board (CARB) through NAAQS and CAAQS, respectively. The NAAQS and CAAQS limit criteria pollutant concentrations to protect human health and prevent environmental and property damage. Other pollutants of concern include nitrogen oxides and reactive organic gases, which are precursors to ozone, and toxic air contaminants, which can cause cancer and other human health ailments (USEPA 2017a, 2017b).

Regional air districts oversee local air quality regulations within air basins to ensure that the requirements of federal and state air quality laws are met. Compliance with federal and state air quality laws is accomplished primarily through air districts adopting air quality attainment plans and issuing air quality analysis guidance, including recommended thresholds of significance for evaluating air quality impacts in CEQA documents. Each air district in California enforces its own rules and regulations to comply with state and federal laws. These regulations usually incorporate both the California and federal regulations into one or more rules. Air district regulations address criteria pollutants, toxic air contaminates—including diesel particulate matter (DPM), chlorine, and ammonia—public nuisances created by air pollution, odors, and other air quality-related issues. Depending on the quantity of air pollutants that will be emitted from the source and the area designation for that pollutant, the new or modified source may be required to install best available control technology.

Most air districts regulate diesel-fueled stationary sources (e.g., generators, stationary water pumps) by requiring registration or additional permits. For example, the Sacramento Metropolitan Air Quality Management District administers an Agricultural Engine Registration program that requires the registration of all diesel-fueled stationary and portable engines that are rated greater than 50 horsepower and used exclusively for agricultural purposes (SMAQMD 2018). Air districts also typically require an Authority to Construct and Permit to Operate for the construction and installation of stationary sources greater than 50 horsepower (BAAQMD 2017a; SJVAPCD 2015). These requirements help maintain an inventory of stationary sources within air districts, provide for the review of new and modified stationary sources of air pollution, provide mechanisms including emission trade-offs that could be granted without interfering with the attainment or maintenance of air quality standards, and ensure no net increases in emissions above specified thresholds from new and modified stationary sources of all nonattainment pollutants and their precursors.

Each of the 15 air basins and 30 regional air districts in the study area has its own unique air quality conditions, thresholds, and local regulations. Existing air quality conditions can be characterized in terms of the federal and state air quality standards by monitoring data collected. USEPA and CARB maintain an extensive network of monitoring stations throughout California. Measurements at the monitoring stations are taken on varied schedules (e.g., continuously and averaged hourly, every 6 days), depending on the criteria pollutant, using USEPA and CARB collection methods. Measurements and monitoring stations are also routinely audited to ensure accuracy (CARB 2009, 2011). Measurements of criteria pollutant concentrations at monitoring stations are used to designate regions throughout California as attainment, maintenance, or nonattainment with the NAAQS and CAAQS for individual criteria pollutants. Table 7.5-1 summarizes the current federal and state attainment status of counties within the study area and identifies the applicable air basins and air districts.

Table 7.5-1. Regional Air Basin, Air District, and Federal and State Criteria Pollutant Attainment Designations for Counties in the Study Area

County	Air Basin	Air District/ Air Quality Management Agency	Federal Attainment Status (NAAQS)	State Attainment Status (CAAQS)
Alameda	San Francisco Bay Area	Bay Area	N – O_3 A – all other pollutants	N – O_3, PM2.5, PM10 A – all other pollutants
Alpine	Great Basin Valleys	Great Basin Unified	A – all pollutants	N – PM10 U – O_3, CO A – all other pollutants
Amador	Mountain Counties	Amador	N – O_3 A – all other pollutants	N – O_3 U – PM2.5, PM10, CO A – all other pollutants
Butte	Sacramento Valley	Butte	N – O_3 A – all other pollutants	N – O_3, PM2.5, PM10 A – all other pollutants
Calaveras	Mountain Counties	Calaveras	N – O_3 A – all other pollutants	N – O_3, PM10 U – PM2.5, CO A – all other pollutants
Colusa	Sacramento Valley	Colusa	A – all pollutants	N – PM10 U – CO A – all other pollutants
Contra Costa	San Francisco Bay Area	Bay Area	N – O_3 A – all other pollutants	N – O_3, PM2.5, PM10 A – all other pollutants
El Dorado	Lake Tahoe and Mountain Counties	El Dorado	N – O_3* A – O_3*, all other pollutants	N – O_3*, PM10 U – PM2.5*, CO* A – O_3*, PM2.5*, CO*, all other pollutants
Fresno	San Joaquin Valley	San Joaquin Valley	N – O_3, PM2.5 M – PM10 A – all other pollutants	N – O_3, PM2.5, PM10 A – all other pollutants
Glenn	Sacramento Valley	Glenn	A – all pollutants	N – PM10 U – CO A – all other pollutants
Imperial	Salton Sea	Imperial	N – O_3, PM2.5*, PM10 A – PM2.5*, all other pollutants	N – O_3, PM10, PM2.5* A – PM2.5*, all other pollutants
Inyo	Great Basin Valleys	Great Basin Unified	N – PM10* A – PM10*, all other pollutants	N – O_3, PM10 A – all other pollutants
Kern	San Joaquin Valley and Mojave Desert	San Joaquin Valley and Eastern Kern	N – O_3, PM2.5*, PM10* M – PM10* A – PM2.5*, all other pollutants	N – O_3, PM2.5*, PM10 U – PM2.5*, CO* A – CO*, all other pollutants
Kings	San Joaquin Valley	San Joaquin Valley	N – O_3, PM2.5 M – PM10 A – all other pollutants	N – O_3, PM2.5, PM10 U – CO A – all other pollutants
Lake	Lake County	Lake County	A – all pollutants	A – all pollutants
Lassen	Northeast Plateau	Lassen	A – all pollutants	U – PM10, CO A – all other pollutants
Los Angeles	South Coast and Mojave Desert	South Coast and Antelope Valley	N – O_3, PM2.5*, Pb* M – PM10*, CO*, NO_2* A – PM2.5*, PM10*, CO*, NO_2*, Pb*, SO_2	N – O_3, PM2.5*, PM10 U – PM2.5* A – all other pollutants

County	Air Basin	Air District/ Air Quality Management Agency	Federal Attainment Status (NAAQS)	State Attainment Status (CAAQS)
Madera	San Joaquin Valley	San Joaquin Valley	N – O_3, PM2.5 M – PM10 A – all other pollutants	N – O_3, PM2.5, PM10 A – all other pollutants
Marin	San Francisco Bay Area	Bay Area	N – O_3 A – all other pollutants	N – O_3, PM2.5, PM10 A – all other pollutants
Mariposa	Mountain Counties	Mariposa	N – O_3 A – all other pollutants	N – O_3, PM10* U – PM2.5, PM10* A – all other pollutants
Merced	San Joaquin Valley	San Joaquin Valley	N – O_3, PM2.5 M – PM10 A – all other pollutants	N – O_3, PM2.5, PM10 U – CO A – all other pollutants
Modoc	Northeast Plateau	Modoc	A – all pollutants	U – PM10, CO A – all other pollutants
Mono	Great Basin Valleys	Great Basin Unified	N – PM10* M – PM10* A – all other pollutants	N – O_3, PM10 A – all other pollutants
Monterey	North Central Coast	Monterey Bay Unified	A – all pollutants	N – O_3, PM10 A – all other pollutants
Napa	San Francisco Bay Area	Bay Area	N – O_3 A – all other pollutants	N – O_3, PM2.5, PM10 A – all other pollutants
Nevada	Mountain Counties	Northern Sierra	N – O_3 A – all other pollutants	N – O_3, PM10 U – PM2.5, CO A – all other pollutants
Orange	South Coast	South Coast	N – O_3, PM2.5 M – PM10, CO, NO_2 A – all other pollutants	N – O_3, PM2.5, PM10 A – all other pollutants
Placer	Sacramento Valley, Lake Tahoe, and Mountain Counties	Placer	N – O_3* A – O_3*, all other pollutants	N – O_3, PM10 U – PM2.5*, CO* A – PM2.5*, CO*, all other pollutants
Plumas	Mountain Counties	Northern Sierra	N – PM2.5* A – PM2.5*, all other pollutants	N – PM10, PM2.5* U – O_3, PM2.5* A – all other pollutants
Riverside	Salton Sea, South Coast, and Mojave Desert	South Coast and Mojave Desert	N – O_3*, PM2.5*, PM10* M –CO*, NO_2* A – O_3*, PM2.5*, PM10*, CO*, NO_2*, all other pollutants	N – O_3, PM2.5*, PM10 U – PM2.5*, CO* A – PM2.5*, CO*, all other pollutants
Sacramento	Sacramento Valley	Sacramento Metro	N – O_3 M – PM10 A – all other pollutants	N – O_3, PM10 A – all other pollutants
San Benito	North Central Coast	Monterey Bay Unified	A – all pollutants	N – O_3, PM10 U – CO A – all other pollutants
San Bernardino	Mojave Desert and South Coast	Mojave Desert and South Coast	N – O_3, PM2.5*, PM10* M – PM10*, CO*, NO_2* A – PM2.5*, CO*, NO_2*, all other pollutants	N – O_3, PM2.5*, PM10 U – PM2.5* A – PM2.5*, all other pollutants
San Diego	San Diego	San Diego	N – O_3 A – all other pollutants	N – O_3, PM2.5, PM10 A – all other pollutants

County	Air Basin	Air District/ Air Quality Management Agency	Federal Attainment Status (NAAQS)	State Attainment Status (CAAQS)
San Francisco	San Francisco Bay Area	Bay Area	N – O_3 A – all other pollutants	N – O_3, PM2.5, PM10 A – all other pollutants
San Joaquin	San Joaquin Valley	San Joaquin Valley	N – O_3, PM2.5 M – PM10 A – all other pollutants	N – O_3, PM2.5, PM10 A – all other pollutants
San Luis Obispo	South Central Coast	San Luis Obispo	N – O_3* A – O_3*, All other pollutants	N – O_3, PM10 A – all other pollutants
San Mateo	San Francisco Bay Area	Bay Area	N – O_3 A – all other pollutants	N – O_3, PM2.5, PM10 A – all other pollutants
Santa Barbara	South Central Coast	Santa Barbara	A – all pollutants	N – O_3, PM10 U – PM2.5 A – all other pollutants
Santa Clara	San Francisco Bay Area	Bay Area	N – O_3 A – all other pollutants	N – O_3, PM2.5, PM10 A – all other pollutants
Santa Cruz	North Central Coast	Monterey Bay Unified	A – all pollutants	N – O_3, PM10 U – CO A – all other pollutants
Shasta	Sacramento Valley	Shasta	A – all pollutants	N – O_3 U – CO A – all other pollutants
Sierra	Mountain Counties	Northern Sierra	A – all pollutants	U – O_3, PM10, CO A – all other pollutants
Siskiyou	Northeast Plateau	Siskiyou County	A – all pollutants	U – CO A – all other pollutants
Solano	Sacramento Valley and San Francisco Bay Area	Yolo-Solano and Bay Area	N – O_3 A – CO*, all other pollutants	N – O_3, PM10, PM2.5* U – PM2.5* A – all other pollutants
Sonoma	North Coast and San Francisco Bay Area	Northern Sonoma and Bay Area	N – O_3* A – all other pollutants	N – O_3*, PM2.5*, PM10* U – CO* A – O_3*, PM2.5*, PM10*, CO*, all other pollutants
Stanislaus	San Joaquin Valley	San Joaquin Valley	N – O_3, PM2.5 M – PM10 A – all other pollutants	N – O_3, PM2.5, PM10 A – all other pollutants
Sutter	Sacramento Valley	Feather River	N – O_3 A – all other pollutants	N – O_3,* PM10 A – O_3,* all other pollutants
Tehama	Sacramento Valley	Tehama	N – O_3* A – all other pollutants	N – O_3, PM10 U – PM2.5, CO A – all other pollutants
Tulare	San Joaquin Valley	San Joaquin Valley	N – O_3, PM2.5 M – PM10 A – all other pollutants	N – O_3, PM2.5, PM10 A – all other pollutants
Tuolumne	Mountain Counties	Tuolumne	N – O_3 A – all other pollutants	N – O_3 U – PM10 A – all other pollutants
Ventura	South Central Coast	Ventura	N – O_3 A – all other pollutants	N – O_3, PM10 A – all other pollutants

County	Air Basin	Air District/ Air Quality Management Agency	Federal Attainment Status (NAAQS)	State Attainment Status (CAAQS)
Yolo	Sacramento Valley	Yolo-Solano	N – O_3 A – all other pollutants	N – O_3, PM10 U – PM2.5 A – all other pollutants
Yuba	Sacramento Valley	Feather River	A – all pollutants	N – PM10 U – CO A – all other pollutants

Sources: USEPA 2020; CARB 2019.
* = designation applies to a portion of the county.
A = attainment; CAAQS = California ambient air quality standards; CO = carbon monoxide; M = maintenance; N = nonattainment; NAAQS = national ambient air quality standards; NO_2 = nitrogen dioxide; O_3 = ozone; Pb = lead; PM2.5 = particulate matter less than 2.5 microns in aerodynamic diameter; PM10 = particulate matter less than 10 microns in aerodynamic diameter; SO_2 = sulfur dioxide; U = unclassified

As shown in Table 7.5-1, the attainment status of counties for individual criteria pollutants varies. In air districts where criteria pollutants (i.e., ozone, particulate matter, CO) are currently considered nonattainment, the districts have prepared and adopted air quality plans. The primary goal of air quality plans is for air districts to achieve federal and state air quality standards within their air basins. Air districts have established thresholds for criteria pollutant emissions from various activities to prevent further deterioration of ambient air quality and to assist with air quality attainment within their air basins.

In addition to criteria pollutants, the localized pollutants with the greatest potential to result in a significant, material impact on human health are localized CO, DPM, and asbestos. Generally, mobile sources, including heavy traffic congestion and diesel-fueled engines, contribute to high levels of CO, DPM, and particulate matter. Asbestos may be found in existing structures where asbestos was used during the construction of the structures or in its natural state in rock or soil (known as naturally occurring asbestos) (e.g., San Joaquin, Fresno, and Colusa Counties) (DOC 2000). In addition, although not an air pollutant, Valley fever is a disease caused by inhaling *Coccidioides immitis* fungal spores in certain types of soil endemic to the Central Valley and Southern California that become airborne when the soil is disturbed.

7.5.2.3 Sensitive Receptors

A *sensitive receptor* is a facility or land use that houses or attracts members of the population, such as children, the elderly, and people with illnesses, who are particularly sensitive to the effects of air pollutants (CARB 2005). A 1,000-foot radius is typically used by local air districts to determine nearby sensitive receptors that could be affected by proposed activities (BAAQMD 2017b). Known sensitive receptors are present in the study area, including residences, hospitals, and schools. Sensitive receptors are primarily concentrated in urbanized areas, but scattered sensitive receptors are also located in rural areas. While sensitive receptors are generally expected to be located more than 1,000 feet away from facilities such as reservoirs and wastewater treatment plants (WWTP), they may be near or immediately adjacent to facilities such as groundwater pumps.

7.5.2.4 Current Emissions

Activities known to produce air pollutant emissions currently take place throughout the study area. The activity that produces the largest amounts of pollutant emissions is the operation of power-generating facilities that utilize fossil fuels (e.g., natural gas, coal, digester gas). These facilities occur in larger concentrations in urban areas (e.g., San Francisco Bay Area, Los Angeles, San Diego) (^CEC 2017a) and are typically regulated and permitted to emit a maximum amount of criteria pollutants. Groundwater pumping for private, agricultural, or municipal use currently takes place throughout the study area, with more water pumping occurring in rural and agricultural areas (e.g., San Joaquin Valley). Pumping groundwater involves the use of diesel or electric pumps and other stationary equipment (e.g., generators) that emit air pollutants. In addition, the existing facility operation and maintenance activities (e.g., equipment and vehicle use, worker commutes, material delivery activities, application of architectural coatings), which include facilities such as hydropower plants, reservoirs, stream gages, and WWTPs, currently generate pollutant emissions.

The generation and severity of odors are dependent on several factors, including the nature, frequency, and intensity of the source; wind direction; and the location of the receptor(s). Odors rarely result in physical harm but can cause discomfort, leading to complaints to regulatory agencies. Facilities known to produce operational odors are located in urban, rural, and agricultural locations and generally include landfills, WWTPs, food processing facilities, and certain agricultural facilities. Agricultural activities typically generate odors associated with diesel exhaust from equipment, vehicles, and groundwater pumps and with practices such as raising of livestock (e.g., animal housing, manure storage, and land application) and other animal farming operations, field burning, soil tilling, crop harvesting, and herbicide/pesticide application. These activities are primarily located in rural and agricultural areas.

7.5.3 Impact Analysis

Activities that generate emissions in excess of established thresholds would be expected to have significant impacts on air quality because an exceedance of the thresholds is anticipated to conflict with applicable air quality plans, contribute to NAAQS and CAAQS violations, and result in project-level and cumulative air quality impacts. Therefore, the analysis is focused on activities that could result in increased emissions.

Changes in hydrology could result in increased emissions associated with replacement of hydropower from changes in flow. In addition, reoperation of reservoirs could result in drawdown that leaves unvegetated soil exposed to wind, resulting in minor windblown dust emissions. Further, changes in reservoir levels and flow could increase HAB formation, which may generate odor.

Changes in water supply include reduced Sacramento/Delta supply to agriculture that could result in agricultural land fallowing and post-harvest rice burning that could cause dust and increased emissions, respectively. Changes in water supply include groundwater pumping and other water management actions in response to reduced Sacramento/Delta supply, including groundwater storage and recovery, water transfers, and water recycling, that could generate emissions. Water recycling and WWTPs can also generate odor.

Other activities associated with changes in hydrology and changes in water supply would not generate emissions, dust, or odor and are not evaluated further in this section. Further, a project may be deemed inconsistent with air quality plans if it would result in population and/or employment growth that exceeds growth estimates included in applicable air quality plans. Changes in hydrology and changes in water supply would not induce substantial population growth or employment (see Sections 7.16, *Population and Housing,* and 7.25*, Growth-Inducing Effects*). Accordingly, these topics are not evaluated further in this section.

Section 7.21, *Habitat Restoration and Other Ecosystem Projects*, and Section 7.22, *New or Modified Facilities,* describe and analyze potential air quality impacts from various actions that involve construction.

Impact AQ-a: Conflict with or obstruct implementation of the applicable air quality plan

Impact AQ-b: Violate any air quality standard or contribute substantially to an existing or projected air quality violation

Impact AQ-c: 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)

The analyses of activities that generate emissions that could conflict with applicable air quality plans, contribute to NAAQS and CAAQS violations, and result in project-level and cumulative air quality impacts are closely related and are therefore combined and addressed together under Impacts AQ-a through AQ-c.

Changes in Hydrology

As described in Section 7.8, *Energy*, changes in hydrology could result in a decrease of hydropower generation due to the reoperation of reservoirs to meet instream flow requirements. The loss in hydropower generation may necessitate increased production from other power facilities to offset the loss. Hydropower would be replaced by facilities that currently generate power, such as other renewable generating sources or nonrenewable sources. The generation of additional power could result in increased criteria pollutant emissions at other power facilities. However, these facilities are already built and permitted to emit a maximum amount of criteria pollutants. These facilities are required to offset additional power generation by using pollution credits under existing regulations. Therefore, if additional emissions are generated as a result of a loss of hydropower, these emissions would be generated by facilities that are permitted to do so. The permit requirements would ensure that no net increase in pollutant emissions would occur, which would be consistent with existing air quality plans. Therefore, it is not anticipated that changes in hydropower generation would result in a change in long-term emissions when compared with baseline conditions. There would be no impact.

Changes in hydrology (flows and reservoir levels) could result in drawdown in reservoirs that exposes unvegetated soil to the drying action of sun and wind. Once dry, particles can be picked up by the wind and contribute to dust in the atmosphere. Clear, windy spring or summer days typically provide weather conditions most conducive to blowing dust, resulting in windblown dust emissions. Wind speeds increase as a function of height above surface level. Under baseline conditions, surface water elevations fluctuate throughout the year, exposing unvegetated soil to the drying action of sun and wind. Many reservoirs historically experience substantial changes in water elevation based on operational needs and hydrology. Under the proposed Plan amendments, the potential for exposure of unvegetated soil occurs only during certain times of the year. Chapter 6, *Changes in Hydrology and Water Supply*, describes that, in general, for all but the 65 scenario, the rim reservoirs would be operated more conservatively, meaning that they would not be drawn down as far in the late summer and fall during drought periods. While the fall storage levels may be similar in the scenarios during droughts, the late spring and earlier summer reservoir storages may be lower than baseline. A few reservoirs in the upper watersheds show potential for drawdowns that would be lower than baseline conditions between May and September, particularly during critical and dry water years. While storage levels in some reservoirs may be below baseline during certain times of the year, exposed soils would be at surface level, or potentially depressed within the reservoir, making wind dispersion less likely because wind speeds increase as a function of height above surface level. Further, soil conditions in reservoirs are also typically heavier sediments such as silt and clay. In the spring and early summer, these sediments would also have a higher moisture content following spring snowmelt and rains. In total, these conditions limit the potential for dispersion during drawdown and wind events. Accordingly, changes in hydrology would not substantially increase airborne fugitive dust from wind erosion. This impact would be less than significant.

Changes in Water Supply

Reduced Sacramento/Delta supply to agriculture could result in agricultural land fallowing, which could result in increased fugitive dust if crop or vegetation stubble cover does not remain or vegetative regrowth does not occur. However, the fact that these lands may no longer be irrigated at present levels of water use does not mean they would necessarily be fallowed in perpetuity or potentially converted to nonagricultural uses. Implementation of water conservation measures could allow less water to service more acres. Further, growers may choose to turn to less-intensive agricultural uses such as dryland farming, deficit irrigation (i.e., reduction in irrigation), and grazing on lands that are no longer regularly irrigated. For example, some crops (e.g., alfalfa, pasture) are able to survive under deficit irrigation where only a portion of the crop water demands are met (^Orloff et al. 2015a, 2015b). While there could be a decline in yield for these types of crops or a reduction in the full use of pasture, if the full water requirements were continually restricted, they could still potentially remain in agricultural use (^Orloff et al. 2015a, 2015b). Finally, even some fallowed lands would be expected to retain crop stubble cover, ultimately experience vegetative regrowth, or both. This root material and regrowth would stabilize soils and serve to reduce the potential for fugitive dust, making any potential fugitive dust emissions due to fallowing temporary and limited in occurrence.

In contrast, the baseline of active agricultural operations and associated emissions occurs on a permanent basis, because crop burning, soil tillage, crop harvesting, and pesticide and herbicide application occur seasonally, depending on the type of crop, over the long-term lifespan of the cropland. Air quality may therefore benefit somewhat from reductions in smoke, fugitive dust, and equipment exhaust emissions; and it is anticipated that the limited amount of potential fugitive dust emissions associated with unvegetated land would be outweighed by the reduction in potential long-term emissions associated with reduced agricultural activities. These impacts would be less than significant. Historically, many rice fields in the Sacramento Valley were burned after harvest to dispose of leftover straw and to control for disease, releasing air pollutant emissions and affecting air quality. The practice was greatly reduced under the Connelly-Areias-Chandler Rice Straw Burning Reduction Act of 1991 (Health & Saf. Code, § 41865). Many farmers instead now flood the fields to decompose rice straw, which also provides bird habitat. Reduced water supply to agriculture could affect acreage of post-harvest flooding of rice fields, which could result in an increased occurrence of post-harvest rice straw burning. Increased rice straw burning could affect air quality in rural and agricultural areas where rice is currently grown. However, existing regulations limit the maximum annual allowable number of acres burned in the Sacramento Valley

Air Basin. Conditional rice straw burning permits are issued only if certain terms and conditions are met, which would limit emissions from increased straw burning. In addition, other post-harvest rice straw management activities may be feasible in some cases to reduce and divert rice straw. For instance, some rice growers in the Sacramento Valley implement alternative methods to manage post-harvest rice straw, including incorporating the straw into the soil without winter flooding and harvesting the rice straw for other uses, while others divert rice straw to storage or sell rice straw to other markets (CARB 2013; CalRice 2014). Therefore, a reduction in Sacramento/Delta surface water supply for post-harvest flooding and subsequent fall rice straw decomposition would not result in a significant increase in rice straw burning compared with baseline conditions. This impact would be less than significant.

Changes in water supply could lead to increased groundwater pumping and other water management actions, such as groundwater storage and recovery, water transfers, water recycling, and water conservation, in response to reduced Sacramento/Delta supply.

Groundwater pumping and groundwater storage and recovery are expected to require additional pumping that would likely be powered by electric pumps because these pumps are cheaper and more efficient than diesel pumps for long-term use. Additional energy would come from either a renewable or nonrenewable source that is already permitted, and thus, no new operational air quality emissions would be expected. Use of renewable energy (e.g., solar) to power groundwater pumps has been steadily increasing in the agricultural sector, and this trend is expected to continue because associated costs have dramatically declined. As such, the ability to use solar pumps has increased. However, a small portion of groundwater pumping may still utilize other fuels (e.g., diesel, gasoline). Depending on the type of fuel used, emissions could vary, though diesel pumps are typically more polluting than pumps powered by other fuels. Therefore, this analysis conservatively assumes that diesel pumps would be used for additional groundwater pumping.

Diesel pumps would generate exhaust-related emissions and toxic air contaminants during operations. The installation of additional diesel pumps would need to comply with the air pollutant rules and requirements of respective air districts to reduce associated emissions. For example, the Sacramento Metropolitan Air Quality Management District administers an Agricultural Engine Registration program that requires the registration of all diesel-fueled stationary and portable engines that are rated greater than 50 horsepower and used exclusively for agricultural purposes (SMAQMD 2018). Similarly, the San Joaquin Valley Air Pollution Control District requires operators of diesel-fueled engines rated at 50 horsepower and greater to secure permits (SJVAPCD 2015).

Based on calendar year 2020 emission factors from the California Emissions Estimator Model (^Trinity Consultants 2017), using an 84-horsepower (model default) diesel pump for 1 hour would generate 0.386 gram of reactive organic gas, 3.432 grams of CO, 3.219 grams of nitrogen oxide, 0.006 gram of sulfur dioxide, 0.189 gram of PM10, and 0.0189 gram of PM2.5. These emissions would occur locally at the pump source and are well below published air district thresholds. However, depending on the extent of groundwater pumping, multiple diesel-powered pumps could be operating simultaneously within an air district where the combined emissions level of all other groundwater pumping could exceed the applicable air district thresholds.

This impact would be potentially significant. To reduce potential air quality impacts from diesel pumps, entities undertaking or agencies approving these actions would need to implement Mitigation Measure MM-AQ-a–c, which includes provisions such as the use of energy-efficient pumps and equipment alternatives to diesel-fueled pumps, or replacement with electric pumps, that would mitigate criteria air pollutant emissions from groundwater pumping and groundwater storage and recovery activities. However, unless and until the mitigation is fully implemented, the impact remains potentially significant.

Operation of groundwater storage and recovery would not be expected to have air quality impacts beyond those described for groundwater well pumping. For passive groundwater storage, changing the timing and/or volume of water in existing canals and agricultural fields would not have the potential to generate air quality emissions. While some energy may be required as part of lift pumps and stations, the additional energy would not be beyond what is currently experienced when operating the canals. For injection wells, energy use for operation of well site equipment, including pumps, automatic valves, lighting, and chlorination facility, would also be small compared to the existing local electrical demand. Operation of equipment for passive and injection groundwater storage would not generate direct emissions because equipment would be powered by electricity, which would be generated at an existing power generation facility.

Emissions from the use of water transfers and water recycling would come from pumping and treatment facilities or sources that are already permitted, and thus, no new operational air quality emissions would be expected. As noted in Section 7.8, *Energy*, Impact EN-e, water transfers would require a similar amount of energy and associated emissions as water exports. Recycled water also replaces treated surface water or groundwater that typically requires more energy (and associated emissions) to procure and treat for use.

Water conservation involves actions that can be taken by municipal and agricultural users to conserve water such as meter use, using water-efficient landscaping and appliances, and implementing improvements to on-farm irrigation systems and water supply delivery systems (e.g., installation of integrated supervisory control and data acquisition systems and canal automation; increased use of pressurized, drip, or micro-spray irrigation methods; lining of canals or encasement/installation of underground pipes). (Construction-related air quality impacts from building or modifying facilities is evaluated in Section 7.22, *New or Modified Facilities*). The improvement of on-farm irrigation systems would result in more efficient use of existing pumps and infrastructure. The implementation of municipal water conservation measures (e.g.., low-flow appliances, efficient irrigation systems, xeriscaping) could lead to energy savings associated with reduced water treatment, municipal distribution, heating, and wastewater collection and treatment, resulting in reduced emissions (see Section 7.8, *Energy*, Impact EN-e). Therefore, water conservation could result in reduced pollutant emissions compared with baseline conditions, which would be beneficial.

The implementation of other water management actions may lead to increased maintenance activities associated with the use of existing facilities. These activities are anticipated to remain similar to baseline conditions, with no substantial change in emissions from equipment use, employees' activities, or vehicle travel. Some emissions may be generated from the maintenance of lift pumps and stations, but the additional emissions would not increase beyond what currently occurs. In addition, the maintenance of WWTPs and water recycling facilities may require a slight increase in chemical transport and storage, but because these facilities are typically within or adjacent to other similar facilities, the increase in emissions would be negligible compared with existing chemical transport and storage at these locations. Water transfers from groundwater substitution also could slightly increase emissions, but the use of existing facilities without substantial changes in maintenance activities would limit emissions. There would be no impact.

Impact AQ-d: Expose sensitive receptors to substantial pollutant concentrations

Changes in Hydrology

As discussed under Impacts AQ-a through AQ-c, changes in hydrology (flows and reservoir levels) may expose soils to wind events at certain times of the year when reservoir drawdown lowers water levels, resulting in windblown dust emissions. These effects are expected to be less than significant, and there is low probability that sensitive receptors (e.g., residences, hospitals, schools) would be in proximity to increased pollutant concentrations due to windblown dust from reservoir drawdown. This impact would be less than significant.

Changes in Water Supply

As discussed under Impacts AQ-a through AQ-c, changes in water supply may result in agricultural land fallowing, post-harvest rice burning, groundwater pumping, and the use of other water management actions resulting in localized fugitive dust and emissions (e.g., DPM).

Naturally occurring asbestos and Valley fever are endemic to areas within the study area (i.e., mountain counties and the Central Valley, respectively). The potential for exposure to Valley fever exists in agricultural areas, such as the southern portions of the San Joaquin Valley, where reported Valley fever cases have historically exceeded 10 per 100,000 people (CDPH 2016). Fallowed land could result in exposed soils and windblown fugitive dust, which could increase the likelihood of exposure to naturally occurring asbestos and Valley fever. However, some fallowed fields would retain crop stubble cover, ultimately experience regrowth, or both. The root material and regrowth would stabilize soils to some extent and reduce their potential for increased windblown erosion. Additionally, fallowing lands may result in a reduction in windblown dust because these lands would not be in active agricultural production, which includes substantial soil disturbance from tillage, crop harvesting, and other activities (see Section 7.9, *Geology and Soils*). Therefore, any potential for an increase in exposure to substantial pollutant concentrations would be minimal. Furthermore, the potential for sensitive receptors to be in proximity to fallowed land would be minimal. This impact would be less than significant.

The amount of pollutant emissions associated with post-harvest rice burning, groundwater pumping, and the use of other water management actions may vary depending on location and extent. While the precise location and magnitude of required emissions-generating activities is not known, and the resulting pollutant emissions cannot be determined with certainty at this time, any increase in emissions is likely to be minor given the limited and infrequent extent of the action. DPM emissions from diesel pumps would be generated only when pumps are in use. These emissions-generating activities would occur in or adjacent to agricultural lands, rural areas, or—in the case of municipal groundwater pumps, in areas with suitable land use designations and zoning for infrastructure (e.g., public facilities). Therefore, there is low probability that sensitive receptors (e.g., residences, hospitals, schools) would be in proximity to increased pollutant concentrations. This impact would be less than significant.

Impact AQ-e: Create objectionable odors affecting a substantial number of people

The generation and severity of odors depends on several factors, including the nature, frequency, and intensity of the source; wind direction; and the location of the receptor(s). Odors rarely cause physical harm but can be a nuisance, leading to complaints to regulatory agencies.

Changes in Hydrology

As discussed in Section 7.12.1, *Surface Water*, changes in hydrology could lead to reduced storage levels in some reservoirs; and reduced flow at some locations may increase the formation of HABs, which could produce odor compounds. HABs have been reported in multiple locations within the Sacramento River watershed and Delta eastside tributaries regions and are a statewide issue that exists independently of potential incremental effects from the proposed Plan amendments. Sensitive receptors are generally expected to be located more than 1,000 feet away from facilities, such as reservoirs, where HABs occur. Any associated odors would dissipate as a function of distance and are not anticipated to affect a substantial number of people (i.e., result in more than five odor complaints per year averaged over 5 years). In addition, the proposed Plan amendments would provide higher flushing flows in winter and spring that are expected to lead to reduced HABs in some areas. This impact would be less than significant.

Changes in Water Supply

WWTPs and water recycling facilities have been identified by CARB (2005) as being commonly associated with odors. Lower pipe velocities and longer detention times from reduced municipal supply and increased indoor water conservation could exacerbate odors at WWTPs, at water recycling facilities, and throughout sewer collection systems. In some situations, and under specific meteorological conditions, decreased discharge rates and longer effluent detention times could lead to temporary increases in objectionable odors that could affect certain individuals. WWTPs and water recycling facilities typically have odor management plans already in place as conditions of operation. Standard operating procedures for responding to odor complaints exist to further assist with determining whether actions such as increased maintenance are needed to reduce odors. Waste discharge permits also include provisions limiting objectionable odors such that they are not perceivable beyond a certain geographic area. As discussed in Section 7.20, *Utilities and Service Systems*, WWTPs and water recycling facilities generally undertake facility expansions, upgrades, and improvements in substantial increments in response to a variety of factors; and any changes in influent as a result of the proposed Plan amendments can be addressed in the overall context. It is unlikely that incremental change in WWTP processes would result in an increase of objectionable odor above baseline conditions that affect a substantial number of people.

In addition, increased use of recycled water from water recycling facilities would be conducted pursuant to the State Water Board's General Order for Water Reclamation Requirements for Recycled Water Use, which contains conditions, including maintaining dissolved oxygen in the wastewater, to minimize and eliminate odors (SWRCB 2016). Because recycled water is typically distributed to users in the service area for irrigation purposes, the extent of water treatment would vary depending on the ultimate use. For instance, recycled water delivered for agricultural purposes may not be treated to the same extent as potable water and may contain some residual odors.

However, sensitive receptors are generally located away from agricultural uses where the recycled water would be used. As such, it is unlikely that an incremental increase in the use of recycled water would result in an increase of objectionable odor above baseline conditions that affect a substantial number of people. This impact would be less than significant.

Changes in water supply could lead to increased groundwater pumping and other water management actions, such as groundwater storage and recovery. Groundwater pumping and groundwater storage and recovery are expected to require additional pumping, which would likely be powered by electric pumps because these pumps are cheaper and more efficient than diesel pumps for long-term use. However, a small portion of groundwater pumping may still use other fuels (e.g., diesel, gasoline). Odors could be emitted during the operation of groundwater wells, from the extraction of materials from wells during well sampling and from emissions from diesel equipment. The objectionable odors that could be produced would be temporary and localized to the well site. This impact would be less than significant.

7.5.4 Mitigation Measures

MM-AQ-a–c: Mitigate impacts from criteria air pollutant emissions from groundwater pumping

Water users who utilize increased use of groundwater pumping to replace surface water supplies and conduct groundwater storage and recovery operations should consider energy-efficient pumps and other equipment, including using alternatives to diesel-fueled pumps. Specific measures may include the following.

- Where feasible, use diesel pumps with engines meeting USEPA Tier 4 Final or better.
- Use electric, compressed natural gas, or other alternatively fueled pumps instead of the diesel counterparts, where available.

7.5.5 References Cited

7.5.5.1 Common References

^California Energy Commission (CEC). 2017a. *California Operational Power Plants January 2017*.

^Orloff, S., C. Brummer, and D. Putnam. 2015a. *Drought Tip: Managing Irrigated Pasture during Drought*. University of California Agriculture and Natural Resources Publication 8537. September.

^Orloff, S., D. Putnam, and K. Bali. 2015b. *Drought Tip: Drought Strategies for Alfalfa*. University of California Agriculture and Natural Resources Publication 8522.

^Trinity Consultants. 2017. *California Emissions Estimate Model. Appendix D: Default Tables.* October.

7.5.5.2 Section References

Bay Area Air Quality Management District (BAAQMD). 2017a. *Engineering Division Permit Handbook.*

Bay Area Air Quality Management District (BAAQMD). 2017b. *CEQA Guidelines.* May.

California Air Resources Board (CARB). 2005. *Air Quality and Land Use Handbook: A Community Health Perspective.* April.

California Air Resources Board (CARB). 2009. *Gaseous Criteria Pollutant Monitoring as of June 24, 2009.* June 24. Available: https://www.arb.ca.gov/aaqm/am_tables/criteria.htm. Accessed: August 3, 2017.

California Air Resources Board (CARB). 2011. *Particulate Matter Monitoring as of January 27, 2011.* January 27. Available: https://www.arb.ca.gov/aaqm/am_tables/partic.htm. Accessed: August 3, 2017.

California Air Resources Board (CARB). 2013. *Rice Straw Management.* February 22. Available: https://ww3.arb.ca.gov/smp/rice/rice.htm. Accessed: November 22, 2019.

California Air Resources Board (CARB). 2019. *Summaries of Historical Area Designations for State Standards.* July. Available: https://ww2.arb.ca.gov/our-work/programs/state-and-federal-area-designations/state-area-designations/summary-tables. Accessed: June 5 and June 9, 2020.

California Air Resources Board (CARB). 2023. *National Ambient Air Quality Standards.* April. Available: https://ww2.arb.ca.gov/resources/national-ambient-air-quality-standards. Accessed: April 18, 2023.

California Department of Conservation (DOC). 2000. *A General Location Guide for Ultramafic Rocks in California—Areas More Likely to Contain Naturally Occurring Asbestos.* August.

California Department of Public Health (CDPH). 2016. *Valley Fever Fact Sheet.* January.

California Rice (CalRice). 2014. *Air Quality.* n.d. Available: http://www.calricenews.org/air-quality/. Accessed: November 22, 2019.

Sacramento Metropolitan Air Quality Management District (SMAQMD). 2018. *Agricultural Operations and Air Quality Permits.* Available: http://www.airquality.org/Businesses/Permits-Registration-Programs/Ag-Operations. Accessed: January 30, 2018.

San Joaquin Valley Air Pollution Control District (SJVAPCD). 2015. *Permit Requirement Checklist.* May 12.

San Joaquin Valley Air Pollution Control District (SJVAPCD). 2016. *Chapter 2 Air Quality in the Valley: Challenges and Progress.* June 16.

State Water Resources Control Board (SWRCB). 2016. *Order WQ 2016-0068-DDW. Water Reclamation Requirements for Recycled Water Use.* June 7.

Trinity Consultants. 2017. Appendix D. Default Data Tables. Prepared for the California Air Pollution Control Officers Association. October.

U.S. Environmental Protection Agency (USEPA). 2017a. *Ozone Basics.* April 5. Available: https://www.epa.gov/ozone-pollution/ozone-basics. Accessed: August 2, 2017.

U.S. Environmental Protection Agency (USEPA). 2017b. *What are Hazardous Air Pollutants?* February 9. Available: https://www.epa.gov/haps/what-are-hazardous-air-pollutants. Accessed: August 2, 2017.

U.S. Environmental Protection Agency (USEPA). 2020. *Nonattainment Areas for Criteria Pollutants (Greenbook)*. February 13. Available: https://www.epa.gov/green-book. Accessed: May 31, 2020.