Chapter 23
Air Quality and Greenhouse Gases

This chapter describes the environmental setting and study area for air quality and greenhouse gases (GHGs); analyzes impacts that could result from construction, operation, and maintenance of the project; and provides mitigation measures to reduce the effects of potentially significant impacts. This chapter also analyzes the impacts that could result from implementation of compensatory mitigation required for the project, describes any additional mitigation necessary to reduce those impacts, and analyzes the impacts that could result from other mitigation measures associated with other resource chapters in this Draft Environmental Impact Report (Draft EIR).

23.0 Summary Comparison of Alternatives

Table 23-0 provides a summary comparison of impacts on air quality and GHGs by alternative. The table presents the CEQA findings after all mitigation is applied. If applicable, the table also presents quantitative results after all mitigation is applied. This table also provides information on the magnitude of the most pertinent and quantifiable impacts on air quality and GHGs that are expected to result from construction and operation and maintenance (O&M) of the alternatives. Impacts to consider are to the extent construction and maintenance emissions of ozone precursors and criteria pollutants exceed local air district thresholds, which are designed to achieve regional attainment with federal and state ambient air quality standards. Individuals residing near the water conveyance alignment may also be exposed to increased health risks from air pollution resulting from construction and O&M activities. The analysis also considers the extent to which project construction and long-term O&M, including changes in State Water Project (SWP) and Central Valley Project (CVP) pumping operations, would generate GHG emissions and contribute to global climate change.

23.0.1 Air Quality

Construction of any of the project alternatives would result in emissions of nitrogen oxides (NO_X) that would exceed Sacramento Metropolitan Air Quality Management District's (SMAQMD's), San Joaquin Valley Air Pollution Control District's (SJVAPCD's), and Bay Area Air Quality Management District's (BAAQMD's) thresholds (Figure 23-1 in Section 23.1.4, *Regional Climate and Meteorology*, displays the air district boundaries). Construction of any of the project alternatives would also exceed SMAQMD's daily threshold for particulate matter (PM) less than 10 microns in diameter (PM10), and Alternatives 2a and 4a would exceed SMAQMD's annual PM10 threshold. Construction of Alternative 5 would exceed SJVAPCD's PM10 threshold. None of the project alternatives would result in construction emissions above Yolo-Solano Air Quality Management District's (YSAQMD) thresholds.

The project would be built with feasible on-site environmental commitments to reduce emissions and minimize effects on air quality. Specifically, fugitive dust emissions would be reduced through implementation of a dust control plan (Environmental Commitment EC-11: *Fugitive Dust Control*) and best management practices at new concrete batch plants (Environmental Commitment EC-12: *On-Site Concrete Batching Plants*). Exhaust-related pollutants would be reduced through use of renewable diesel, Tier 4 diesel engines, newer on-road and marine engines, and other BMPs, as required by Environmental Commitments EC-7: *Off-Road Heavy-Duty Engines*, EC-8: *On-Road Haul Trucks*, EC-9: *On-Site Locomotives*, EC-10: *Marine Vessels*, and EC-13: *DWR Best Management Practices to Reduce GHG Emissions*. These environmental commitments would minimize air quality impacts through application of best available on-site controls to reduce construction emissions; however, even with these commitments, exceedances of air district thresholds would still occur, resulting in a significant impact before mitigation. DWR would implement mitigation measures to mitigate the remaining construction impact on air quality resources. Specifically, Mitigation Measures AQ-1, AQ-2, and AQ-3 would mitigate NO_X and PM10 emissions, as applicable, to below SMAQMD, SJVAPCD, and BAAQMD thresholds. Accordingly, the impact would be less than significant with mitigation.

Within the SMAQMD, the amount of construction effort, and thus construction emissions, for alternatives with the same project design capacity (i.e., cubic feet per second [cfs]) would be similar. Emissions levels among Alternatives 1, 3, and 5 (6,000 cfs), Alternatives 2b and 4b (3,000 cfs), Alternatives 2c and 4c (4,500 cfs), and Alternatives 2a and 4a (7,500 cfs) would therefore be comparable. Alternatives 2a and 4a would result in the greatest overall emissions primarily because these alternatives require construction of three intake facilities. In contrast, construction of Alternatives 2b and 4b, which includes only one intake, requires less earthmoving and heavy-duty equipment and vehicles, and thus generates fewer emissions.

Within the SJVAPCD, the amount of construction equipment and vehicles, and thus construction exhaust emissions (e.g., NO_X), would be greatest under Alternatives 2a and 4a. Compared to other alternatives, Alternatives 2a and 4a require more equipment and vehicles in the SJVAPCD because of the larger proposed tunnel and additional reusable tunnel material (RTM) that would be extracted and handled at the Bouldin Island or Lower Roberts Island shaft locations. While Alternatives 2a and 4a would generate greater amounts of combustion pollutants, fugitive dust emissions in the SJVAPCD would be highest under Alternative 5. This is because under Alternative 5, two launch shafts would be constructed at Lower Roberts Island, effectively doubling the amount of earthmoving and vehicles traveling on unpaved surfaces at this location, compared to all other proposed alternatives.

Within the BAAQMD, construction emissions would be highest under Alternatives 2a and 4a because these alternatives would construct an additional tunnel launch shaft adjacent to the Banks Pumping Plant.

Construction activities within the YSAQMD under all alternatives would be limited to employee travel and equipment and material hauling, resulting in combustion and dust emissions from on-road vehicles. Emissions levels would be similar among all project alternatives.

Construction of all alternatives would lead to new violations of the PM10 and PM less than 2.5 microns in diameter (PM2.5) national ambient air quality standards (NAAQS) and California ambient air quality standards (CAAQS), as well as potentially contribute to existing PM10 and PM2.5 violations through exceedances of the significant impact levels (SILs). Construction of Alternatives 1, 2a, 2b, and 2c would generate maximum nitrogen dioxide (NO_2) concentrations above the NAAQS. Environmental commitments would minimize localized air quality effects (EC-7 through EC-13), although emissions would still violate the ambient air quality standards and SILs. These environmental commitments represent all best available on-site controls to reduce construction emissions. Mitigation Measure AQ-5 requires additional studies, ambient air quality monitoring, and potentially corrective actions to reduce pollutant concentrations, as necessary. While Mitigation Measure AQ-5 would lower exposure to project-generated air pollution, it may not be feasible to eliminate all localized exceedances of the ambient quality standards and SILs. Accordingly, this impact is determined to be significant and unavoidable.

Diesel particulate matter (DPM) generated during construction of Alternatives 2a and 4a would expose three receptor locations north of Intake A to cancer risk above SMAQMD's threshold. Cancer and health hazards would be below all air district thresholds at all other receptor locations in the local air quality study area. DPM generated during construction of Intake A would be reduced through use of renewable diesel, Tier 4 diesel engines, newer on-road and marine engines, and other BMPs, as required by environmental commitments. Mitigation Measure AQ-6 offers affected receptors financial assistance for the installation of high-efficiency heating, ventilation, and air conditioning (HVAC) filters or relocation. If either option were accepted by homeowners, the impact would be reduced to less than significant. However, if homeowners reject DWR's assistance, the impact would be significant and unavoidable.

Long-term O&M of the project alternatives would not result in ozone precursor or criteria pollutant emissions above any air district thresholds. Localized criteria pollutant concentrations likewise would not cause or contribute to an ambient air quality violation. Mobile equipment and vehicles required for O&M would be used infrequently and would not expose receptors to substantial pollutant concentrations or result in significant cancer or noncancer health risks. Regular testing of stationary emergency generators would not result in health risk in excess of applicable local air district thresholds. In general, O&M and associated emissions would be comparable among all project alternatives.

There are no geologic features normally associated with naturally occurring asbestos (NOA) in or near the project area. As such, there is no potential for impacts related to NOA emissions during construction activities, and none of the project alternatives would expose sensitive receptors to substantial NOA concentrations. Construction contractors would be required to comply with existing asbestos rules and regulations, which require implementation of dust control measures to limit the potential for airborne asbestos. Asbestos-containing materials and lead-based paint may be found during demolition activities, although all project alternatives would comply with all National Emission Standards for Hazardous Air Pollutants regulations (Code of Federal Regulations, Title 40, Part 61, Subpart M). Similarly, implementation of all feasible dust control measures (EC-11) would minimize the risk of contracting Valley fever, if *Coccidioides immitis* fungus spores are present in the soil during earthmoving activities. While minor odors may be generated during construction and O&M, none of the project alternatives include substantial odor emitting facilities, such as wastewater treatment facilities, landfills, and refineries.

23.0.2 Greenhouse Gases

Construction of any of the project alternatives would result in an increase in GHG emissions. Land use changes resulting from construction activities and compensatory mitigation would alter existing GHG emissions and removals. Following construction, O&M activities and changes in CVP and SWP operational pumping would generate direct and indirect GHG emissions. These annual emissions would decline over time as improvements in engine technology and regulations to reduce combustion emissions reduce the carbon intensity of equipment, vehicles, and electricity generation.

GHG emissions generated by O&M and SWP pumping activities would not impede DWR's ability to achieve its GHG emissions reduction goals set forth in the *California Department of Water Resources Climate Action Plan Phase 1: Greenhouse Gas Emissions Reduction Plan Update 2020* (2020 Update). Total net additional emissions generated by project construction and displaced purchases of CVP electricity are estimated to be between 453,412 and 794,180 metric tons CO_2e, with Alternative 4a generating the most emissions, and Alternative 2b generating the least. These emissions exceed the net zero threshold adopted by DWR for the purposes of this analysis. Mitigation Measure AQ-9, *Develop and Implement a GHG Reduction Plan to Reduce GHG Emissions from Construction and Net CVP Operational Pumping to Net Zero* would mitigate these emissions to net zero through the development and implementation of a GHG mitigation program. Cumulative GHG emissions from land use change emissions under Alternatives 1, 2a, 2b, 2c, and 5 are projected to decrease relative to baseline and increase under Alternatives 3, 4a, 4b, and 4c. Implementing Mitigation Measure CMP would offset land use change emissions from construction of the eastern conveyance alignment alternatives through additional habitat creation. Accordingly, through a combination of project-specific mitigation and tiering from DWR's Update 2020, none of the project alternatives would result in a cumulatively significant GHG impact, nor would any alternative contribute to a cumulatively considerable impact on global climate change.

Table ES-2 in the Executive Summary provides a summary of all impacts disclosed in this chapter.

1 **Table 23-0. Comparison of Impacts on Air Quality and Greenhouse Gases by Alternative**

	Alternative								
Chapter 23 – Air Quality and Greenhouse Gases	1	2a	2b	2c	3	4a	4b	4c	5
Impact AQ-1: Result in Impacts on Regional Air Quality within the Sacramento Metropolitan Air Quality Management District	LTS	LTS	LTS	LTS	LTS	LTS	LTS	LTS	LTS
Max daily (lb) NO_X emissions from any construction year	697	1,072	559	729	694	1,042	609	700	591
Max daily (lb) NO_X emissions during O&M	27	30	26	27	27	30	26	27	27
Impact AQ-2: Result in Impacts on Regional Air Quality within the San Joaquin Valley Air Pollution Control District	LTS	LTS	LTS	LTS	LTS	LTS	LTS	LTS	LTS
Max average daily (lb) NO_X emissions from any construction year	185	267	152	161	212	273	162	177	200
Max daily (lb) NO_X emissions during O&M	1	1	1	1	1	1	1	1	1
Impact AQ-3: Result in Impacts on Regional Air Quality within the Bay Area Air Quality Management District	LTS	LTS	LTS	LTS	LTS	LTS	LTS	LTS	LTS
Max daily (lb) NO_X emissions from any construction year	266	283	224	216	280	280	241	211	255
Max daily (lb) NO_X emissions during O&M	40	41	40	40	40	41	40	40	40
Impact AQ-4: Result in Impacts on Air Quality within the Yolo-Solano Air Quality Management District	LTS	LTS	LTS	LTS	LTS	LTS	LTS	LTS	LTS
Max daily (lb) NO_X emissions from any construction year	1	1	1	1	1	1	1	1	1
Max daily (lb) NO_X emissions during O&M	5	5	5	5	5	5	5	5	5
Impact AQ-5: Result in Exposure of Sensitive Receptors to Substantial Localized Criteria Pollutant Emissions	SU	SU	SU	SU	SU	SU	SU	SU	SU
Max 24-hour PM10 concentration from construction of any location (μ/m^3)	87	86	87	86	111	111	110	110	111

	Alternative								
Chapter 23 – Air Quality and Greenhouse Gases	1	2a	2b	2c	3	4a	4b	4c	5
Impact AQ-6: Result in Exposure of Sensitive Receptors to Substantial Toxic Air Contaminant Emissions	LTS	SU	LTS	LTS	LTS	SU	LTS	LTS	LTS
Max additional cancer risk (per million) from construction of any location	8	26	4	8	8	26	4	8	8
Max additional cancer risk (per million) from standby engine generator testing	<1	<1	<1	<1	<1	<1	<1	<1	<1
Impact AQ-7: Result in Exposure of Sensitive Receptors to Asbestos, Lead-Based Paint, or Fungal Spores That Cause Valley Fever	LTS	LTS	LTS	LTS	LTS	LTS	LTS	LTS	LTS
Impact AQ-8: Result in Exposure of Sensitive Receptors to Substantial Odor Emissions	LTS	LTS	LTS	LTS	LTS	LTS	LTS	LTS	LTS
Impact AQ-9: Result in Impacts on Global Climate Change from Construction and O&M	LTS	LTS	LTS	LTS	LTS	LTS	LTS	LTS	LTS
Total net additional emissions (metric tons CO_2e) [a]	629,698	788,451	453,412	500,967	646,491	794,180	461,656	510,754	497,652
Impact AQ-10: Result in Impacts on Global Climate Change from Land Use Change	LTS	LTS	LTS	LTS	LTS	LTS	LTS	LTS	LTS
Cumulative net additional emissions (metric tons CO_2e) [b]	-8,502 to -15,790	-8,502 to -15,790	-8,502 to -15,790	-8,502 to -15,790	22,333 to 41,475	22,333 to 41,475	22,333 to 41,475	22,333 to 41,475	-16,235 to -30,150

LTS = less than significant; SU = significant and unavoidable; CO_2e = carbon dioxide equivalent; NO_X = nitrogen oxide; μ/m³ = micrograms per cubic meter.

[a] Net emissions from construction and displaced purchases of CVP electricity. Potential emissions from project-induced land use change assessed under Impact AQ-10.

[b] Cumulative sum of project land use emissions (including emissions associated with both new emissions and change in sequestration) minus the cumulative sum of the baseline scenario emissions and sequestration through 2070.

23.1 Environmental Setting

Air quality describes the amount of air pollution to which the public is exposed. GHGs are gaseous compounds that limit the transmission of Earth's radiated heat out to space. Air quality and GHGs are important considerations for the Delta Conveyance Project because current regional air quality conditions exceed certain federal and state ambient air quality standards and because GHGs generated by the alternatives may contribute to global climate change. Ambient air quality standards are established by the California Air Resources Board (CARB) and U.S. Environmental Protection Agency (EPA) to protect public health and welfare and the environment.

This chapter describes criteria pollutants and their precursors, toxic air contaminants (TACs), and GHGs that may be generated by the alternatives. It also defines global climate change and describes ambient air quality conditions, including regional meteorology, existing pollutant concentrations, and locations of sensitive receptors in the air quality study area. The chapter assesses the air quality and GHG impacts that would result from implementation of the alternatives and provides mitigation for significant impacts where feasible. The potential air quality and GHG effects of the project alternatives are evaluated quantitatively and qualitatively consistent with the approach described in Chapter 4, *Framework for the Environmental Analysis*. Appendices 23A through 23D present supporting data and calculations for the impact analysis presented in Section 23.3.3, *Impacts and Mitigation Approaches*.

Impacts on air quality and GHGs associated with induced growth, if any, are addressed in Chapter 31, *Growth Inducement*. Potential effects of climate change on specific resources (e.g., land use) are discussed qualitatively for applicable resource topics throughout this Draft Environmental Impact Report (Draft EIR). Resource chapters that rely on CalSim 3/Delta Simulation Model II (DSM2) modeling results address potential climate change and sea level rise for the No Project Alternative at 2040 and as part of the cumulative analysis. The ability for the alternatives to affect the resiliency and adaptability of the study area to the effects of climate change is described in Chapter 30, *Climate Change*.

Federal, state, and local regulations related to air quality and GHGs that would apply to the alternatives are discussed in Appendix 4A, *Potentially Relevant Laws, Regulations, and Programs*.

23.1.1 Study Area

The air quality study area encompasses the areas directly and indirectly affected by construction of the alternatives and O&M activities. Two geographic scales define the air quality study area—the *local* study area is the project footprint plus areas within 1,000 feet of the construction and operational fence line, and the *regional* study area is the affected air basins. The water conveyance alignments and primary haul routes are in the Sacramento Valley Air Basin (SVAB), San Joaquin Valley Air Basin (SJVAB), and San Francisco Bay Area Air Basin (SFBAAB). These air basins combined compose the regional study area.

Climate change is a global problem, and GHGs are global pollutants. Given the long atmospheric lifetimes of GHGs, the GHGs emitted by many sources worldwide accumulate in the atmosphere. No single emitter of GHGs is large enough to trigger global climate change on its own. Rather, climate change is the result of the individual contributions of countless past, present, and future sources.

Thus, GHG impacts are inherently cumulative, and the GHG study area includes the entire state and global atmosphere.

23.1.2 Pollutants of Concern

23.1.2.1 Criteria Pollutants

Criteria pollutants are a group of six common air pollutants for which the federal and state governments have set NAAQS and CAAQS, respectively (Table 23-1). Criteria pollutants are defined as ozone, carbon monoxide (CO), lead (Pb), nitrogen dioxide (NO_2), sulfur dioxide (SO_2), and particulate matter (PM), which consists of particulates 10 microns in diameter or less (PM10) and 2.5 microns in diameter or less (PM2.5). Ozone is considered a regional pollutant because its precursors affect air quality on a regional scale; NO_X and reactive organic gases (ROGs) react photochemically to form ozone, and this reaction occurs at some distance downwind of the emissions source. Pollutants such as CO, NO_2, SO_2, and Pb are considered local pollutants that tend to accumulate in the air locally. PM is both a local and regional pollutant.

Concentrations of criteria pollutants are commonly used indicators of ambient air quality for which acceptable levels of exposure can be determined. The ambient air quality standards for these pollutants are set with an adequate margin of safety for public health and the environment (Clean Air Act Section 109). Epidemiological, controlled human exposure, and toxicology studies evaluate potential health and environmental effects of criteria pollutants and form the scientific basis for new and revised ambient air quality standards.

Table 23-2 provides a brief description of sources and health effects of the six criteria pollutants. The primary criteria pollutants generated by the alternatives are ozone precursors (NO_X and ROG), CO, NO_2, SO_2, and PM.[1] Additional narrative on sources and health effects of these pollutants follows the table.

Table 23-1. Current Federal and State Ambient Air Quality Standards

		National Standards [a]	
Criteria Pollutant and Average Time	California Standards	Primary	Secondary
Ozone—1-hour	0.09 ppm	None [b]	None [b]
Ozone—8-hour	0.070 ppm	0.070 ppm	0.070 ppm
Particulate Matter (PM10)—24-hour	50 μg/m³	150 μg/m³	150 μg/m³
Particulate Matter (PM10)—Annual mean	20 μg/m³	None	None
Fine Particulate Matter (PM2.5)—24-hour	None	35 μg/m³	35 μg/m³
Fine Particulate Matter (PM2.5)—Annual mean	12 μg/m³	12.0 μg/m³	15 μg/m³
Carbon Monoxide—8-hour	9.0 ppm	9 ppm	None
Carbon Monoxide—1-hour	20 ppm	35 ppm	None
Nitrogen Dioxide—Annual mean	0.030 ppm	0.053 ppm	0.053 ppm
Nitrogen Dioxide—1-hour	0.18 ppm	0.100 ppm	None

[1] Pb is also a criteria pollutant, and there are state standards for sulfates, hydrogen sulfide, vinyl chloride, and visibility particulates. However, these pollutants are typically associated with industrial sources, which are not included as part of the project. Accordingly, they are not evaluated further.

Criteria Pollutant and Average Time	California Standards	National Standards [a]	
		Primary	Secondary
Sulfur Dioxide—Annual mean [c]	None	0.030 ppm	None
Sulfur Dioxide—24-hour [c]	0.04 ppm	0.014 ppm	None
Sulfur Dioxide—3-hour	None	None	0.5 ppm
Sulfur Dioxide—1-hour	0.25 ppm	0.075 ppm	None
Lead—30-day average	1.5 μg/m^3	None	None
Lead—Calendar quarter	None	1.5 μg/m^3	1.5 μg/m^3
Lead—3-month average	None	0.15 μg/m^3	0.15 μg/m^3
Sulfates—24-hour	25 μg/m^3	None	None
Visibility-Reducing Particles—8-hour	– [d]	None	None
Hydrogen Sulfide—1-hour	0.03 ppm	None	None
Vinyl Chloride—24-hour	0.01 ppm	None	None

Source: California Air Resources Board 2016.

ppm= parts per million; μg/m^3 = micrograms per cubic meter; NAAQS = national ambient air quality standards; SO_2 = sulfur dioxide; CAAQS = California ambient air quality standards.

[a] National standards are divided into primary and secondary standards. Primary standards are intended to protect public health, whereas secondary standards are intended to protect public welfare and the environment.

[b] The federal 1-hour standard of 12 parts per hundred million was in effect from 1979 through June 15, 2005. The revoked standard is referenced because it was employed for such a long period and is a benchmark for state implementation plans.

[c] The annual and 24-hour NAAQS for SO_2 only apply for 1 year after designation of the new 1-hour standard to those areas that were previously in nonattainment for 24-hour and annual NAAQS.

[d] CAAQS for visibility-reducing particles is defined by an extinction coefficient of 0.23 per kilometer – visibility of 10 miles or more due to particles when relative humidity is less than 70%.

Table 23-2. Sources and Potential Health and Environmental Effects of Criteria Pollutants

Pollutant	Primary Sources	Potential Effects
Ozone (O_3)	Formed by a chemical reaction between ROG and NO_X in the presence of sunlight. Primary sources of ROG and NO_X are vehicle exhaust, industrial combustion, gasoline storage and transport, solvents, paints, and landfills.	Inflammation of the mucous membranes and lung airways; wheezing; coughing and pain when inhaling deeply; decreased lung capacity; aggravation of lung and heart problems. Reduced crop yield and damage to plants, rubber, some textiles, and dyes.
Particulate matter (PM)	Power plants, steel mills, chemical plants, unpaved roads and parking lots, wood-burning stoves and fireplaces, and automobiles.	Irritation of the airways, coughing, or difficulty breathing; aggravated asthma; development of chronic bronchitis; irregular heartbeat; nonfatal heart attacks; and premature death in people with heart or lung disease. Impairs visibility (haze).
Carbon monoxide (CO)	A component of motor vehicle exhaust that is formed when carbon in fuel is not burned completely.	Reduced ability of blood to deliver oxygen to vital tissues, affecting the cardiovascular and nervous system. Impaired vision and dizziness that can lead to unconsciousness or death.

Pollutant	Primary Sources	Potential Effects
Nitrogen dioxide (NO_2)	Motor vehicles, electric utilities, and other sources that burn fuel.	Aggravation of lung and heart problems. Precursor to ozone and acid rain. Contributes to global warming and nutrient overloading, which deteriorates water quality. Brown discoloration of the atmosphere.
Sulfur dioxide (SO_2)	Petroleum refineries, cement manufacturing, metal processing facilities, locomotives, large ships, and fuel combustion in diesel engines.	Aggravation of lung and heart problems. Converts to sulfuric acid, which can damage marble, iron, and steel. Damage to crops and natural vegetation. Impaired visibility.
Lead (Pb)	Metal refineries, smelters, battery manufacturers, iron and steel producers, use of leaded fuels by racing and aircraft industries.	Anemia; damage to the kidneys, liver, brain, reproductive and nervous systems, and other organs; and neurological problems, including learning deficits and lowered IQ. Affects animals, plants, and aquatic ecosystems.

Source: California Air Pollution Control Officers Association n.d.

Ozone

Ozone, or smog, is a photochemical oxidant that is formed when ROGs and NO_X (both by-products of the internal combustion engine) react with sunlight. ROGs are compounds made up primarily of hydrogen and carbon atoms. Internal combustion associated with motor vehicle usage is the major source of hydrocarbons. Other sources of ROGs are emissions associated with the use of paints and solvents, the application of asphalt paving, and the use of household consumer products such as aerosols. The two major forms of NO_X are nitric oxide (NO) and NO_2. NO is a colorless, odorless gas formed from atmospheric nitrogen and oxygen when combustion takes place under high temperature and/or high pressure. NO_2 is a reddish-brown irritating gas formed by the combination of NO and oxygen. In addition to serving as an integral participant in ozone formation, NO_X also directly acts as an acute respiratory irritant and increases susceptibility to respiratory pathogens by impairing the immune system.

Ozone poses a higher risk to those who already suffer from respiratory diseases (e.g., asthma), children, older adults, and people who are active outdoors. Exposure to ozone at certain concentrations can make breathing more difficult, cause shortness of breath and coughing, inflame and damage the airways, aggravate lung diseases, increase the frequency of asthma attacks, and cause chronic obstructive pulmonary disease. Studies show associations between short-term ozone exposure and nonaccidental mortality, including deaths from respiratory issues. Studies also suggest long-term exposure to ozone may increase the risk of respiratory-related deaths (U.S. Environmental Protection Agency 2019). The concentration of ozone at which health effects are observed depends on an individual's sensitivity, level of exertion (i.e., breathing rate), and duration of exposure. Studies show large individual differences in the intensity of symptomatic responses, with one study finding no symptoms to the least responsive individual after a 2-hour exposure to 400 parts per billion of ozone and a 50% decrease in forced airway volume in the most responsive individual. Although the results vary, evidence suggests that sensitive populations (e.g., asthmatics) may be affected on days when the 8-hour maximum ozone concentration reaches 80 parts per billion (U.S. Environmental Protection Agency 2016). In addition to human health effects, ozone has been tied to crop damage, typically in the form of stunted growth, leaf discoloration, cell damage, and premature death (U.S. Environmental Protection Agency 2021a).

Carbon Monoxide

CO is a colorless, odorless, toxic gas produced by incomplete combustion of carbon substances, such as gasoline or diesel fuel. In the study area, high CO levels are of greatest concern during the winter, when periods of light winds combine with the formation of ground-level temperature inversions from evening through early morning. These conditions trap pollutants near the ground, reducing the dispersion of vehicle emissions. Moreover, motor vehicles exhibit increased CO emissions rates at low air temperatures. The primary adverse health effect associated with CO is interference with normal oxygen transfer to the blood, which may result in tissue oxygen deprivation. Exposure to CO at high concentrations can also cause fatigue, headaches, confusion, dizziness, and chest pain (California Air Resources Board 2020a).

There are no ecological or environmental effects from ambient CO (California Air Resources Board 2020a).

Nitrogen Dioxide

NO_2 can be directly emitted from combustion sources, such as boilers, gas turbines, and mobile and stationary reciprocating internal combustion engines. Much of the NO_2 in the ambient air, however, is photochemically formed by the combination of NO and other air pollutants. For this reason, NO_2 levels can vary depending on direct emissions levels and changes in atmospheric conditions, particularly the amount of sunlight.

A large body of scientific literature suggests that NO_2 exposure can intensify responses to allergens in asthmatics. Epidemiological studies have also demonstrated an association between NO_2 and premature death, cardiopulmonary effects, decreased lung-function growth in children, respiratory symptoms, emergency room visits for asthma, and intensified allergic responses. Like other pollutants, children and individuals with underlying respiratory conditions (e.g., asthma) are at greater risk of experiencing significant impacts following exposure to NO_2 (California Air Resources Board 2020b).

In addition to potential human health impacts, NO_2 can reduce visibility. High NO_2 concentrations (greater than 0.2 parts per million [ppm]) over prolonged periods (100 hours or more) have also been reported to injure crops (California Air Resources Board 2020b).

Sulfur Dioxide

SO_2 is generated by burning fossil fuels, industrial processes, and natural sources, such as volcanoes. The major adverse health effects associated with SO_2 exposure pertain to the upper respiratory tract. Controlled human and epidemiological studies show that exposure to SO_2 near the 1-hour NAAQS of 0.075 ppm can result in asthma exacerbation, including bronchoconstriction accompanied by symptoms of respiratory irritation such as wheezing, shortness of breath, and chest tightness. These symptoms can be more pronounced during exercise or physical activity. Exposure at elevated levels of SO_2 (above 1 ppm) may result in increased incidence of pulmonary symptoms and disease, decreased pulmonary function, and increased risk of mortality, especially among the elderly and people with cardiovascular disease or chronic lung disease (California Air Resources Board 2020c).

In addition to potential human health impacts, SO_2 deposition contributes to soil and surface water acidification and acid rain (California Air Resources Board 2020c).

Particulate Matter

PM pollution consists of very small liquid and solid particles floating in the air, which can include smoke, soot, dust, salts, acids, and metals. PM that is less than 10 microns in diameter, about 1/7th the thickness of a human hair, is referred to as PM10. Particulate matter that is 2.5 microns or less in diameter, roughly 1/28th the diameter of a human hair, is referred to as PM2.5. Major sources of PM10 include motor vehicles; wood-burning stoves and fireplaces; dust from construction, landfills, and agriculture; wildfires and brush/waste burning; industrial sources; windblown dust from open lands; and atmospheric chemical and photochemical reactions. PM2.5 results from fuel combustion (from motor vehicles, power generation, and industrial facilities), residential fireplaces, and wood stoves. Particulate matter also forms when gases emitted from industries and motor vehicles, such as SO_2, NO_X, and ROG, undergo chemical reactions in the atmosphere.

Particulate pollution can be transported over long distances and may adversely affect the human respiratory system, especially for people who are naturally sensitive or susceptible to breathing problems. Numerous studies have linked PM exposure to premature death in people with preexisting heart or lung disease, nonfatal heart attacks, irregular heartbeat, aggravated asthma, decreased lung function, and increased respiratory symptoms. In 2008, CARB estimated that annual PM2.5 emissions for the entire Sacramento metropolitan area[2] cause 90 premature deaths, 20 hospital admissions, 1,200 asthma and lower respiratory symptom cases, 110 acute bronchitis cases, 7,900 lost workdays, and 42,000 minor restricted activity days (Sacramento Metropolitan Air Quality Management District et al. 2013:1–2). Studies in the San Francisco Bay Area (Bay Area) have shown that every 1 microgram per cubic meter reduction in PM2.5 results in a 1% reduction in mortality rate for individuals over 30 years old (Bay Area Air Quality Management District 2017a:C-6–C-7).

Depending on their composition, both PM10 and PM2.5 can also affect water quality and acidity, deplete soil nutrients, damage sensitive forests and crops, affect ecosystem diversity, and contribute to acid rain (U.S. Environmental Protection Agency 2020).

23.1.2.2 Toxic Air Contaminants

Although NAAQS and CAAQS have been established for criteria pollutants, no ambient standards exist for TACs. Many pollutants are identified as TACs because of their potential to increase the risk of developing cancer or because of their acute or chronic health risks. For TACs that are known or suspected carcinogens, CARB has consistently found that there are no levels or thresholds below which exposure is risk-free. Individual TACs vary greatly in the risks they present. At a given level of exposure, one TAC may pose a hazard that is many times greater than another. TACs are identified and their toxicity is studied by the California Office of Environmental Health Hazard Assessment (OEHHA). The primary TACs of concern associated with the Delta Conveyance Project alternatives are diesel particulate matter (DPM) and asbestos.

DPM is generated by diesel-fueled equipment and vehicles. CARB estimates that DPM emissions are responsible for about 70% of the total ambient air toxics risk (California Air Resources Board 2000:8). Within the Bay Area, studies have found that of all controlled TACs, emissions of DPM are responsible for about 82% of the total ambient cancer risk (Bay Area Air Quality Management

[2] Sacramento metropolitan area includes Sacramento and Yolo Counties and portions of Placer, Solano, and El Dorado Counties.

District 2017a:2-21). Short-term exposure to DPM can cause acute irritation (e.g., eye, throat, and bronchial), neurophysiological symptoms (e.g., lightheadedness, nausea), and respiratory symptoms (e.g., coughing, phlegm). The International Agency for Research on Cancer (2012:1) has classified diesel engine exhaust as "carcinogenic to humans, based on sufficient evidence that exposure is associated with an increased risk for lung cancer."

Asbestos is the name given to several naturally occurring fibrous silicate minerals. Before the adverse health effects of asbestos were identified, asbestos was widely used as insulation and fireproofing in buildings, and it can still be found in some older buildings. It is also found in its natural state in ultramafic rock (i.e., igneous and metamorphic rock with low silica content) that has undergone partial or complete alteration to serpentine rock (or serpentinite) and often contains chrysotile asbestos. The inhalation of asbestos fibers into the lungs can result in a variety of adverse health effects, including inflammation of the lungs, respiratory ailments (e.g., asbestosis, which is scarring of lung tissue that results in constricted breathing), and cancer (e.g., lung cancer and mesothelioma, which is cancer of the linings of the lungs and abdomen) (U.S. Environmental Protection Agency 2018a). According to the California Department of Conservation (2000:1-7), naturally occurring asbestos (NOA) is not found along the water conveyance alignments.

23.1.2.3 Valley Fever

Valley fever, also called coccidioidomycosis, is not an air pollutant, but a disease caused by inhaling *Coccidioides immitis* (*C. immitis*) fungus spores. The spores are found in certain types of soil and become airborne when the soil is disturbed. After the fungal spores have settled in the lungs, they change into a multicellular structure called a spherule. Valley fever symptoms generally occur within 2 to 3 weeks of exposure. Approximately 60% of Valley fever cases are mild and display flu-like symptoms or no symptoms at all. Among those who are exposed and seek medical treatment, the most common symptoms are fatigue, cough, chest pain, fever, rash, headache, and joint aches. While *C. immitis* is not typically found in the Sacramento area or Bay Area, the fungus is endemic to the Central Valley (U.S. Geological Survey 2000:3).

23.1.2.4 Greenhouse Gases

The principle anthropogenic (human-made) GHGs contributing to global warming are carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), and fluorinated compounds, including sulfur hexafluoride (SF_6), hydrofluorocarbons (HFCs), and perfluorocarbons (PFCs). Water vapor, the most abundant GHG, is not included in this list because its natural concentrations and fluctuations far outweigh its anthropogenic sources.

The primary GHGs of concern associated with the alternatives are CO_2, CH_4, N_2O, HFCs, and SF_6. Principal characteristics of these pollutants are discussed in the following sections. Note that PFCs are not discussed because these gases are primarily generated by industrial and manufacturing processes, which are not anticipated as part of the project.

Methods have been set forth to describe emissions of GHGs in terms of a single gas to simplify reporting and analysis. The most accepted method to compare GHG emissions is the global warming potential (GWP) methodology defined in Intergovernmental Panel on Climate Change (IPCC) reference documents. IPCC defines the GWP of various GHG emissions on a normalized scale that recasts all GHG emissions in terms of carbon dioxide equivalent (CO_2e), which compares the gas in question to that of the same mass of CO_2 (CO_2 has a GWP of 1 by definition).

Table 23-3 lists the GWP of CO_2, CH_4, N_2O, SF_6, and HFCs and their lifetimes in the atmosphere. The GWPs are from the IPCC's fourth assessment report, consistent with statewide GHG emissions reporting protocol (California Air Resources Board 2020d).

Table 23-3. Lifetimes and Global Warming Potentials of Key Greenhouse Gases

Greenhouse Gas	Global Warming Potential (100 years)	Lifetime (years)
CO_2	1	–
CH_4	25	12
N_2O	298	114
SF_6	22,800	3,200
HFCs	124 to 14,800	1 to 270

Source: California Air Resources Board 2020d.
CH_4 = methane; CO_2 = carbon dioxide; N_2O = nitrous oxide; SF_6 = sulfur hexafluoride; HFCs = hydrofluorocarbons.

All GWPs used for CARB's GHG inventory, and to assess attainment of the state's GHG reduction targets, are considered over a 100-year timeframe (as shown in Table 23-3). However, CARB recognizes the importance of short-lived climate pollutants (SLCPs) and reducing these emissions to achieve the State's overall climate change goals. SLCPs have atmospheric lifetimes on the order of a few days to a few decades, and their relative climate forcing impacts, when measured in terms of how they heat the atmosphere, can be tens, hundreds, or even thousands of times greater than that of CO_2 (California Air Resources Board 2017:36). Recognizing their short-term lifespan and warming impact, SLCPs are measured in terms of CO_2e using a 20-year time period. The use of GWPs with a time horizon of 20 years better captures the importance of the SLCPs and gives a better perspective on the speed at which SLCP emissions controls will affect the atmosphere relative to CO_2 emissions controls. The SLCP Reduction Strategy addresses the three primary SLCPs—CH_4, hydrofluorocarbon gases, and anthropogenic black carbon. Methane has a lifetime of 12 years and a 20-year GWP of 72. Hydrofluorocarbon gases have lifetimes of 1.4 to 52 years and 20-year GWPs of 437 to 6,350. Anthropogenic black carbon has a lifetime of a few days to weeks and a 20-year GWP of 3,200 (California Air Resources Board 2017:40).

Carbon Dioxide

CO_2 accounts for more than 80% of all GHG emissions emitted in California (California Air Resources Board 2020e). CO_2 enters the atmosphere through fossil fuels (oil, natural gas, and coal) combustion, solid waste decomposition, plant and animal respiration, and chemical reactions (e.g., manufacture of cement). CO_2 is also removed from the atmosphere (or "sequestered") when it is absorbed by plants as part of the biological carbon cycle.

Methane

CH_4, the main component of natural gas, is the second most abundant GHG and has a GWP of 25 (California Air Resources Board 2020e). Sources of anthropogenic emissions of CH_4 include growing rice, raising cattle, using natural gas, landfill outgassing, and mining coal. Certain land uses also function as both a source and sink for CH_4. For example, wetlands are a terrestrial source of CH_4, whereas undisturbed, aerobic soils act as a CH_4 sink (i.e., they remove CH_4 from the atmosphere).

Nitrous Oxide

Anthropogenic sources of N_2O include agricultural processes (e.g., fertilizer application), nylon production, fuel-fired power plants, nitric acid production, and vehicle emissions. N_2O also is used in rocket engines, racecars, and as an aerosol spray propellant. Natural processes, such as nitrification and denitrification, can also produce N_2O, which can be released to the atmosphere by diffusion.

Sulfur Hexafluoride

SF_6, a human-made chemical, is used as an electrical insulating fluid for power distribution equipment, in the magnesium industry, in semiconductor manufacturing, and also as a tracer chemical for the study of oceanic and atmospheric processes. SF_6 is a powerful GHG with a GWP of 22,800 (California Air Resources Board 2020d). Because SF_6 is a human-made chemical, it did not exist in the atmosphere before the twentieth century.

Hydrofluorocarbons

HFCs are human-made chemicals used in commercial, industrial, and consumer products and have high GWPs. HFCs are generally used as substitutes for ozone-depleting substances in automobile air conditioners and refrigerants. Within the transportation sector, HFCs from refrigeration and air conditioning units represented about 3% of total on-road emissions in California in 2017 (California Air Resources Board 2019a:1).

23.1.3 Global Climate Change

The process known as the *greenhouse effect* keeps the atmosphere near Earth's surface warm enough for the successful habitation of humans and other life forms. The greenhouse effect is created by sunlight that passes through the atmosphere. Some of the sunlight striking Earth is absorbed and converted to heat, which warms the surface. The surface emits a portion of this heat as infrared radiation, some of which is re-emitted back toward the surface by GHGs in the atmosphere, and some of which results in warming of the atmosphere. Human activities that generate GHGs increase the amount of infrared radiation absorbed by the atmosphere, thus enhancing the greenhouse effect, and amplifying the warming of Earth.

Increases in fossil-fuel combustion and deforestation have exponentially increased concentrations of GHGs in the atmosphere since the Industrial Revolution (Intergovernmental Panel on Climate Change 2018:4). Rising atmospheric concentrations of GHGs in excess of natural levels result in increasing global surface temperatures—a process commonly referred to as *global warming*. Higher global surface temperatures, in turn, result in changes to Earth's climate system, including increased ocean temperature and acidity, reduced sea ice, variable precipitation, and increased frequency and intensity of extreme weather events (Intergovernmental Panel on Climate Change 2018:7–10). Large-scale changes to Earth's system are collectively referred to as *climate change.*

The IPCC was established by the World Meteorological Organization and United Nations Environment Programme to assess scientific, technical, and socioeconomic information relevant to understanding climate change, its potential impacts, and options for adaptation and mitigation. The IPCC estimates that human-induced warming reached approximately 1 degree Celsius (°C) above preindustrial levels in 2017, increasing at 0.2°C per decade. Under the current nationally determined contributions of mitigation from each country until 2030, global warming is expected to rise 3°C by 2100, with warming to continue afterward (Intergovernmental Panel on Climate Change

2018:4). Large increases in global temperatures could have substantial significant impacts on the natural and human environments worldwide and in California.

As discussed above, this chapter addresses the potential GHG emissions of the project alternatives. A more extensive discussion of climate change and how the alternatives affect the study area's resiliency to expected changes in climate can be found in Chapter 30, *Climate Change*. Each resource chapter evaluates how the alternatives would affect the specific resource in question. Climate change is integrated into the analysis in Appendix 3C, *Defining Existing Conditions, No Project Alternative, and Cumulative Impact Conditions* and Appendix 3D, *2070 Analysis*, where the effects of the alternatives are analyzed at future time periods. In these analyses, the alternatives are evaluated using a projection of future climate that includes changes in temperature, precipitation, humidity, hydrology, and sea level rise.

23.1.4 Regional Climate and Meteorology

The primary factors that determine air quality are the locations of air pollutant sources and the amount of pollutants emitted from those sources. Meteorological and topographical conditions are also important—atmospheric conditions, such as wind speed, wind direction, and air temperature gradients interact with the physical features of the landscape to determine the movement and dispersal of air pollutants. Land use and land management also contribute to microclimates through the absorption and emissions of GHGs.

California is divided into 15 air basins based on geographic features that create distinctive regional climates. As noted in Section 23.1.1, *Study Area*, the regional air quality study area includes the SVAB, SJVAB, and SFBAAB. The following section discusses climate and meteorological information associated with these three air basins. Figure 23-1 illustrates the three air basins in the regional study area. The figure also shows the boundaries for the four relevant air districts, as discussed above. Footprints for Alternatives 2a (central alignment), 4b (eastern alignment), and 5 (Bethany Reservoir alignment) are shown for reference.

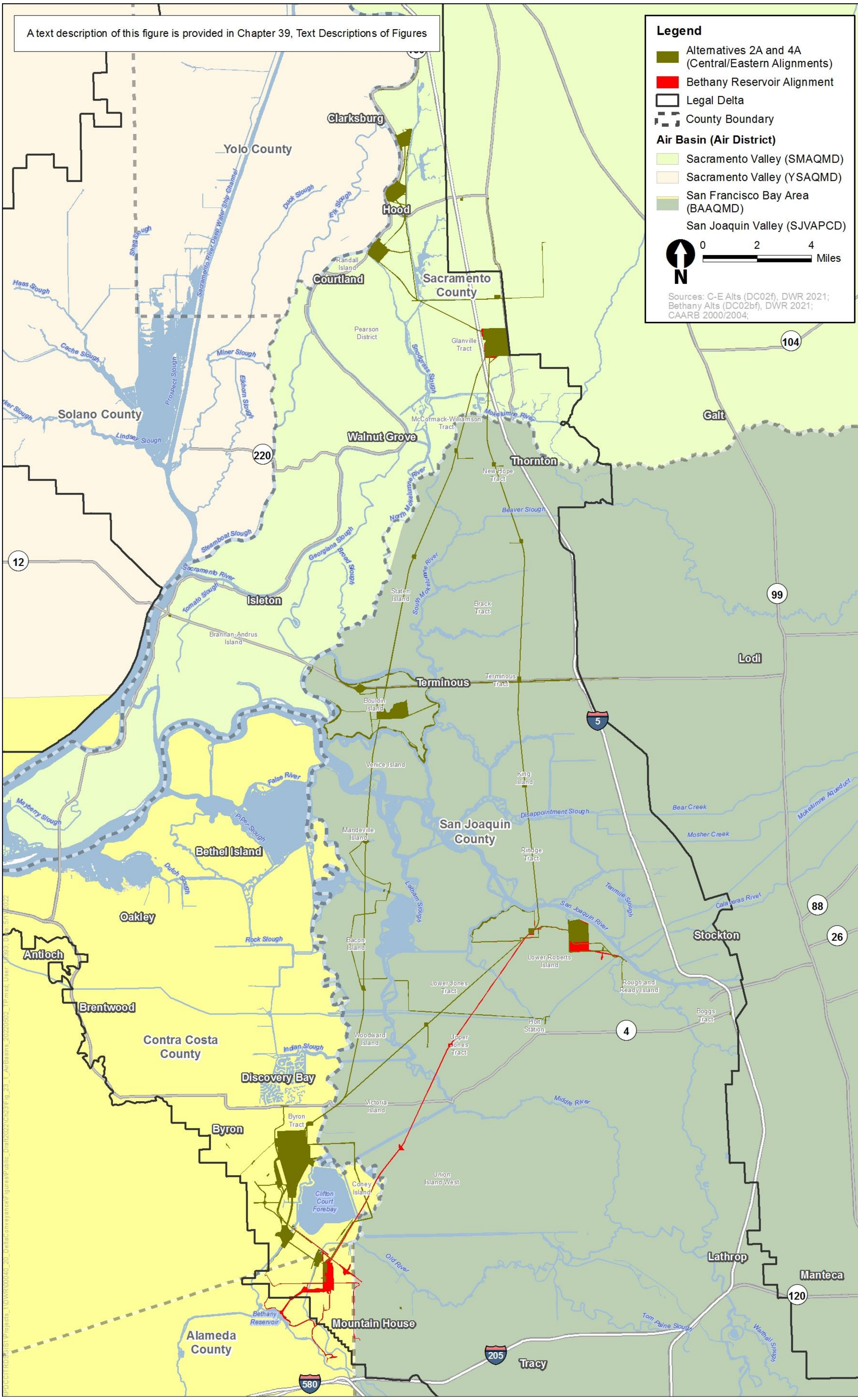

Figure 23-1. Air Basins and Air Districts in the Regional Air Quality Study Area

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23.1.4.1 Sacramento Valley Air Basin

The SVAB is bounded on the north by the Cascade Range, on the south by the SJVAB, on the east by the Sierra Nevada, and on the west by the Coast Ranges. The SVAB contains all of Tehama, Glenn, Butte, Colusa, Yolo, Sutter, Yuba, Sacramento, and Shasta Counties, as well as portions of Solano and Placer Counties (17 California Code of Regulations [Cal. Code Regs.] § 60106).

The SVAB has a Mediterranean climate characterized by hot, dry summers and cool, rainy winters. During winter, the north Pacific storm track intermittently dominates Sacramento Valley weather, and fair-weather alternates with periods of extensive clouds and precipitation. Periods of dense and persistent low-level fog, which is most prevalent between storms, are also characteristic of winter weather in the valley. The frequency and persistence of heavy fog in the valley diminish with the approach of spring. The average yearly temperature range for the Sacramento Valley is 20 degrees Fahrenheit (°F) to 115°F, with summer high temperatures often exceeding 90°F and winter low temperatures occasionally dropping below freezing.

In general, the prevailing winds are moderate in strength and vary from moist clean breezes from the south to dry land flows from the north. The mountains surrounding the SVAB create a barrier to airflow that can trap air pollutants under certain meteorological conditions. The highest frequency of air stagnation occurs in the autumn and early winter when large high-pressure cells collect over the Sacramento Valley. The lack of surface wind during these periods and the reduced vertical flow caused by less surface heating reduces the influx of outside air and allows air pollutants to become concentrated in a stable volume of air. The surface concentrations of pollutants are highest when these conditions are combined with temperature inversions (warm air over cool air), which trap pollutants near the ground.

The ozone season (May through October) in the Sacramento Valley is characterized by stagnant morning air or light winds with the Delta sea breeze arriving in the afternoon out of the southwest. Usually, the evening breeze transports the airborne pollutants to the north out of the Sacramento Valley. During about half of the days from July to September, however, a phenomenon called the Schultz eddy prevents this from occurring. Instead of allowing the prevailing wind patterns to move north carrying the pollutants out, the Schultz eddy causes the wind pattern to circle back to the south. Essentially, this phenomenon causes the air pollutants to be blown south toward the Sacramento Valley and Yolo County. This phenomenon has the effect of exacerbating the pollution levels in the area and increases the likelihood of violating federal or state standards. The Schultz eddy normally dissipates around noon when the Delta sea breeze arrives (Yolo-Solano Air Quality Management District 2007:A-1).

23.1.4.2 San Joaquin Valley Air Basin

The SJVAB is bounded by the Sierra Nevada to the east, the Coast Ranges to the west, the SVAB to the north, and the Tehachapi Mountains to the south. The SJVAB contains all of San Joaquin, Stanislaus, Merced, Madera, Fresno, Kings, and Tulare Counties, as well as a portion of Kern County (17 Cal. Code Regs. § 60107).

Like the SVAB, the SJVAB has a Mediterranean climate that is characterized by hot, dry summers and cool, rainy winters. Summer high temperatures often exceed 100°F. During the summer, winds in the SJVAB most frequently blow from the northwesterly direction. Although marine air generally flows into the basin from the Delta, the surrounding mountain ranges restrict air movement through and out of the valley. Several days in the winter are marked by stagnation events during which winds are weak and transport of pollutants is limited.

The vertical dispersion of air pollutants in the SJVAB is limited by the presence of persistent temperature inversion. Due to differences in air density, the air above and below the inversion do not mix. Air pollutants tend to collect under an inversion, leading to higher concentrations of emitted pollutants. Precipitation and fog tend to reduce some pollutant concentrations, but atmospheric moisture can also increase pollution levels, including particulate matter. Because wintertime conditions are favorable to fog formation, PM concentrations tend to be greatest during the winter. Conversely, ozone needs sunlight for its formation, and clouds and fog block the required radiation. Accordingly, ozone levels are generally greatest in the summer and typically peak in the afternoon (San Joaquin Valley Air Pollution Control District 2015a:15–19).

23.1.4.3 San Francisco Bay Area Air Basin

The SFBAAB contains all of Napa, Contra Costa, Alameda, Santa Clara, San Mateo, San Francisco, and Marin Counties, as well as portions of Sonoma and Solano Counties (17 Cal. Code Regs. § 60101). Climate within the SFBAAB is characterized by moderately wet winters and dry summers. Winter rains, which occur in the months of December through March, account for about 75% of the average annual rainfall.

Climate is affected by marine air flow and the basin's proximity to the San Francisco Bay Area. Bay breezes push air onshore during the daytime and draw air offshore at night. During the summer months, the bay helps to cool the warm onshore flows, while it warms the air during the winter months. This mediating effect keeps temperatures relatively consistent throughout the year. In the easternmost portion of the SFBAAB where the Clifton Court Forebay is located, the bay wind patterns can concentrate and carry air pollutants from other cities to the region, adding to the mix of pollutants that are emitted locally (Bay Area Air Quality Management District 2017b:C-1–C-12).

23.1.5 Existing Air Quality Conditions

23.1.5.1 Ambient Criteria Pollutant Concentrations

The existing conditions in the air quality study area can be characterized by regional monitoring data. CARB collects ambient air quality data through a network of air monitoring stations throughout the state.[3] Three stations, one in each air basin closest to the project footprint, were selected for this analysis: Sacramento T Street (SVAB), Stockton-Hazelton Street (SJVAB), and Bethel Island Road (SFBAAB). These stations were selected from the available CARB monitoring network based on their proximity to the project footprint. The stations are about 7, 8, and 5 miles, respectively, to the nearest point along the conveyance alignment. The Sacramento T Street and Stockton-Hazelton Street stations are in downtown Sacramento and Stockton, respectively, and as

[3] A citizen air quality monitoring network (purpleair.com) has been installed gradually throughout the project area, which could be used to establish background concentrations. However, the instrumentation used in this citizen air quality monitoring network includes low-cost sensors that have significant uncertainty in their accuracy. Moreover, these low-cost sensors do not comply with the Federal Reference Method (FRM) or equivalent Federal Equivalent Method (FEM), which are used by the local and regional air districts for CAAQS and NAAQS monitoring and attainment. Comparative analysis of Purple Air monitoring stations in the vicinity of the project to air district-approved monitoring stations confirms that the air district stations are a more conservative choice to use in representing background concentrations over the more rural citizen air quality monitoring stations (ICF 2022).

such, monitored pollutant concentrations are influenced by urban emissions sources (e.g., congested vehicles, buildings). Data from these stations are therefore more representative of existing conditions in portions of the study area nearest to cities and roadways. Emissions sources along more rural parts of the study area in Sacramento and San Joaquin counties (e.g., through the Delta) are much less concentrated, and as such, monitored pollutant concentrations from the Sacramento T Street and Stockton-Hazelton Street provide a conservative representation of ambient conditions (ICF 2022).

Table 23-4 presents the results of the ambient monitoring at the three stations, where available, for the most recent 3 years (2018–2020). Air quality concentrations are expressed in terms of ppm or micrograms per cubic meter ($\mu g/m^3$). Between 2018 and 2020, monitored CO and NO_2 concentrations did not exceed any federal or state standards at any of the three monitoring locations. However, the state and federal standards for ozone and PM10 and federal standard for PM2.5 were exceeded. The ambient air quality standards define clean air and represent the maximum amount of pollution that can be present in outdoor air without any harmful effects on people and the environment. Existing violations of the ozone and PM ambient air quality standards indicate that certain individuals exposed to these pollutants may experience certain health effects, including increased incidence of cardiovascular and respiratory ailments.

23.1.5.2 Attainment Status

Local monitoring data (Table 23-4) are used to designate areas as nonattainment, maintenance, attainment, or unclassified for the NAAQS and CAAQS. The four designations are further defined as:

- Nonattainment—assigned to areas where monitored pollutant concentrations consistently violate the standard in question.
- Maintenance—assigned to areas where monitored pollutant concentrations exceeded the standard in question in the past but are no longer in violation of that standard.
- Attainment—assigned to areas where pollutant concentrations meet the standard in question over a designated period.
- Unclassified—assigned to areas where data are insufficient to determine whether a pollutant is violating the standard in question.

Table 23-5 summarizes the attainment status of the portions of the SVAB, SJVAB, and SFBAAB along the water conveyance alignments with regard to the NAAQS and CAAQS.

1 **Table 23-4. Ambient Air Quality Monitoring Data along the Water Conveyance Alignments (2018–2020)**

	Sacramento T Street Station			Stockton-Hazelton Street			Bethel Island Road		
Pollutant Standards	2018	2019	2020	2018	2019	2020	2018	2019	2020
Ozone (O_3)									
Maximum 1-hour concentration (ppm)	0.097	0.100	0.112	0.088	0.098	0.100	0.093	0.082	0.107
Maximum 8-hour concentration (ppm)	0.084	0.074	0.076	0.077	0.077	0.074	0.078	0.072	0.085
Measured number of days standard exceeded									
CAAQS 1-hour (>0.09 ppm)	1	1	1	0	1	1	0	0	1
CAAQS 8-hour (>0.070 ppm)	1	1	3	1	2	2	1	1	2
NAAQS 8-hour (>0.070 ppm)	1	1	3	2	2	2	1	1	2
Carbon Monoxide (CO) [a]									
Maximum 8-hour concentration (ppm)	3.0	1.3	1.6	2.7	1.4	2.2	2.0	1.0	2.1
Maximum 1-hour concentration (ppm)	3.2	1.4	4.3	3.0	3.1	2.7	2.2	1.8	2.4
Measured number of days standard exceeded									
NAAQS 8-hour (>9 ppm)	0	0	0	0	0	0	0	0	0
CAAQS 8-hour (>9.0 ppm)	0	0	0	0	0	0	0	0	0
NAAQS 1-hour (>35 ppm)	0	0	0	0	0	0	0	0	0
CAAQS 1-hour (>20 ppm)	0	0	0	0	0	0	0	0	0
Nitrogen Dioxide (NO_2)									
National maximum 1-hour concentration (ppm)	66.3	61.9	54.1	65.3	72.3	60.0	42.6	29.8	29.8
State maximum 1-hour concentration (ppm)	66	61	54	65	72	60	42	29	29
Annual average concentration (ppm)	9	9	9	12	12	11	5	4	4
Measured number of days standard exceeded									
CAAQS 1-hour (0.18 ppm)	0	0	0	0	0	0	0	0	0
NAAQS 1-hour (0.10 ppm)	0	0	0	0	0	0	0	0	0

	Sacramento T Street Station			Stockton-Hazelton Street			Bethel Island Road		
Pollutant Standards	2018	2019	2020	2018	2019	2020	2018	2019	2020
Particulate Matter (PM10)									
National maximum 24-hour concentration (µg/m3)	292.6	174.7	298.7	187.0	85.9	147.0	142.9	54.7	38.6
National second-highest 24-hour concentration (µg/m3)	252.7	90.7	232.2	173.6	68.3	113.8	53.7	53.0	21.2
State maximum 24-hour concentration (µg/m3)	309.5	179.1	292.8	198.6	89.1	148.5	151.0	57.0	40.0
State second-highest 24-hour concentration (µg/m3)	267.2	92.9	260.5	184.1	70.1	122.0	55.0	55.0	22.0
Annual average concentration (µg/m3)	29.2	20.2	31.1	28.7	24.4	33.5	10.0	7.9	7.6
Measured number of days standard exceeded									
NAAQS 24-hour (>150 $\mu g/m^3$)	6	1	4	2	0	0	0	0	0
CAAQS 24-hour (>50 $\mu g/m^3$)	22	24	59	5	7	12	2	2	0
CAAQS annual (> 20 $\mu g/m^3$)	Yes	Yes	Yes	Yes	Yes	Yes	No	No	No
Particulate Matter (PM2.5)									
National maximum 24-hour concentration (µg/m3)	149.9	32.2	111.0	188.0	50.1	130.7	–	–	–
National second-highest 24-hour concentration (µg/m3)	108.8	31.1	76.8	150.6	49.4	122.2	–	–	–
State maximum 24-hour concentration (µg/m3)	263.3	37.1	150.4	188.0	50.1	130.7	–	–	–
State second-highest 24-hour concentration (µg/m3)	225.1	32.3	116.0	150.6	49.4	122.2	–	–	–
Annual average concentration (µg/m3)	12.8	7.7	–	17.5	9.3	14.3	–	–	–
Measured number of days standard exceeded									
NAAQS 24-hour (>35 $\mu g/m^3$)	3	0	6	25	6	23	–	–	–
NAAQS/CAAQS annual (>12 $\mu g/m^3$)	Yes	No	–	Yes	No	Yes	–	–	–
Sulfur Dioxide (SO_2)									
No data available									

Sources: California Air Resources Board 2021a; U.S. Environmental Protection Agency 2021b.

CAAQS = California ambient air quality standards; CO = carbon monoxide; NAAQS = national ambient air quality standards; $\mu g/m^3$ = micrograms per cubic meter; O_3 = ozone; PM2.5 = particulate matter 2.5 microns or less in diameter; PM10 = particulate matter 10 microns or less in diameter; ppm = parts per million; SMAQMD = Sacramento Metropolitan Air Quality Management District; SO_2 = sulfur dioxide; > = greater than; – = not applicable or there was insufficient or no data available to determine the value.

[a] SMAQMD data from the Bercut Drive station.

Table 23-5. Federal and State Attainment Status along the Water Conveyance Alignments within the SVAB, SJVAB, and SFBAAB

Pollutant	SVAB Federal	SVAB State	SJVAB Federal	SJVAB State	SFBAAB Federal	SFBAAB State
Ozone (O_3)	Nonattainment (moderate/ severe 15 [a])	Nonattainment	Nonattainment (extreme)	Nonattainment	Nonattainment (marginal)	Nonattainment
Particulate matter (PM10)	Maintenance (moderate)	Nonattainment	Maintenance (serious)	Nonattainment	Attainment/ Unclassified	Nonattainment
Particulate matter (PM2.5) (24-hour)	Nonattainment (moderate)	–	Nonattainment (serious/ moderate [b])	–	Nonattainment (moderate)	–
Particulate matter (PM2.5) (annual)	Attainment	Attainment	Nonattainment (moderate)	Nonattainment	Attainment	Nonattainment
Carbon monoxide (CO)	Attainment	Attainment	Attainment	Attainment	Attainment	Attainment
Nitrogen dioxide (NO_2)	Attainment/ Unclassified	Attainment	Attainment/ Unclassified	Attainment	Attainment/ Unclassified	Attainment
Sulfur dioxide (SO_2)	Attainment/ Unclassified	Attainment	Attainment/ Unclassified	Attainment	Attainment/ Unclassified	Attainment

Sources: California Air Resources Board 2020f; U.S. Environmental Protection Agency 2021c.

CO = carbon monoxide; NAAQS = national ambient air quality standards; NO_2 = nitrogen dioxide; O_3 = ozone; PM2.5 = particulate matter 2.5 microns or less in diameter; PM10 = particulate matter 10 microns or less in diameter; SFBAAB = San Francisco Bay Area Air Basin; SJVAB = San Joaquin Valley Air Basin; SO_2 = sulfur dioxide; SVAB = Sacramento Valley Air Basin; – = no standard.

[a] The Sacramento metropolitan area is designated moderate nonattainment for the 2015 8-hour ozone standard and severe 15 nonattainment for the 2008 8-hour ozone standard. Areas classified as severe-15 must attain the NAAQS within 15 years of the effective date of the nonattainment designation.

[b] The SJVAB is serious nonattainment for the 2006 24-hour PM2.5 standard and moderate nonattainment for the 2012 annual PM2.5 standard.

23.1.5.3 Environmental Burdens

OEHHA maintains the California Communities Environmental Health Screening Tool (CalEnviroScreen), which provides relative rankings of census tracts based on 21 environmental, health, demographic, and socioeconomic indicators (e.g., ozone concentrations, groundwater threats, education levels). Ranking scores are provided for each indicator, which are also combined to provide an overall ranking score for the census tract. The scores are not a measure of health risk; rather, they reflect the relative pollution burden and vulnerabilities in one census tract compared to other census tracts in the state. Scores are given on a scale of 0 to 100, with larger numbers representing areas with relatively high existing pollution burdens and population sensitivities.

Figure 23-2 presents the CalEnviroScreen (version 4.0) scores for the statutory Delta. The conveyance alignment footprints for Alternative 2a (central), Alternative 4a (eastern), and Alternative 5 (Bethany Reservoir) are provided for reference. As shown in Figure 23-2, the census tracts including Bacon Island, Lower Roberts Island, Upper and Lower Jones Tract, Mandeville Island, and Boggs Tract have the highest (poorest) score in the study area, indicating that communities in this part of the study area have relatively high existing pollution burdens and population sensitivities. The CalEnviroScreen scores improve moving north along the conveyance alignments and to the west.

23.1.6 Emissions Inventories

23.1.6.1 Criteria Pollutants

A criteria pollutant inventory is an accounting of the total emissions from all sources in a geographic area over a specified time period. Emission inventories are used in air quality planning and can provide a general indication of existing air quality in an area. CARB maintains an annual emissions inventory for each county and air basin in the state. The inventories for SVAB, SJVAB, and SFBAAB consist of data submitted to CARB by the local air districts, plus estimates for certain source categories, which are provided by CARB staff. Table 23-6 summarizes the most recent (2017) criteria pollutant inventories for the three regional air quality study area air basins.

Table 23-6. Criteria Pollutant Emissions Inventories for the Regional Air Quality Study Area (2017) (tons per day)

Air Basin	ROG	NO_X	CO	SO_2	PM10	PM2.5
SVAB	158	129	586	3	158	45
SJVAB	321	228	680	6	267	69
SFBAAB	245	197	905	23	89	37

Source: California Air Resources Board 2019b.

CO = carbon monoxide; NO_X = nitrogen oxides; PM2.5 = particulate matter 2.5 microns or less in diameter; PM10 = particulate matter 10 microns or less in diameter; ROG = reactive organic gases; SO_2 = sulfur dioxide; SFBAAB = San Francisco Bay Area Air Basin; SJVAB = San Joaquin Valley Air Basin; SVAB = Sacramento Valley Air Basin.

23.1.6.2 Greenhouse Gases

Like criteria pollutant inventories, a GHG inventory is a quantification of all GHG emissions and sinks within a selected physical and/or economic boundary. GHG inventories can be performed on a large scale (i.e., for global and national entities) or on a small scale (i.e., for a building or person). Although many processes are difficult to evaluate, several agencies have developed tools to quantify emissions from certain sources. Table 23-7 outlines the most recent global, national, statewide, and local GHG inventories to help contextualize the magnitude of potential project-related emissions.

Table 23-7. Global, National, State, and Local GHG Emissions Inventories

Year and Area [a]	CO_2e (metric tons)
2010 Global	52,000,000,000
2019 United States	5,769,000,000
2019 California	418,200,000
2015 SFBAAB	85,000,000
2015 Unincorporated Sacramento County	4,853,647

Sources: Intergovernmental Panel on Climate Change 2014:5; U.S. Environmental Protection Agency 2021d; California Air Resources Board 2021b; Bay Area Air Quality Management District 2017a:3-14; Ascent 2016:2.
CO_2e = carbon dioxide equivalent; SFBAAB = San Francisco Bay Area Air Basin.
[a] GHG emissions inventories for the SVAB and SJVAB are currently unavailable.

23.1.7 Sensitive Receptors

The NAAQS and CAAQS apply at publicly accessible areas, regardless of whether those areas are populated. For the purposes of air quality analysis, *sensitive land uses* are defined as locations where human populations, especially children, seniors, and sick persons, are located and where there is reasonable expectation of continuous human exposure according to the averaging period for the air quality standards (e.g., 24-hour, 8-hour, and 1-hour). *Sensitive receptors* include residences, medical facilities, nursing homes, schools and schoolyards, daycare centers, and parks and playgrounds. Analyses performed by CARB indicate that providing a separation of at least 1,000 feet from diesel sources and high-traffic areas would reduce exposure to air contaminants and decrease asthma symptoms in children (California Air Resources Board 2005:8–10). This CARB study demonstrates that diesel concentrations and resultant health effects decline as a function of distance from the emissions source.

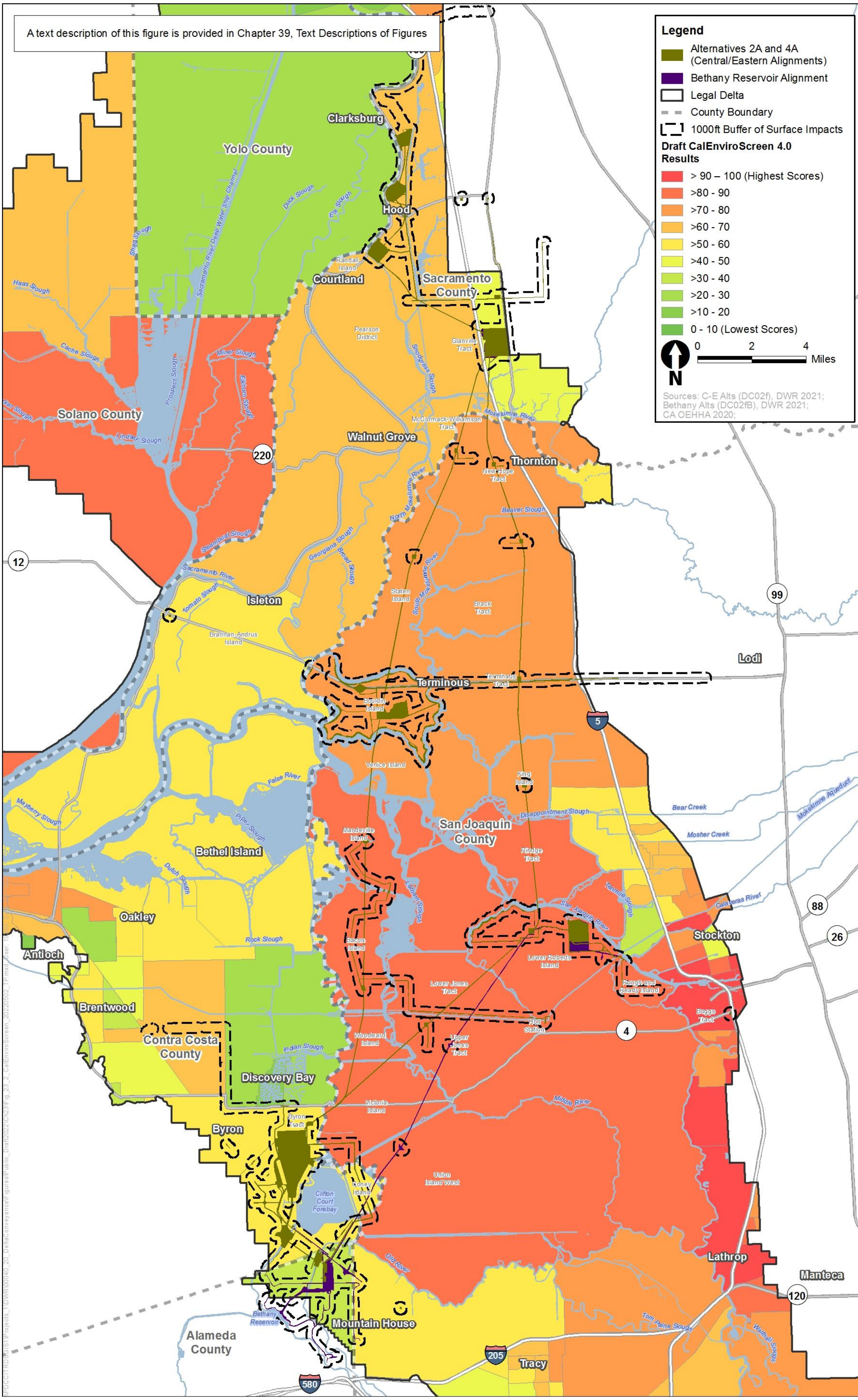


Figure 23-2. CalEnviroScreen Ranking Scores

Table 23-8 shows the number of receptors within 1,000 feet of surface construction features and adjacent haul routes. Residential receptors are the only receptor type within 1,000 feet of surface construction features and adjacent haul routes; there are no educational, medical, or recreational receptors in the local air quality study area. The table identifies the distances in feet to the closest residential receptor. As shown in Table 23-8, while the number of residential receptors within 1,000 feet differs among the alternatives, the distance of the closest receptor does not change among alternatives within the same conveyance alignment.

Table 23-8. Closest Receptor Distance (feet) and Total Number of Residential Receptors within 1,000 Feet of Surface Construction Features and Adjacent Haul Routes

Alternative	Distance of Closest Receptor	Number of Receptors within 1,000 Feet
1	59	707
2a	59	731
2b	59	612
2c	59	707
3	11	536
4a	11	560
4b	11	441
4c	11	536
5	11	345

Note: Table shows the closest residential receptor to surface construction features by alternative. The distance was measured from a point digitized on the structure to the edge of the nearest project feature boundary. There are no educational, medical, or recreational receptors within 1,000 feet of surface construction features and adjacent haul routes.

Figures 23-3 through 23-5 depict sensitive receptors within 1,000 feet of surface construction features and adjacent haul routes for each conveyance alignment. Note that for the central and eastern alignments, Figures 23-3 and 23-4 depict Alternatives 2A and 4A, respectively. These alternatives are shown because they have the largest construction footprint and therefore the most receptors within 1,000 feet.

23.2 Applicable Laws, Regulations, and Programs

The applicable laws, regulations, and programs considered in the assessment of project impacts on air quality are indicated in Section 23.3.1, *Methods for Analysis*, or the impact analysis, as appropriate. Applicable laws, regulations and programs associated with state and federal agencies that have a review or potential approval responsibility have also been considered in the development CEQA impact thresholds or are otherwise considered in the assessment of environmental impacts. A listing of some of the agencies and their respective potential review and approval responsibilities, in addition to those under CEQA, is provided in Chapter 1, *Introduction*, Table 1-1. A listing of some of the federal agencies and their respective potential review, approval, and other responsibilities, in addition to those under NEPA, is provided in Chapter 1, Table 1-2.

23.3 Environmental Impacts

This section describes the direct and cumulative environmental impacts associated with air quality and GHGs that would result from project construction and O&M. It describes the methods used to determine the impacts of the project and lists the thresholds used to conclude whether an impact would be significant. Measures to mitigate (i.e., avoid, minimize, rectify, reduce, eliminate, or compensate for) significant impacts are provided. Indirect impacts are discussed in Chapter 31, *Growth Inducement*.

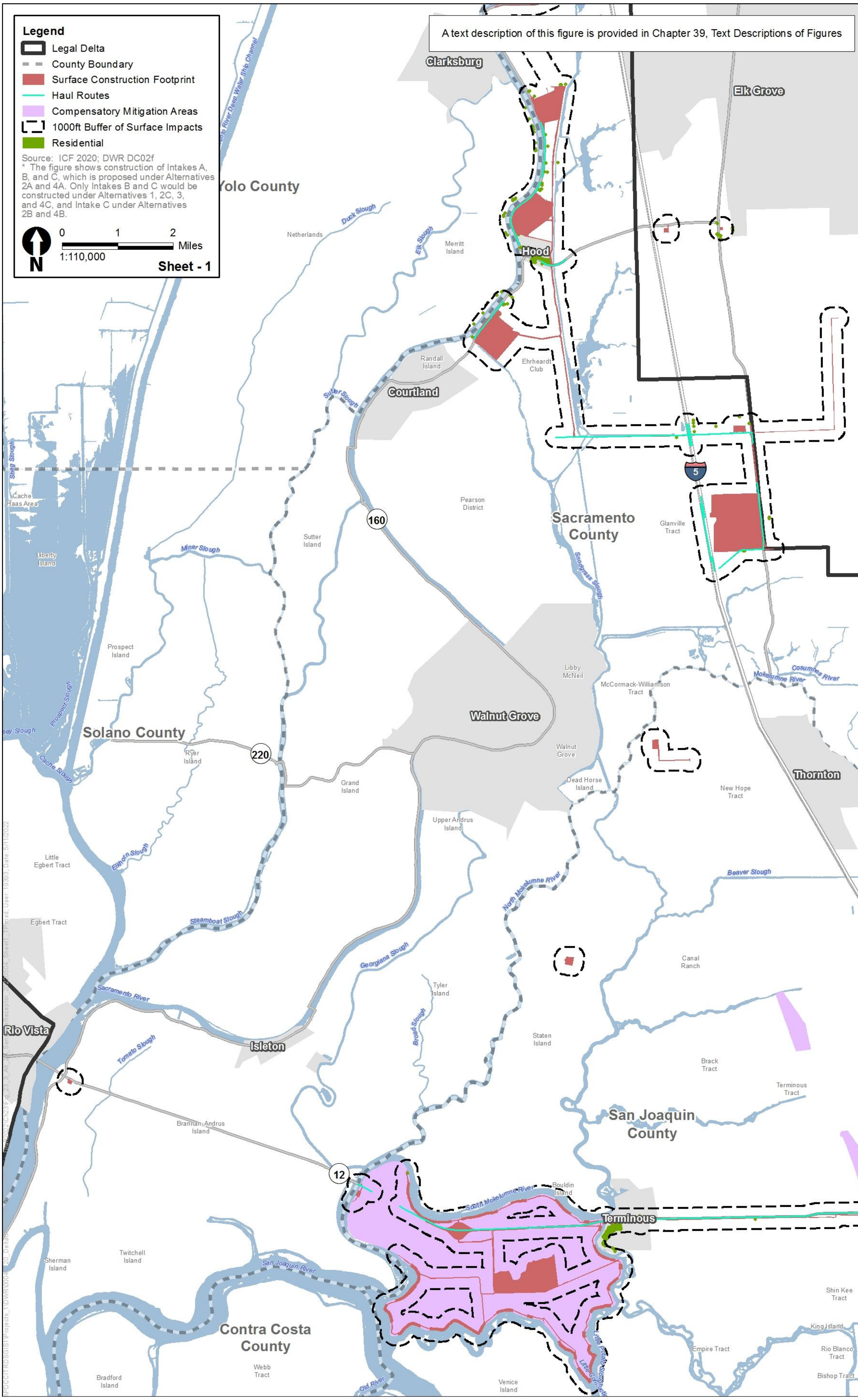
23.3.1 Methods for Analysis

This section describes the sources and methods used to analyze potential project impacts on air quality and GHGs. The impact analysis focuses on criteria pollutants, TACs, Valley fever spores, and GHGs. These are defined further in Section 23.1.2, *Pollutants of Concern*. The impacts of these pollutants generated by construction and O&M of the project alternatives were assessed and quantified using air district recommended software tools, techniques, and emissions factors. Emissions and impacts under all project alternatives are analyzed at an equal level of detail. This section summarizes the methods used to analyze impacts.

Project-specific construction and O&M assumptions (e.g., equipment operating hours, cubic yards of soil moved) were developed to support the impact analysis. Appendix 23A, *Mass Emissions Estimation Methodology,* presents the detailed quantification method for mass emissions. All data used in the air quality and GHG impact analysis are presented in Appendix 23B, Air Quality and GHG Analysis Activity Data. Appendices 23C and 23D present the detailed quantification method for the health risk assessment (HRA), ambient air quality analysis (AAQA), and photochemical modeling.

23.3.1.1 Process and Methods of Review for Air Quality and Greenhouse Gases

Construction of the Delta Conveyance Project and compensatory mitigation would occur over 12 to 14 years, depending on the alternative. Preliminary investigations, as described in Chapter 3, *Description of the Proposed Project and Alternatives*, would begin approximately 2 years before project construction. O&M activities would occur annually immediately following construction, but are analyzed under 2020 operating conditions, as described further below. The following sections describe the analysis procedures for construction and long-term O&M activities. The method used to correlate regional criteria pollutant emissions generated by the alternatives to potential health consequences (e.g., increased cases of respiratory illness) is also presented.



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2 **Figure 23-3. Sensitive Receptors within 1,000 Feet of the Central Conveyance Alignment (page 1 of 3)**

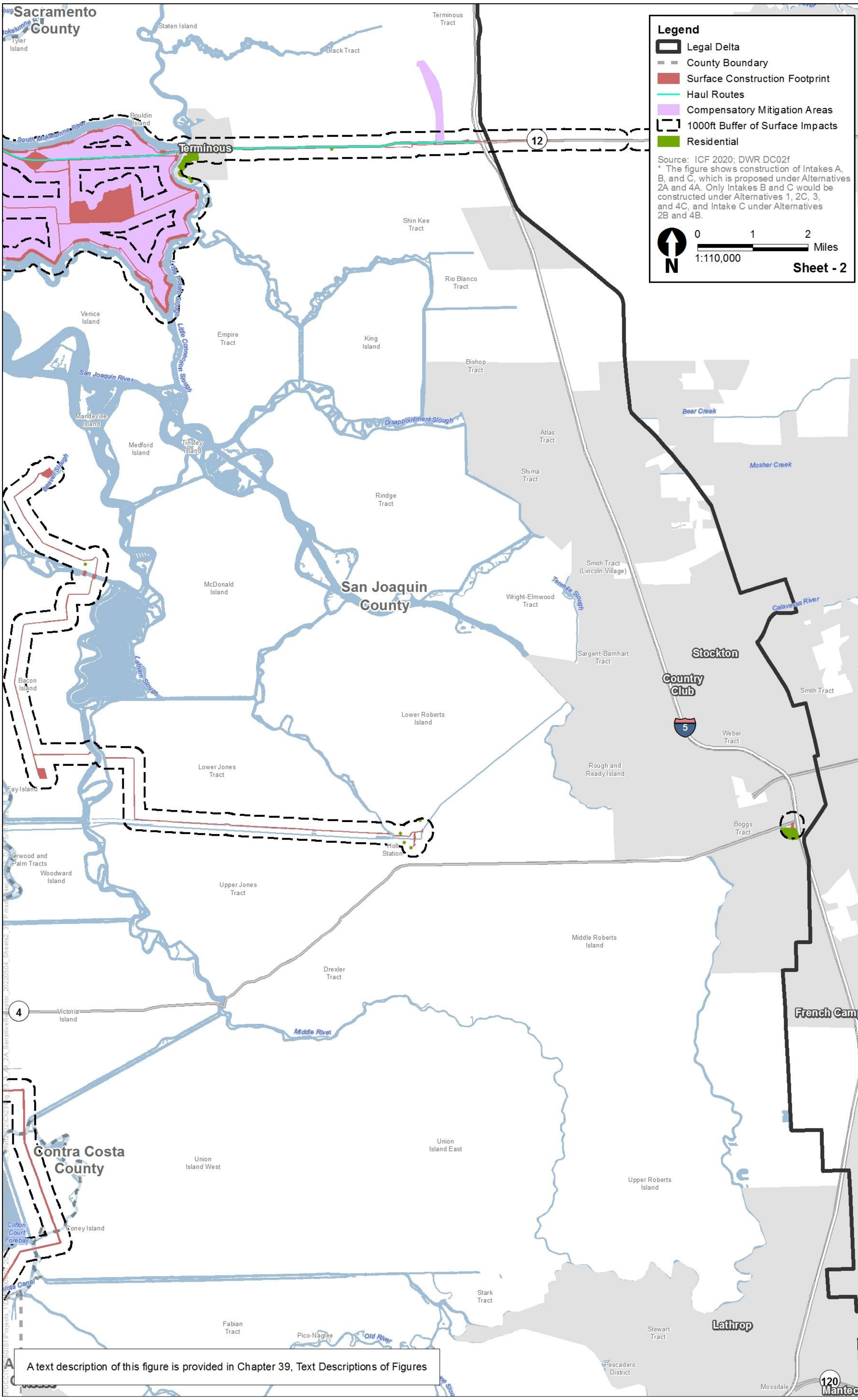

Figure 23-3. Sensitive Receptors within 1,000 Feet of the Central Conveyance Alignment (page 2 of 3)

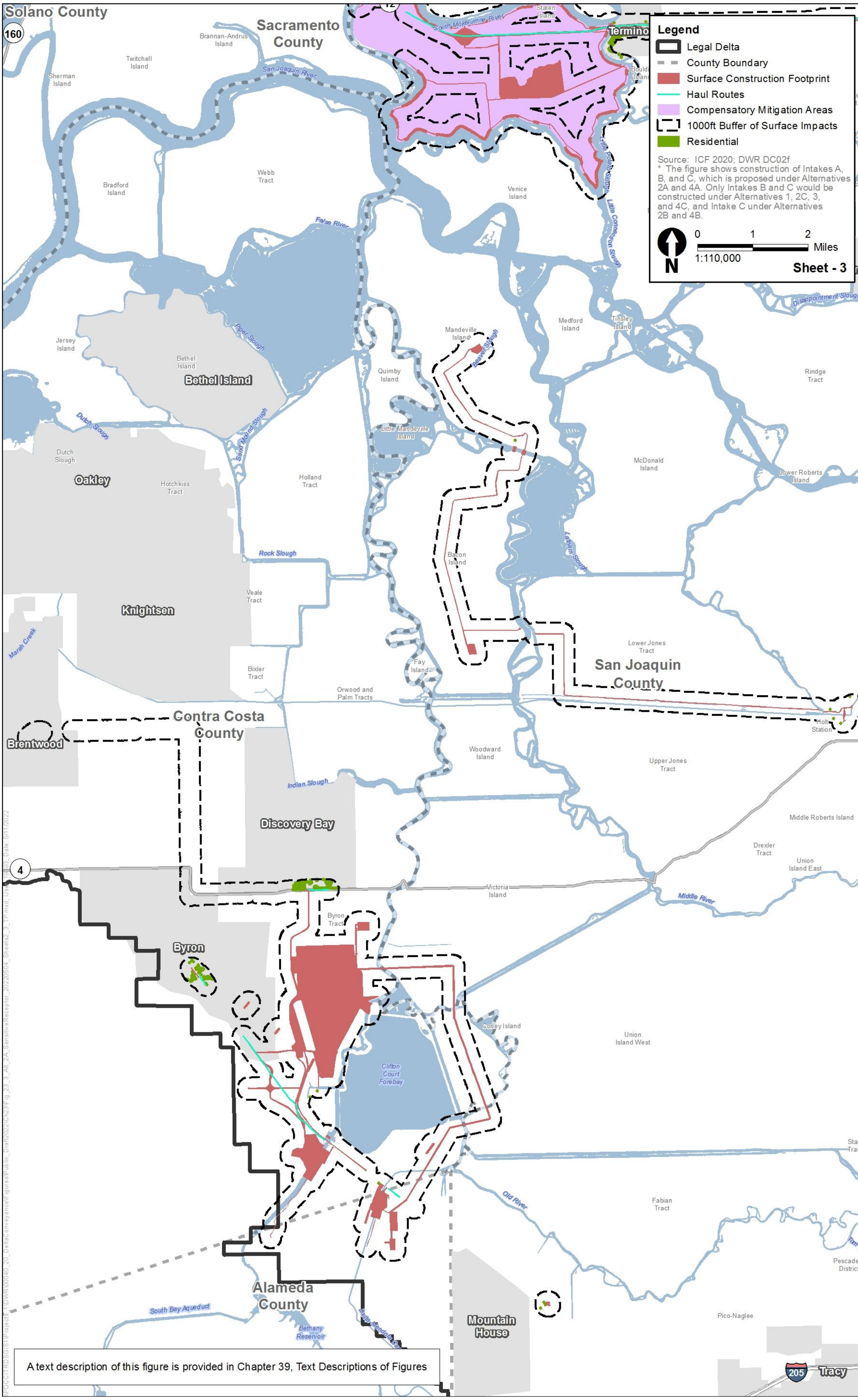

Figure 23-3. Sensitive Receptors within 1,000 Feet of the Central Conveyance Alignment (page 3 of 3)

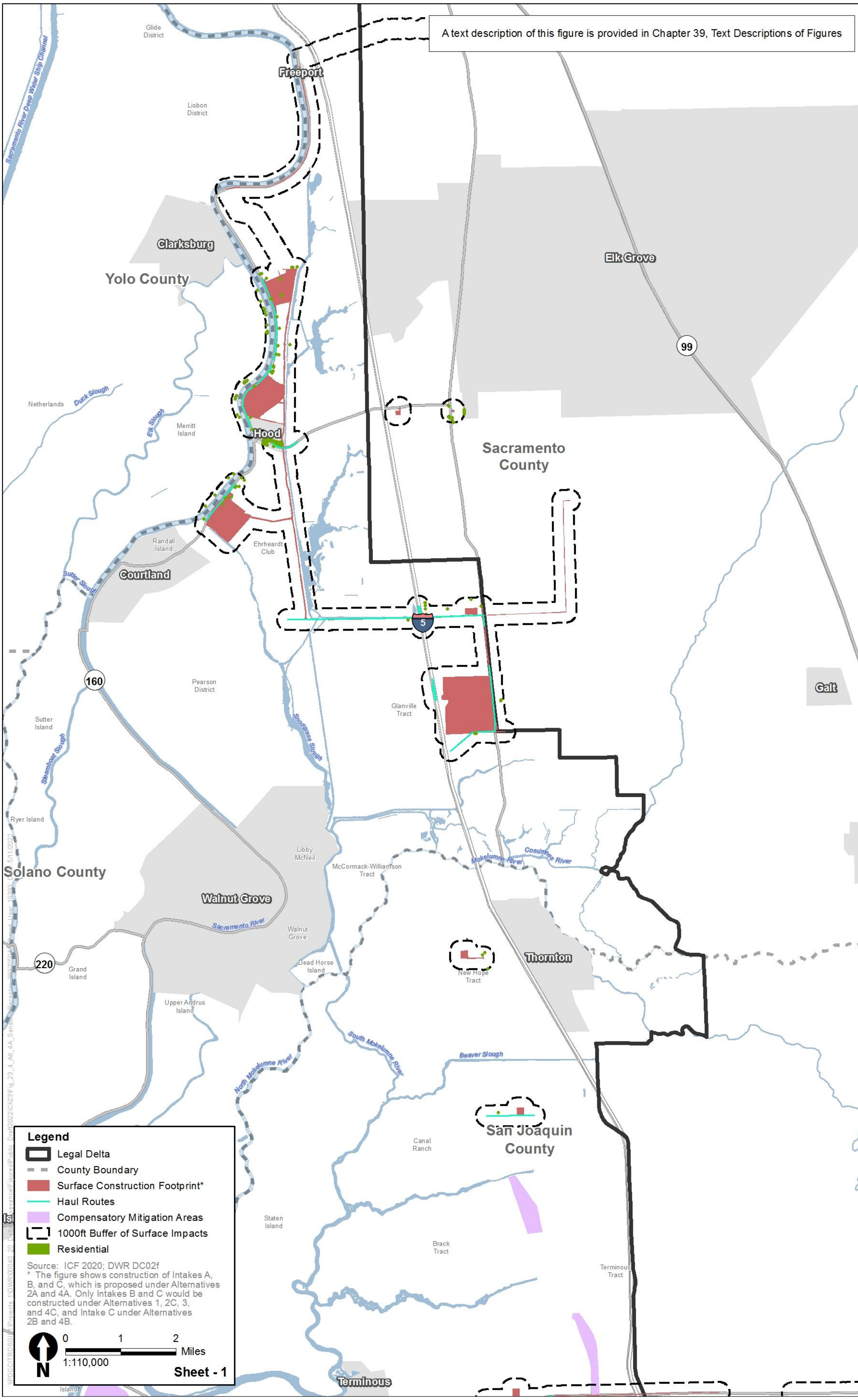

Figure 23-4. Sensitive Receptors within 1,000 Feet of the Eastern Conveyance Alignment (page 1 of 3)

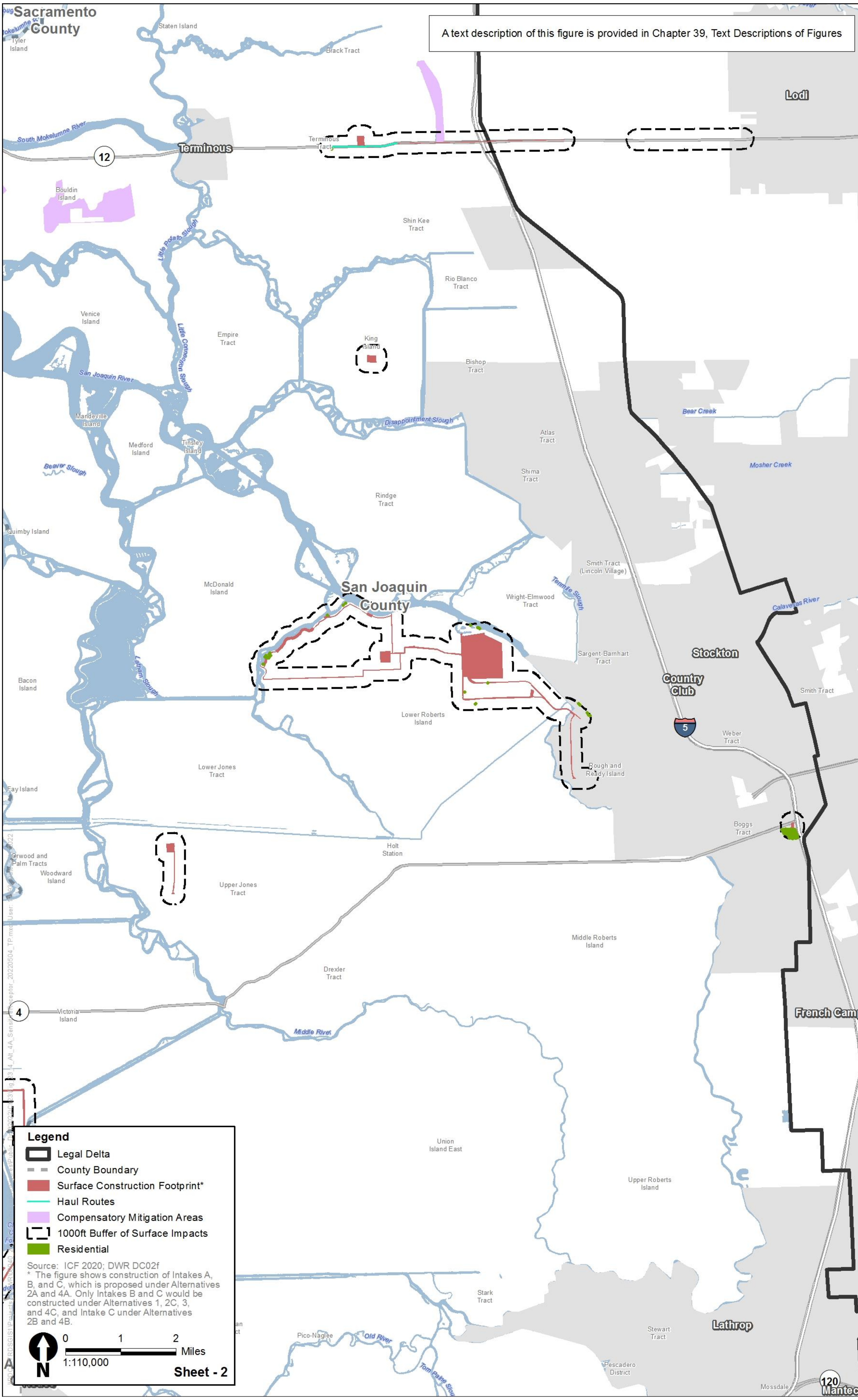

Figure 23-4. Sensitive Receptors within 1,000 Feet of the Eastern Conveyance Alignment (page 2 of 3)

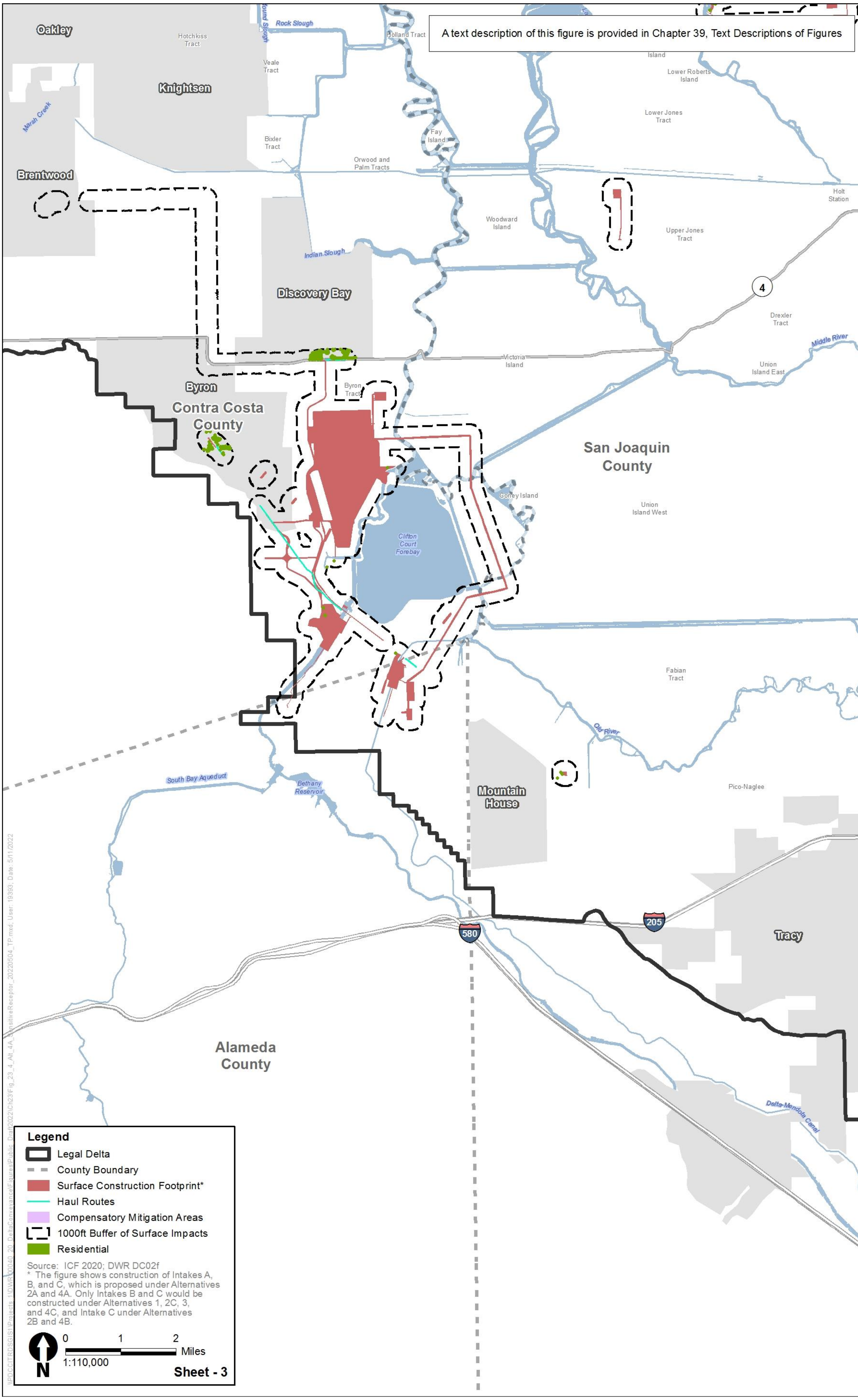

Figure 23-4. Sensitive Receptors within 1,000 Feet of the Eastern Conveyance Alignment (page 3 of 3)

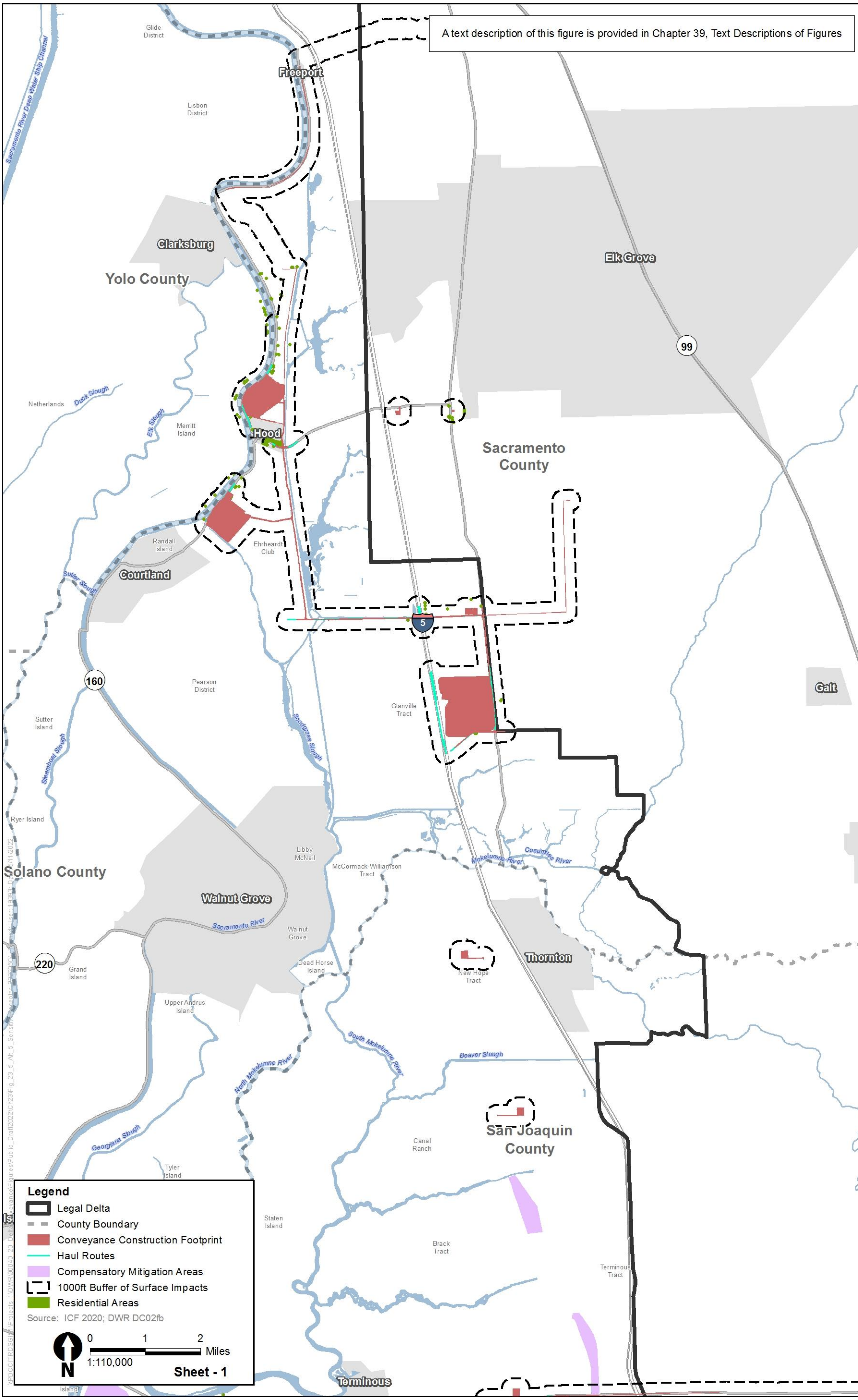

Figure 23-5. Sensitive Receptors within 1,000 Feet of the Bethany Reservoir Alignment (page 1 of 3)

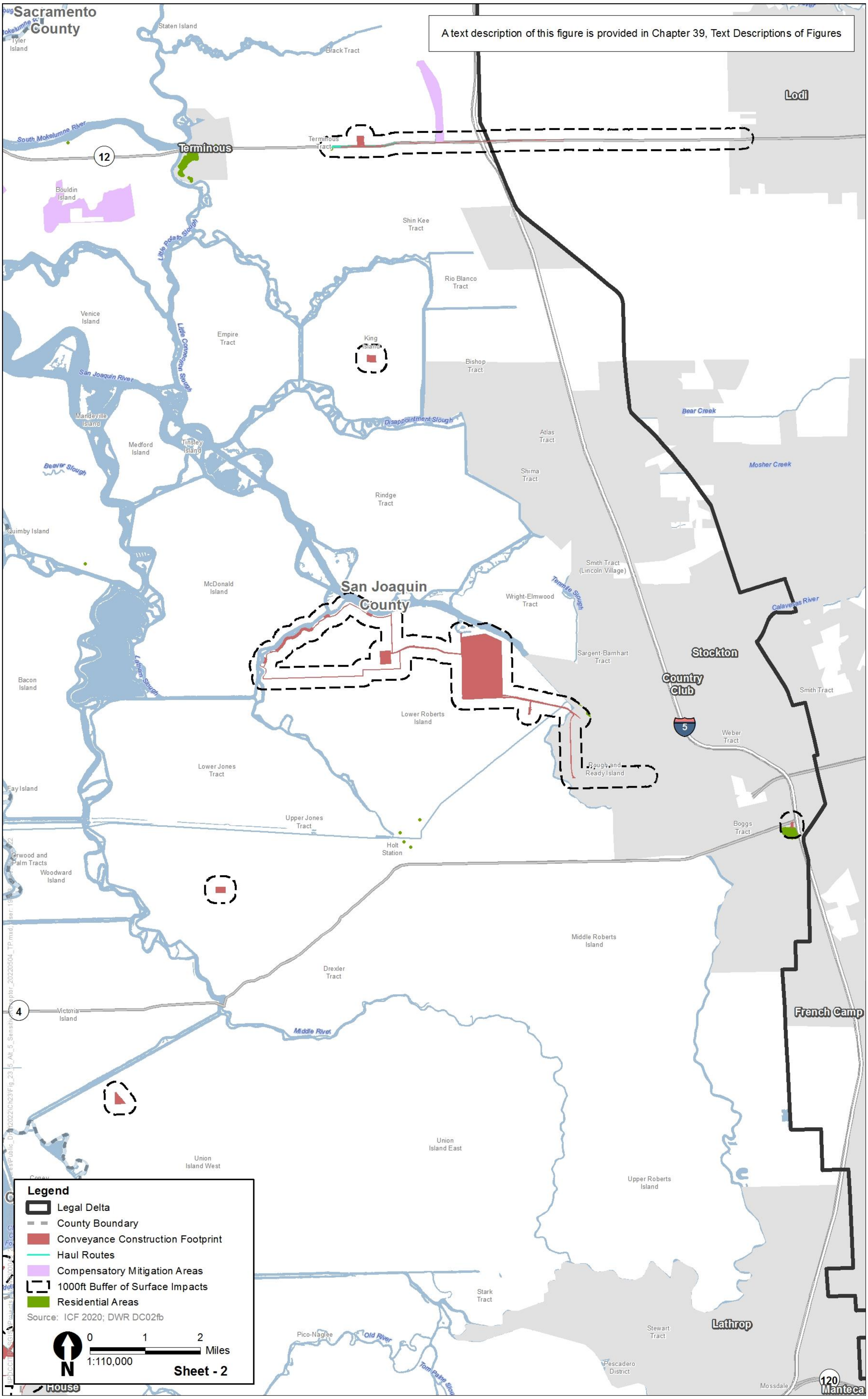

Figure 23-5. Sensitive Receptors within 1,000 Feet of the Bethany Reservoir Alignment (page 2 of 3)

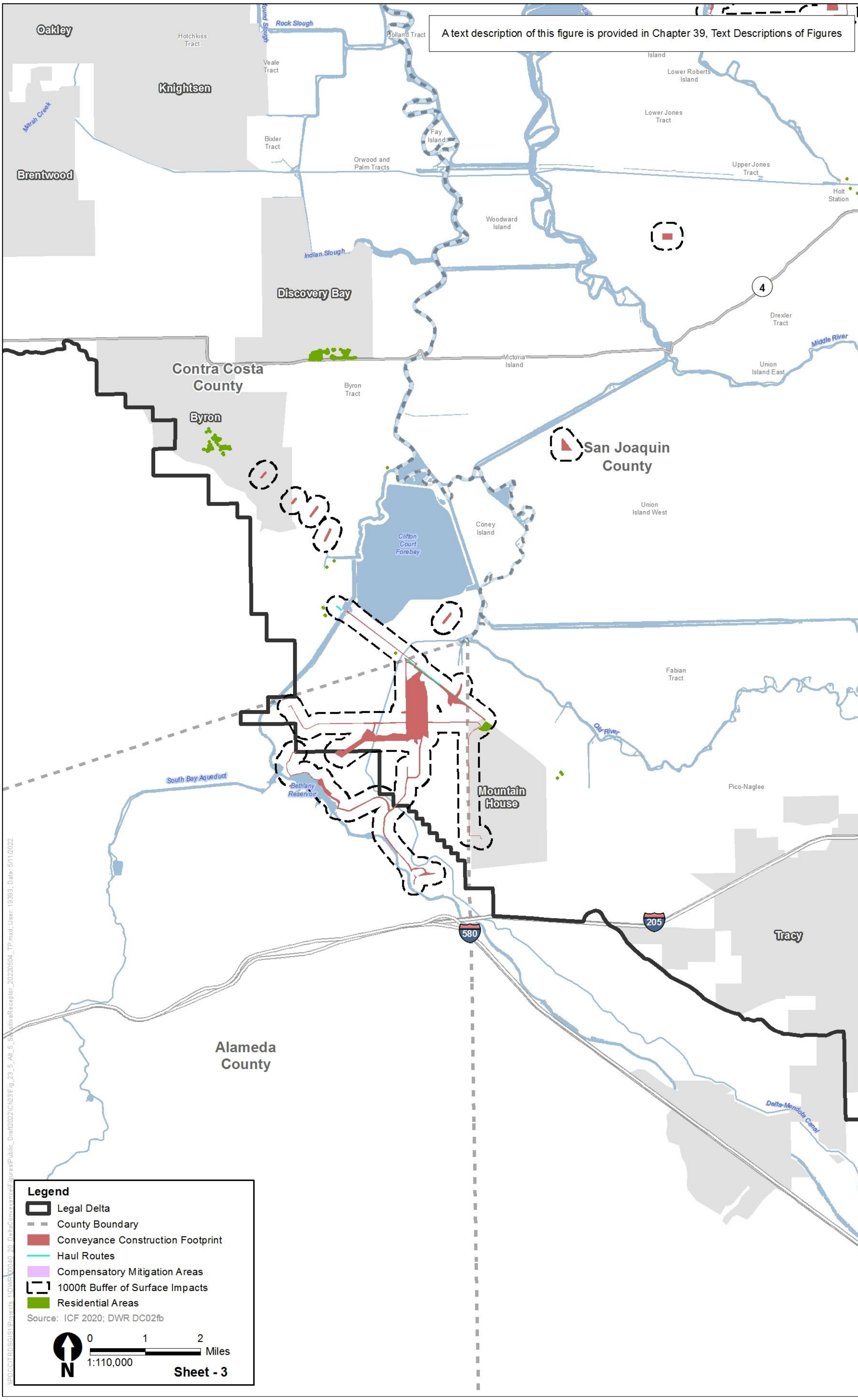

Figure 23-5. Sensitive Receptors within 1,000 Feet of the Bethany Reservoir Alignment (page 3 of 3)

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23.3.1.2 Evaluation of Construction Activities

Mass Emissions Modeling

Water Conveyance Facility and Compensatory Mitigation Sites

Construction of the Delta Conveyance Project and compensatory mitigation sites would generate emissions of criteria pollutants and precursors (ROG, NO_X, CO, SO_2, PM10, and PM2.5) and GHGs (CO_2, CH_4, N_2O, SF_6, and HFCs) that could result in air quality and GHG impacts. Emissions would originate from off-road equipment exhaust, marine vessel exhaust, locomotive exhaust, helicopter exhaust, employee and haul truck vehicle exhaust, earth and materials movement, paving, electricity consumption, and concrete batching. These emissions would be limited to the construction period and would cease when construction activities are completed.

Combustion exhaust, fugitive dust (PM10 and PM2.5), and fugitive off-gassing (VOC) were estimated based on project-specific construction data (e.g., schedule, equipment, truck volumes) and a combination of emissions factors and methodologies from the California Emissions Estimator Model (CalEEMod), version 2016.3.2; the Emissions FACtors model (EMFAC2017 and CT-EMFAC2017)[4]; the EPA's *AP-42 Compilation of Air Pollutant Emission Factors* (AP-42); and other relevant agency guidance and published literature. Daily and annual criteria pollutant and GHG emissions were quantified based on concurrent construction activity. Emissions estimates for activities that span more than one air district were apportioned based on the location of construction activity. Modeling includes implementation of quantifiable air quality environmental commitments described in Appendix 3B, *Environmental Commitments and Best Management Practices*, Section 3B.2. Refer to Appendix 23A, *Mass Emissions Estimation Methodology*, for a detailed description of the analysis method. Modeling assumptions are provided in Appendix 23B, *Air Quality and GHG Analysis Activity Data.*

Land Use Change and Sequestration Analysis

Construction of the Delta Conveyance Project and compensatory mitigation sites would alter existing land uses, resulting in changes to present-day (baseline) GHG emissions or removals. Analysts quantified the net GHG effect of land use change associated with construction of the central, eastern, and Bethany Reservoir alignments and compensatory mitigation sites. The GHG impact of the project was determined by calculating GHG emissions and removals relative to existing conditions. The project GHG emissions and removals over time were compared to the baseline scenarios to estimate the cumulative net GHG effect. Refer to Appendix 23A, Attachments 23A.1 and 23A.2 for a detailed description of the analysis method.

Correlation of Criteria Pollutants to Potential Human Health Consequences

A quantitative health impact assessment (HIA) was developed to correlate criteria pollutant emissions generated during project construction to potential human health consequences. Project-specific correlations of criteria pollutant emissions to specific health endpoints (e.g., increased cases of asthma) are not commonly performed because models that quantify changes in ambient pollution and resultant health effects were developed to support regional planning and policy analysis and

[4] CARB released EMAFC2021 on January 15, 2021, but this version has not yet been approved by EPA. Accordingly, this analysis uses EMAFC2017, which was available at the time of the notice of preparation and is the current EPA approved version of EMFAC.

generally have limited sensitivity to changes in criteria pollutant concentrations induced by individual projects. However, given the geographic scale of the project, modeling to correlate project-generated criteria pollutants and precursor emissions (NOx, ROG, PM2.5, SO_2 and CO) to specific health endpoints has been conducted. This analysis represents a good faith effort, based on existing tools, to provide disclosure of the potential health effects during project construction, as directed by the Supreme Court in *Sierra Club v. County of Fresno* (2018) 6 Cal.5th 502, 517–522.

The HIA uses the Comprehensive Air Quality Model with extensions (CAMx) to mathematically simulate chemical and physical processes in the atmosphere to predicted air pollutant concentrations. EPA's Benefits Mapping and Analysis Program Community Edition (BenMAP-CE) was used to estimate resulting health effects from incremental changes in region air pollution modeled by CAMx. BenMAP-CE uses epidemiological data to determine the impact on a health endpoint (e.g., asthma) associated with the change in air concentration using concentration response functions developed from epidemiological data for specific air pollutant. Further details on the methodology used to determine the health impacts from criteria pollutants are available in Appendix 23D, *Criteria Pollutant Health Impact Assessment Methodology*.

The HIA is based on several conservative assumptions, including, but not limited to the following.

1. Unmitigated construction emissions are modeled. The HIA therefore does not reflect reductions in ROG, NOx, and PM2.5 that would be achieved by project-level mitigation.

2. The highest predicted mass emissions at all project features (e.g., intakes) were modeled contemporaneously (i.e., in the same year). As noted above, project construction would be spread over 12 to 14 years, depending on the alternative, with construction of some project features never occurring in the same year. Aggregating construction emissions from all features into a single analysis year, and using the peak emissions rates for those features, ensures that modeled changes in air pollution during construction are not underreported.

3. Reported health effects respond to changes in air pollutant concentration, including small incremental changes. This assumes that health effects seen at large concentrations from the epidemiological studies can be linearly scaled to small concentration differences, even though there is a potential threshold below which health effects may not occur. This method of linearly scaling health effects is used by the EPA in regulatory evaluations (U.S. Environmental Protection Agency 2010).

4. BenMAP-CE relies on concentration response functions that are based on correlations between health effects and *outdoor* air exposure. The model does not adjust for time spent indoors, which often results in lower exposure to air pollution depending on the indoor environment and air exchange rate.

Because of these conservative assumptions, the results of the HIA reflect an upper-bound of potential health consequences associated with construction of the proposed project. As with all health-based analyses, there are also several assumptions embodied within the HIA that contribute to uncertainty in predicted air pollutant concentrations and associated health risks (e.g., chemical speciation, allocation of emissions among spatial grid cells, future distribution of population age subgroups). Further discussion on modeled uncertainty is presented in Appendix 23D. The uncertainty and conservative nature of the HIA is recognized to caution readers in adopting the predicted results as precise or exact. This does not mean that the results are invalid or uninformative. Rather, they are a prediction of outcomes stemming from multiple complex and interrelated processes.

Localized Criteria Pollutant Concentration Modeling

Ambient Air Quality Analysis

A quantitative AAQA was conducted to assess the potential for construction-generated criteria pollutants to cause new or contribute to existing violations of the NAAQS and CAAQS. The AAQA considers both long-term (annual) emissions and short-term (less than 24 hours) impacts of all criteria pollutants, as applicable based on the established NAAQS and CAAQS (refer to Table 23-1). On-site concentrations of pollutants were modeled using the mass emissions modeling results and the AERMOD dispersion model. A representative maximum emissions scenario for short-term impacts was developed for major construction features based on maximum activity levels that could take place concurrently. All major design components of the project were quantitatively analyzed. The combined effect of emissions from geographically proximate construction was also assessed. Refer to Appendix 23C, *Health Risk Assessment and Ambient Air Quality Analysis Methodology*, for a detailed description of the analysis method.

Carbon Monoxide Hotspot Analysis

Increased traffic congestion during construction can contribute to high levels of CO. As discussed in Section 23.3.2, *Thresholds of Significance*, San Joaquin Valley Air Pollution Control District (SJVAPCD), Bay Area Air Quality Management District (BAAQMD), and YSAQMD (Yolo-Solano Air Quality Management District) have adopted screening criteria that provide a conservative indication of whether a project would cause a CO hotspot and would require additional site-specific dispersion modeling to determine whether CO CAAQS would be exceeded. Traffic data indicate that no intersections in the transportation study area would exceed BAAQMD's volume-based screening criteria (24,000 vehicles per hour), but some intersections would degrade intersection level of service (LOS), thereby failing SJVAPCD's and YSAQMD's CO screening criteria (refer to Appendix 20A, *Delta Conveyance 2020 Traffic Analysis*). Deterioration of intersection LOS could also indicate conflicts with local congestion management plans, which would violate a BAAQMD screening criteria.

A microscale CO hotspot screening analysis was performed for the following three locations (one in each SMAQMD, SJVAPCD, and BAAQMD; because project traffic would be prohibited from using Delta roads, there would be no impact on local intersections within YSAQMD) to verify that off-site construction traffic would not cause or contribute to a violation of the CO CAAQS or NAAQS. These intersections were selected because they were identified as having the highest total traffic volumes and worst levels of congestion/delay of the studied intersections in Appendix 20A, *Delta Conveyance 2020 Traffic Analysis*.

- Hood Franklin Road/Southbound Interstate (I)-5 On/Off-Ramps
- State Route (SR) 12/Terminous Drive
- Byron Highway/Clifton Court Road

The potential for CO hotspots were evaluated using the California Department of Transportation Institute of Transportation Studies Transportation Project-Level Carbon Monoxide Protocol (CO Protocol) (Garza et al. 1997:B-1–B-24) and project traffic data (refer to Appendix 20A, *Delta Conveyance 2020 Traffic Analysis*). CO concentrations were conservatively modeled under 2020 roadway conditions and emissions intensities, even though peak construction traffic would occur after the fifth year of construction. CO concentrations for the three intersections were modeled for

Alternatives 2a, 4, and 5, respectively. These alternatives have the highest projected off-site construction volumes at these locations. Accordingly, CO concentrations under all other alternatives would be lower than those presented in this analysis.

Health Risk Assessment

A quantitative HRA was conducted to assess the potential impacts associated with public exposure to DPM.[5] Consistent with BAAQMD (2017b) guidance, localized PM2.5 concentrations were also quantified. The HRA was conducted using the guidelines provided by OEHHA (2015:1-1–9-17) and local air districts (Bay Area Air Quality Management District 2020:1-27; San Joaquin Valley Air Pollution Control District 2019:3–7; Sacramento Metropolitan Air Quality Management District 2020a:5-1–5-10). The EPA's AERMOD dispersion model was used to quantify annual average DPM and PM2.5 concentrations at nearby receptor locations for each feature. Three representative meteorological datasets, which broadly cover the different meteorological conditions found along the project alignment, were used in the analysis. Various construction work areas were assumed to characterize construction activities and emissions. Cancer and noncancer health impacts to the surrounding community were calculated based on the results of the dispersion modeling, OEHHA's guidance on risk calculations (2015:1-1–9-17), and local air district guidance. Refer to Appendix 23C, *Health Risk Assessment and Ambient Air Quality Analysis Methodology*, for a detailed description of the analysis method.

Asbestos, Valley Fever, and Odor Analyses

The analysis used the *A General Location Guide for Ultramafic Rocks in California—Areas More Likely to Contain Naturally Occurring Asbestos* (California Department of Conservation 2000:1–7) to determine if NOA occurs within the local air quality study area. The analysis considered whether demolition would occur during construction and whether the alternatives would comply with applicable standards for appropriate disposal per air district rules and regulations. The Valley fever and odor analyses are likewise qualitative and consider the potential for receptors to be exposed to *C. immitis* fungus spores and nuisance odors. The qualitative Valley fever and odor analyses draw on guidance published by the U.S. Geological Survey (2000:3) and local air districts (Bay Area Air Quality Management District 2017b:3-4; San Joaquin Valley Air Pollution Control District 2015a:103; Sacramento Metropolitan Air Quality Management District 2020a:7-5).

23.3.1.3 Evaluation of Operations and Maintenance

Maintenance Mass Emissions Modeling

Water Conveyance Facility

Maintenance of the water conveyance facility would generate emissions of criteria pollutants and precursors (ROG, NO_X, CO, SO_2, PM10, and PM2.5) and GHGs (CO_2, CH_4, N_2O, SF_6, and HFCs) that could result in long-term air quality and GHG impacts. Depending on the type of maintenance activity, emissions would originate from on-road vehicle exhaust, equipment exhaust, marine vessel exhaust, truck loading (sediment removal), repaving, and circuit breakers. Emissions were

[5] While DPM is a complex mixture of gases and fine particles that includes more than 40 substances listed by EPA and CARB as hazardous air pollutants, OEHHA guidance (2015) indicates that the cancer potency factor developed to evaluate cancer risks was developed based on total diesel exhaust (gas and PM).

estimated using project-specific activity data and emissions factors and methodologies from CalEEMod, EMFAC models, the EPA's AP-42, and other relevant agency guidance and published literature. The emissions intensity of maintenance activities was estimated under 2020 conditions to define baseline conditions. Refer to Appendix 23A, *Mass Emissions Estimation Methodology*, for a detailed description of the analysis method.

Because personnel and equipment currently required for maintenance is minimal, this analysis assumes emissions resulting from associated vehicle traffic and equipment are zero under existing conditions. This approach represents a conservative assessment as the net impact of the project would be higher under zero baseline conditions.

Compensatory Mitigation Sites

Future site visits requiring vehicle trips, such as biological monitoring, would likely occur a few times per year. Pond excavation would occur in specific locations further described in Appendix 3F, *Compensatory Mitigation Plan for Special-Status Species and Aquatic Resources*, and may be required once every 5 years. These activities required to monitor and maintain the compensatory mitigation sites would be less frequent and intense than current on-site agricultural practices. Accordingly, O&M criteria pollutant emissions generated by vehicles and equipment are expected to decrease compared to existing conditions and were not quantitatively evaluated. This approach is conservative because it does not account for the maintenance emissions benefits achieved by replacing existing agricultural operations, which are a more emissions intensive land use activity, with natural lands, which only require minimal O&M.

GHG emissions resulting from habitat restoration and land use change, including the conversion of existing agricultural lands, were quantified according to the methods described above in Section 23.3.1.2, *Evaluation of Construction Activities*.

Operational SWP and CVP Pumping Emissions Modeling

Long-term operation of the water conveyance facility would require the use of electricity for pumping, which would result in GHG emissions[6] from the generation, distribution, and transmission of this electricity. Annual electricity consumption required for SWP and CVP pumping for all alternatives are presented in Chapter 22, *Energy,* Tables 22-11 and 22-12. As discussed in Chapter 22, hydropower is the primary energy source for the CVP. CVP pumping required by the project alternatives would therefore not directly result in increased GHG emissions (hydropower is considered neutral with respect to GHG emissions).[7] Hydropower supplied to a project alternative, however, would reduce the quantity of hydropower supplied to the California grid and/or other CVP

[6] Fossil fuel–powered electrical-generating facilities also emit criteria pollutants. However, criteria pollutants emitted by these facilities are regulated by the California Energy Commission and California Public Utilities Commission. Accordingly, criteria pollutants from off-site generation of electricity are excluded from project-level environmental analysis.

[7] Some research suggests that operation of hydroelectric turbines may release dissolved CH_4. Changes in flow rates and water conveyance may also affect GHG flux rates in adjacent canals and rivers. However, the GHG flux rate and amount of released CH_4 is highly variable and depends on several site-specific factors, including the reservoir depth, the amount of organic material/plant material, the flow rate, and the reservoir/river location. Moreover, while turbines may hasten the release of excess CH_4, those emissions would likely be released downstream regardless of whether the water runs through a turbine (Teodoru et al. 2012:1–14). Accordingly, this analysis does not include evaluations of CH_4 emissions during turbine operation or changes in GHG flux rates in upstream and downstream tributaries because they would be speculative and the net systematic effect likely immaterial.

customers, potentially resulting in GHG emissions from other generating sources used to meet the displaced demand. Because the specific replacement sources (e.g., natural gas, solar, wind) are unknown, indirect GHG emissions from displaced hydropower were quantified using 2020 statewide grid average emissions factors from the EPA (2021b).

Localized Criteria Pollutant Concentrations, TAC Health Risk, and Odor Analyses

O&M activities would require minimal equipment and vehicles, and in some cases, would only occur annually or every few years. Therefore, potential changes in localized pollutant concentrations and health risks were assessed qualitatively, except for stationary standby engine generators. The odor analysis is likewise qualitative and considers the potential for receptors to be exposed to nuisance odors from O&M activities. Each of the intakes, Southern/Bethany Complex, South Delta Outlet and Control Structure, and Delta Mendota Canal Control Structure would have standby engine generators that would be used in the event of power outages. Because the standby engine generators are stationary sources that would remain at the same location and result in regular (monthly) emissions, the potential health risks resulting from standby engine generator testing were estimated. PM exhaust concentrations from standby engine generator testing were estimated using EPA's AERMOD dispersion model and emissions data from operational mass emissions analysis. Health risks were estimated according to the methods described above in Section 23.3.1.2, *Evaluation of Construction Activities,* and Appendix 23C, *Health Risk Assessment and Ambient Air Quality Analysis Methodology.*

Given the minimal emissions expected during O&M, the analysis did not quantitatively correlate criteria pollutant emissions to potential human health consequences. Criteria pollutants resulting from O&M activities would be substantially less than those generated during construction of the project. Accordingly, any changes in community health incidence resulting from O&M activities would be much less than those predicted for project construction activities.

23.3.2 Thresholds of Significance

This chapter analyzes the following potential air quality and GHG impacts.

- Impacts on air quality within the Sacramento Metropolitan Air Quality Management District (SMAQMD), SJVAPCD, BAAQMD, or YSAQMD.
- Exposure of sensitive receptors to substantial localized criteria pollutant emissions or TAC emissions.
- Exposure of sensitive receptors to asbestos, lead-based paint, or fungal spores that cause Valley fever.
- Exposure of sensitive receptors to substantial odor emissions.
- Impacts on global climate change from construction or O&M activities.

The significance of these impacts is based largely on compliance with state and federal air quality standards, as well as standards and plans developed by local air districts, as discussed in this section. The primary federal and state standards are the NAAQS and CAAQS, respectively. Both the NAAQS and CAAQS have been established to protect public health and welfare and the environment. Local air districts are required to develop plans and control programs for attaining the federal and state standards. The air districts have also developed health-based guidance for assessing the significance of other pollutants, such as DPM and asbestos. Therefore, the NAAQS and CAAQS, as well as the standards and plans developed by the air districts, provide appropriate thresholds for determining whether project-related emissions would result in significant impacts. The quantitative emissions thresholds developed by the four regional air districts to evaluate the significance level of impacts are discussed in the following sections.

The analysis of localized impacts and health risks also relies on standards developed by OEHHA. OEHHA is the lead state agency for the assessment of health risks posed by environmental contaminants, including TACs and other pollutants. The agency's mission is to protect human health and the environment through scientific evaluation of risks posed by hazardous substances. The standards developed by OEHHA are based on extensive scientific evidence and are specifically intended for the protection of human health and the environment.

Impacts related to GHG emissions are evaluated based on consistency with the *California Department of Water Resources Climate Action Plan Phase 1: Greenhouse Gas Emissions Reduction Plan, Update 2020* (Update 2020) and established statewide GHG reduction goals, including SB 32, EO S-3-05, and EO B-55-18. The GHG reduction goals are based on scientific consensus on the GHG emissions reduction needed to avert the worst effects of climate change. The CEQA Guidelines provide that a lead agency may consider a project's consistency with the State's long-term climate goals or strategies in determining the significance of impacts (CEQA Guidelines § 15064.4[b][3]).).

The following sections summarize the thresholds for each of the impact criteria noted above.

23.3.2.1 Evaluation of Mitigation Impacts

CEQA also requires an evaluation of potential impacts caused by the implementation of mitigation measures. Following the CEQA conclusion for each impact, the chapter analyzes potential impacts associated with implementing both the Compensatory Mitigation Plan and the other mitigation measures required to address with potential impacts caused by the project. Mitigation impacts are considered in combination with project impacts in determining the overall significance of the project. Additional information regarding the analysis of mitigation measure impacts is provided in Chapter 4, *Framework for the Environmental Analysis*.

23.3.2.2 Impacts on Air Quality within SMAQMD, SJVAPCD, BAAQMD, or YSAQMD

SMAQMD's (2020b:1), SJVAPCD's (2015a:80), BAAQMD's (2017b:2-2), and YSAQMD's (2017:6) CEQA guidelines contain emissions thresholds to assist lead agencies in evaluating the significance of project-generated criteria pollutant and precursor emissions. Table 23-9 presents the air district thresholds applicable to construction and O&M period emissions. The air district thresholds have been developed to prevent further deterioration of ambient air quality, which is influenced by emissions generated by projects within a specific air basin. The project-level thresholds therefore consider relevant past, present, and reasonably foreseeable future projects within the project area. For example, as noted in the BAAQMD's (2017b:2-1) CEQA Guidelines,

> In developing thresholds of significance for air pollutants, BAAQMD considered the emission levels for which a project's individual emissions would be cumulatively considerable. If a project exceeds the identified significance thresholds, its emissions would be cumulatively considerable, resulting in significant adverse air quality impacts to the region's existing air quality conditions.

And in the SMAQMD's (2020a:8-1) CEQA Guidelines,

> The District's approach to thresholds of significance is key to determining whether a project's individual emissions would result in a cumulatively considerable adverse contribution to the Sacramento Valley Air Basin's existing air quality conditions. If a project's emissions are estimated to be less than the thresholds, the project would not be expected to result in a cumulatively considerable contribution to the significant cumulative impact.

And in the SJVAPCD's (2015a:109) CEQA Guidelines,

> Any proposed development project that would individually have a significant air quality impact would also be considered to have a significant cumulative air quality impact.

And in the YSAQMD's (2007:7) CEQA Guidelines,

> Any proposed project that would individually have a significant air quality impact…would also be considered to have a significant cumulative impact.

The emissions thresholds presented in Table 23-9 therefore represent the maximum emissions a project may generate before it would result in a cumulatively considerable adverse contribution to existing air quality conditions. The thresholds are distinct and applicable only to emissions generated within each air district. For example, emissions generated by the alternatives in the SMAQMD in excess of SMAQMD's thresholds would result in a significant impact on regional air quality in the SMAQMD. Similarly, emissions generated in the SJVAPCD in excess of SJVAPCD's thresholds would result in a significant impact in the SJVAPCD, and so on for BAAQMD and YSAQMD.

SMAQMD's ROG and NO_X thresholds (Table 23-9) are based on emissions reduction targets that were set for new development projects in consideration of regional ozone attainment goals. The particulate matter thresholds align with the new source review (NSR) permit offset levels, which are designed to prevent new emissions sources from affecting attainment progress. SMAQMD thresholds therefore represent maximum emissions levels for new development required to support attainment of the NAAQS and CAAQS.

SJVAPCD's and BAAQMD's thresholds are based on the NSR offset requirements for stationary sources. SJVAPCD has determined that use of SJVAPCD Rule 2201 (New Source Review—NSR) Offset thresholds as thresholds of significance for criteria pollutants is an appropriate and effective means of promoting consistency in significance determinations within the environmental review process and is applicable to both stationary and non-stationary emissions sources. SJVAPCD's attainment plans demonstrate that project-specific emissions below their thresholds would have a less than significant impact on air quality. (San Joaquin Valley Air Pollution Control District 2015a:81–82.) BAAQMD has likewise concluded that the stationary pollutants described under the NSR program are equally significant to those pollutants generated with land use projects. BAAQMD's thresholds were set as the total emissions thresholds associated within the NSR program to help attain the NAAQS (Bay Area Air Quality Management District 2017b:D-46–D-47).

Table 23-9. SMAQMD, SJVAPCD, BAAQMD, and YSAQMD Criteria Pollutant and Precursor Thresholds

Analysis	SMAQMD	SJVAPCD [a]	BAAQMD	YSAQMD
Construction	NO_X: 85 lbs/day PM10: 80 lbs/day and 14.6 tons/year [b] PM2.5: 82 lbs/day and 15 tons/year [b]	ROG: 10 tons/year NO_X: 10 tons/year PM10: 15 tons/year PM2.5: 15 tons/year CO: 100 tons/year SO_X: 27 tons/year	ROG: 54 lbs/day NO_X: 54 lbs/day PM10: 82 lbs/day (exhaust only) PM2.5: 54 lbs/day (exhaust only)	ROG: 10 tons/year NO_X: 10 tons/year PM10: 80 lbs/day CO: Violation of CAAQS
O&M	ROG: 65 lbs/day NO_X: 65 lbs/day PM10: same as construction PM2.5: same as construction	Same as construction	ROG: 54 lbs/day or 10 tons/year NO_X: 54 lbs/day or 10 tons/year PM10: 82 lbs/day or 15 tons/year PM2.5: 54 lbs/day or 10 tons/year	Same as construction

Sources: Sacramento Metropolitan Air Quality Management District 2020b:1; San Joaquin Valley Air Pollution Control District 2015a:80; Bay Area Air Quality Management District 2017b:2-2; Yolo-Solano Air Quality Management District 2007:6.

AAQA = ambient air quality analysis; BAAQMD = Bay Area Air Quality Management District; SMAQMD = Sacramento Metropolitan Air Quality Management District; SJVAPCD = San Joaquin Valley Air Pollution Control District; YSAQMD = Yolo-Solano Air Quality Management District; ROG = reactive organic gases; lbs = pounds; NO_X = nitrogen oxides; PM10 = particulate matter that is 10 microns in diameter and smaller; PM2.5 = particulate matter that is 2.5 microns in diameter and smaller; CO = carbon monoxide; SO_X = sulfur oxide; CAAQS = California ambient air quality standards; NAAQS = national ambient air quality standards.

[a] SJVAPCD has also established a 100-pound-per-day threshold as a screening-level threshold to help determine whether increased emissions from a proposed project would cause or contribute to a violation of CAAQS or NAAQS. Projects with emissions below the threshold would not be in violation of CAAQS or NAAQS. Projects with emissions above the threshold would require an AAQA to confirm this conclusion (San Joaquin Valley Air Pollution Control District 2015a:93).

[b] Threshold applicable with implementation of all feasible dust control best management practices.

YSAQMD's ozone precursor thresholds are based on the emissions levels identified under Rule 3.20—Ozone Transport Mitigation, which implements the California Ozone Transport Mitigation Regulation codified under California Code of Regulations, Title 17, Division 3, Chapter 1, Subchapter 1.5, Article 6, section 70600(b)(1)(C). The Transport Mitigation Regulation was adopted to ensure that air quality is not significantly degraded by new sources of emissions, inclusive of pollutant transport to downwind air districts. Based on the ozone attainment status of YSAQMD and its location within the broader Sacramento area, Rule 3.20 requires a 10 tons per year "no net increase" program for NO_X and ROG generated by stationary sources. YSAQMD has concluded that the stationary source restriction established by Rule 3.20 is equally applicable to land use projects. YSAQMD's regional ozone thresholds for attaining the CAAQS and NAAQS were therefore set as the total emissions thresholds associated with Rule 3.20 and the California Ozone Transport Mitigation Regulation (Yolo-Solano Air Quality Management District 2007:B-1).

YSAQMD's PM10 threshold is based on the emissions levels identified under the NSR program, which is a permitting program established by Congress as part of the Clean Air Act Amendments of 1990 to ensure that air quality is not significantly degraded by new sources of emissions. YSAQMD's NSR program requires best available control technologies (BACT) to be applied where new or modified PM10 emissions exceed 80 pounds per day. Therefore, a project's PM10 emissions that trigger the YSAQMD's BACT threshold for PM10 would result in substantial air emissions and have a potentially significant impact on air quality (Yolo-Solano Air Quality Management District 2007:B-1).

YSAQMD's (2007:B-2) CEQA Handbook states that "localized high levels of CO, or CO hotspots, is the District's concern," and that "hotspots are usually associated with roadways that are congested and have heavy traffic volume." YSAQMD considers a project to result in a significant CO impact if it would create a CO hotspot that would violate the CAAQS of 9 ppm (8-hour average) or 20 ppm (1-hour average) (Yolo-Solano Air Quality Management District 2007:B-2). YSAQMD has adopted screening criteria to determine whether a project could cause a CO hotspot, as discussed below in Section 23.3.2.2, *Exposure of Receptors to Localized Emissions*.

23.3.2.3 Exposure of Receptors to Localized Emissions

Ambient Air Quality

The alternatives would result in a significant localized air quality effect if criteria pollutant concentrations exceed the ambient air quality standards or contribute substantially to an existing or projected violation. In areas where background concentrations do not currently exceed the NAAQS or CAAQS, the ambient air quality standard (Table 23-1) for each respective pollutant is used as the threshold. The increase in pollutant concentration associated with project emissions is added to the background concentration to estimate the total ambient air pollutant concentration for comparison with the threshold.

In areas where background concentrations already exceed the NAAQS or CAAQS, a substantial contribution to the existing violations is defined based on the applicable significant impact level (SIL). Incremental pollutant concentration impacts are evaluated using SILs established by the EPA under 40 CFR 51.165(b)(2) and in EPA's supporting guidance (U.S. Environmental Protection Agency 2018b:17). The EPA SILs define when emissions changes are not meaningful and do not contribute to a violation of the ambient air quality standards under the Prevention of Significant Deterioration program.

Table 23-10 summarizes the localized criteria pollutant thresholds used in the analysis. The ambient air quality standard is presented for pollutants and locations where background concentrations do not currently exceed the NAAQS or CAAQS. Ambient monitoring data from the three closest stations to the project footprint were used to define background concentrations (refer to Table 23-4). As noted above, if background concentrations currently violate the NAAQS or CAAQS, the SIL is used. Therefore, similar to the mass emissions thresholds (Table 23-9), the ambient air quality thresholds shown in Table 23-10 are distinct and only applicable to concentrations generated within the defined geographical areas.

Table 23-10. Localized Ambient Air Quality Thresholds (μg/m³)

District	CO	NO_2	SO_2	PM10	PM2.5
SMAQMD	1-hr CAAQS: 23,000 8-hr CAAQS: 10,000 1-hr NAAQS: 40,000 8-hr NAAQS: 10,000	1-hour CAAQS: 339 1-hour NAAQS: 188 Annual CAAQS: 57 Annual NAAQS: 100	1-hr CAAQS: 655 24-hr CAAQS: 105 1-hr NAAQS: 196	24-hr CAAQS/ NAAQS SIL: 5.0 Annual CAAQS SIL: 1.0	24-hr NAAQS SIL: 1.2 Annual CAAQS SIL: 0.2 Annual NAAQS: 12
SJVAPCD	1-hr CAAQS: 23,000 8-hr CAAQS: 10,000 1-hr NAAQS: 40,000 8-hr NAAQS: 10,000	1-hour CAAQS: 339 1-hour NAAQS: 188 Annual CAAQS: 57 Annual NAAQS: 100	1-hr CAAQS: 655 24-hr CAAQS: 105 1-hr NAAQS: 196	24-hr NAAQS: 150 24-hr CAAQS SIL: 5.0 Annual CAAQS SIL: 1.0	24-hr NAAQS SIL: 1.2 Annual NAAQS/CAAQS SIL: 0.2
BAAQMD	1-hr CAAQS: 23,000 8-hr CAAQS: 10,000 1-hr NAAQS: 40,000 8-hr NAAQS: 10,000	1-hour CAAQS: 339 1-hour NAAQS: 188 Annual CAAQS: 57 Annual NAAQS: 100	1-hr CAAQS: 655 24-hr CAAQS: 105 1-hr NAAQS: 196	24-hr NAAQS: 150 24-hr CAAQS SIL: 5.0 Annual CAAQS: 20	24-hr NAAQS SIL: 1.2 Annual CAAQS/ NAAQS: 12

Source: National and California ambient air quality standards; U.S. Environmental Protection Agency 2018b:17.

BAAQMD = Bay Area Air Quality Management District; SMAQMD = Sacramento Metropolitan Air Quality Management District; SJVAPCD = San Joaquin Valley Air Pollution Control District; YSAQMD = Yolo-Solano Air Quality Management District; μg/m³ = micrograms per cubic meter; CO = carbon monoxide; NO_2 = nitrogen dioxide; SO_2 = sulfur dioxide; PM10 = particulate matter that is 10 microns in diameter and smaller; PM2.5 = particulate matter that is 2.5 microns in diameter and smaller; CAAQS = California ambient air quality standards; NAAQS = national ambient air quality standards; SIL = significant impact level.

Carbon Monoxide from On-Road Vehicles

Air district screening criteria are used to evaluate whether on-road vehicles in the air quality study area would result in a CO hotspot and violation of the CO CAAQS. BAAQMD adopted the following screening criteria to determine whether project-generated traffic would cause a potential violation of the CO CAAQS.

- Project traffic would not increase traffic volumes at affected intersections to more than 44,000 vehicles per hour.
- Project traffic would not increase traffic volumes at affected intersections to more than 24,000 vehicles per hour where vertical and/or horizontal mixing is substantially limited (e.g., tunnel, parking garage, bridge underpass, natural or urban street canyon, below-grade roadway).

- The project is consistent with an applicable congestion management plan established by the county congestion management agency for designated roads or highways, regional transportation plans, and local congestion management agency plans.

SJVAPCD (2015a:98) and YSAQMD (2017:11) have also adopted screening criteria for the analysis of CO concentration from project-generated traffic.[8] These criteria are based on whether a project would reduce the level of service (LOS) at affected intersections to LOS E or F. All air district screening criteria were developed based on county average vehicle fleets that are primarily comprised of gasoline vehicles. Construction vehicles would be predominantly diesel trucks, which generate fewer CO emissions per idle-hour and vehicle miles traveled than gasoline-powered vehicles. Accordingly, the air district screening thresholds provide a conservative evaluation threshold for the assessment of potential CO emissions impacts during construction.

Diesel Particulate Matter and Localized Particulate Matter

All four air districts have adopted thresholds to evaluate receptor exposure to DPM emissions (Sacramento Metropolitan Air Quality Management District 2020b:1; Yolo-Solano Air Quality Management District 2007:7; San Joaquin Valley Air Pollution Control District 2015b:1; Bay Area Air Quality Management District 2017b:2-2). The “substantial” DPM threshold defined by SMAQMD, BAAQMD, and YSAQMD is the probability of contracting cancer for the maximum exposed individual exceeding 10 in 1 million, or the ground-level concentrations of noncarcinogenic TACs resulting in a hazard index greater than 1 for the maximum exposed individual. SJVAPCD’s hazard index is also greater than 1 for the maximum exposed individual, but its cancer risk threshold is 20 in 1 million.

The BAAQMD has adopted an incremental concentration-based significance threshold to evaluate receptor exposure to localized PM2.5, where a “substantial” contribution is defined as PM2.5 concentrations exceeding 0.3 $\mu g/m^3$. PM10 from earthmoving activities during construction is expected to be significant without application of dust control measures. SMAQMD and SJVAPCD also require dust control measures to reduce fugitive PM2.5 and PM10 during construction activities.

The BAAQMD’s cumulative cancer risk threshold is 100 cases per million and its noncancer thresholds are a hazard index of greater than 10.0 and a PM2.5 concentration of greater than 0.8 $\mu g/m^3$. SMAQMD, SJVAPCD, and YSAQMD do not have separate cumulative health risk thresholds.

Table 23-11 summarizes the PM2.5 concentration (BAAQMD only) and cancer and noncancer health risk thresholds used in the analysis. The alternatives would expose sensitive receptors to substantial TAC emissions if any of the thresholds in Table 2-11 are exceeded.

Table 23-11. PM2.5 Concentration Thresholds and Cancer and Noncancer Health Risk Thresholds for Receptor Exposure to Diesel Particulate Matter

District	Cancer Risk	Hazard Index	PM2.5 ($\mu g/m^3$)
SMAQMD	10 per million (project and cumulative)	1.0 (project and cumulative)	–
SJVAPCD	20 per million (project and cumulative)	1.0 (project and cumulative)	–
BAAQMD	10 per million (project)	1.0 (project)	0.3 (project)

[8] SMAQMD (2020a:4-1) does not consider construction-generated CO a significant pollutant of concern because construction activities and land use development projects typically do not generate substantial quantities of this pollutant.

District	Cancer Risk	Hazard Index	PM2.5 (μg/m³)
BAAQMD	100 per million (cumulative)	10.0 (cumulative)	0.8 (cumulative)
YSAQMD	10 per million (project and cumulative)	1.0 (project and cumulative)	–

Sources: Sacramento Metropolitan Air Quality Management District 2020b:1; San Joaquin Valley Air Pollution Control District 2015b:1; Bay Area Air Quality Management District 2017b:2-2; Yolo-Solano Air Quality Management District 2007:7.

BAAQMD = Bay Area Air Quality Management District; SMAQMD = Sacramento Metropolitan Air Quality Management District; SJVAPCD = San Joaquin Valley Air Pollution Control District; YSAQMD = Yolo-Solano Air Quality Management District; PM2.5 = particulate matter that is 2.5 microns in diameter and smaller; μg/m³ = micrograms per cubic meter.

23.3.2.4 Exposure of Receptors to Asbestos, Lead-Based Paint, or Fungal Spores

Receptors would be exposed to significant asbestos and lead-based paint emissions if the project alternatives fail to comply with applicable local rules and regulations. All air districts require the demolition or renovation of asbestos or building materials containing lead-based paint to comply with the limitations of the National Emissions Standards for Hazardous Air Pollutants regulations (40 CFR Part 61), as articulated in local rules (SMAQMD Rule 902, SJVAPCD Rule 7050, BAAQMD Regulation 11 Rule 2, and YSAQMD Rule 9.9). These rules ensure that asbestos and lead-based paint are disposed of appropriately and safely (Sacramento Metropolitan Air Quality Management District 2020a:5-5).

Receptors would be exposed to significant health impacts from *C. immitis* spores if dust emissions during construction are uncontrolled. The potential for the project to expose receptors to increased risk of developing Valley fever is highest in areas known to contain *C. immitis* and during earthmoving activities that generate fugitive dust.

23.3.2.5 Exposure of Receptors to Odors

Receptors would be exposed to significant odors if the project alternatives result in objectionable odor emissions that affect a substantial number of people. There are no quantitative thresholds that specifically define receptor exposure to objectionable odors. SMAQMD's (2020a:7-5), SJVAPCD's (2015a:103), and BAAQMD's (2017b:3-4) CEQA guidelines include recommended odor screening distances for common land use types that typically generate odors. BAAQMD's (2017b:2-2) CEQA guide further defines a significant odor impact as five confirmed odor complaints per year averaged over 3 years. YSAQMD's (2007:8) CEQA guide notes that "a project may reasonably be expected to have a significant adverse odor impact where it 'generates odorous emissions in such quantities as to cause detriment, nuisance, or annoyance to any considerable number of persons or to the public, or which may endanger the comfort, repose, health, or safety of any such person or the public, or which may cause, or have a natural tendency to cause, injury or damage to business or property.'"

23.3.2.6 Impacts on Global Climate Change

Project Construction

DWR has determined that for the purposes of this analysis, any increase in GHG emissions from construction equipment, vehicles, and energy consumption above net zero would result in a significant impact.

CEQA does not establish quantitative significance thresholds for construction-generated GHG emissions; instead, each project put forth by the lead agency is evaluated on a case by case basis using the most up to date calculation and analysis methods. However, by enacting AB 32 and SB 32, the State Legislature has established statewide GHG reduction targets extending through 2030. Scientific studies (as best represented by the IPCC's periodic reports) demonstrate that climate change is already occurring due to past GHG emissions. Evidence concludes that carbon neutrality must be achieved by mid-century to avoid the most severe climate change impacts. A net zero threshold represents a conservative assessment of construction emissions considering that the generation of construction-related GHG emissions is generally short term in duration compared to the project's overall lifetime. Regardless, DWR conservatively selected a net zero threshold to avoid underrepresenting potential impacts.

Maintenance Activities and Operational SWP Pumping

In May 2012, DWR adopted the *California Department of Water Resources Climate Action Plan Phase I: Greenhouse Gas Emissions Reduction Plan* (2012 Plan), which detailed DWR's efforts to reduce GHG emissions consistent with EO S-3-05 and AB-32. The 2012 Plan provided estimates of historical (going back to 1990), current, and future GHG emissions related to operations (e.g., energy use), construction (e.g., bulldozer), maintenance (e.g., flood protection facility upkeep), and business practices (e.g., DWR building related).

DWR prepared the 2012 Plan consistent with CEQA Guidelines Section 15183.5. This section of the CEQA Guidelines provides that a "Plan for the Reduction of Greenhouse Gas Emissions," which meets the specified requirements, "may be used in the cumulative impacts analysis of later projects" (CEQA Guidelines § 15183.5[b]). More specifically, "[l]ater project-specific environmental documents may tier from and/or incorporate by reference" the "programmatic review" conducted for the GHG reduction plan (CEQA Guidelines § 15183.5[a]). "An environmental document that relies on a greenhouse gas reduction plan for a cumulative impacts analysis must identify those requirements specified in the plan that apply to the project, and, if those requirements are not otherwise binding and enforceable, incorporate those requirements as mitigation measures applicable to the project" (CEQA Guidelines § 15183.5[b][2]). Because global climate change, by its very nature, is a global cumulative impact, an individual project's compliance with a qualifying GHG reduction plan may suffice to mitigate the project's incremental contribution to that cumulative impact to a level that is not "cumulatively considerable" (CEQA Guidelines § 15064[h][3]).

In July 2020, DWR developed the *California Department of Water Resources Climate Action Plan Phase 1: Greenhouse Gas Emissions Reduction Plan Update 2020* (Update 2020) to review GHG reductions since the 2012 Plan and to update strategies for further reduction consistent with EOs B-30-15 and B-55-18 and SB 32. Update 2020 specifies aggressive 2030 and 2045 emissions reduction goals and identifies a list of GHG emissions reduction measures that DWR will undertake to achieve these goals. DWR prepared an addendum to the negative declaration for the 2012 Plan to evaluate changes under Update 2020 required to meet the State's long-term reduction goals relative to the analysis that was conducted for the 2012 Plan (California Department of Water Resources 2020b). DWR concluded that these changes would not cause any new significant environmental impacts that would require the preparation of a subsequent environmental document (CEQA Guidelines § 12162[b] and § 15164[b]). Accordingly, projects consistent with Update 2020 may tier their cumulative GHG impact analysis from the associated CEQA addendum to the negative declaration for the 2012 Plan, which demonstrates that DWR will achieve GHG emissions reductions consistent with above statewide GHG emissions reduction goals.

Chapter X of Update 2020 outlines how individual projects can demonstrate consistency with Update 2020 so that they may rely on the analysis it provides for the purposes of a CEQA cumulative GHG impacts analysis (California Department of Water Resources 2020a:63–66). Update 2020 requires that the following steps be taken to ensure that the project is consistent with Update 2020:

- Identify, quantify, and analyze the GHG emissions from the proposed project and alternatives.
- Determine that construction-related GHG emissions levels do not exceed 25,000 metric tons of carbon dioxide equivalent ($MTCO_2e$) for the entire construction phase of the project or 12,500 $MTCO_2e$ in any single year of construction.
- Incorporate into the design or implementation of the project all applicable construction emissions reduction measures listed in Update 2020.
- Determine that the project does not conflict with DWR's ability to implement any of the specific action GHG emissions reduction measures outlined in Update 2020.
    - OP-1 Termination of Power Supplies from Reid Gardner Power Plant
    - OP-2 Energy Efficiency Improvements
    - OP-3 Renewable Energy Procurement Plan (REPP)
    - OP-4 On-Site Renewable Energy Resources
    - OP-5 Replace Energy from the Lodi Energy Center
    - OP-6 Carbon Sequestration
    - OP-7 Increase Use of Zero-Carbon Energy
    - MA-1 Reduce SF_6 Emissions from Switchgears
    - MA-2 Participate in Sacramento Municipal Utility District (SMUD) Commercial Greenergy Program
    - MA-3 Purchase Carbon Offsets
    - MA-4 Implement the DWR Sustainability Policy
    - MA-5 Retail Energy Reduction

In addition to all of these listed requirements, if implementation of the project would result in additional energy demands on the SWP system of 15 gigawatt hours (GWh) per year or greater, the project must perform additional analyses with DWR's Project Power & Risk Office (PARO) to determine whether the additional energy demand would require DWR to take additional steps beyond those identified in Update 2020 to achieve its emissions reduction goals. If the analyses indicate that the additional load resulting from the proposed project would require DWR to modify existing or implement additional GHG emissions reduction measures, such measures must be approved by PARO.

Consistent with DWR project-level cumulative GHG emissions analysis requirements, a GHG Emission Reduction Plan Consistency Determination Form from Update 2020 was completed (refer to Appendix 22E, *Assessment Form for Consistency with GHG Emissions Reduction Plan*). The alternatives would result in additional SWP energy demands more than 15 GWh per year. Consultation with PARO has occurred to verify that revisions to DWR's Renewable Power Procurement Plan are not needed to accommodate the additional energy demand associated with the project. As such, operational emissions from: (1) increased SWP pumping; and (2) project maintenance are addressed consistent with Update 2020 and are found to be less than significant, as discussed further in Section 23.3.3, *Impacts and Mitigation Approaches*.

Displaced Purchases of CVP Electricity

DWR has determined that for the purposes of this analysis, any increase in indirect GHG emissions above net zero related to displaced purchases of CVP electricity would result in a significant impact. Hydropower is the primary energy source for CVP activities. Because hydropower is considered neutral with respect to emissions, CVP pumping associated with the project alternatives would therefore not directly result in increased GHG emissions (hydropower is considered neutral with respect to emissions). However, hydropower supplied to a project alternative could reduce the quantity of hydropower supplied to the California grid and/or other CVP customers, resulting in indirect GHG emissions. Increased indirect GHG emissions from displaced purchases of CVP electricity could impede attainment of statewide GHG reduction goals.

Land Use Change

DWR has determined that for the purposes of this analysis, any increase in cumulative GHG emissions from land use change above net zero would result in a significant impact. Unlike construction emissions from equipment and vehicles, which cease when the engine is turned off, many of the GHG emissions and removals associated with land use change occur annually and can vary depending on the growth rate of vegetation and other factors. Accordingly, it is more appropriate to evaluate GHG effects from land use change over a cumulative period that captures the natural variability in emissions during and after the establishment of vegetation. This approach safeguards against selecting an arbitrary analysis year that may show emissions or removals in that single year, which may or may not be reflective of the overall and long-term emissions trend induced by land use change. The selection of a no net increase above baseline emissions levels is consistent with CARB (2021c) objectives to maintain natural lands as a resilient carbon sink. Senate Bill 1386 also identifies the protection and management of natural and working lands as a key strategy toward meeting the state’s GHG reduction targets.

23.3.3 Impacts and Mitigation Approaches

23.3.3.1 No Project Alternative

As described in Chapter 3, *Description of the Proposed Project and Alternatives,* CEQA Guidelines Section 15126.6 directs that an EIR evaluate a specific alternative of “no project” along with its impact. The No Project Alternative in this Draft EIR represents the circumstances under which the project (or project alternative) does not proceed and considers predictable actions, such as projects, plans, and programs, that would be reasonably expected to occur in the foreseeable future if the Delta Conveyance Project is not constructed and operated. This description of the environmental conditions under the No Project Alternative first considers how air quality and GHGs emissions could change over time and then discusses how other predictable actions could affect air quality and GHG emissions.

Future Air Quality and Greenhouse Gases Conditions

Future ambient air quality conditions in the Delta are not anticipated to substantially change compared to existing conditions. Construction and operations of future projects may contribute to regional emissions and worsen ambient air quality. However, federal, state, and local regulations, such as those related to the electrification of the transportation and energy sectors, are expected to achieve substantial reductions in future emissions levels, despite regional growth. The SJVAPCD has adopted the *2018 Plan for the 1997, 2006, and 2012 PM2.5 Standards, 2016 Plan for the 2008 8-Hour Ozone Standard*, *2013 Plan for the Revoked 1-Hour Ozone Standard, 2007 Ozone Plan*, and *2007 PM10 Maintenance Plan and Request for Redesignation* to achieve regional attainment with the ambient air quality standards by the earliest practical date (San Joaquin Valley Air Pollution Control District 2007a, 2007b, 2013, 2016, 2018b).

Future ambient air quality conditions in the service area are likewise not expected to substantially differ from existing conditions due to existing and proposed regulations. While the extent of emissions that might occur in any given region is variable, local air districts have adopted plans to control future emissions and ensure regional attainment with the NAAQS and CAAQS.

Predictable Actions by Others

A list and description of actions included as part of the No Project Alternative are provided in Appendix 3C, *Defining Existing Conditions, No Project Alternative, and Cumulative Impact Conditions*. As described in Chapter 4, *Framework for the Environmental Analysis,* the No Project Alternative analyses focus on identifying the additional water-supply-related actions public water agencies may opt to follow if the Delta Conveyance Project does not occur.

Public water agencies participating in the Delta Conveyance Project have been grouped into four geographic regions. The water agencies within each geographic region would likely pursue a similar suite of water supply projects under the No Project Alternative (Appendix 3C, *Defining Existing Conditions, No Project Alternative, and Cumulative Impact Conditions*). Activities associated with the various water supply projects could result in the generation of criteria pollutants, TAC, and GHG emissions from on-road vehicle movement and use of mobile, stationary, and earthmoving (e.g., grading) equipment. Emissions would vary depending on the level of activity, length of the activity, specific operations, types of equipment, number of personnel, wind and precipitation conditions, and soil moisture content. Operational activities typically include inspection, monitoring, testing, maintenance, and facility operations. These activities could generate emissions from mobile and stationary equipment, on-road vehicles, energy consumption, and fugitive processes.

The specific types and amounts of construction and operational activities would differ depending on the water supply project. Table 23-12 summarizes potential construction and operational emissions that may be generated by the project categories based on a review of other similar project types and the regions in which the projects are expected to be required. The table also identifies the relevant air districts with local air quality management authority in each of the water supply regions. Activities under the No Project Alternative could occur in two of the air districts in the air quality study area for the project alternatives—BAAQMD and SJVAPCD. The additional air districts are defined below. Like BAAQMD and SJVAPCD, many of these air districts have published CEQA guidelines that contain emissions thresholds to assist lead agencies in evaluating the significance of project-generated criteria pollutant and precursor emissions.

- Antelope Valley Air Quality Management District (AVAQMD)

- Eastern Kern Air Quality Management District (EKAQMD)
- Mojave Desert Air Quality Management District (MDAQMD)
- South Coast Air Quality Management District (SCAQMD)
- San Diego Air Pollution Control District (SDAPCD)
- San Luis Obispo Air Pollution Control District (SLOAPCD)
- Ventura County Air Pollution Control District (VCAPCD)

Desalination projects would most likely be pursued in the northern and southern coastal regions. The southern coastal region would likely require larger and more desalination projects than the northern coastal region to replace the water yield that otherwise would have been received through Delta Conveyance. Groundwater recovery (brackish water desalination) could occur across the northern inland, southern coastal, southern inland regions. Physical construction activities required for desalination and groundwater recovery projects would be similar and could include clearing, grubbing, and grading; trenching; and construction of pipelines, tanks, pumps, electrical equipment, and buildings. Long-term emissions associated with operation of desalination and groundwater recovery facilities typically include emissions from O&M and employee vehicle trips, stationary sources, and consumption of electricity and natural gas.

Groundwater management projects would occur in the northern and southern coastal regions. Construction activities for each project could include site clearing; excavation and backfill; and construction of basins, conveyance canals, pipelines, diversions, and pump stations. Operational activities may include maintenance and repair of banks, berms, and concrete structures, and removal of debris, sediment, and vegetation. These activities normally require the use of heavy-duty construction equipment and vehicles, typically on an annual basis prior to the wet season. Emissions may also be generated by work trucks and employee commute vehicles. New diesel-powered pump stations would generate criteria pollutants, TAC, and GHG emissions. Indirect GHG emissions would be generated by electric-powered pumps.

Water recycling projects could be pursued in all four regions. The northern inland region would require the fewest number of wastewater treatment/water reclamation plants, followed by the northern coastal region, followed by the southern coastal region. The southern inland region would require the greatest number of water recycling projects to replace the anticipated water yield that it would receive through Delta Conveyance. Construction techniques for water recycling projects would vary depending on the type of project (e.g., for landscape irrigation, groundwater recharge, dust control, industrial processes) but could require earthmoving activities, grading, excavation, trenching, and facility erection. Operations activities could result in emissions from employee commutes, on-site heavy-duty equipment, stationary equipment, electricity consumption, natural gas consumption, and wastewater treatment processes.

Table 23-12. Summary of No Project Activities and Potential Emissions

Project type	Region	Air Districts	Potential Construction Emissions	Potential Operational Emissions
Increased/ accelerated desalination	Northern Coastal, Southern Coastal	BAAQMD, SCAQMD, SDAPCD, AVAQMD, SJVAPCD, SLOAPCD, VCAPCD	Exhaust emissions and fugitive dust from construction equipment, vehicles, employee commutes required for facility construction and pipeline installation.	Exhaust emissions and fugitive dust from O&M and employee vehicle trips. Exhaust emissions from stationary source fuel combustion. GHG emissions from electricity consumption.
Groundwater recovery (brackish water desal)	Northern Inland, Southern Coastal, Southern Inland	BAAQMD, SLOAPCD, VCAPCD, SJVAPCD, EKAQMD, MDAQMD, AVAQMD, SCAQMD	Exhaust emissions and fugitive dust from construction equipment, vehicles, employee commutes required for facility construction and pipeline installation.	Exhaust emissions and fugitive dust from O&M and employee vehicle trips. Exhaust emissions from stationary source fuel combustion. GHG emissions from electricity consumption. Potential odors from treatment process.
Groundwater management	Northern Coastal, Southern Coastal	BAAQMD, SCAQMD, SDAPCD, AVAQMD, SJVAPCD, SLOAPCD, VCAPCD	Exhaust emissions and fugitive dust from equipment and vehicles for well drilling, construction of supporting facilities, and vegetation management.	Exhaust emissions and fugitive dust from O&M and employee vehicle trips. Exhaust emissions from fossil-fueled powered pumps. GHG emissions from electric-powered pumps.
Water recycling	Northern Coastal, Northern Inland, Southern Coastal, Southern Inland	BAAQMD, SLOAPCD, VCAPCD, SJVAPCD, EKAQMD, MDAQMD, AVAQMD, SCAQMD	Exhaust emissions and fugitive dust from equipment and vehicles for facility construction, pipeline installation, vegetation management, grading, and trenching.	For new treatment facilities, exhaust emissions and fugitive dust from O&M and employee vehicle trips. Exhaust emissions from stationary source fuel combustion. GHG emissions from electricity consumption and water treatment, with potential offsetting of emissions increased due to reduced water consumption.
Water Use efficiency measures	Northern Coastal, Southern Coastal, Southern Inland	BAAQMD, SLOAPCD, VCAPCD, SJVAPCD, EKAQMD, MDAQMD, AVAQMD, SCAQMD	Minor exhaust emissions and fugitive dust is pipeline or canal construction is required.	Reduced GHG emissions from lower water sector energy consumption. Potential for increased odors and GHG emissions in wastewater treatment systems due to lower pipe velocities. Fugitive dust is agriculture lands are fallowed.

BAAQMD = Bay Area Air Quality Management District; SCAQMD = South Coast Air Quality Management District; SDAPCD = San Diego Air Pollution Control District; AVAQMD = Antelope Valley Air Quality Management District; SJVAPCD = San Joaquin Valley Air Pollution Control District; SLOAPCD = San Luis Obispo Air Pollution Control District; VCAPCD = Ventura County Air Pollution Control District; EKAQMD = Eastern Kern Air Quality Management District; MDAQMD = Mojave Desert Air Quality Management District; GHG = greenhouse gas.

Water efficiency projects could be pursued in all four regions and involve a wide variety of project types, such as flow measurement or automation in a local water delivery system, lining of canals, use of buried perforated pipes to water fields, and additional detection and repair of commercial and residential leaking pipes. Projects requiring physical construction (e.g., lining of canals) could generate minor amounts of emissions from ground disturbance and equipment operation. Physical changes in water levels in reservoirs, rivers, and streams from implementation of conservation measures would not result in long-term criteria pollutant emissions. However, required water conservation could result in agricultural land fallowing, which could result in increased fugitive dust if crop or vegetation stubble cover or vegetative regrowth does not remain. Increased water conservation could also affect operations at existing municipal wastewater treatment plants, water recycling facilities, and throughout the wastewater conveyance system, resulting in increased odors and GHG emissions from lower pipe velocities and longer detention times.

SWP Pumping and Displaced Purchases of CVP Electricity

Calculated annual electricity consumption for SWP pumping and displaced purchases of CVP electricity under existing conditions and the No Project Alternative are presented in Chapter 22, *Energy*, Tables 22-11 and 22-12. Table 23-13 presents criteria pollutant and GHG emissions generated by electricity consumption and distribution.

Table 23-13. Total Criteria Pollutant and GHG Emissions from SWP Pumping and Displaced Purchases of CVP Electricity for Existing Conditions and the No Project Alternative (tons/year) [a]

Condition	ROG	CO	NO_X	PM10	PM2.5	SO_2	CO_2e [b]
Existing	60	920	2,057	246	207	2,138	1,651,142
No Project Alternative (2040)	29	586	320	134	48	69	301,478

ROG = reactive organic gases; CO = carbon monoxide; NO_X = nitrogen oxides; PM10 = particulate matter that is 10 microns in diameter and smaller; PM2.5 = particulate matter that is 2.5 microns in diameter and smaller; SO_2 = sulfur dioxide; CO_2e = carbon dioxide equivalent.

[a] Power plants located throughout the state supply the grid with power, which would be distributed to the study area to meet project demand. Power supplied by statewide power plants would generate criteria pollutants. Because these power plants are located throughout the state, criteria pollutant emissions associated with the No Project Alternative electricity demand cannot be ascribed to a specific air basin or air district within the study area.

[b] Emissions are presented in metric tons.

Because power plants are located throughout the state, criteria pollutant emissions associated with electricity demand from SWP pumping and displaced purchases of CVP electricity under the No Project Alternative cannot be ascribed to a specific air basin or air district within the study area, and it cannot be determined whether the air pollutant emissions associated with electricity generation would degrade air quality in a specific air basin or air district within the study area. Consequently, impacts relating to the electricity consumption from SWP pumping and displaced purchases of CVP electricity under the No Project Alternative through a comparison of electricity-related emissions to the local thresholds shown in Table 23-9, which are established to manage emissions sources under the jurisdiction of individual air districts, would be infeasible. Criteria pollutant emissions from electricity consumption, which are summarized in Table 23-13, are therefore provided for informational purposes only and are not included in the impact conclusion.

There would be no substantial changes in CVP and SWP energy production or use for the No Project Alternative. This is because there would be no change in the operations of the existing CVP and SWP hydroelectric generation facilities or pumping facilities. Based on current information, the projections regarding carbon intensity of electricity generation would be much lower in 2040 because of Senate Bill 100, which requires that zero-carbon resources comprise 100% of electric retail sales to end-use customers by 2045. Accordingly, while CVP and SWP electricity consumption are not expected to change substantially under the No Project Alternative, emissions generated by the production and transmission of that electricity are predicted to be lower under the No Project Alternative compared to existing conditions (Table 23-13).

While emissions from SWP pumping and displaced purchases of CVP electricity are expected to decrease, the plans, projects, and programs implemented in the absence of the Delta Conveyance Project would generate construction and operational emissions. The example water reliability projects discussed above could occur if the Delta Conveyance Project were not approved and project objectives were not met. While it cannot be anticipated what ultimate suite of projects would be chosen by each of the regions, it would likely be a mix of various types of projects reasonably feasible within that region, as outlined in Chapter 3, *Description of the Proposed Project and Alternatives*, and Appendix 3C, *Defining Existing Conditions, No Project Alternative, and Cumulative Impact Conditions*.

As shown in Table 23-12, construction activities required for water use efficiency measures may be relatively minor. However, more intensive construction may be required for new or expanded facilities, including desalination, groundwater recovery, and water recycling facilities, which may generate emissions above local air district thresholds. Information on the location, types, and quantity of construction equipment required for each project is unavailable. Likewise, the levels of potential long-term O&M activities that may result from implementation of individual projects and plans are currently unknown. While some project activities (e.g., routine O&M, including inspections and minor repairs) may not substantially increase O&M activities relative to existing conditions, other projects would install entirely new facilities representing a new long-term source of emissions that could exceed adopted thresholds. Construction and O&M activities involving diesel equipment could also expose nearby receptors to increased health risks. Measures similar to those proposed for the Delta Conveyance Project are likely to be available to reduce emissions and public health risks.

23.3.3.2 Impacts of the Project Alternatives on Air Quality

Impact AQ-1: Result in Impacts on Regional Air Quality within the Sacramento Metropolitan Air Quality Management District

All Project Alternatives

Project Construction

The predominant pollutants associated with project construction in the SMAQMD would be fugitive dust (PM10 and PM2.5) from earthmoving activities and concrete batching. Combustion pollutants, particularly ozone precursors, would also be generated by heavy equipment and vehicles. Emissions vary substantially depending on the level of activity, length of the construction period, specific construction operations, types of equipment, number of personnel, wind and precipitation conditions, and soil moisture content.

Tables 23-14 through 23-22 summarize construction emissions that would be generated in the SMAQMD in pounds per day and tons per year by each project alternative. There would be no compensatory mitigation sites in SMAQMD and, therefore, no associated emissions. The emissions estimates include implementation of the following air quality environmental commitments:

- Environmental Commitment EC-7: *Off-Road Heavy-Duty Engines* would minimize exhaust emissions from off-road equipment by requiring all heavy-duty equipment used during construction to meet Tier 4 engine requirements. Tier 4 engine requirements are currently the strictest emissions standards adopted by CARB and EPA. The environmental commitment also requires use of renewable diesel, which is produced from non-petroleum renewable resources and waste products and generates substantially fewer emissions than traditional diesel per gallon combusted. This commitment does not preclude use of electric-powered equipment over diesel engines, to the extent they become commercially available. However, because the penetration of electric engines in the construction fleet is currently unknown, the emissions analysis conservatively assumes all equipment would use diesel engines.
- Environmental Commitment EC-9: *On-Site Locomotives* would minimize exhaust emissions from locomotives operating within the Twin Cities Complex, Southern Complex, and/or Lower Roberts Island by requiring that they meet Tier 4 engine requirements.
- Environmental Commitment EC-10: *Marine Vessels* would minimize exhaust emissions from marine vessels by requiring that they operate engines no older than model year 2010 (manufactured or retrofitted).
- Environmental Commitment EC-11: *Fugitive Dust Control* would minimize fugitive dust emissions through the implementation of a dust control plan. The dust control plan would outline measures such as watering exposed soil, applying dust suppressants to unpaved roads, stabilizing stockpiles with biopolymers, installing wind breaks, enclosing conveyors and mechanical driers, washing vehicles before exiting the construction site, and protecting disturbed areas following construction.
- Environmental Commitment EC-12: *On-Site Concrete Batching Plants* would minimize fugitive dust emissions from concrete batching through implementation of control measures, such as water sprays, enclosures, hoods, and other suitable technology.

Environmental Commitment EC-8: *On-Road Haul Trucks* would minimize exhaust emissions from on-road trucks by requiring all haul trucks to have model year engines manufactured or retrofitted ideally within the past 5 years of when the vehicles are brought to the individual construction sites, but no more than 8 years from overall project groundbreaking. The measure also encourages DWR to use electric or hybrid-electric vehicles over diesel counterparts. While this commitment would reduce emissions from diesel haul trucks by requiring newer model year engines (or electric vehicles), because there is flexibility to use vehicles that are up to 8 years old at the start of construction, the exact project fleet mix is unknown. Accordingly, the emissions analysis does not quantify or include potential reductions associated with Environmental Commitment EC-8.

Table 23-14. Criteria Pollutant and Precursor Emissions from Construction of Alternative 1 in the Sacramento Metropolitan Air Quality Management District [a]

	Maximum Daily Emissions (lbs/day) [b]										Annual Emissions (tons/year)									
				PM10			PM2.5							PM10			PM2.5			
Year	ROG	NO_X	CO	Exhaust	Dust	Total [c]	Exhaust	Dust	Total [c]	SO_2	ROG	NO_X	CO	Exhaust	Dust	Total [c]	Exhaust	Dust	Total [c]	SO_2
Alternative 1																				
PFIY 1	37	**249**	315	10	13	23	9	3	12	<1	1	3	12	<1	1	1	<1	<1	<1	<1
PFIY 2	37	**249**	315	10	13	23	9	3	12	<1	1	3	11	<1	1	1	<1	<1	<1	<1
CY 1	10	**307**	137	1	166	**166**	1	18	19	1	<1	7	5	<1	3	3	<1	<1	1	<1
CY 2	24	**199**	346	2	107	**109**	1	36	37	1	1	11	22	<1	5	6	<1	2	2	<1
CY 3	13	**410**	321	2	117	**119**	2	36	38	2	1	14	18	<1	7	7	<1	2	2	<1
CY 4	15	**363**	433	2	107	**108**	2	16	18	2	1	21	21	<1	5	5	<1	1	1	<1
CY 5	46	**551**	1,087	5	152	**156**	4	41	46	4	4	57	119	<1	12	12	<1	3	4	<1
CY 6	40	**648**	1,242	5	155	**160**	5	39	44	4	4	67	141	1	13	14	1	3	4	<1
CY 7	49	**697**	1,349	6	204	**209**	6	47	53	5	4	54	140	1	14	14	1	3	4	<1
CY 8	42	**576**	938	6	147	**153**	6	32	36	3	2	31	60	<1	12	12	<1	3	3	<1
CY 9	31	**444**	412	5	108	**113**	4	21	26	1	1	26	30	<1	11	11	<1	2	2	<1
CY 10	9	**347**	168	1	80	**81**	1	18	19	1	1	24	16	<1	9	9	<1	2	2	<1
CY 11	6	**224**	113	1	59	59	1	13	14	1	<1	15	11	<1	6	7	<1	1	1	<1
CY 12	29	48	129	<1	77	77	<1	12	12	<1	<1	2	8	<1	8	8	<1	1	1	<1
CY 13	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CY 14	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Threshold [d]	–	*85*	–	–	–	*80 [e]*	–	–	*82 [e]*	–	–	–	–	–	–	*14.6 [e]*	–	–	*15.0 [e]*	–

BMPs = best management practices; CO = carbon monoxide; lbs = pounds; NO_X = nitrogen oxides; PM10 = particulate matter that is 10 microns in diameter and smaller; PM2.5 = particulate matter that is 2.5 microns in diameter and smaller; ROG = reactive organic gases; SMAQMD = Sacramento Metropolitan Air Quality Management District; SO_2 = sulfur dioxide; PFIY = preliminary field investigation year; CY = construction year.

[a] Emissions results include implementation of air quality Environmental Commitments EC-7 and EC-9 through EC-12. Exceedances of SMAQMD's thresholds are shown in **bolded underline**.

[b] Presents the highest emissions estimate during a single day of construction in each year, based on concurrent construction activities.

[c] Total PM10 and PM2.5 emissions consist of exhaust and fugitive dust emissions. Annual values for exhaust and dust may not add to the totals in the total column because of rounding. Daily results for exhaust and dust may not add to the totals in the total column because the table presents maximum emissions results for each individual pollutant component. For example, the maximum PM exhaust emissions may not occur on the same day as the maximum total dust emissions.

[d] In developing these thresholds, SMAQMD considered levels at which project emissions are cumulatively considerable. Consequently, exceedances of project-level thresholds would be cumulatively considerable.

[e] Threshold applicable with implementation of all feasible dust control BMPs.

Table 23-15. Criteria Pollutant and Precursor Emissions from Construction of Alternative 2a in the Sacramento Metropolitan Air Quality Management District [a]

	Maximum Daily Emissions (lbs/day) [b]										Annual Emissions (tons/year)									
				PM10			PM2.5							PM10			PM2.5			
Year	ROG	NO_X	CO	Exhaust	Dust	Total [c]	Exhaust	Dust	Total [c]	SO_2	ROG	NO_X	CO	Exhaust	Dust	Total [c]	Exhaust	Dust	Total [c]	SO_2
Alternative 2a																				
PFIY 1	37	**249**	315	10	13	23	9	3	12	<1	1	3	14	<1	1	1	<1	<1	<1	<1
PFIY 2	37	**249**	315	10	13	23	9	3	12	<1	1	3	12	<1	1	1	<1	<1	<1	<1
CY 1	10	**348**	153	2	170	**171**	1	19	20	1	<1	11	7	<1	3	3	<1	1	1	<1
CY 2	27	**207**	172	1	65	66	1	13	14	1	1	12	12	<1	3	3	<1	1	1	<1
CY 3	10	**440**	192	2	92	**94**	2	21	23	2	<1	12	12	<1	3	3	<1	1	1	<1
CY 4	15	**350**	419	2	76	77	2	18	19	2	1	21	19	<1	3	3	<1	1	1	<1
CY 5	48	**606**	1,130	5	167	**171**	5	45	50	4	4	58	118	1	12	13	1	3	4	<1
CY 6	49	**830**	1,577	7	179	**185**	7	42	47	5	5	80	173	1	16	**17**	1	4	5	1
CY 7	72	**1,072**	2,218	9	253	**262**	9	59	68	7	7	91	233	1	20	**21**	1	4	5	1
CY 8	59	**862**	1,839	8	215	**220**	8	45	53	6	4	62	131	1	19	**20**	1	4	5	<1
CY 9	49	**739**	739	7	164	**171**	7	31	38	3	2	44	48	<1	16	**17**	<1	3	3	<1
CY 10	12	**369**	257	2	108	**110**	2	24	25	1	1	28	27	<1	13	13	<1	3	3	<1
CY 11	8	**251**	177	1	98	**99**	1	20	21	1	1	19	18	<1	13	13	<1	2	2	<1
CY 12	29	58	84	<1	82	**83**	<1	15	15	<1	<1	4	8	<1	13	13	<1	2	2	<1
CY 13	2	37	79	<1	116	**117**	<1	18	18	<1	<1	1	5	<1	15	15	<1	2	2	<1
CY 14	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Threshold [d]	–	*85*	–	–	–	*80 [e]*	–	–	*82 [e]*	–	–	–	–	–	–	*14.6 [e]*	–	–	*15.0 [e]*	–

BMPs = best management practices; CO = carbon monoxide; lbs = pounds; NO_X = nitrogen oxides; PM10 = particulate matter that is 10 microns in diameter and smaller; PM2.5 = particulate matter that is 2.5 microns in diameter and smaller; ROG = reactive organic gases; SMAQMD = Sacramento Metropolitan Air Quality Management District; SO_2 = sulfur dioxide; PFIY = preliminary field investigation year; CY = construction year.

[a] Emissions results include implementation of air quality Environmental Commitments EC-7 and EC-9 through EC-12. Exceedances of SMAQMD's thresholds are shown in **bolded underline**.

[b] Presents the highest emissions estimate during a single day of construction in each year, based on concurrent construction activities.

[c] Total PM10 and PM2.5 emissions consist of exhaust and fugitive dust emissions. Annual values for exhaust and dust may not add to the totals in the total column because of rounding. Daily results for exhaust and dust may not add to the totals in the total column because the table presents maximum emissions results for each individual pollutant component. For example, the maximum PM exhaust emissions may not occur on the same day as the maximum total dust emissions.

[d] In developing these thresholds, SMAQMD considered levels at which project emissions are cumulatively considerable. Consequently, exceedances of project-level thresholds would be cumulatively considerable.

[e] Threshold applicable with implementation of all feasible dust control BMPs.

Table 23-16. Criteria Pollutant and Precursor Emissions from Construction of Alternative 2b in the Sacramento Metropolitan Air Quality Management District [a]

	Maximum Daily Emissions (lbs/day) [b]										Annual Emissions (tons/year)									
				PM10			PM2.5							PM10			PM2.5			
Year	ROG	NO_X	CO	Exhaust	Dust	Total [c]	Exhaust	Dust	Total [c]	SO_2	ROG	NO_X	CO	Exhaust	Dust	Total [c]	Exhaust	Dust	Total [c]	SO_2
Alternative 2b																				
PFIY 1	37	**249**	315	10	13	23	9	3	12	<1	1	2	10	<1	1	1	<1	<1	<1	<1
PFIY 2	37	**249**	315	10	13	23	9	3	12	<1	1	2	9	<1	1	1	<1	<1	<1	<1
CY 1	9	**304**	129	1	166	**166**	1	18	19	1	<1	7	4	<1	3	3	<1	<1	<1	<1
CY 2	24	**224**	348	2	105	**106**	2	36	38	1	1	13	22	<1	6	6	<1	2	2	<1
CY 3	12	**380**	302	2	116	**118**	2	36	38	2	1	11	16	<1	6	6	<1	2	2	<1
CY 4	17	**352**	476	2	85	**86**	2	20	21	2	1	23	21	<1	3	3	<1	1	1	<1
CY 5	42	**436**	736	3	122	**126**	3	35	38	3	3	43	90	<1	9	10	<1	3	3	<1
CY 6	26	**559**	739	4	119	**123**	3	34	37	3	3	49	77	<1	8	9	<1	2	3	<1
CY 7	24	**413**	619	3	117	**120**	3	27	30	2	2	40	57	<1	7	8	<1	2	2	<1
CY 8	27	**488**	456	4	113	**117**	3	23	27	2	1	27	28	<1	7	7	<1	2	2	<1
CY 9	20	**371**	290	3	80	**83**	3	17	19	1	1	26	20	<1	6	6	<1	1	1	<1
CY 10	5	**244**	105	1	39	40	1	9	10	1	<1	12	9	<1	2	2	<1	1	1	<1
CY 11	5	82	159	1	62	63	1	11	11	1	<1	7	13	<1	5	5	<1	1	1	<1
CY 12	27	27	32	<1	7	7	<1	2	2	<1	<1	1	1	<1	<1	<1	<1	<1	<1	<1
CY 13	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CY 14	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Threshold [d]	–	*85*	–	–	–	*80 [e]*	–	–	*82 [e]*	–	–	–	–	–	–	*14.6 [e]*	–	–	*15.0 [e]*	–

BMPs = best management practices; CO = carbon monoxide; lbs = pounds; NO_X = nitrogen oxides; PM10 = particulate matter that is 10 microns in diameter and smaller; PM2.5 = particulate matter that is 2.5 microns in diameter and smaller; ROG = reactive organic gases; SMAQMD = Sacramento Metropolitan Air Quality Management District; SO_2 = sulfur dioxide; PFIY = preliminary field investigation year; CY = construction year.

[a] Emissions results include implementation of air quality Environmental Commitments EC-7 and EC-9 through EC-12. Exceedances of SMAQMD's thresholds are shown in **bolded underline**.

[b] Presents the highest emissions estimate during a single day of construction in each year, based on concurrent construction activities.

[c] Total PM10 and PM2.5 emissions consist of exhaust and fugitive dust emissions. Annual values for exhaust and dust may not add to the totals in the total column because of rounding. Daily results for exhaust and dust may not add to the totals in the total column because the table presents maximum emissions results for each individual pollutant component. For example, the maximum PM exhaust emissions may not occur on the same day as the maximum total dust emissions.

[d] In developing these thresholds, SMAQMD considered levels at which project emissions are cumulatively considerable. Consequently, exceedances of project-level thresholds would be cumulatively considerable.

[e] Threshold applicable with implementation of all feasible dust control BMPs.

Table 23-17. Criteria Pollutant and Precursor Emissions from Construction of Alternative 2c in the Sacramento Metropolitan Air Quality Management District [a]

	Maximum Daily Emissions (lbs/day) [b]										Annual Emissions (tons/year)									
				PM10			PM2.5							PM10			PM2.5			
Year	ROG	NO_X	CO	Exhaust	Dust	Total [c]	Exhaust	Dust	Total [c]	SO_2	ROG	NO_X	CO	Exhaust	Dust	Total [c]	Exhaust	Dust	Total [c]	SO_2
Alternative 2c																				
PFIY 1	37	**249**	315	10	13	23	9	3	12	<1	1	3	12	<1	1	1	<1	<1	<1	<1
PFIY 2	37	**249**	315	10	13	23	9	3	12	<1	1	3	11	<1	1	1	<1	<1	<1	<1
CY 1	10	**346**	152	2	170	**170**	1	19	20	1	<1	11	7	<1	3	3	<1	1	1	<1
CY 2	27	**206**	199	1	64	65	1	13	13	1	1	13	14	<1	3	3	<1	1	1	<1
CY 3	9	**401**	192	2	83	**84**	2	18	20	1	1	12	13	<1	3	3	<1	1	1	<1
CY 4	16	**403**	438	2	78	**80**	2	18	21	2	1	19	15	<1	2	3	<1	1	1	<1
CY 5	38	**620**	1,130	5	122	**126**	5	29	33	3	3	41	77	<1	8	8	<1	2	2	<1
CY 6	39	**662**	1,341	5	149	**154**	5	34	39	4	4	62	131	1	11	12	1	3	3	<1
CY 7	49	**729**	1,329	6	201	**207**	5	47	53	5	4	49	124	1	12	12	1	3	3	<1
CY 8	38	**555**	914	5	133	**136**	5	32	34	3	2	39	63	<1	11	11	<1	3	3	<1
CY 9	21	**277**	367	3	85	**88**	3	18	21	1	1	16	23	<1	7	7	<1	1	2	<1
CY 10	7	**237**	144	1	57	58	1	14	15	1	1	20	15	<1	5	5	<1	1	1	<1
CY 11	5	**193**	124	1	67	67	1	11	12	1	<1	13	11	<1	4	4	<1	1	1	<1
CY 12	27	46	92	<1	72	73	<1	12	13	<1	<1	1	4	<1	4	4	<1	1	1	<1
CY 13	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CY 14	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Threshold [d]	–	*85*	–	–	–	*80 [e]*	–	–	*82 [e]*	–	–	–	–	–	–	*14.6 [e]*	–	–	*15.0 [e]*	–

BMPs = best management practices; CO = carbon monoxide; lbs = pounds; NO_X = nitrogen oxides; PM10 = particulate matter that is 10 microns in diameter and smaller; PM2.5 = particulate matter that is 2.5 microns in diameter and smaller; ROG = reactive organic gases; SMAQMD = Sacramento Metropolitan Air Quality Management District; SO_2 = sulfur dioxide; PFIY = preliminary field investigation year; CY = construction year.

[a] Emissions results include implementation of air quality Environmental Commitments EC-7 and EC-9 through EC-12. Exceedances of SMAQMD's thresholds are shown in **bolded underline**.

[b] Presents the highest emissions estimate during a single day of construction in each year, based on concurrent construction activities.

[c] Total PM10 and PM2.5 emissions consist of exhaust and fugitive dust emissions. Annual values for exhaust and dust may not add to the totals in the total column because of rounding. Daily results for exhaust and dust may not add to the totals in the total column because the table presents maximum emissions results for each individual pollutant component. For example, the maximum PM exhaust emissions may not occur on the same day as the maximum total dust emissions.

[d] In developing these thresholds, SMAQMD considered levels at which project emissions are cumulatively considerable. Consequently, exceedances of project-level thresholds would be cumulatively considerable.

[e] Threshold applicable with implementation of all feasible dust control BMPs.

Table 23-18. Criteria Pollutant and Precursor Emissions from Construction of Alternative 3 in the Sacramento Metropolitan Air Quality Management District [a]

	Maximum Daily Emissions (lbs/day) [b]										Annual Emissions (tons/year)									
				PM10			PM2.5							PM10			PM2.5			
Year	ROG	NO_X	CO	Exhaust	Dust	Total [c]	Exhaust	Dust	Total [c]	SO_2	ROG	NO_X	CO	Exhaust	Dust	Total [c]	Exhaust	Dust	Total [c]	SO_2
Alternative 3																				
PFIY 1	37	**249**	315	10	13	23	9	3	12	<1	1	3	11	<1	1	1	<1	<1	<1	<1
PFIY 2	37	**249**	315	10	13	23	9	3	12	<1	1	2	10	<1	1	1	<1	<1	<1	<1
CY 1	10	**325**	147	1	163	**163**	1	18	18	1	<1	6	5	<1	3	3	<1	<1	1	<1
CY 2	24	**170**	344	1	103	**104**	1	35	36	1	1	9	22	<1	5	5	<1	2	2	<1
CY 3	8	**123**	261	1	89	**91**	1	29	30	1	1	8	17	<1	6	6	<1	1	2	<1
CY 4	15	**282**	428	2	96	**97**	2	16	17	1	1	17	20	<1	4	5	<1	1	1	<1
CY 5	46	**561**	1,102	5	143	**147**	5	39	43	4	4	57	121	1	12	12	1	3	4	<1
CY 6	41	**694**	1,267	5	154	**159**	5	42	47	4	5	70	145	1	13	14	1	3	4	<1
CY 7	50	**690**	1,353	6	196	**202**	6	45	50	5	4	55	143	1	14	15	1	3	4	<1
CY 8	42	**581**	954	6	154	**160**	6	31	37	3	2	32	62	<1	13	13	<1	3	3	<1
CY 9	32	**454**	435	5	113	**118**	5	22	26	2	1	27	33	<1	11	11	<1	2	2	<1
CY 10	10	**351**	191	1	84	**86**	1	18	19	1	1	25	20	<1	10	10	<1	2	2	<1
CY 11	6	**214**	134	1	64	65	1	14	14	1	1	17	14	<1	8	8	<1	2	2	<1
CY 12	30	67	135	1	86	**86**	1	14	14	<1	<1	4	8	<1	10	10	<1	2	2	<1
CY 13	1	27	9	<1	4	4	<1	1	1	<1	<1	2	1	<1	<1	<1	<1	<1	<1	<1
CY 14	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Threshold [d]	–	*85*	–	–	–	*80 [e]*	–	–	*82 [e]*	–	–	–	–	–	–	*14.6 [e]*	–	–	*15.0 [e]*	–

BMPs = best management practices; CO = carbon monoxide; lbs = pounds; NO_X = nitrogen oxides; PM10 = particulate matter that is 10 microns in diameter and smaller; PM2.5 = particulate matter that is 2.5 microns in diameter and smaller; ROG = reactive organic gases; SMAQMD = Sacramento Metropolitan Air Quality Management District; SO_2 = sulfur dioxide; PFIY = preliminary field investigation year; CY = construction year.

[a] Emissions results include implementation of air quality Environmental Commitments EC-7 and EC-9 through EC-12. Exceedances of SMAQMD's thresholds are shown in **bolded underline**.

[b] Presents the highest emissions estimate during a single day of construction in each year, based on concurrent construction activities.

[c] Total PM10 and PM2.5 emissions consist of exhaust and fugitive dust emissions. Annual values for exhaust and dust may not add to the totals in the total column because of rounding. Daily results for exhaust and dust may not add to the totals in the total column because the table presents maximum emissions results for each individual pollutant component. For example, the maximum PM exhaust emissions may not occur on the same day as the maximum total dust emissions.

[d] In developing these thresholds, SMAQMD considered levels at which project emissions are cumulatively considerable. Consequently, exceedances of project-level thresholds would be cumulatively considerable.

[e] Threshold applicable with implementation of all feasible dust control BMPs.

Table 23-19. Criteria Pollutant and Precursor Emissions from Construction of Alternative 4a in the Sacramento Metropolitan Air Quality Management District [a]

	Maximum Daily Emissions (lbs/day) [b]										Annual Emissions (tons/year)									
				PM10			PM2.5							PM10			PM2.5			
Year	ROG	NO_X	CO	Exhaust	Dust	Total [c]	Exhaust	Dust	Total [c]	SO_2	ROG	NO_X	CO	Exhaust	Dust	Total [c]	Exhaust	Dust	Total [c]	SO_2
Alternative 4a																				
PFIY 1	37	**249**	315	10	13	23	9	3	12	<1	1	3	13	<1	1	1	<1	<1	<1	<1
PFIY 2	37	**249**	315	10	13	23	9	3	12	<1	1	3	11	<1	1	1	<1	<1	<1	<1
CY 1	11	**365**	156	2	166	**167**	2	18	19	1	<1	11	7	<1	3	3	<1	1	1	<1
CY 2	27	**154**	171	1	58	58	1	11	12	1	1	10	12	<1	3	3	<1	1	1	<1
CY 3	5	**156**	122	1	64	64	1	13	14	1	<1	8	11	<1	3	3	<1	1	1	<1
CY 4	15	**327**	412	2	71	72	2	16	17	2	1	17	18	<1	2	2	<1	1	1	<1
CY 5	47	**604**	1,127	5	165	**170**	5	45	50	4	4	57	119	1	12	13	1	3	4	<1
CY 6	48	**811**	1,574	7	177	**183**	6	42	47	5	5	79	172	1	16	**17**	1	4	5	1
CY 7	71	**1,042**	2,215	9	256	**265**	9	59	68	7	7	89	233	1	20	**21**	1	5	5	1
CY 8	58	**841**	1,832	8	223	**229**	8	46	53	6	4	60	131	1	20	**21**	1	4	5	<1
CY 9	49	**732**	735	7	168	**175**	7	32	39	2	2	43	48	<1	17	**17**	<1	3	3	<1
CY 10	11	**361**	253	2	115	**116**	2	24	26	1	1	27	27	<1	14	14	<1	3	3	<1
CY 11	8	**263**	175	1	97	**98**	1	20	21	1	1	19	18	<1	13	13	<1	2	3	<1
CY 12	29	71	88	<1	84	**85**	<1	15	16	<1	<1	5	8	<1	13	13	<1	2	2	<1
CY 13	3	37	84	<1	123	**124**	<1	19	19	<1	<1	3	6	<1	16	**16**	<1	2	2	<1
CY 14	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Threshold [d]	–	*85*	–	–	–	*80* [e]	–	–	*82* [e]	–	–	–	–	–	–	*14.6* [e]	–	–	*15.0* [e]	–

BMPs = best management practices; CO = carbon monoxide; lbs = pounds; NO_X = nitrogen oxides; PM10 = particulate matter that is 10 microns in diameter and smaller; PM2.5 = particulate matter that is 2.5 microns in diameter and smaller; ROG = reactive organic gases; SMAQMD = Sacramento Metropolitan Air Quality Management District; SO_2 = sulfur dioxide; PFIY = preliminary field investigation year; CY = construction year.

[a] Emissions results include implementation of air quality Environmental Commitments EC-7 and EC-9 through EC-12. Exceedances of SMAQMD's thresholds are shown in **bolded underline**.

[b] Presents the highest emissions estimate during a single day of construction in each year, based on concurrent construction activities.

[c] Total PM10 and PM2.5 emissions consist of exhaust and fugitive dust emissions. Annual values for exhaust and dust may not add to the totals in the total column because of rounding. Daily results for exhaust and dust may not add to the totals in the total column because the table presents maximum emissions results for each individual pollutant component. For example, the maximum PM exhaust emissions may not occur on the same day as the maximum total dust emissions.

[d] In developing these thresholds, SMAQMD considered levels at which project emissions are cumulatively considerable. Consequently, exceedances of project-level thresholds would be cumulatively considerable.

[e] Threshold applicable with implementation of all feasible dust control BMPs.

Table 23-20. Criteria Pollutant and Precursor Emissions from Construction of Alternative 4b in the Sacramento Metropolitan Air Quality Management District [a]

	Maximum Daily Emissions (lbs/day) [b]										Annual Emissions (tons/year)									
				PM10			PM2.5							PM10			PM2.5			
Year	ROG	NO_X	CO	Exhaust	Dust	Total [c]	Exhaust	Dust	Total [c]	SO_2	ROG	NO_X	CO	Exhaust	Dust	Total [c]	Exhaust	Dust	Total [c]	SO_2
Alternative 4b																				
PFIY 1	37	**249**	315	10	13	23	9	3	12	<1	1	2	9	<1	1	1	<1	<1	<1	<1
PFIY 2	37	**249**	315	10	13	23	9	3	12	<1	<1	2	8	<1	<1	1	<1	<1	<1	<1
CY 1	10	**322**	132	1	162	**163**	1	17	18	1	<1	6	4	<1	3	3	<1	<1	<1	<1
CY 2	24	**202**	339	1	101	**103**	1	35	36	1	1	11	25	<1	6	6	<1	2	3	<1
CY 3	7	**113**	240	1	90	**91**	1	29	30	1	<1	6	11	<1	4	4	<1	1	1	<1
CY 4	17	**308**	473	2	82	**83**	2	19	21	2	1	20	20	<1	3	3	<1	1	1	<1
CY 5	42	**417**	751	3	120	**124**	3	34	37	3	3	42	91	<1	9	10	<1	3	3	<1
CY 6	27	**609**	772	4	124	**128**	4	35	39	3	3	49	80	<1	9	9	<1	2	3	<1
CY 7	24	**389**	638	3	122	**125**	3	28	30	2	2	38	59	<1	8	8	<1	2	2	<1
CY 8	28	**490**	472	4	119	**123**	4	25	28	2	1	26	31	<1	8	8	<1	2	2	<1
CY 9	21	**379**	315	3	93	**96**	3	18	21	1	1	25	23	<1	7	7	<1	1	2	<1
CY 10	6	**256**	127	1	42	43	1	10	10	1	1	15	13	<1	3	3	<1	1	1	<1
CY 11	6	**110**	188	1	67	67	1	12	13	1	1	12	18	<1	5	5	<1	1	1	<1
CY 12	27	55	30	<1	11	11	<1	3	3	<1	<1	1	1	<1	<1	<1	<1	<1	<1	<1
CY 13	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CY 14	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Threshold [d]	–	*85*	–	–	–	*80* [e]	–	–	*82* [e]	–	–	–	–	–	–	*14.6* [e]	–	–	*15.0* [e]	–

BMPs = best management practices; CO = carbon monoxide; lbs = pounds; NO_X = nitrogen oxides; PM10 = particulate matter that is 10 microns in diameter and smaller; PM2.5 = particulate matter that is 2.5 microns in diameter and smaller; ROG = reactive organic gases; SMAQMD = Sacramento Metropolitan Air Quality Management District; SO_2 = sulfur dioxide; PFIY = preliminary field investigation year; CY = construction year.

[a] Emissions results include implementation of air quality Environmental Commitments EC-7 and EC-9 through EC-12. Exceedances of SMAQMD's thresholds are shown in **bolded underline**.

[b] Presents the highest emissions estimate during a single day of construction in each year, based on concurrent construction activities.

[c] Total PM10 and PM2.5 emissions consist of exhaust and fugitive dust emissions. Annual values for exhaust and dust may not add to the totals in the total column because of rounding. Daily results for exhaust and dust may not add to the totals in the total column because the table presents maximum emissions results for each individual pollutant component. For example, the maximum PM exhaust emissions may not occur on the same day as the maximum total dust emissions.

[d] In developing these thresholds, SMAQMD considered levels at which project emissions are cumulatively considerable. Consequently, exceedances of project-level thresholds would be cumulatively considerable.

[e] Threshold applicable with implementation of all feasible dust control BMPs.

Table 23-21. Criteria Pollutant and Precursor Emissions from Construction of Alternative 4c in the Sacramento Metropolitan Air Quality Management District [a]

	Maximum Daily Emissions (lbs/day) [b]										Annual Emissions (tons/year)									
				PM10			PM2.5							PM10			PM2.5			
Year	ROG	NO_X	CO	Exhaust	Dust	Total [c]	Exhaust	Dust	Total [c]	SO_2	ROG	NO_X	CO	Exhaust	Dust	Total [c]	Exhaust	Dust	Total [c]	SO_2
Alternative 4c																				
PFIY 1	37	**249**	315	10	13	23	9	3	12	<1	1	3	11	<1	1	1	<1	<1	<1	<1
PFIY 2	37	**249**	315	10	13	23	9	3	12	<1	1	2	10	<1	1	1	<1	<1	<1	<1
CY 1	11	**364**	156	2	166	**167**	2	18	19	1	<1	11	7	<1	3	3	<1	<1	1	<1
CY 2	27	**171**	176	1	55	56	1	10	10	1	1	10	12	<1	3	3	<1	1	1	<1
CY 3	5	**130**	115	1	58	59	1	11	11	1	<1	7	12	<1	3	3	<1	1	1	<1
CY 4	16	**389**	442	2	77	79	2	18	20	2	1	15	14	<1	2	2	<1	1	1	<1
CY 5	38	**620**	1,129	5	123	**127**	5	29	33	3	3	40	77	<1	8	8	<1	2	2	<1
CY 6	39	**642**	1,340	5	148	**153**	5	34	39	4	4	61	131	1	12	12	1	3	3	<1
CY 7	48	**700**	1,323	5	203	**209**	5	47	53	5	4	47	124	1	12	13	1	3	3	<1
CY 8	38	**540**	910	5	138	**141**	5	32	34	3	2	38	63	<1	12	12	<1	3	3	<1
CY 9	20	**267**	365	3	96	**99**	3	20	22	1	1	15	23	<1	9	9	<1	2	2	<1
CY 10	7	**227**	141	1	66	67	1	15	16	1	1	20	15	<1	7	7	<1	1	2	<1
CY 11	7	**229**	182	1	100	**101**	1	18	19	1	1	15	12	<1	9	9	<1	2	2	<1
CY 12	27	41	34	<1	15	15	<1	4	4	<1	<1	2	1	<1	<1	<1	<1	<1	<1	<1
CY 13	<1	2	4	<1	3	3	<1	1	1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
CY 14	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Threshold [d]	–	*85*	–	–	–	*80 [e]*	–	–	*82 [e]*	–	–	–	–	–	–	*14.6 [e]*	–	–	*15.0 [e]*	–

BMPs = best management practices; CO = carbon monoxide; lbs = pounds; NO_X = nitrogen oxides; PM10 = particulate matter that is 10 microns in diameter and smaller; PM2.5 = particulate matter that is 2.5 microns in diameter and smaller; ROG = reactive organic gases; SMAQMD = Sacramento Metropolitan Air Quality Management District; SO_2 = sulfur dioxide; PFIY = preliminary field investigation year; CY = construction year.

[a] Emissions results include implementation of air quality Environmental Commitments EC-7 and EC-9 through EC-12. Exceedances of SMAQMD's thresholds are shown in **bolded underline**.

[b] Presents the highest emissions estimate during a single day of construction in each year, based on concurrent construction activities.

[c] Total PM10 and PM2.5 emissions consist of exhaust and fugitive dust emissions. Annual values for exhaust and dust may not add to the totals in the total column because of rounding. Daily results for exhaust and dust may not add to the totals in the total column because the table presents maximum emissions results for each individual pollutant component. For example, the maximum PM exhaust emissions may not occur on the same day as the maximum total dust emissions.

[d] In developing these thresholds, SMAQMD considered levels at which project emissions are cumulatively considerable. Consequently, exceedances of project-level thresholds would be cumulatively considerable.

[e] Threshold applicable with implementation of all feasible dust control BMPs.

Table 23-22. Criteria Pollutant and Precursor Emissions from Construction of Alternative 5 in the Sacramento Metropolitan Air Quality Management District [a]

	Maximum Daily Emissions (lbs/day) [b]										Annual Emissions (tons/year)									
				PM10			PM2.5							PM10			PM2.5			
Year	ROG	NO_X	CO	Exhaust	Dust	Total [c]	Exhaust	Dust	Total [c]	SO_2	ROG	NO_X	CO	Exhaust	Dust	Total [c]	Exhaust	Dust	Total [c]	SO_2
Alternative 5																				
PFIY 1	37	**249**	315	10	13	23	9	3	12	<1	1	2	11	<1	1	1	<1	<1	<1	<1
PFIY 2	37	**249**	315	10	13	23	9	3	12	<1	1	2	9	<1	1	1	<1	<1	<1	<1
CY 1	10	**311**	138	1	162	**162**	1	17	17	1	<1	7	5	<1	3	3	<1	<1	<1	<1
CY 2	24	**148**	217	1	53	54	1	14	14	1	1	4	14	<1	3	3	<1	1	1	<1
CY 3	5	84	169	1	68	68	1	10	11	<1	<1	4	12	<1	4	4	<1	1	1	<1
CY 4	16	**243**	429	2	84	**85**	2	16	17	1	1	18	21	<1	5	5	<1	1	1	<1
CY 5	39	**464**	1,071	4	128	**132**	4	37	41	3	4	49	118	<1	11	12	<1	3	4	<1
CY 6	39	**553**	1,246	5	125	**129**	5	35	40	4	4	58	141	1	12	13	1	3	4	<1
CY 7	48	**591**	1,332	5	171	**176**	5	41	46	4	4	45	139	1	13	14	1	3	3	<1
CY 8	42	**560**	941	6	131	**137**	5	30	34	3	2	28	61	<1	12	12	<1	3	3	<1
CY 9	33	**467**	439	5	103	**107**	4	22	26	2	1	27	32	<1	11	11	<1	2	2	<1
CY 10	9	**314**	206	1	73	73	1	16	17	1	1	20	19	<1	9	9	<1	2	2	<1
CY 11	6	**160**	124	1	61	61	1	13	13	1	1	11	13	<1	8	8	<1	1	1	<1
CY 12	13	39	131	<1	49	50	<1	8	8	<1	<1	2	8	<1	12	12	<1	2	2	<1
CY 13	4	48	13	<1	8	8	<1	2	2	<1	<1	1	<1	<1	<1	<1	<1	<1	<1	<1
CY 14	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Threshold [d]	–	*85*	–	–	–	*80* [e]	–	–	*82* [e]	–	–	–	–	–	–	*14.6* [e]	–	–	*15.0* [e]	–

BMPs = best management practices; CO = carbon monoxide; lbs = pounds; NO_X = nitrogen oxides; PM10 = particulate matter that is 10 microns in diameter and smaller; PM2.5 = particulate matter that is 2.5 microns in diameter and smaller; ROG = reactive organic gases; SMAQMD = Sacramento Metropolitan Air Quality Management District; SO_2 = sulfur dioxide; PFIY = preliminary field investigation year; CY = construction year.

[a] Emissions results include implementation of air quality Environmental Commitments EC-7 and EC-9 through EC-12. Exceedances of SMAQMD's thresholds are shown in **bolded underline**.

[b] Presents the highest emissions estimate during a single day of construction in each year, based on concurrent construction activities.

[c] Total PM10 and PM2.5 emissions consist of exhaust and fugitive dust emissions. Annual values for exhaust and dust may not add to the totals in the total column because of rounding. Daily results for exhaust and dust may not add to the totals in the total column because the table presents maximum emissions results for each individual pollutant component. For example, the maximum PM exhaust emissions may not occur on the same day as the maximum total dust emissions.

[d] In developing these thresholds, SMAQMD considered levels at which project emissions are cumulatively considerable. Consequently, exceedances of project-level thresholds would be cumulatively considerable.

[e] Threshold applicable with implementation of all feasible dust control BMPs.

Environmental Commitment EC-13: *DWR Best Management Practices to Reduce GHG Emissions* requires construction contractors to implement applicable GHG BMPs from Update 2020. While these BMPs specifically target GHG emissions from construction activities, several of the strategies would likewise achieve criteria pollutant reductions. For example, BMP 8 requires all construction equipment be maintained in proper working condition, and BMP 9 requires vehicle tires be properly inflated. BMP 12 encourages SmartWay certified trucks for deliveries where the haul distance exceeds 100 miles and a heavy-duty class 7 or class 8 semi-truck or 53-foot or longer box type trailer to be used for hauling. SmartWay certified trucks are outfitted at point of sale or retrofitted with equipment that significantly reduces fuel use and emissions. While Environmental Commitment EC-13 would achieve criteria pollutant reductions during construction, specific details on how individual construction contractors would implement the various BMPs, many of which outline recommendations or voluntary practices, is currently unknown. Accordingly, the emissions analysis does not quantify or include potential reductions associated with Environmental Commitment EC-13.

While the locations of the central and eastern alignments diverge between the Twin Cities Complex and Southern Complex, the amount of construction (e.g., equipment operating hours, earthmoving), and thus construction emissions, for alternatives with the same project design capacity (i.e., cfs) would be similar. This is reflected in Tables 23-14 through 23-22, which show comparable emissions levels among Alternatives 1, 3, and 5 (6,000 cfs), Alternatives 2b and 4b (3,000 cfs), Alternatives 2c and 4c (4,500 cfs), and Alternatives 2a and 4a (7,500 cfs). Alternatives 2a and 4a would result in the greatest total emissions primarily because these alternatives require construction of three intake facilities. In contrast, construction of Alternatives 2b and 4b, which include only one intake, requires less earthmoving and heavy-duty equipment and vehicles, and thus would generate fewer total emissions.

Even with incorporation of environmental commitments, construction of all project alternatives would result in an impact on regional air quality because NO_X (ozone precursor) and particulate matter emissions would exceed SMAQMD's thresholds. SMAQMD's thresholds were established to prevent emissions from new projects in the Sacramento County portion of the SVAB from contributing to violations of the CAAQS or NAAQS. Because construction emissions of NO_X and particulate matter would exceed these thresholds, the project would contribute to regional air pollution within the SVAB. Construction of the project may also conflict with the *2017 Sacramento Regional 8-Hour Ozone Attainment and Reasonable Further Progress Plan*, *PM2.5 Maintenance Plan and Redesignation Request*, and *PM10 Implementation/Maintenance Plan and Redesignation Request for Sacramento County*, which were adopted to achieve regional attainment with the ambient air quality standards (Sacramento Metropolitan Air Quality Management District 2010; Sacramento Metropolitan Air Quality Management District et al. 2013, 2017).

All project alternatives would result in maximum daily NO_X and PM10 emissions above SMAQMD's thresholds. Annual PM10 emissions generated under Alternatives 2a and 4a would also exceed SMAQMD's threshold. The greatest emissions generally would occur between construction years 5 and 10, mainly because of concurrent activities required for intake construction. Construction activities and emissions intensity would decline after construction year 10, once heavy earthmoving and other equipment-intensive activities are complete.

SMAQMD does not have mass emissions thresholds for ROG, CO or SO_2; localized air quality impacts from these pollutants are evaluated based on the air dispersion modeling of ambient air concentrations. Impact AQ-5 discusses the conclusions of the modeled ambient air concentrations.

Operations and Maintenance

O&M would be conducted daily or at varying frequencies, depending on the type of activity. Daily maintenance activities include inspections, security checks, and operations oversight. Less frequent maintenance activities include operability testing, cleaning, sediment removal, dewatering, and repaving. As discussed in Section 23.3.1.3, *Evaluation of Operations*, long-term operation of the project would require the use of electricity for pumping. While fossil fuel–powered electrical-generating facilities emit criteria pollutants, these facilities are regulated and permitted at a maximum emissions level. Therefore, operational emissions associated with electricity consumption are not included in the analysis because these emissions have already been evaluated and accounted for in existing permit and environmental documents.

Table 23-23 summarizes O&M emissions from the proposed project and alternatives that would be generated in SMAQMD in pounds per day and tons per year. Emissions were quantified using 2020 conditions to define baseline conditions, although the project would not be fully operational until around 2040. Based on current information, it is projected that the emissions intensity of equipment and vehicle operation in 2040 would be lower than under 2020 conditions because of improvements in engine technology and regulations to reduce combustion emissions (see Appendix 23F, *Air Quality and Greenhouse Gases 2040 Analysis*). Accordingly, the emissions estimates presented in Table 23-23 are based on a conservative representation of emissions.

As shown in Table 23-23, O&M activities in SMAQMD would not exceed SMAQMD's thresholds. O&M emissions are expected to be comparable among all project alternatives, with Alternatives 2a and 4a resulting in slightly more emissions than other alternatives because of additional activity required to maintain three intakes.

CEQA Conclusion—All Project Alternatives

The impact would be significant under CEQA for all project alternatives because construction could result in exceedances of SMAQMD's maximum daily NO_X and PM10 thresholds before mitigation. Construction of Alternatives 2a and 4a would also exceed SMAQMD's annual PM10 threshold before mitigation. No other thresholds would be exceeded during construction. O&M activities likewise would not result in criteria pollutant or precursor emissions above SMAQMD's numeric thresholds.

Impacts associated with fugitive dust emissions would be minimized through implementation of a dust control plan (Environmental Commitment EC-11: *Fugitive Dust Control*) and BMPs at new concrete batch plants (Environmental Commitment EC-12: *On-Site Concrete Batching Plants*). Exhaust-related pollutants would be reduced through use of renewable diesel, Tier 4 diesel engines, newer on-road and marine engines, and other BMPs, as required by Environmental Commitments EC-7: *Off-Road Heavy-Duty Engines* through EC-10: *Marine Vessels* and EC-13: *DWR Best Management Practices to Reduce GHG Emissions.* These environmental commitments would minimize air quality impacts through application of best available on-site controls to reduce construction emissions; however, even with these commitments, exceedances of SMAQMD's thresholds would occur, and the project would contribute a significant level of regional ROG, NO_X, and particulate matter pollution within the SVAB.

Table 23-23. Criteria Pollutant and Precursor Emissions from O&M Activities in the Sacramento Metropolitan Air Quality Management District [a]

	Maximum Daily Emissions (lbs/day) [a]										Annual Emissions (tons/year) [a]									
				PM10			PM2.5							PM10			PM2.5			
Alternative	ROG	NO_X	CO	Exhaust	Dust	Total [b]	Exhaust	Dust	Total [b]	SO_2	ROG	NO_X	CO	Exhaust	Dust	Total [b]	Exhaust	Dust	Total [b]	SO_2
1	21	27	250	1	2	2	1	1	1	<1	<1	<1	1	<1	<1	<1	<1	<1	<1	<1
2a	21	30	223	1	2	3	1	1	1	<1	<1	<1	2	<1	<1	<1	<1	<1	<1	<1
2b	21	26	248	1	2	2	1	<1	1	<1	<1	<1	1	<1	<1	<1	<1	<1	<1	<1
2c	21	27	249	1	2	2	1	<1	1	<1	<1	<1	1	<1	<1	<1	<1	<1	<1	<1
3	21	27	250	1	2	2	1	1	1	<1	<1	<1	1	<1	<1	<1	<1	<1	<1	<1
4a	21	30	223	1	2	3	1	1	1	<1	<1	<1	2	<1	<1	<1	<1	<1	<1	<1
4b	21	26	248	1	2	2	1	<1	1	<1	<1	<1	1	<1	<1	<1	<1	<1	<1	<1
4c	21	27	249	1	2	2	1	<1	1	<1	<1	<1	1	<1	<1	<1	<1	<1	<1	<1
5	21	27	250	1	2	2	1	1	1	<1	<1	<1	1	<1	<1	<1	<1	<1	<1	<1
Threshold [c]	*65*	*65*	–	–	–	*80*	–	–	*82*	–	–	–	–	–	–	*14.6*	–	–	*15.0*	–

CO = carbon monoxide; lbs = pounds; NO_X = nitrogen oxides; PM10 = particulate matter that is 10 microns in diameter and smaller; PM2.5 = particulate matter that is 2.5 microns in diameter and smaller; ROG = reactive organic gases SMAQMD = Sacramento Metropolitan Air Quality Management District; SO_X = sulfur oxide.

[a] The annual estimates include emissions from all monthly, quarterly, semiannual, and annual activities and conservatively assume all long-term activities would occur in that same year. The daily estimates are based on an assessment of the maximum amount of maintenance that could theoretically occur in a single day.

[b] Total PM10 and PM2.5 emissions consist of exhaust and fugitive dust emissions. Annual values for exhaust and dust may not add to the totals in the total column because of rounding. Daily results for exhaust and dust may not add to the totals in the total column because the table presents maximum emissions results for each individual pollutant component. For example, the maximum PM exhaust emissions may not occur on the same day as the maximum total dust emissions.

[c] In developing these thresholds, SMAQMD considered levels at which project emissions are cumulatively considerable. Consequently, exceedances of project-level thresholds would be cumulatively considerable.

DWR would implement Mitigation Measure AQ-1: *Offset Construction-Generated Criteria Pollutants in the Sacramento Valley Air Basin* to mitigate NO_X and PM10 emissions to below SMAQMD's thresholds. Because SMAQMD's thresholds were established to prevent emissions from new projects in the SVAB from contributing to CAAQS or NAAQS violations, mitigating emissions below the threshold levels would avoid potential conflicts with the ambient air quality plans and would ensure that project construction would not contribute a significant level of air pollution such that regional air quality within the SVAB would be degraded. Accordingly, the impact would be less than significant with mitigation.

Mitigation Measure AQ-1: Offset Construction-Generated Criteria Pollutants in the Sacramento Valley Air Basin

Performance Standard

Prior to issuance of construction contracts, DWR will enter into a memorandum of understanding (MOU) with SMAQMD or develop an alternative or complementary mitigation program (as discussed below) to reduce NO_X and PM10. Emissions above the federal *de minimis* thresholds[9] will be reduced to net zero (0). Emissions not above the *de minimis* thresholds, but above SMAQMD's thresholds, will be reduced to quantities below the air district's thresholds.

Emissions generated by project construction have been quantified as part of this Draft EIR. Although this inventory could be used exclusively to inform the required mitigation commitment, the methods used to quantify emissions in the Draft EIR were conservative. They also do not account for any additional reductions that may be achieved by future state and federal regulations that reduce the emissions intensity of equipment and vehicles, nor do they account for reduction strategies that may be implemented by DWR pursuant to other mitigation measures (e.g., Mitigation Measure AQ-9). Accordingly, this Draft EIR likely overestimates actual emissions that would be generated by construction of the project. DWR may, therefore, reanalyze criteria pollutant emissions from construction of the project to update the required reduction commitment to achieve performance standard.

An updated emissions analysis conducted for the project will be performed using approved emissions models and methods available at the time of the reanalysis. The analysis must use the latest available engineering data for the project, inclusive of any required environmental commitments or emissions reduction strategies. Consistent with the methodology used in this Draft EIR, emissions factors may account for enacted regulations that will influence future year emissions intensities (e.g., fuel efficiency standards for on-road vehicles).

Mitigation Agreement with SMAQMD

1. DWR will enter into an MOU with SMAQMD to reduce NO_X and PM10 according to the performance standard described above.
    a. The mitigation offset fee amount will be determined at the time of mitigation to fund one or more emissions reduction projects within the SVAB (or in a nearby area of equal or higher nonattainment classification, as allowed under 40 CFR 93.158(2)). SMAQMD will require an additional administrative fee of no less than 5% of the total offset fee.

[9] Federal *de minimis* thresholds are triggered if the project is subject to general conformity.

The mitigation offset fee will be determined by DWR and SMAQMD based on the type of projects available at the time of mitigation. This fee is intended to fund emissions reduction projects to achieve reductions. Documentation of payment will be provided to DWR or its designated representative.

b. The MOU will include details regarding the annual calculation of required offsets DWR must achieve, funds to be paid, administrative fees, and the timing of the emissions reduction projects. Reduction projects may be administrated through SMAQMD's Heavy-Duty Low-Emission Vehicle Incentive Programs (HDLEVIP), which include the Carl Moyer and Sacramento Emergency Clean Air Transportation (SECAT) Programs. The HDLEVIP and associated incentive programs are managed and implemented by SMAQMD on behalf of all air districts within the Sacramento Federal Nonattainment Area. Example projects funded through the Carl Moyer Program include the following.

- Independent Construction Caterpillar 633D Scraper Tier 2 Engine Repower
- Kiewit Pacific Construction Caterpillar 16G Grader Diesel Catalyst Retrofit
- Commercial Low-Emission Propane Generator
- American Engineering & Asphalt Caterpillar 825C Compactor Tier 2 Engine Repower
- B&D Geerts Construction Caterpillar 826C Compactor Tier 1 Engine Repower

The SECAT program differs from the Carl Moyer Program in that it can only fund projects for on-road vehicles. However, the SECAT program can also finance operational emissions reductions, including facility modifications and out-of-cycle replacements; the Carl Moyer Program is only available to fund the incremental capital costs of control measures.

c. Acceptance of the mitigation fee by SMAQMD will serve as an acknowledgment and commitment by SMAQMD to: (1) implement an emissions reduction project(s) within a timeframe to be determined based on the type of project(s) selected after receipt of the mitigation fee designed to achieve the emissions reduction objectives; and (2) provide documentation to DWR or its designated representative describing the project(s) funded by the mitigation fee, including the amount of emissions reduced (tons per year) from the emissions reduction project(s). To qualify under this mitigation measure, the specific emissions reduction project(s) must result in emissions reductions in the SVAB (or in a nearby area of equal or higher nonattainment classification, as allowed under 40 CFR 93.158(2)) that are real, surplus, quantifiable, enforceable, and will not otherwise be achieved through compliance with existing regulatory requirements or any other legal requirement. Funding will need to be received prior to contracting with participants and should allow enough time to receive and process applications to fund and implement off-site reduction projects prior to commencement of the project activities that are being offset. This will roughly equate to one year prior to the required mitigation; additional lead time may be necessary depending on the level of off-site emissions reductions required for a specific year.

Alternative or Complementary Mitigation Program

Should DWR be unable to enter what they regard as a satisfactory agreement with SMAQMD, or should DWR enter an agreement with SMAQMD but find themselves unable to meet the performance standards established above, DWR will develop an alternative or complementary off-site mitigation program to reduce NO_X and PM10 emissions according to the performance standard described above.

DWR will establish a program to fund emissions reduction projects through grants, emission reduction credits (ERCs), or similar mechanisms. DWR may identify emissions reduction projects through consultation with SMAQMD, other regional air districts, CARB, CEC, local governments, transit agencies, or others, as needed. Potential projects could include but are not limited to the following.

- Alternative fuel, low-emissions school buses, transit buses, and other vehicles.
- Diesel engine retrofits and repowers.
- Locomotive retrofits and repowers.
- Electric vehicle or lawn equipment rebates.
- Electric vehicle charging stations and plug-ins.
- Video-teleconferencing systems for local businesses.
- Telecommuting start-up costs for local businesses.

As part of its alternative or complementary off-site mitigation program, DWR will develop pollutant-specific formulas to monetize, calculate, and achieve emissions reductions in a cost-effective manner. Payments can be allocated to emissions reductions projects in a grant-like manner. DWR will document the fee schedule basis, such as consistency with the CARB's Carl Moyer Program cost-effectiveness limits and capital recovery factors.

DWR will conduct annual reporting to verify and document that emissions reductions projects achieve a 1:1 reduction with construction emissions to ensure claimed offsets meet the required performance standard. Each report should describe the projects that were funded over the prior year, identify emissions reduction realized by the funded projects, document compliance with mitigation requirements, and identify corrective actions (if any) needed to ensure the offsetting program achieves the performance standards for NOx and PM10. DWR will retain a third-party expert to assist with its review and approval of the annual reports. Annual reports will be finalized and posted on DWR's website by December 31 of the following year.

Mitigation Impacts

Compensatory Mitigation

Although the Compensatory Mitigation Plan described in Appendix 3F, *Compensatory Mitigation Plan for Special-Status Species and Aquatic Resources,* does not act as mitigation for criteria pollutant emissions from project construction or operations, its implementation could result in regional air quality impacts.

The compensatory mitigation to restore wetland, open-water, and upland communities on Bouldin Island and restore freshwater marsh along Interstate (I-)5 would not occur in the SMAQMD. These activities would occur in SJVAPCD and are evaluated in Impact AQ-2.

As described in Appendix 3F, additional channel margin and tidal habitat may be created within the North Delta Arc as part of the Compensatory Mitigation Plan. The types of construction activities and equipment needed for channel margin and tidal habitat creation are similar to what would be required for construction of the project, although they would be of substantially lesser magnitude. While the specific design criteria required to support emissions quantification are not yet developed, based on the level of activity and emissions quantified for restoration along I-5 and on Bouldin Island (see Table 23-34), construction emissions are not expected to exceed SMAQMD thresholds. Accordingly, construction of the compensatory mitigation sites in SMAMQD would not worsen existing regional air quality or conflict with adopted ambient air quality attainment plans. Therefore, the project alternatives combined with compensatory mitigation would not change the overall construction impact conclusion of less than significant with mitigation.

Following restoration, future site visits requiring vehicle trips, such as biological monitoring, would likely occur a few times per year. These activities required to monitor and maintain the compensatory mitigation sites would be less frequent and intense than current on-site agricultural practices. Accordingly, maintenance of new channel margin and tidal habitat sites would not result in exceedances of SMAQMD's thresholds. Therefore, the project alternatives combined with compensatory mitigation would not change the overall O&M impact conclusion of less than significant.

Other Mitigation Measures

Some mitigation measures would result in construction equipment exhaust, haul truck exhaust, employee vehicle exhaust, and dust from grading, clearing, excavation, and landscaping activities that would temporarily generate criteria air pollutant emissions and potentially affect regional air quality in SMAQMD. The mitigation measures with potential to result in impacts on regional air quality are: Mitigation Measures BIO-2c: *Electrical Power Line Support Placement*; SOILS-2: *Prepare and Implement Topsoil Salvage, Handling, Stockpiling and Reapplication Plans*; AG-3: *Replacement or Relocation of Affected Infrastructure Supporting Agricultural Properties*; AES-1c: *Implement Best Management Practices to Implement Project Landscaping Plan*; CUL-1: *Prepare and Implement a Built-Environment Treatment Plan in Consultation with Interested Parties*; and CUL-2: *Conduct a Survey of Inaccessible Properties to Assess Eligibility, Determine If These Properties Will Be Adversely Affected by the Project, and Develop Treatment to Resolve or Mitigate Adverse Impacts*. Temporary impacts on regional air quality resulting from implementation of mitigation measures would be similar to construction effects of the project alternatives, but of a much lesser magnitude. Environmental Commitments EC-7: *Off-Road Heavy-Duty Engines,* EC-8: *On-Road Haul Trucks*, and EC-13: *DWR Best Management Practices to Reduce GHG Emissions* would reduce construction equipment and vehicle exhaust emissions generated from implementation of mitigation measures. Environmental Commitments EC-11: *Fugitive Dust Control* and EC-12: *On-Site Site Concrete Batching Plants* are available to reduce fugitive dust. Mitigation Measure AQ-1: *Offset Construction-Generated Criteria Pollutants in the Sacramento Valley Air Basin* would offset any remaining emissions above SMAQMD thresholds and reduce the severity of any potential air quality effects. Therefore, implementation of other mitigation measures is unlikely to result in regional air quality impacts in SMAQMD and would be less than significant with mitigation.

Overall, impacts on regional air quality in the SMAQMD from implementation of compensatory mitigation and other mitigation measures, combined with project alternatives, would not change the less than significant with mitigation impact conclusion.

Impact AQ-2: Result in Impacts on Regional Air Quality within the San Joaquin Valley Air Pollution Control District

All Project Alternatives

Project Construction

The predominant pollutants associated with project construction in the SJVAPCD would be fugitive dust (PM10 and PM2.5) from earthmoving activities and concrete batching. Combustion pollutants, particularly ozone precursors, would also be generated by heavy equipment and vehicles. Emissions vary substantially depending on the level of activity, length of the construction period, specific construction operations, types of equipment, number of personnel, wind and precipitation conditions, and soil moisture content.

Tables 23-24 through 23-32 summarize construction emissions that would be generated in the SJVAPCD in pounds per day and tons per year by each alternative, exclusive and inclusive of the Compensatory Mitigation Plan. The emissions estimates include implementation of quantifiable air quality environmental commitments.

Table 23-24. Criteria Pollutant and Precursor Emissions from Construction of Alternative 1 in the San Joaquin Valley Air Pollution Control District [a]

	Average Daily Emissions (lbs/day) [b]										Annual Emissions (tons/year)									
				PM10			PM2.5							PM10			PM2.5			
Year	ROG	NO_X	CO	Exhaust	Dust	Total [c]	Exhaust	Dust	Total [c]	SO_2	ROG	NO_X	CO	Exhaust	Dust	Total [c]	Exhaust	Dust	Total [c]	SO_2
Alternative 1																				
PFIY 1	6	30	**164**	1	11	12	1	3	4	<1	1	4	20	<1	1	1	<1	<1	<1	<1
PFIY 2	6	29	**162**	1	11	12	1	3	4	<1	1	4	20	<1	1	1	<1	<1	<1	<1
CY 1	2	25	31	<1	15	15	<1	3	3	<1	<1	3	4	<1	2	2	<1	<1	<1	<1
CY 2	6	44	57	<1	18	19	<1	5	5	<1	1	5	7	<1	2	2	<1	1	1	<1
CY 3	6	60	**132**	1	22	23	1	6	6	<1	1	8	16	<1	3	3	<1	1	1	<1
CY 4	13	91	**251**	1	44	45	1	12	13	1	2	**11**	31	<1	5	6	<1	1	2	<1
CY 5	15	**185**	**229**	1	69	70	1	16	17	1	2	**23**	29	<1	9	9	<1	2	2	<1
CY 6	14	**180**	**224**	1	61	62	1	16	17	1	2	**22**	28	<1	8	8	<1	2	2	<1
CY 7	12	**160**	**174**	1	68	69	1	18	18	1	1	**20**	22	<1	9	9	<1	2	2	<1
CY 8	8	99	**117**	<1	65	65	<1	14	15	1	1	**12**	15	<1	8	8	<1	2	2	<1
CY 9	6	76	96	<1	77	78	<1	15	16	<1	1	9	12	<1	10	10	<1	2	2	<1
CY 10	5	**100**	91	<1	85	85	<1	16	17	<1	1	**13**	11	<1	11	11	<1	2	2	<1
CY 11	3	52	57	<1	36	36	<1	7	7	<1	<1	7	7	<1	4	4	<1	1	1	<1
CY 12	2	5	6	<1	1	1	<1	<1	<1	<1	<1	1	1	<1	<1	<1	<1	<1	<1	<1
CY 13	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CY 14	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Compensatory Mitigation with Alternative 1 [d]																				
CY 1	4	38	87	<1	26	26	<1	5	5	<1	1	5	11	<1	3	3	<1	1	1	<1
CY 2	8	53	**130**	1	29	30	1	6	6	<1	1	7	16	<1	4	4	<1	1	1	<1
CY 3	6	60	**132**	1	23	23	1	6	6	<1	1	8	17	<1	3	3	<1	1	1	<1
Threshold [e]	*100*	*100*	*100*	*–*	*–*	*100*	*–*	*–*	*100*	*100*	*10*	*10*	*100*	*–*	*–*	*15*	*–*	*–*	*15*	*27*

AAQA = ambient air quality analysis; CAAQS = California ambient air quality standards; CO = carbon monoxide; ROG = reactive organic gases; lbs = pounds; NAAQS = national ambient air quality standards; NO_X = nitrogen oxides; PM10 = particulate matter that is 10 microns in diameter and smaller; PM2.5 = particulate matter that is 2.5 microns in diameter and smaller; SJVAPCD = San Joaquin Valley Air Pollution Control District; SO_2 = sulfur dioxide; PFIY = preliminary field investigation year; CY = construction year.

[a] Emissions results include implementation of air quality Environmental Commitments EC-7 and EC-9 through EC-12. Exceedances of SJVAPCD's thresholds are shown in **bolded underline**.

[b] Presents the average emissions estimate during a single day of construction in each year. Average emissions are presented in SJVAPCD (rather than maximum emissions), consistent with (San Joaquin Valley Air Pollution Control District 2018a:3) guidance for correct application of its 100-pound-per-day AAQA screening criteria.

[c] Total PM10 and PM2.5 emissions consist of exhaust and fugitive dust emissions. Annual and daily values for exhaust and dust may not add to the totals in the total column because of rounding.

[d] Presents emissions only during the 3 project construction years in which construction of compensatory mitigation sites would occur.

[e] The 100-pound-per-day threshold is a screening-level threshold to help determine whether increased emissions from a project would cause or contribute to a violation of CAAQS or NAAQS. Projects with emissions below the threshold would not be in violation of CAAQS or NAAQS. Projects with emissions above the threshold would require an AAQA to confirm this conclusion (San Joaquin Valley Air Pollution Control District 2015a:93). In developing the annual thresholds, SJVAPCD considered levels at which project emissions are cumulatively considerable. Consequently, exceedances of project-level thresholds would be cumulatively considerable.

Table 23-25. Criteria Pollutant and Precursor Emissions from Construction of Alternative 2a in the San Joaquin Valley Air Pollution Control District [a]

	Average Daily Emissions (lbs/day) [b]										Annual Emissions (tons/year)									
				PM10			PM2.5							PM10			PM2.5			
Year	ROG	NO_X	CO	Exhaust	Dust	Total [c]	Exhaust	Dust	Total [c]	SO_2	ROG	NO_X	CO	Exhaust	Dust	Total [c]	Exhaust	Dust	Total [c]	SO_2
Alternative 2a																				
PFIY 1	7	32	**179**	1	12	13	1	3	4	<1	1	4	22	<1	1	2	<1	<1	1	<1
PFIY 2	7	32	**177**	1	12	13	1	3	4	<1	1	4	22	<1	1	2	<1	<1	<1	<1
CY 1	4	40	45	<1	19	19	<1	4	4	<1	<1	5	6	<1	2	2	<1	1	1	<1
CY 2	7	52	67	<1	22	22	<1	6	6	<1	1	7	8	<1	3	3	<1	1	1	<1
CY 3	7	51	**135**	1	22	22	1	6	6	<1	1	6	17	<1	3	3	<1	1	1	<1
CY 4	13	96	**257**	1	39	40	1	11	12	1	2	**12**	32	<1	5	5	<1	1	2	<1
CY 5	16	**186**	**239**	1	64	65	1	17	18	1	2	**23**	30	<1	8	8	<1	2	2	<1
CY 6	16	**216**	**271**	1	69	70	1	18	19	1	2	**27**	34	<1	9	9	<1	2	2	<1
CY 7	16	**267**	**258**	1	87	88	1	23	24	1	2	**33**	32	<1	11	11	<1	3	3	<1
CY 8	12	**194**	**197**	1	84	85	1	19	20	1	2	**24**	25	<1	10	11	<1	2	2	<1
CY 9	8	**129**	**152**	1	91	91	1	18	19	1	1	**16**	19	<1	11	11	<1	2	2	<1
CY 10	7	**109**	**139**	1	98	98	1	19	19	1	1	**14**	17	<1	12	12	<1	2	2	<1
CY 11	5	64	**103**	<1	113	**113**	<1	20	20	<1	1	8	13	<1	14	14	<1	2	3	<1
CY 12	3	12	20	<1	15	15	<1	2	3	<1	<1	2	3	<1	2	2	<1	<1	<1	<1
CY 13	<1	1	1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
CY 14	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

	Average Daily Emissions (lbs/day) [b]										Annual Emissions (tons/year)									
				PM10			PM2.5							PM10			PM2.5			
Year	ROG	NO_X	CO	Exhaust	Dust	Total [c]	Exhaust	Dust	Total [c]	SO_2	ROG	NO_X	CO	Exhaust	Dust	Total [c]	Exhaust	Dust	Total [c]	SO_2
Compensatory Mitigation with Alternative 2a [d]																				
CY 1	6	53	**100**	<1	30	30	<1	6	6	<1	1	7	13	<1	4	4	<1	1	1	<1
CY 2	9	62	**140**	1	33	33	1	7	7	<1	1	8	18	<1	4	4	<1	1	1	<1
CY 3	7	51	**135**	1	22	23	1	6	6	<1	1	6	17	<1	3	3	<1	1	1	<1
Threshold [e]	*100*	*100*	*100*	–	–	*100*	–	–	*100*	*100*	*10*	*10*	*100*	–	–	*15*	–	–	*15*	*27*

AAQA = ambient air quality analysis; CAAQS = California ambient air quality standards; CO = carbon monoxide; ROG = reactive organic gases; lbs = pounds; NAAQS = national ambient air quality standards; NO_X = nitrogen oxides; PM10 = particulate matter that is 10 microns in diameter and smaller; PM2.5 = particulate matter that is 2.5 microns in diameter and smaller; SJVAPCD = San Joaquin Valley Air Pollution Control District; SO_2 = sulfur dioxide; PFIY = preliminary field investigation year; CY = construction year.

[a] Emissions results include implementation of air quality Environmental Commitments EC-7 and EC-9 through EC-12. Exceedances of SJVAPCD's thresholds are shown in **bolded underline**.

[b] Presents the average emissions estimate during a single day of construction in each year. Average emissions are presented in SJVAPCD (rather than maximum emissions), consistent with (San Joaquin Valley Air Pollution Control District 2018a:3) guidance for correct application of its 100-pound-per-day AAQA screening criteria.

[c] Total PM10 and PM2.5 emissions consist of exhaust and fugitive dust emissions. Annual and daily values for exhaust and dust may not add to the totals in the total column because of rounding.

[d] Presents emissions only during the 3 project construction years in which construction of compensatory mitigation sites would occur.

[e] The 100-pound-per-day threshold is a screening-level threshold to help determine whether increased emissions from a project would cause or contribute to a violation of the CAAQS or NAAQS. Projects with emissions below the threshold would not be in violation of the CAAQS or NAAQS. Projects with emissions above the threshold would require an AAQA to confirm this conclusion (San Joaquin Valley Air Pollution Control District 2015a:93). In developing the annual thresholds, SJVAPCD considered levels at which project emissions are cumulatively considerable. Consequently, exceedances of project-level thresholds would be cumulatively considerable.

Table 23-26. Criteria Pollutant and Precursor Emissions from Construction of Alternative 2b in the San Joaquin Valley Air Pollution Control District [a]

	Average Daily Emissions (lbs/day) [b]										Annual Emissions (tons/year)									
				PM10			PM2.5							PM10			PM2.5			
Year	ROG	NO_X	CO	Exhaust	Dust	Total [c]	Exhaust	Dust	Total [c]	SO_2	ROG	NO_X	CO	Exhaust	Dust	Total [c]	Exhaust	Dust	Total [c]	SO_2
Alternative 2b																				
PFIY 1	6	28	**156**	1	10	11	1	3	4	<1	1	3	19	<1	1	1	<1	<1	<1	<1
PFIY 2	6	27	**154**	1	10	11	1	3	4	<1	1	3	19	<1	1	1	<1	<1	<1	<1
CY 1	2	26	31	<1	15	15	<1	3	3	<1	<1	3	4	<1	2	2	<1	<1	<1	<1
CY 2	6	49	61	<1	20	21	<1	5	6	<1	1	6	8	<1	3	3	<1	1	1	<1
CY 3	6	45	**121**	<1	18	19	<1	5	5	<1	1	6	15	<1	2	2	<1	1	1	<1

	Average Daily Emissions (lbs/day) [b]										Annual Emissions (tons/year)									
				PM10			PM2.5							PM10			PM2.5			
Year	ROG	NO_X	CO	Exhaust	Dust	Total [c]	Exhaust	Dust	Total [c]	SO_2	ROG	NO_X	CO	Exhaust	Dust	Total [c]	Exhaust	Dust	Total [c]	SO_2
CY 4	14	100	**257**	1	43	44	1	12	13	1	2	**12**	32	<1	5	5	<1	2	2	<1
CY 5	13	**148**	**202**	1	53	53	1	13	14	1	2	**19**	25	<1	7	7	<1	2	2	<1
CY 6	10	**152**	**175**	1	46	47	1	12	13	1	1	**19**	22	<1	6	6	<1	2	2	<1
CY 7	8	**135**	**131**	1	50	51	1	13	14	1	1	**17**	16	<1	6	6	<1	2	2	<1
CY 8	5	**104**	87	<1	46	47	<1	10	11	<1	1	**13**	11	<1	6	6	<1	1	1	<1
CY 9	5	87	78	<1	51	51	<1	11	11	<1	1	**11**	10	<1	6	6	<1	1	1	<1
CY 10	3	57	58	<1	60	60	<1	10	11	<1	<1	7	7	<1	7	7	<1	1	1	<1
CY 11	1	15	16	<1	10	10	<1	2	2	<1	<1	2	2	<1	1	1	<1	<1	<1	<1
CY 12	2	4	5	<1	1	1	<1	<1	<1	<1	<1	<1	1	<1	<1	<1	<1	<1	<1	<1
CY 13	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CY 14	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Compensatory Mitigation with Alternative 2b [d]																				
CY 1	4	39	87	<1	26	26	<1	5	5	<1	1	5	11	<1	3	3	<1	1	1	<1
CY 2	8	59	**134**	1	31	32	1	6	7	<1	1	7	17	<1	4	4	<1	1	1	<1
CY 3	6	45	**122**	<1	19	19	<1	5	5	<1	1	6	15	<1	2	2	<1	1	1	<1
Threshold [e]	*100*	*100*	*100*	*–*	*–*	*100*	*–*	*–*	*100*	*100*	*10*	*10*	*100*	*–*	*–*	*15*	*–*	*–*	*15*	*27*

AAQA = ambient air quality analysis; CAAQS = California ambient air quality standards; CO = carbon monoxide; ROG = reactive organic gases; lbs = pounds; NAAQS = national ambient air quality standards; NO_X = nitrogen oxides; PM10 = particulate matter that is 10 microns in diameter and smaller; PM2.5 = particulate matter that is 2.5 microns in diameter and smaller; SJVAPCD = San Joaquin Valley Air Pollution Control District; SO_2 = sulfur dioxide; PFIY = preliminary field investigation year; CY = construction year.

[a] Emissions results include implementation of air quality Environmental Commitments EC-7 and EC-9 through EC-12. Exceedances of SJVAPCD's thresholds are shown in **bolded underline**.

[b] Presents the average emissions estimate during a single day of construction in each year. Average emissions are presented in SJVAPCD (rather than maximum emissions), consistent with (San Joaquin Valley Air Pollution Control District 2018a:3) guidance for correct application of its 100-pound-per-day AAQA screening criteria.

[c] Total PM10 and PM2.5 emissions consist of exhaust and fugitive dust emissions. Annual and daily values for exhaust and dust may not add to the totals in the total column because of rounding.

[d] Presents emissions only during the 3 project construction years in which construction of compensatory mitigation sites would occur.

[e] The 100-pound-per-day threshold is a screening-level threshold to help determine whether increased emissions from a project would cause or contribute to a violation of the CAAQS or NAAQS. Projects with emissions below the threshold would not be in violation of the CAAQS or NAAQS. Projects with emissions above the threshold would require an AAQA to confirm this conclusion (San Joaquin Valley Air Pollution Control District 2015a:93). In developing the annual thresholds, SJVAPCD considered levels at which project emissions are cumulatively considerable. Consequently, exceedances of project-level thresholds would be cumulatively considerable.

Table 23-27. Criteria Pollutant and Precursor Emissions from Construction of Alternative 2c in the San Joaquin Valley Air Pollution Control District [a]

	Average Daily Emissions (lbs/day) [b]										Annual Emissions (tons/year)									
				PM10			PM2.5							PM10			PM2.5			
Year	ROG	NO_X	CO	Exhaust	Dust	Total [c]	Exhaust	Dust	Total [c]	SO_2	ROG	NO_X	CO	Exhaust	Dust	Total [c]	Exhaust	Dust	Total [c]	SO_2
Alternative 2c																				
PFIY 1	6	30	**164**	1	11	12	1	3	4	<1	1	4	20	<1	1	1	<1	<1	<1	<1
PFIY 2	6	29	**162**	1	11	12	1	3	4	<1	1	4	20	<1	1	1	<1	<1	<1	<1
CY 1	4	39	45	<1	19	19	<1	4	4	<1	<1	5	6	<1	2	2	<1	1	1	<1
CY 2	7	52	67	<1	22	22	<1	6	6	<1	1	6	8	<1	3	3	<1	1	1	<1
CY 3	6	48	**124**	<1	19	20	<1	5	6	<1	1	6	16	<1	2	2	<1	1	1	<1
CY 4	7	83	**192**	1	22	23	1	7	8	1	1	**10**	24	<1	3	3	<1	1	1	<1
CY 5	13	**134**	**199**	1	53	54	1	14	14	1	2	**17**	25	<1	7	7	<1	2	2	<1
CY 6	14	**161**	**215**	1	60	61	1	16	17	1	2	**20**	27	<1	8	8	<1	2	2	<1
CY 7	11	**148**	**163**	1	64	64	1	17	17	1	1	**19**	20	<1	8	8	<1	2	2	<1
CY 8	8	**125**	**120**	<1	63	63	<1	14	15	1	1	**16**	15	<1	8	8	<1	2	2	<1
CY 9	6	46	90	<1	62	63	<1	13	13	<1	1	6	11	<1	8	8	<1	2	2	<1
CY 10	5	78	82	<1	68	69	<1	13	14	<1	1	10	10	<1	9	9	<1	2	2	<1
CY 11	3	46	44	<1	30	30	<1	6	6	<1	<1	6	5	<1	4	4	<1	1	1	<1
CY 12	2	5	5	<1	1	1	<1	<1	<1	<1	<1	1	1	<1	<1	<1	<1	<1	<1	<1
CY 13	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CY 14	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Compensatory Mitigation with Alternative 2c [d]																				
CY 1	6	53	**101**	<1	30	31	<1	6	6	<1	1	7	13	<1	4	4	<1	1	1	<1
CY 2	9	61	**140**	1	32	33	1	7	7	<1	1	8	17	<1	4	4	<1	1	1	<1
CY 3	6	48	**125**	<1	20	20	<1	5	6	<1	1	6	16	<1	2	3	<1	1	1	<1
Threshold [e]	*100*	*100*	*100*	–	–	*100*	–	–	*100*	*100*	*10*	*10*	*100*	–	–	*15*	–	–	*15*	*27*

AAQA = ambient air quality analysis; CAAQS = California ambient air quality standards; CO = carbon monoxide; ROG = reactive organic gases; lbs = pounds; NAAQS = national ambient air quality standards; NO_X = nitrogen oxides; PM10 = particulate matter that is 10 microns in diameter and smaller; PM2.5 = particulate matter that is 2.5 microns in diameter and smaller; SJVAPCD = San Joaquin Valley Air Pollution Control District; SO_2 = sulfur dioxide; PFIY = preliminary field investigation year; CY = construction year.

[a] Emissions results include implementation of air quality Environmental Commitments EC-7 and EC-9 through EC-12. Exceedances of SJVAPCD's thresholds are shown in **bolded underline**.

[b] Presents the average emissions estimate during a single day of construction in each year. Average emissions are presented in SJVAPCD (rather than maximum emissions), consistent with (San Joaquin Valley Air Pollution Control District 2018a:3) guidance for correct application of its 100-pound-per-day AAQA screening criteria.

[c] Total PM10 and PM2.5 emissions consist of exhaust and fugitive dust emissions. Annual and daily values for exhaust and dust may not add to the totals in the total column because of rounding.

[d] Presents emissions only during the 3 project construction years in which construction of compensatory mitigation sites would occur.

[e] The 100-pound-per-day threshold is a screening-level threshold to help determine whether increased emissions from a project would cause or contribute to a violation of the CAAQS or NAAQS. Projects with emissions below the threshold would not be in violation of the CAAQS or NAAQS. Projects with emissions above the threshold would require an AAQA to confirm this conclusion (San Joaquin Valley Air Pollution Control District 2015a:93). In developing the annual thresholds, SJVAPCD considered levels at which project emissions are cumulatively considerable. Consequently, exceedances of project-level thresholds would be cumulatively considerable.

Table 23-28. Criteria Pollutant and Precursor Emissions from Construction of Alternative 3 in the San Joaquin Valley Air Pollution Control District [a]

	Average Daily Emissions (lbs/day) [b]										Annual Emissions (tons/year)									
				PM10			PM2.5							PM10			PM2.5			
Year	ROG	NO_X	CO	Exhaust	Dust	Total [c]	Exhaust	Dust	Total [c]	SO_2	ROG	NO_X	CO	Exhaust	Dust	Total [c]	Exhaust	Dust	Total [c]	SO_2
Alternative 3																				
PFIY 1	6	25	**144**	1	9	10	1	3	3	<1	1	3	18	<1	1	1	<1	<1	<1	<1
PFIY 2	5	25	**143**	1	9	10	1	3	3	<1	1	3	18	<1	1	1	<1	<1	<1	<1
CY 1	2	26	34	<1	13	13	<1	3	3	<1	<1	3	4	<1	2	2	<1	<1	<1	<1
CY 2	3	28	28	<1	11	12	<1	3	3	<1	<1	3	3	<1	1	1	<1	<1	<1	<1
CY 3	4	32	68	<1	14	14	<1	4	4	<1	<1	4	8	<1	2	2	<1	<1	<1	<1
CY 4	9	67	**140**	<1	51	52	<1	11	12	1	1	8	18	<1	6	6	<1	1	1	<1
CY 5	14	**187**	**221**	1	72	73	1	16	17	1	2	**23**	28	<1	9	9	<1	2	2	<1
CY 6	15	**212**	**246**	1	63	64	1	16	17	1	2	**26**	31	<1	8	8	<1	2	2	<1
CY 7	13	**175**	**212**	1	54	55	1	13	14	1	2	**22**	27	<1	7	7	<1	2	2	<1
CY 8	9	**115**	**153**	1	42	43	1	9	10	1	1	**14**	19	<1	5	5	<1	1	1	<1
CY 9	7	91	**137**	1	48	48	1	10	11	1	1	**11**	17	<1	6	6	<1	1	1	<1
CY 10	7	**117**	**142**	1	73	73	1	14	15	1	1	**15**	18	<1	9	9	<1	2	2	<1
CY 11	4	60	78	<1	69	69	<1	12	13	<1	1	7	10	<1	9	9	<1	2	2	<1
CY 12	1	14	8	<1	48	48	<1	8	8	<1	<1	2	1	<1	6	6	<1	1	1	<1
CY 13	1	7	4	<1	2	2	<1	<1	<1	<1	<1	1	<1	<1	<1	<1	<1	<1	<1	<1
CY 14	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

	Average Daily Emissions (lbs/day) [b]										Annual Emissions (tons/year)									
				PM10			PM2.5							PM10			PM2.5			
Year	ROG	NO_X	CO	Exhaust	Dust	Total [c]	Exhaust	Dust	Total [c]	SO_2	ROG	NO_X	CO	Exhaust	Dust	Total [c]	Exhaust	Dust	Total [c]	SO_2
Compensatory Mitigation with Alternative 3 [d]																				
CY 1	4	39	89	<1	24	24	<1	4	5	<1	1	5	11	<1	3	3	<1	1	1	<1
CY 2	5	37	**<u>101</u>**	<1	22	23	<1	4	4	<1	1	5	13	<1	3	3	<1	<1	1	<1
CY 3	4	32	68	<1	14	14	<1	4	4	<1	<1	4	9	<1	2	2	<1	<1	<1	<1
Threshold [e]	*100*	*100*	*100*	–	–	*100*	–	–	*100*	*100*	*10*	*10*	*100*	–	–	*15*	–	–	*15*	*27*

AAQA = ambient air quality analysis; CAAQS = California ambient air quality standards; CO = carbon monoxide; ROG = reactive organic gases; lbs = pounds; NAAQS = national ambient air quality standards; NO_X = nitrogen oxides; PM10 = particulate matter that is 10 microns in diameter and smaller; PM2.5 = particulate matter that is 2.5 microns in diameter and smaller; SJVAPCD = San Joaquin Valley Air Pollution Control District; SO_2 = sulfur dioxide; PFIY = preliminary field investigation year; CY = construction year.

[a] Emissions results include implementation of air quality Environmental Commitments EC-7 and EC-9 through EC-12. Exceedances of SJVAPCD's thresholds are shown in **<u>bolded underline</u>**.

[b] Presents the average emissions estimate during a single day of construction in each year. Average emissions are presented in SJVAPCD (rather than maximum emissions), consistent with (San Joaquin Valley Air Pollution Control District 2018a:3) guidance for correct application of its 100-pound-per-day AAQA screening criteria.

[c] Total PM10 and PM2.5 emissions consist of exhaust and fugitive dust emissions. Annual and daily values for exhaust and dust may not add to the totals in the total column because of rounding.

[d] Presents emissions only during the 3 project construction years in which construction of compensatory mitigation sites would occur.

[e] The 100-pound-per-day threshold is a screening-level threshold to help determine whether increased emissions from a project would cause or contribute to a violation of the CAAQS or NAAQS. Projects with emissions below the threshold would not be in violation of the CAAQS or NAAQS. Projects with emissions above the threshold would require an AAQA to confirm this conclusion (San Joaquin Valley Air Pollution Control District 2015a:93). In developing the annual thresholds, SJVAPCD considered levels at which project emissions are cumulatively considerable. Consequently, exceedances of project-level thresholds would be cumulatively considerable.

Table 23-29. Criteria Pollutant and Precursor Emissions from Construction of Alternative 4a in the San Joaquin Valley Air Pollution Control District [a]

	Average Daily Emissions (lbs/day) [b]										Annual Emissions (tons/year)									
				PM10			PM2.5							PM10			PM2.5			
Year	ROG	NO_X	CO	Exhaust	Dust	Total [c]	Exhaust	Dust	Total [c]	SO_2	ROG	NO_X	CO	Exhaust	Dust	Total [c]	Exhaust	Dust	Total [c]	SO_2
Alternative 4a																				
PFIY 1	6	28	**<u>159</u>**	1	10	11	1	3	4	<1	1	4	20	<1	1	1	<1	<1	<1	<1
PFIY 2	6	27	**<u>157</u>**	1	10	11	1	3	3	<1	1	3	20	<1	1	1	<1	<1	<1	<1
CY 1	4	40	45	<1	16	16	<1	4	4	<1	<1	5	6	<1	2	2	<1	<1	1	<1
CY 2	5	37	49	<1	20	20	<1	5	5	<1	1	5	6	<1	2	2	<1	1	1	<1
CY 3	4	31	72	<1	16	17	<1	4	5	<1	<1	4	9	<1	2	2	<1	1	1	<1

	Average Daily Emissions (lbs/day) [b]										Annual Emissions (tons/year)									
				PM10			PM2.5							PM10			PM2.5			
Year	ROG	NO_X	CO	Exhaust	Dust	Total [c]	Exhaust	Dust	Total [c]	SO_2	ROG	NO_X	CO	Exhaust	Dust	Total [c]	Exhaust	Dust	Total [c]	SO_2
CY 4	9	69	**142**	<1	34	35	<1	10	10	1	1	9	18	<1	4	4	<1	1	1	<1
CY 5	14	**183**	**224**	1	73	74	1	17	18	1	2	**23**	28	<1	9	9	<1	2	2	<1
CY 6	15	**221**	**246**	1	70	71	1	19	20	1	2	**28**	31	<1	9	9	<1	2	2	<1
CY 7	16	**273**	**269**	1	82	83	1	21	22	1	2	**34**	34	<1	10	10	<1	3	3	<1
CY 8	12	**201**	**205**	1	71	72	1	17	18	1	2	**25**	26	<1	9	9	<1	2	2	<1
CY 9	8	**136**	**158**	1	78	79	1	16	17	1	1	**17**	20	<1	10	10	<1	2	2	<1
CY 10	7	**116**	**145**	1	86	86	1	17	18	1	1	**15**	18	<1	11	11	<1	2	2	<1
CY 11	5	65	94	<1	92	92	<1	17	17	<1	1	8	12	<1	12	12	<1	2	2	<1
CY 12	2	23	42	<1	91	91	<1	14	14	<1	<1	3	5	<1	11	11	<1	2	2	<1
CY 13	1	8	8	<1	5	5	<1	1	1	<1	<1	1	1	<1	1	1	<1	<1	<1	<1
CY 14	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Compensatory Mitigation with Alternative 4a [d]																				
CY 1	6	53	**101**	<1	27	27	<1	5	6	<1	1	7	13	<1	3	3	<1	1	1	<1
CY 2	7	47	**122**	<1	30	31	<1	6	7	<1	1	6	15	<1	4	4	<1	1	1	<1
CY 3	4	31	73	<1	17	17	<1	4	5	<1	<1	4	9	<1	2	2	<1	1	1	<1
Threshold [e]	*100*	*100*	*100*	–	–	*100*	–	–	*100*	*100*	*10*	*10*	*100*	–	–	*15*	–	–	*15*	*27*

AAQA = ambient air quality analysis; CAAQS = California ambient air quality standards; CO = carbon monoxide; ROG = reactive organic gases; lbs = pounds; NAAQS = national ambient air quality standards; NO_X = nitrogen oxides; PM10 = particulate matter that is 10 microns in diameter and smaller; PM2.5 = particulate matter that is 2.5 microns in diameter and smaller; SJVAPCD = San Joaquin Valley Air Pollution Control District; SO_2 = sulfur dioxide; PFIY = preliminary field investigation year; CY = construction year.

[a] Emissions results include implementation of air quality Environmental Commitments EC-7 and EC-9 through EC-12. Exceedances of SJVAPCD's thresholds are shown in **bolded underline**.

[b] Presents the average emissions estimate during a single day of construction in each year. Average emissions are presented in SJVAPCD (rather than maximum emissions), consistent with (San Joaquin Valley Air Pollution Control District 2018a:3) guidance for correct application of its 100-pound-per-day AAQA screening criteria.

[c] Total PM10 and PM2.5 emissions consist of exhaust and fugitive dust emissions. Annual and daily values for exhaust and dust may not add to the totals in the total column because of rounding.

[d] Presents emissions only during the 3 project construction years in which construction of compensatory mitigation sites would occur.

[e] The 100-pound-per-day threshold is a screening-level threshold to help determine whether increased emissions from a project would cause or contribute to a violation of the CAAQS or NAAQS. Projects with emissions below the threshold would not be in violation of the CAAQS or NAAQS. Projects with emissions above the threshold would require an AAQA to confirm this conclusion (San Joaquin Valley Air Pollution Control District 2015a:93). In developing the annual thresholds, SJVAPCD considered levels at which project emissions are cumulatively considerable. Consequently, exceedances of project-level thresholds would be cumulatively considerable.

Table 23-30. Criteria Pollutant and Precursor Emissions from Construction of Alternative 4b in the San Joaquin Valley Air Pollution Control District [a]

	Average Daily Emissions (lbs/day) [b]										Annual Emissions (tons/year)									
				PM10			PM2.5							PM10			PM2.5			
Year	ROG	NO_X	CO	Exhaust	Dust	Total [c]	Exhaust	Dust	Total [c]	SO_2	ROG	NO_X	CO	Exhaust	Dust	Total [c]	Exhaust	Dust	Total [c]	SO_2
Alternative 4b																				
PFIY 1	5	24	**137**	1	9	10	1	2	3	<1	1	3	17	<1	1	1	<1	<1	<1	<1
PFIY 2	5	23	**135**	1	9	10	1	2	3	<1	1	3	17	<1	1	1	<1	<1	<1	<1
CY 1	2	26	31	<1	12	12	<1	3	3	<1	<1	3	4	<1	1	2	<1	<1	<1	<1
CY 2	4	32	35	<1	15	15	<1	4	4	<1	<1	4	4	<1	2	2	<1	<1	<1	<1
CY 3	3	24	62	<1	13	13	<1	3	4	<1	<1	3	8	<1	2	2	<1	<1	<1	<1
CY 4	10	79	**146**	1	50	51	1	12	13	1	1	10	18	<1	6	6	<1	2	2	<1
CY 5	11	**146**	**197**	1	65	66	1	15	15	1	1	**18**	25	<1	8	8	<1	2	2	<1
CY 6	10	**162**	**189**	1	52	53	1	13	14	1	1	**20**	24	<1	7	7	<1	2	2	<1
CY 7	9	**138**	**175**	1	45	45	1	12	13	1	1	**17**	22	<1	6	6	<1	1	2	<1
CY 8	7	**114**	**140**	1	35	36	1	8	9	1	1	**14**	17	<1	4	4	<1	1	1	<1
CY 9	6	96	**127**	1	37	37	1	9	9	1	1	**12**	16	<1	5	5	<1	1	1	<1
CY 10	4	72	84	<1	38	38	<1	8	8	<1	<1	9	11	<1	5	5	<1	1	1	<1
CY 11	2	28	28	<1	37	37	<1	7	7	<1	<1	3	4	<1	5	5	<1	1	1	<1
CY 12	<1	4	2	<1	1	1	<1	<1	<1	<1	<1	1	<1	<1	<1	<1	<1	<1	<1	<1
CY 13	<1	<1	1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
CY 14	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Compensatory Mitigation with Alternative 4b [d]																				
CY 1	4	39	87	<1	23	23	<1	4	5	<1	1	5	11	<1	3	3	<1	1	1	<1
CY 2	6	42	**108**	<1	26	26	<1	5	5	<1	1	5	13	<1	3	3	<1	1	1	<1
CY 3	3	24	62	<1	13	13	<1	4	4	<1	<1	3	8	<1	2	2	<1	<1	<1	<1
Threshold [e]	*100*	*100*	*100*	–	–	*100*	–	–	*100*	*100*	*10*	*10*	*100*	–	–	*15*	–	–	*15*	*27*

AAQA = ambient air quality analysis; CAAQS = California ambient air quality standards; CO = carbon monoxide; ROG = reactive organic gases; lbs = pounds; NAAQS = national ambient air quality standards; NO_X = nitrogen oxides; PM10 = particulate matter that is 10 microns in diameter and smaller; PM2.5 = particulate matter that is 2.5 microns in diameter and smaller; SJVAPCD = San Joaquin Valley Air Pollution Control District; SO_2 = sulfur dioxide; PFIY = preliminary field investigation year; CY = construction year.

[a] Emissions results include implementation of air quality Environmental Commitments EC-7 and EC-9 through EC-12. Exceedances of SJVAPCD's thresholds are shown in **bolded underline**.

[b] Presents the average emissions estimate during a single day of construction in each year. Average emissions are presented in SJVAPCD (rather than maximum emissions), consistent with (San Joaquin Valley Air Pollution Control District 2018a:3) guidance for correct application of its 100-pound-per-day AAQA screening criteria.

[c] Total PM10 and PM2.5 emissions consist of exhaust and fugitive dust emissions. Annual and daily values for exhaust and dust may not add to the totals in the total column because of rounding.

[d] Presents emissions only during the 3 project construction years in which construction of compensatory mitigation sites would occur.

[e] The 100-pound-per-day threshold is a screening-level threshold to help determine whether increased emissions from a project would cause or contribute to a violation of the CAAQS or NAAQS. Projects with emissions below the threshold would not be in violation of the CAAQS or NAAQS. Projects with emissions above the threshold would require an AAQA to confirm this conclusion (San Joaquin Valley Air Pollution Control District 2015a:93). In developing the annual thresholds, SJVAPCD considered levels at which project emissions are cumulatively considerable. Consequently, exceedances of project-level thresholds would be cumulatively considerable.

Table 23-31. Criteria Pollutant and Precursor Emissions from Construction of Alternative 4c in the San Joaquin Valley Air Pollution Control District [a]

	Average Daily Emissions (lbs/day) [b]										Annual Emissions (tons/year)									
				PM10			PM2.5							PM10			PM2.5			
Year	ROG	NO_X	CO	Exhaust	Dust	Total [c]	Exhaust	Dust	Total [c]	SO_2	ROG	NO_X	CO	Exhaust	Dust	Total [c]	Exhaust	Dust	Total [c]	SO_2
Alternative 4c																				
PFIY 1	6	25	**144**	1	9	10	1	3	3	<1	1	3	18	<1	1	1	<1	<1	<1	<1
PFIY 2	5	25	**143**	1	9	10	1	3	3	<1	1	3	18	<1	1	1	<1	<1	<1	<1
CY 1	4	39	45	<1	16	16	<1	4	4	<1	<1	5	6	<1	2	2	<1	<1	1	<1
CY 2	4	35	40	<1	16	16	<1	4	4	<1	1	4	5	<1	2	2	<1	<1	1	<1
CY 3	3	29	69	<1	15	15	<1	4	4	<1	<1	4	9	<1	2	2	<1	1	1	<1
CY 4	4	58	91	<1	18	18	<1	5	6	<1	1	7	11	<1	2	2	<1	1	1	<1
CY 5	11	**133**	**196**	1	55	56	1	14	14	1	1	**17**	24	<1	7	7	<1	2	2	<1
CY 6	15	**177**	**244**	1	62	63	1	16	17	1	2	**22**	31	<1	8	8	<1	2	2	<1
CY 7	13	**166**	**247**	1	62	63	1	16	17	1	2	**21**	31	<1	8	8	<1	2	2	<1
CY 8	10	**145**	**202**	1	47	48	1	12	13	1	1	**18**	25	<1	6	6	<1	1	2	<1
CY 9	8	66	**168**	1	54	55	1	12	13	1	1	8	21	<1	7	7	<1	1	2	<1
CY 10	7	**101**	**161**	1	58	59	1	12	13	1	1	**13**	20	<1	7	7	<1	2	2	<1
CY 11	4	57	72	<1	75	75	<1	13	13	<1	<1	7	9	<1	9	9	<1	2	2	<1
CY 12	1	14	9	<1	5	5	<1	1	1	<1	<1	2	1	<1	1	1	<1	<1	<1	<1
CY 13	<1	4	2	<1	1	1	<1	<1	<1	<1	<1	1	<1	<1	<1	<1	<1	<1	<1	<1
CY 14	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

	Average Daily Emissions (lbs/day) [b]										Annual Emissions (tons/year)									
				PM10			PM2.5							PM10			PM2.5			
Year	ROG	NO_X	CO	Exhaust	Dust	Total [c]	Exhaust	Dust	Total [c]	SO_2	ROG	NO_X	CO	Exhaust	Dust	Total [c]	Exhaust	Dust	Total [c]	SO_2
Compensatory Mitigation with Alternative 4c [d]																				
CY 1	6	52	**<u>101</u>**	<1	27	27	<1	5	6	<1	1	7	13	<1	3	3	<1	1	1	<1
CY 2	6	45	**<u>113</u>**	<1	27	27	<1	5	6	<1	1	6	14	<1	3	3	<1	1	1	<1
CY 3	3	29	69	<1	15	16	<1	4	4	<1	<1	4	9	<1	2	2	<1	1	1	<1
Threshold [e]	*100*	*100*	*100*	–	–	*100*	–	–	*100*	*100*	*10*	*10*	*100*	–	–	*15*	–	–	*15*	*27*

AAQA = ambient air quality analysis; CAAQS = California ambient air quality standards; CO = carbon monoxide; ROG = reactive organic gases; lbs = pounds; NAAQS = national ambient air quality standards; NO_X = nitrogen oxides; PM10 = particulate matter that is 10 microns in diameter and smaller; PM2.5 = particulate matter that is 2.5 microns in diameter and smaller; SJVAPCD = San Joaquin Valley Air Pollution Control District; SO_2 = sulfur dioxide; PFIY = preliminary field investigation year; CY = construction year.

[a] Emissions results include implementation of air quality Environmental Commitments EC-7 and EC-9 through EC-12. Exceedances of SJVAPCD's thresholds are shown in **<u>bolded underline</u>**.

[b] Presents the average emissions estimate during a single day of construction in each year. Average emissions are presented in SJVAPCD (rather than maximum emissions), consistent with (San Joaquin Valley Air Pollution Control District 2018a:3) guidance for correct application of its 100-pound-per-day AAQA screening criteria.

[c] Total PM10 and PM2.5 emissions consist of exhaust and fugitive dust emissions. Annual and daily values for exhaust and dust may not add to the totals in the total column because of rounding.

[d] Presents emissions only during the 3 project construction years in which construction of compensatory mitigation sites would occur.

[e] The 100-pound-per-day threshold is a screening-level threshold to help determine whether increased emissions from a project would cause or contribute to a violation of the CAAQS or NAAQS. Projects with emissions below the threshold would not be in violation of the CAAQS or NAAQS. Projects with emissions above the threshold would require an AAQA to confirm this conclusion (San Joaquin Valley Air Pollution Control District 2015a:93). In developing the annual thresholds, SJVAPCD considered levels at which project emissions are cumulatively considerable. Consequently, exceedances of project-level thresholds would be cumulatively considerable.

Table 23-32. Criteria Pollutant and Precursor Emissions from Construction of Alternative 5 in the San Joaquin Valley Air Pollution Control District [a]

	Average Daily Emissions (lbs/day) [b]										Annual Emissions (tons/year)									
				PM10			PM2.5							PM10			PM2.5			
Year	ROG	NO_X	CO	Exhaust	Dust	Total [c]	Exhaust	Dust	Total [c]	SO_2	ROG	NO_X	CO	Exhaust	Dust	Total [c]	Exhaust	Dust	Total [c]	SO_2
Alternative 5																				
PFIY 1	5	24	**<u>137</u>**	1	9	10	1	2	3	<1	1	3	17	<1	1	1	<1	<1	<1	<1
PFIY 2	5	23	**<u>135</u>**	1	9	10	1	2	3	<1	1	3	17	<1	1	1	<1	<1	<1	<1
CY 1	3	22	22	<1	13	14	<1	3	3	<1	<1	3	3	<1	2	2	<1	<1	<1	<1
CY 2	2	16	23	<1	11	11	<1	2	2	<1	<1	2	3	<1	1	1	<1	<1	<1	<1
CY 3	5	30	**<u>155</u>**	1	22	23	1	6	7	<1	1	4	19	<1	3	3	<1	1	1	<1

	Average Daily Emissions (lbs/day)[b]										Annual Emissions (tons/year)									
				PM10			PM2.5							PM10			PM2.5			
Year	ROG	NO_X	CO	Exhaust	Dust	Total[c]	Exhaust	Dust	Total[c]	SO_2	ROG	NO_X	CO	Exhaust	Dust	Total[c]	Exhaust	Dust	Total[c]	SO_2
CY 4	11	83	**226**	1	63	64	1	14	14	1	1	**10**	28	<1	8	8	<1	2	2	<1
CY 5	13	**174**	**236**	1	69	70	1	16	17	1	2	**22**	30	<1	9	9	<1	2	2	<1
CY 6	15	**200**	**259**	1	78	79	1	17	19	1	2	**25**	32	<1	10	10	<1	2	2	<1
CY 7	12	**172**	**209**	1	72	73	1	16	17	1	2	**21**	26	<1	9	9	<1	2	2	<1
CY 8	10	**130**	**176**	1	91	92	1	18	19	1	1	**16**	22	<1	11	11	<1	2	2	<1
CY 9	9	**118**	**168**	1	130	**130**	1	23	24	1	1	**15**	21	<1	16	**16**	<1	3	3	<1
CY 10	8	**131**	**158**	1	144	**145**	1	25	26	1	1	**16**	20	<1	18	**18**	<1	3	3	<1
CY 11	4	70	83	<1	145	**145**	<1	23	24	<1	1	9	10	<1	18	**18**	<1	3	3	<1
CY 12	2	23	40	<1	95	95	<1	14	15	<1	<1	3	5	<1	12	12	<1	2	2	<1
CY 13	11	8	17	<1	10	10	<1	1	2	<1	1	1	2	<1	1	1	<1	<1	<1	<1
CY 14	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Compensatory Mitigation with Alternative 5[d]																				
CY 1	4	35	78	<1	24	25	<1	4	4	<1	1	4	10	<1	3	3	<1	<1	1	<1
CY 2	4	25	96	<1	22	22	<1	3	3	<1	<1	3	12	<1	3	3	<1	<1	<1	<1
CY 3	5	30	**156**	1	23	23	1	7	7	<1	1	4	19	<1	3	3	<1	1	1	<1
Threshold[e]	*100*	*100*	*100*	–	–	*100*	–	–	*100*	*100*	*10*	*10*	*100*	–	–	*15*	–	–	*15*	*27*

AAQA = ambient air quality analysis; CAAQS = California ambient air quality standards; CO = carbon monoxide; ROG = reactive organic gases; lbs = pounds; NAAQS = national ambient air quality standards; NO_X = nitrogen oxides; PM10 = particulate matter that is 10 microns in diameter and smaller; PM2.5 = particulate matter that is 2.5 microns in diameter and smaller; SJVAPCD = San Joaquin Valley Air Pollution Control District; SO_2 = sulfur dioxide; PFIY = preliminary field investigation year; CY = construction year.

[a] Emissions results include implementation of air quality Environmental Commitments EC-7 and EC-9 through EC-12. Exceedances of SJVAPCD's thresholds are shown in **bolded underline**.

[b] Presents the average emissions estimate during a single day of construction in each year. Average emissions are presented in SJVAPCD (rather than maximum emissions), consistent with (San Joaquin Valley Air Pollution Control District 2018a:3) guidance for correct application of its 100-pound-per-day AAQA screening criteria.

[c] Total PM10 and PM2.5 emissions consist of exhaust and fugitive dust emissions. Annual and daily values for exhaust and dust may not add to the totals in the total column because of rounding.

[d] Presents emissions only during the 3 project construction years in which construction of compensatory mitigation sites would occur.

[e] The 100-pound-per-day threshold is a screening-level threshold to help determine whether increased emissions from a project would cause or contribute to a violation of the CAAQS or NAAQS. Projects with emissions below the threshold would not be in violation of the CAAQS or NAAQS. Projects with emissions above the threshold would require an AAQA to confirm this conclusion (San Joaquin Valley Air Pollution Control District 2015a:93). In developing the annual thresholds, SJVAPCD considered levels at which project emissions are cumulatively considerable. Consequently, exceedances of project-level thresholds would be cumulatively considerable.

The amount of construction equipment and vehicles, and thus construction exhaust emissions (e.g., ROG, NO_X) would be greatest under Alternatives 2a and 4a. This is reflected in Tables 23-25 through 23-33. Compared to other alternatives, Alternatives 2a and 4a require more equipment and vehicles in the SJVAPCD because of the larger proposed tunnel and additional RTM that would be extracted and moved at the Bouldin Island or Lower Roberts Island shaft locations. While Alternatives 2a and 4a would generate greater amounts of combustion pollutants, fugitive dust emissions in the SJVAPCD would be highest under Alternative 5. This is because under Alternative 5, two launch shafts would be constructed at Lower Roberts Island, effectively doubling the amount of earthmoving and vehicles traveling on unpaved surfaces at this location, compared to all other project alternatives.

Even with incorporation of environmental commitments, construction of all alternatives would result in an impact on regional air quality because NO_X (ozone precursor) emissions would exceed SJVAPCD's annual threshold. Construction of Alternative 5 would also generate PM10 emissions above SJVAPCD's annual threshold. SJVAPCD's annual thresholds were established to prevent emissions from new projects in the SJVAB from contributing to violations of the CAAQS or NAAQS. Because construction emissions of NO_X and PM10 would exceed these thresholds, the project would contribute to regional air pollution within the SJVAB. Construction of the project may also conflict with the *2018 Plan for the 1997, 2006, and 2012 PM2.5 Standards, 2016 Plan for the 2008 8-Hour Ozone Standard*, *2013 Plan for the Revoked 1-Hour Ozone Standard, 2007 Ozone Plan*, and *2007 PM10 Maintenance Plan and Request for Redesignation*, which were adopted to achieve regional attainment with the ambient air quality standards (San Joaquin Valley Air Pollution Control District 2007a, 2007b, 2013, 2016, 2018b).

The greatest annual NO_X emissions generally occur between construction years 5 and 10, mainly because of concurrent activities required for tunnel and shaft construction. The intensity of combustion emissions would decline after construction year 10 once heavy earthmoving and other equipment-intensive activities are complete. Fugitive dust emissions are strongly influenced by vehicle activity on unpaved surfaces and wind erosion of stockpiled materials. Because the heights of on-site stockpiles increase as more material is added, the greatest intensity of windblown dust emissions is estimated to occur between construction years 10 and 12. Once the stockpiles are no longer actively used and are covered or revegetated, windblown dust emissions would cease. The increasing heights of the stockpiles over time, coupled with vehicles traveling on unpaved surfaces to move material, contributes to fugitive dust emissions peaking later in the construction schedule.

As shown in Tables 23-24 through 23-32, construction emissions would also exceed the SJVAPCD's daily AAQA screening trigger for NO_X, CO, and PM10, depending on the alternative. Localized air quality and public health impacts from these pollutants are evaluated based on the air dispersion modeling of ambient air concentrations. Impact AQ-5: *Result in Exposure of Sensitive Receptors to Substantial Localized Criteria Pollutant Emissions* discusses the conclusions of the modeled ambient air concentrations.

Operations and Maintenance

O&M would be conducted daily or at varying frequencies, depending on the type of activity. Daily maintenance activities include inspections, security checks, and operations oversight. Less frequent maintenance activities include operability testing, cleaning, sediment removal, dewatering, and repaving. Table 23-33 summarizes O&M emissions from the proposed project and alternatives that would be generated in SJVAPCD in pounds per day and tons per year. Emissions were quantified under 2020 conditions to define baseline conditions, although the project would not be fully operational until around 2040. Based on current information, it is projected that the emissions intensity of equipment and vehicle operation in 2040 would be lower than under 2020 conditions because of improvements in engine technology and regulations to reduce combustion emissions (see Appendix 23F, *Air Quality and Greenhouse Gases 2040 Analysis*). Accordingly, the emissions estimates presented in Table 23-33 are based on a conservative representation of emissions.

As shown in Table 23-33, O&M activities in SJVAPCD would not exceed SJVAPCD's thresholds. O&M emissions are expected to be comparable among all project alternatives, with Alternative 5 resulting in slightly more emissions than other alternatives because of additional activity required to maintain the double launch shaft at Lower Roberts Island.

CEQA Conclusion—All Project Alternatives

The impact would be significant under CEQA for all project alternatives because construction could result in an exceedance of SJVAPCD's annual NO_X threshold before mitigation. Construction of Alternative 5 would also exceed SJVAPCD's annual PM10 threshold before mitigation. No other thresholds would be exceeded during construction. O&M activities likewise would not result in criteria pollutant or precursor emissions above SJVAPCD's numeric thresholds.

Impacts associated with fugitive dust emissions would be minimized through implementation of a dust control plan (Environmental Commitment EC-11: *Fugitive Dust Control*) and BMPs at new concrete batch plants (Environmental Commitment EC-12: *On-Site Concrete Batching Plants*). Exhaust-related pollutants would be reduced through use of renewable diesel, Tier 4 diesel engines, newer on-road and marine engines, and other BMPs, as required by Environmental Commitments EC-7: *Off-Road Heavy-Duty Engines* through EC-10: *Marine Vessels* and EC-13: *DWR Best Management Practices to Reduce GHG Emissions*. These environmental commitments would minimize air quality impacts through application of best available on-site controls to reduce construction emissions; however, even with these commitments, exceedances of SJVAPCD's thresholds would occur, and the project would contribute a significant level of regional ROG, NO_X, and particulate matter pollution within the SJVAB.

DWR would implement Mitigation Measure AQ-2: *Offset Construction-Generated Criteria Pollutants in the San Joaquin Valley Air Basin* to offset NO_X and PM10 emissions to below SJVAPCD's annual thresholds. Because SJVAPCD's thresholds were established to prevent emissions from new projects in the SJVAB from contributing to CAAQS or NAAQS violations, mitigating emissions below the threshold levels would avoid potential conflicts with the ambient air quality plans and ensure that project construction would not contribute a significant level of air pollution such that regional air quality within the SJVAB would be degraded. Accordingly, the impact would be less than significant with mitigation.

Table 23-33. Criteria Pollutant and Precursor Emissions from O&M Activities in the San Joaquin Valley Air Pollution Control District

	Average Daily Emissions (lbs/day) [a]										Annual Emissions (tons/year) [a]									
				PM10			PM2.5							PM10			PM2.5			
Alternative	ROG	NO_X	CO	Exhaust	Dust	Total [b]	Exhaust	Dust	Total [b]	SO_2	ROG	NO_X	CO	Exhaust	Dust	Total [b]	Exhaust	Dust	Total [b]	SO_2
1	1	1	7	<1	<1	<1	<1	<1	<1	<1	<1	<1	1	<1	<1	<1	<1	<1	<1	<1
2a	1	1	7	<1	<1	<1	<1	<1	<1	<1	<1	<1	1	<1	<1	<1	<1	<1	<1	<1
2b	1	1	7	<1	<1	<1	<1	<1	<1	<1	<1	<1	1	<1	<1	<1	<1	<1	<1	<1
2c	1	1	7	<1	<1	<1	<1	<1	<1	<1	<1	<1	1	<1	<1	<1	<1	<1	<1	<1
3	1	1	8	<1	<1	<1	<1	<1	<1	<1	<1	<1	1	<1	<1	<1	<1	<1	<1	<1
4a	1	1	8	<1	<1	<1	<1	<1	<1	<1	<1	<1	1	<1	<1	<1	<1	<1	<1	<1
4b	1	1	8	<1	<1	<1	<1	<1	<1	<1	<1	<1	1	<1	<1	<1	<1	<1	<1	<1
4c	1	1	8	<1	<1	<1	<1	<1	<1	<1	<1	<1	1	<1	<1	<1	<1	<1	<1	<1
5	1	1	9	<1	<1	<1	<1	<1	<1	<1	<1	<1	2	<1	<1	<1	<1	<1	<1	<1
Threshold [c]	*100*	*100*	*100*	–	–	*100*	–	–	*100*	*100*	*10*	*10*	*100*	–	–	*15*	–	–	*15*	*27*

CO = carbon monoxide; lbs = pounds; NO_X = nitrogen oxides; PM10 = particulate matter that is 10 microns in diameter and smaller; PM2.5 = particulate matter that is 2.5 microns in diameter and smaller; ROG = reactive organic gases; SJVAPCD = San Joaquin Valley Air Pollution Control District; SO_X = sulfur oxide.

[a] The annual estimates include emissions from all monthly, quarterly, semiannual, and annual activities and conservatively assume all long-term activities would occur in that same year. The daily estimates are average daily based on the annual values occurring over 365 days per year.

[b] Total PM10 and PM2.5 emissions consist of exhaust and fugitive dust emissions. Annual values for exhaust and dust may not add to the totals in the total column because of rounding. Daily results for exhaust and dust may not add to the totals in the total column because the table presents maximum emissions results for each individual pollutant component. For example, the maximum PM exhaust emissions may not occur on the same day as the maximum total dust emissions.

[c] In developing these thresholds, the SJVAPCD considered levels at which project emissions are cumulatively considerable. Consequently, exceedances of project-level thresholds would be cumulatively considerable.

Mitigation Measure AQ-2: Offset Construction-Generated Criteria Pollutants in the San Joaquin Valley Air Basin

Performance Standard

Prior to issuance of construction contracts, DWR will enter into a Voluntary Emissions Reduction Agreement (VERA) with the SJVAPCD or develop an alternative or complementary mitigation program (as discussed below) to reduce NO_X and PM10. Emissions above the federal *de minimis* thresholds[10] will be reduced to net zero (0). Emissions not above the *de minimis* thresholds, but above SJVAPCD's thresholds, will be reduced to quantities below the air district's thresholds.

Emissions generated by project construction have been quantified as part of this Draft EIR. Although this inventory could be used exclusively to inform the required mitigation commitment, the methods used to quantify emissions in the Draft EIR were conservative. They also do not account for any additional reductions that may be achieved by future state and federal regulations that reduce the emissions intensity of equipment and vehicles, nor do they account for reduction strategies that may be implemented by DWR pursuant to other mitigation measures (e.g., Mitigation Measure AQ-9). Accordingly, this Draft EIR likely overestimates actual emissions that would be generated by construction of the project. DWR may, therefore, reanalyze criteria pollutant emissions from construction of the project to update the required reduction commitment to achieve performance standard.

An updated emissions analysis conducted for the project will be performed using approved emissions models and methods available at the time of the reanalysis. The analysis must use the latest available engineering data for the project, inclusive of any required environmental commitments or emissions reduction strategies. Consistent with the methodology used in this Draft EIR, emissions factors may account for enacted regulations that will influence future year emissions intensities (e.g., fuel efficiency standards for on-road vehicles).

Mitigation Agreement with SJVAPCD

1. DWR will enter into a VERA with the SJVAPCD to reduce NO_X and PM10 according to the performance standard described above.
    a. The mitigation offset fee amount will be determined at the time of mitigation to fund one or more emissions reduction projects within the SJVAB (or in a nearby area of equal or higher nonattainment classification, as allowed under 40 CFR 93.158(2)). SJVAPCD will require an additional administrative fee of no less than 4% of the total offset fee. The mitigation offset fee will be determined by DWR and SJVAPCD based on the type of projects available at the time of mitigation. This fee is intended to fund emissions reduction projects to achieve reductions. Documentation showing receipt of payment will be provided to DWR or its designated representative.
    b. The VERA will include details regarding the annual calculation of required offsets DWR must achieve, funds to be paid, administrative fee, and the timing of the emissions reduction projects. SJVAPCD's VERA is implemented through District Incentive

[10] Federal *de minimis* thresholds are triggered if the project is subject to general conformity.

Programs, which fund grants and projects to achieve emissions reductions in the SJVAB. Example programs funded through the VERA include the following.

- On-Road Truck Voucher Program
- Burn Clean Program
- Heavy Duty Engine Program
- Cordless Zero-Emission Commercial Lawn & Garden Equipment Demonstration Program
- Statewide School Bus Retrofit Program

c. Acceptance of the offset fee by SJVAPCD will serve as an acknowledgment and commitment by SJVAPCD to: (1) implement an emissions reduction project(s) within a timeframe to be determined based on the type of project(s) selected after receipt of the mitigation fee designed to achieve the emissions reduction objectives; and (2) provide documentation to DWR or its designated representative describing the project(s) funded by the mitigation fee, including the amount of emissions reduced (tons per year) from the emissions reduction project(s). To qualify under this mitigation measure, the specific emissions reduction project(s) must result in emissions reductions in the SJVAB (or in a nearby area of equal or higher nonattainment classification, as allowed under 40 CFR 93.158(2)) that are real, surplus, quantifiable, enforceable, and will not otherwise be achieved through compliance with existing regulatory requirements or any other legal requirement. Funding will need to be received prior to contracting with participants and should allow enough time to receive and process applications to fund and implement off-site reduction projects prior to commencement of the project activities that are being offset. This will roughly equate to 1 year prior to the required mitigation; additional lead time may be necessary depending on the level of off-site emissions reductions required for a specific year.

Alternative or Complementary Mitigation Program

Should DWR be unable to enter what they regard as a satisfactory agreement with SJVAPCD, or should DWR enter an agreement with SJVAPCD but find themselves unable to meet the performance standards established above, DWR will develop an alternative or complementary off-site mitigation program to reduce NO_X and PM10 emissions according to the performance standard described above.

DWR will establish a program to fund emissions reduction projects through grants, ERCs, or similar mechanisms. DWR may identify emissions reduction projects through consultation with SJVAPCD, other regional air districts, CARB, CEC, local governments, transit agencies, or others, as needed. Potential projects could include but are not limited to the following.

- Alternative fuel, low-emissions school buses, transit buses, and other vehicles.
- Diesel engine retrofits and repowers.
- Locomotive retrofits and repowers.
- Electric vehicle or lawn equipment rebates.
- Electric vehicle charging stations and plug-ins.

- Video-teleconferencing systems for local businesses.
- Telecommuting start-up costs for local businesses.

As part of its alternative or complementary off-site mitigation program, DWR will develop pollutant-specific formulas to monetize, calculate, and achieve emissions reductions in a cost-effective manner. Payments can be allocated to emissions reductions projects in a grant-like manner. DWR will document the fee schedule basis, such as consistency with the CARB's Carl Moyer Program cost-effectiveness limits and capital recovery factors.

DWR will conduct annual reporting to verify and document that emissions reductions projects achieve a 1:1 reduction with construction emissions to ensure claimed offsets meet the required performance standard. Each report should describe the projects that were funded over the prior year, identify emissions reduction realized by the funded projects, document compliance with mitigation requirements, and identify corrective actions (if any) needed to ensure the offsetting program achieves the performance standards for NOx and PM10. DWR will retain a third-party expert to assist with its review and approval of the annual reports. Annual reports will be finalized and posted on DWR's website by December 31 of the following year.

Mitigation Impacts

<u>*Compensatory Mitigation*</u>

Although the Compensatory Mitigation Plan described in Appendix 3F, *Compensatory Mitigation Plan for Special-Status Species and Aquatic Resources,* does not act as mitigation for criteria pollutant emissions from project construction or operations, its implementation could result in regional air quality impacts.

Within SJVAPCD, actions undertaken for compensatory mitigation would restore wetland, open-water, and upland communities on Bouldin Island and restore freshwater marsh along I-5. The restoration of channel margin and tidal habitat would be within the North Delta Arc and is not expected to occur in the SJVAPCD. The types of construction activities and equipment needed for the habitat restoration along I-5 and on Bouldin Island are similar to what would be required for construction of the project, although they would be of substantially lesser magnitude. Table 23-34 summarizes emissions that would be generated in the SJVAPCD in pounds per day and tons per year by compensatory mitigation restoration activities, which are expected to occur in construction years 1 through 3. The emissions estimates include implementation of air quality environmental commitments.

As shown in Table 23-34, construction activities required to implement compensatory mitigation would not result in an impact on regional air quality because emissions would not exceed SJVAPCD's annual thresholds. Construction emissions likewise would not exceed SJVAPCD's daily AAQA screening trigger. Because emissions would not exceed SJVAPCD's thresholds, construction of the compensatory mitigation sites in SJVAPCD would not worsen existing regional air quality or conflict with adopted ambient air quality attainment plans. Therefore, the project alternatives combined with compensatory mitigation would not change the overall construction impact conclusion of less than significant with mitigation.

Following restoration, future site visits requiring vehicle trips, such as biological monitoring, would likely occur a few times per year. These activities required to monitor and maintain the compensatory mitigation sites would be less frequent and intense than current on-site agricultural practices. Accordingly, maintenance of the compensatory mitigation sites would not result in exceedances of SJVAPCD's thresholds. Therefore, the project alternatives combined with compensatory mitigation would not change the overall O&M impact conclusion of less than significant.

Table 23-34. Criteria Pollutant and Precursor Emissions from Construction of Compensatory Mitigation Sites in the San Joaquin Valley Air Pollution Control District [a]

	Average Daily Emissions (lbs/day) [b]										Annual Emissions (tons/year)									
				PM10			PM2.5							PM10			PM2.5			
Year	ROG	NO_X	CO	Exhaust	Dust	Total [c]	Exhaust	Dust	Total [c]	SO_2	ROG	NO_X	CO	Exhaust	Dust	Total [c]	Exhaust	Dust	Total [c]	SO_2
Compensatory Mitigation																				
CY 1	2	13	56	<1	11	11	<1	1	1	<1	<1	2	7	<1	1	1	<1	<1	<1	<1
CY 2	2	10	73	<1	11	11	<1	1	1	<1	<1	1	9	<1	1	1	<1	<1	<1	<1
CY 3	<1	<1	<1	<1	1	1	<1	<1	<1	<1	<1	<1	1	<1	<1	<1	<1	<1	<1	<1
Threshold [d]	*100*	*100*	*100*	–	–	*100*	–	–	*100*	*100*	*10*	*10*	*100*	–	–	*15*	–	–	*15*	*27*

AAQA = ambient air quality analysis; CAAQS = California ambient air quality standards; CO = carbon monoxide; ROG = reactive organic gases; lbs = pounds; NAAQS = national ambient air quality standards; NO_X = nitrogen oxides; PM10 = particulate matter that is 10 microns in diameter and smaller; PM2.5 = particulate matter that is 2.5 microns in diameter and smaller; SJVAPCD = San Joaquin Valley Air Pollution Control District; SO_2 = sulfur dioxide; CY = construction year.

[a] Emissions results include implementation of air quality Environmental Commitments EC-7 and EC-9 through EC-12.

[b] Presents the average emissions estimate during a single day of construction in each year. Average emissions are presented in SJVAPCD (rather than maximum emissions), consistent with (San Joaquin Valley Air Pollution Control District 2018a:3) guidance for correct application of its 100-pound-per-day AAQA screening criteria.

[c] Total PM10 and PM2.5 emissions consist of exhaust and fugitive dust emissions. Annual and daily values for exhaust and dust may not add to the totals in the total column because of rounding.

[d] The 100-pound-per-day threshold is a screening-level threshold to help determine whether increased emissions from a project would cause or contribute to a violation of the CAAQS or NAAQS. Projects with emissions below the threshold would not be in violation of the CAAQS or NAAQS. Projects with emissions above the threshold would require an AAQA to confirm this conclusion (San Joaquin Valley Air Pollution Control District 2015a:93). In developing the annual thresholds, SJVAPCD considered levels at which project emissions are cumulatively considerable. Consequently, exceedances of project-level thresholds would be cumulatively considerable.

Other Mitigation Measures

Some mitigation measures would result in construction equipment exhaust, haul truck exhaust, employee vehicle exhaust, and dust from grading, clearing, excavation, and landscaping activities that would temporarily generate criteria air pollutant emissions and potentially affect regional air quality in the SJVAPCD. The mitigation measures with potential to result in impacts on regional air quality are: Mitigation Measures BIO-2c: *Electrical Power Line Support Placement*; SOILS-2: *Prepare and Implement Topsoil Salvage, Handling, Stockpiling and Reapplication Plans*; AG-3: *Replacement or Relocation of Affected Infrastructure Supporting Agricultural Properties*; AES-1c: *Implement Best Management Practices to Implement Project Landscaping Plan*; CUL-1: *Prepare and Implement a Built-Environment Treatment Plan in Consultation with Interested Parties*; and CUL-2: *Conduct a Survey of Inaccessible Properties to Assess Eligibility, Determine if These Properties Will Be Adversely Affected by the Project, and Develop Treatment to Resolve or Mitigate Adverse Impacts*. Temporary impacts on regional air quality resulting from implementation of mitigation measures would be similar to construction effects of the project alternatives, but of a much lesser magnitude. Environmental Commitments EC-7: *Off-Road Heavy-Duty Engines,* EC-8: *On-Road Haul Trucks*, EC-9: *On-Site Locomotives*, EC-10: *Marine Vessels*, and EC-13: *DWR Best Management Practices to Reduce GHG Emissions* would reduce construction equipment and vehicle exhaust emissions generate from implementation of mitigation measures. Environmental Commitments EC-11: *Fugitive Dust Control* and EC-12: *On-Site Site Concrete Batching Plants* are available to reduce fugitive dust. Mitigation Measure AQ-2: *Offset Construction-Generated Criteria Pollutants in the San Joaquin Valley Air Basin* would offset any remaining emissions above SJVAPCD thresholds and would reduce the severity of any potential air quality effects. Therefore, implementation of other mitigation measures is unlikely to result in regional air quality impacts in SJVAPCD and would be less than significant with mitigation.

Overall, impacts on regional air quality in the SJVAPCD from implementation of compensatory mitigation and other mitigation measures, combined with project alternatives, would not change the less than significant with mitigation impact conclusion.

Impact AQ-3: Result in Impacts on Regional Air Quality within the Bay Area Air Quality Management District

All Project Alternatives

Project Construction

The predominant pollutants associated with project construction in the BAAQMD are fugitive dust (PM10 and PM2.5) from earthmoving activities. Combustion pollutants, particularly ozone precursors, would also be generated by heavy equipment and vehicles. Emissions vary substantially depending on the level of activity, length of the construction period, specific construction operations, types of equipment, number of personnel, wind and precipitation conditions, and soil moisture content.

Tables 23-35 through 23-43 summarize construction emissions that would be generated in the BAAQMD in pounds per day and tons per year by each alternative. There would be no construction activities related to compensatory mitigation sites. The emissions estimates include implementation of quantifiable air quality environmental commitments.

Table 23-35. Criteria Pollutant and Precursor Emissions from Construction of Alternative 1 in the Bay Area Air Quality Management District [a]

	Maximum Daily Emissions (lbs/day) [b]										Annual Emissions (tons/year)									
				PM10			PM2.5							PM10			PM2.5			
Year	ROG	NO_X	CO	Exhaust	Dust	Total [c]	Exhaust	Dust	Total [c]	SO_2	ROG	NO_X	CO	Exhaust	Dust	Total [c]	Exhaust	Dust	Total [c]	SO_2
Alternative 1																				
PFIY 1	25	**170**	219	7	8	14	6	2	8	<1	<1	1	4	<1	<1	<1	<1	<1	<1	<1
PFIY 2	25	**170**	219	7	8	14	6	2	8	<1	<1	1	4	<1	<1	<1	<1	<1	<1	<1
CY 1	11	24	67	<1	139	139	<1	16	17	<1	<1	1	4	<1	2	2	<1	<1	<1	<1
CY 2	13	**66**	510	2	51	51	2	6	7	1	1	5	32	<1	1	1	<1	<1	<1	<1
CY 3	15	**109**	585	2	434	435	2	51	52	1	1	11	39	<1	15	15	<1	2	2	<1
CY 4	13	**102**	456	2	386	387	2	48	50	1	1	11	25	<1	19	19	<1	3	3	<1
CY 5	33	**186**	959	4	375	379	4	62	66	2	3	19	100	<1	15	15	<1	4	4	<1
CY 6	25	**178**	888	4	439	442	4	64	68	2	3	19	86	<1	20	21	<1	4	4	<1
CY 7	19	**183**	629	3	362	365	3	49	52	2	2	19	75	<1	49	50	<1	8	8	<1
CY 8	14	**110**	463	2	146	148	2	23	25	1	2	14	56	<1	62	62	<1	10	10	<1
CY 9	17	**226**	557	3	391	393	3	50	52	1	2	22	64	<1	69	70	<1	11	11	<1
CY 10	17	**266**	547	3	425	428	3	55	58	2	2	18	50	<1	87	87	<1	13	13	<1
CY 11	11	**140**	371	2	327	328	2	41	43	1	1	9	29	<1	77	78	<1	12	12	<1
CY 12	16	25	144	<1	13	14	<1	3	3	<1	<1	<1	2	<1	<1	<1	<1	<1	<1	<1
CY 13	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CY 14	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Threshold [d]	*54*	*54*	–	*82*	*BMPs [e]*	–	*82*	*BMPs [e]*	–	–	–	–	–	–	–	–	–	–	–	–

BAAQMD = Bay Area Air Quality Management District; BMPs = best management practices; CO = carbon monoxide; lbs = pounds; NO_X = nitrogen oxides; PM10 = particulate matter that is 10 microns in diameter and smaller; PM2.5 = particulate matter that is 2.5 microns in diameter and smaller; ROG = reactive organic gases; SO_2 = sulfur dioxide; PFIY = preliminary field investigation year; CY = construction year.

[a] Emissions results include implementation of air quality Environmental Commitments EC-7 and EC-9 through EC-12. Exceedances of BAAQMD's thresholds are shown in **bolded underline**.

[b] Presents the highest emissions estimate during a single day of construction in each year, based on concurrent construction activities.

[c] Total PM10 and PM2.5 emissions consist of exhaust and fugitive dust emissions. Annual values for exhaust and dust may not add to the totals in the total column because of rounding. Daily results for exhaust and dust may not add to the totals in the total column because the table presents maximum emissions results for each individual pollutant component. For example, the maximum PM exhaust emissions may not occur on the same day as the maximum total dust emissions.

[d] In developing these thresholds, BAAQMD considered levels at which project emissions are cumulatively considerable. Consequently, exceedances of project-level thresholds would be cumulatively considerable.

[e] BAAQMD considers PM dust impacts to be less than significant with implementation of BMPs.

Table 23-36. Criteria Pollutant and Precursor Emissions from Construction of Alternative 2a in the Bay Area Air Quality Management District [a]

	Maximum Daily Emissions (lbs/day) [b]										Annual Emissions (tons/year)									
				PM10			PM2.5							PM10			PM2.5			
Year	ROG	NO_X	CO	Exhaust	Dust	Total [c]	Exhaust	Dust	Total [c]	SO_2	ROG	NO_X	CO	Exhaust	Dust	Total [c]	Exhaust	Dust	Total [c]	SO_2
Alternative 2a																				
PFIY 1	25	**170**	219	7	8	14	6	2	8	<1	<1	1	5	<1	<1	<1	<1	<1	<1	<1
PFIY 2	25	**170**	219	7	8	14	6	2	8	<1	<1	1	5	<1	<1	<1	<1	<1	<1	<1
CY 1	9	23	62	<1	50	51	<1	7	8	<1	<1	1	4	<1	2	2	<1	<1	<1	<1
CY 2	40	**91**	606	2	28	29	2	5	7	2	1	5	35	<1	1	1	<1	<1	<1	<1
CY 3	17	**94**	649	2	115	116	2	19	20	1	1	9	44	<1	10	10	<1	2	2	<1
CY 4	14	**100**	507	2	130	132	2	21	23	1	1	7	24	<1	12	12	<1	2	2	<1
CY 5	39	**238**	1200	4	363	367	4	58	62	3	3	24	121	<1	30	31	<1	5	6	<1
CY 6	33	**244**	1162	4	407	412	4	65	70	3	3	22	110	<1	30	30	<1	5	6	<1
CY 7	20	**194**	681	3	380	383	3	62	65	2	2	20	81	<1	45	45	<1	7	7	<1
CY 8	16	**110**	522	2	336	338	2	54	56	1	2	13	61	<1	54	54	<1	8	9	<1
CY 9	20	**279**	649	3	452	455	3	72	75	2	2	25	76	<1	62	63	<1	10	10	<1
CY 10	20	**283**	656	4	531	534	4	79	82	2	2	27	71	<1	74	75	<1	11	12	<1
CY 11	16	**238**	498	3	535	538	3	78	81	1	1	19	43	<1	75	75	<1	11	11	<1
CY 12	12	36	142	1	48	49	1	8	9	<1	<1	1	4	<1	1	1	<1	<1	<1	<1
CY 13	<1	3	14	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
CY 14	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Threshold [d]	*54*	*54*	–	*82*	*BMPs* [e]	–	*82*	*BMPs* [e]	–	–	–	–	–	–	–	–	–	–	–	–

BAAQMD = Bay Area Air Quality Management District; BMPs = best management practices; CO = carbon monoxide; lbs = pounds; NO_X = nitrogen oxides; PM10 = particulate matter that is 10 microns in diameter and smaller; PM2.5 = particulate matter that is 2.5 microns in diameter and smaller; ROG = reactive organic gases; SO_2 = sulfur dioxide; PFIY = preliminary field investigation year; CY = construction year.

[a] Emissions results include implementation of air quality Environmental Commitments EC-7 and EC-9 through EC-12. Exceedances of BAAQMD's thresholds are shown in **bolded underline**.

[b] Presents the highest emissions estimate during a single day of construction in each year, based on concurrent construction activities.

[c] Total PM10 and PM2.5 emissions consist of exhaust and fugitive dust emissions. Annual values for exhaust and dust may not add to the totals in the total column because of rounding. Daily results for exhaust and dust may not add to the totals in the total column because the table presents maximum emissions results for each individual pollutant component. For example, the maximum PM exhaust emissions may not occur on the same day as the maximum total dust emissions.

[d] In developing these thresholds, BAAQMD considered levels at which project emissions are cumulatively considerable. Consequently, exceedances of project-level thresholds would be cumulatively considerable.

[e] BAAQMD considers PM dust impacts to be less than significant with implementation of BMPs.

Table 23-37. Criteria Pollutant and Precursor Emissions from Construction of Alternative 2b in the Bay Area Air Quality Management District [a]

	Maximum Daily Emissions (lbs/day) [b]										Annual Emissions (tons/year)									
				PM10			PM2.5							PM10			PM2.5			
Year	ROG	NO_X	CO	Exhaust	Dust	Total [c]	Exhaust	Dust	Total [c]	SO_2	ROG	NO_X	CO	Exhaust	Dust	Total [c]	Exhaust	Dust	Total [c]	SO_2
Alternative 2b																				
PFIY 1	25	**170**	219	7	8	14	6	2	8	<1	<1	1	4	<1	<1	<1	<1	<1	<1	<1
PFIY 2	25	**170**	219	7	8	14	6	2	8	<1	<1	1	4	<1	<1	<1	<1	<1	<1	<1
CY 1	9	22	58	<1	49	50	<1	7	7	<1	<1	1	4	<1	2	2	<1	<1	<1	<1
CY 2	41	**160**	694	3	188	191	3	27	30	2	1	7	41	<1	4	4	<1	1	1	<1
CY 3	19	**159**	695	3	189	192	3	27	30	2	1	14	41	<1	21	22	<1	3	3	<1
CY 4	22	**156**	772	3	179	181	3	28	30	2	2	15	57	<1	17	17	<1	3	3	<1
CY 5	33	**196**	926	4	253	256	4	49	53	2	3	22	104	<1	22	23	<1	5	5	<1
CY 6	24	**180**	854	3	315	318	3	60	63	2	3	20	89	<1	35	36	<1	6	7	<1
CY 7	18	**173**	610	3	360	362	3	58	61	2	2	19	73	<1	49	50	<1	8	8	<1
CY 8	14	**107**	458	2	296	298	2	48	50	1	2	13	54	<1	47	47	<1	7	8	<1
CY 9	17	**213**	561	3	481	484	3	74	76	1	2	23	69	<1	71	71	<1	11	11	<1
CY 10	16	**224**	513	3	503	505	3	75	78	1	1	13	30	<1	75	76	<1	11	11	<1
CY 11	4	47	137	1	471	472	1	70	71	<1	<1	2	8	<1	75	75	<1	11	11	<1
CY 12	12	11	46	<1	5	5	<1	1	2	<1	<1	<1	1	<1	<1	<1	<1	<1	<1	<1
CY 13	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CY 14	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Threshold [d]	*54*	*54*	–	*82*	*BMPs* [e]	–	*82*	*BMPs* [e]	–	–	–	–	–	–	–	–	–	–	–	–

BAAQMD = Bay Area Air Quality Management District; BMPs = best management practices; CO = carbon monoxide; lbs = pounds; NO_X = nitrogen oxides; PM10 = particulate matter that is 10 microns in diameter and smaller; PM2.5 = particulate matter that is 2.5 microns in diameter and smaller; ROG = reactive organic gases; SO_2 = sulfur dioxide; PFIY = preliminary field investigation year; CY = construction year.

[a] Emissions results include implementation of air quality Environmental Commitments EC-7 and EC-9 through EC-12. Exceedances of BAAQMD's thresholds are shown in **bolded underline**.

[b] Presents the highest emissions estimate during a single day of construction in each year, based on concurrent construction activities.

[c] Total PM10 and PM2.5 emissions consist of exhaust and fugitive dust emissions. Annual values for exhaust and dust may not add to the totals in the total column because of rounding. Daily results for exhaust and dust may not add to the totals in the total column because the table presents maximum emissions results for each individual pollutant component. For example, the maximum PM exhaust emissions may not occur on the same day as the maximum total dust emissions.

[d] In developing these thresholds, BAAQMD considered levels at which project emissions are cumulatively considerable. Consequently, exceedances of project-level thresholds would be cumulatively considerable.

[e] BAAQMD considers PM dust impacts to be less than significant with implementation of BMPs.

Table 23-38. Criteria Pollutant and Precursor Emissions from Construction of Alternative 2c in the Bay Area Air Quality Management District [a]

	Maximum Daily Emissions (lbs/day) [b]										Annual Emissions (tons/year)									
				PM10			PM2.5							PM10			PM2.5			
Year	ROG	NO_X	CO	Exhaust	Dust	Total [c]	Exhaust	Dust	Total [c]	SO_2	ROG	NO_X	CO	Exhaust	Dust	Total [c]	Exhaust	Dust	Total [c]	SO_2
Alternative 2c																				
PFIY 1	25	**170**	219	7	8	14	6	2	8	<1	<1	1	4	<1	<1	<1	<1	<1	<1	<1
PFIY 2	25	**170**	219	7	8	14	6	2	8	<1	<1	1	4	<1	<1	<1	<1	<1	<1	<1
CY 1	9	23	62	<1	50	51	<1	7	8	<1	<1	1	4	<1	2	2	<1	<1	<1	<1
CY 2	31	**66**	514	2	64	66	2	12	13	1	1	5	35	<1	1	1	<1	<1	<1	<1
CY 3	13	**67**	514	2	102	103	2	18	19	1	1	8	34	<1	8	9	<1	1	2	<1
CY 4	13	**91**	466	2	121	122	2	20	21	1	1	6	23	<1	10	10	<1	2	2	<1
CY 5	33	**187**	974	4	296	299	4	55	58	2	3	20	100	<1	25	26	<1	5	5	<1
CY 6	24	**172**	855	3	296	299	3	55	58	2	2	17	84	<1	23	24	<1	4	5	<1
CY 7	18	**159**	616	2	393	395	2	63	65	1	2	17	73	<1	53	53	<1	8	9	<1
CY 8	14	**98**	460	2	315	316	2	51	52	1	2	12	56	<1	49	49	<1	8	8	<1
CY 9	15	**160**	514	2	480	482	2	73	75	1	2	17	61	<1	70	71	<1	11	11	<1
CY 10	16	**216**	550	3	525	527	3	80	83	1	2	19	48	<1	78	78	<1	12	12	<1
CY 11	10	**174**	312	2	492	494	2	72	75	1	1	12	24	<1	77	77	<1	12	12	<1
CY 12	12	18	85	<1	9	9	<1	2	2	<1	<1	<1	1	<1	<1	<1	<1	<1	<1	<1
CY 13	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CY 14	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Threshold [d]	*54*	*54*	–	*82*	*BMPs [e]*	–	*82*	*BMPs [e]*	–	–	–	–	–	–	–	–	–	–	–	–

BAAQMD = Bay Area Air Quality Management District; BMPs = best management practices; CO = carbon monoxide; lbs = pounds; NO_X = nitrogen oxides; PM10 = particulate matter that is 10 microns in diameter and smaller; PM2.5 = particulate matter that is 2.5 microns in diameter and smaller; ROG = reactive organic gases; SO_2 = sulfur dioxide; PFIY = preliminary field investigation year; CY = construction year.

[a] Emissions results include implementation of air quality Environmental Commitments EC-7 and EC-9 through EC-12. Exceedances of BAAQMD's thresholds are shown in **bolded underline**.

[b] Presents the highest emissions estimate during a single day of construction in each year, based on concurrent construction activities.

[c] Total PM10 and PM2.5 emissions consist of exhaust and fugitive dust emissions. Annual values for exhaust and dust may not add to the totals in the total column because of rounding. Daily results for exhaust and dust may not add to the totals in the total column because the table presents maximum emissions results for each individual pollutant component. For example, the maximum PM exhaust emissions may not occur on the same day as the maximum total dust emissions.

[d] In developing these thresholds, BAAQMD considered levels at which project emissions are cumulatively considerable. Consequently, exceedances of project-level thresholds would be cumulatively considerable.

[e] BAAQMD considers PM dust impacts to be less than significant with implementation of BMPs.

Table 23-39. Criteria Pollutant and Precursor Emissions from Construction of Alternative 3 in the Bay Area Air Quality Management District [a]

	Maximum Daily Emissions (lbs/day) [b]										Annual Emissions (tons/year)									
				PM10			PM2.5							PM10			PM2.5			
Year	ROG	NO_X	CO	Exhaust	Dust	Total [c]	Exhaust	Dust	Total [c]	SO_2	ROG	NO_X	CO	Exhaust	Dust	Total [c]	Exhaust	Dust	Total [c]	SO_2
Alternative 3																				
PFIY 1	25	**170**	219	7	8	14	6	2	8	<1	<1	1	4	<1	<1	<1	<1	<1	<1	<1
PFIY 2	25	**170**	219	7	8	14	6	2	8	<1	<1	1	4	<1	<1	<1	<1	<1	<1	<1
CY 1	9	23	62	<1	51	51	<1	7	8	<1	<1	1	4	<1	2	2	<1	<1	<1	<1
CY 2	39	**77**	539	2	17	17	2	4	5	1	1	5	32	<1	1	1	<1	<1	<1	<1
CY 3	13	**111**	493	2	174	176	2	25	27	1	1	11	38	<1	13	13	<1	2	2	<1
CY 4	13	**106**	454	2	185	187	2	28	30	1	1	11	24	<1	18	18	<1	3	3	<1
CY 5	33	**203**	959	4	298	302	4	55	59	2	3	21	100	<1	21	22	<1	4	5	<1
CY 6	25	**193**	889	4	299	302	4	54	58	2	3	21	86	<1	29	30	<1	5	5	<1
CY 7	19	**201**	632	3	448	451	3	69	71	2	2	22	76	<1	59	60	<1	9	9	<1
CY 8	14	**111**	462	2	382	384	2	62	64	1	2	14	56	<1	63	63	<1	10	10	<1
CY 9	18	**237**	572	3	499	502	3	76	78	2	2	23	66	<1	72	72	<1	11	11	<1
CY 10	17	**280**	562	3	627	629	3	92	94	2	2	20	52	<1	92	93	<1	14	14	<1
CY 11	10	**147**	311	1	523	524	1	77	79	1	1	9	29	<1	77	77	<1	12	12	<1
CY 12	13	35	177	1	409	410	1	63	64	<1	<1	2	6	<1	73	73	<1	11	11	<1
CY 13	2	13	57	<1	401	401	<1	61	61	<1	<1	1	4	<1	73	73	<1	11	11	<1
CY 14	<1	2	13	<1	<1	47	<1	<1	7	<1	<1	<1	<1	<1	9	9	<1	1	1	<1
Threshold [d]	*54*	*54*	–	*82*	*BMPs* [e]	–	*82*	*BMPs* [e]	–	–	–	–	–	–	–	–	–	–	–	–

BAAQMD = Bay Area Air Quality Management District; BMPs = best management practices; CO = carbon monoxide; lbs = pounds; NO_X = nitrogen oxides; PM10 = particulate matter that is 10 microns in diameter and smaller; PM2.5 = particulate matter that is 2.5 microns in diameter and smaller; ROG = reactive organic gases; SO_2 = sulfur dioxide; PFIY = preliminary field investigation year; CY = construction year.

[a] Emissions results include implementation of air quality Environmental Commitments EC-7 and EC-9 through EC-12. Exceedances of BAAQMD's thresholds are shown in **bolded underline**.

[b] Presents the highest emissions estimate during a single day of construction in each year, based on concurrent construction activities.

[c] Total PM10 and PM2.5 emissions consist of exhaust and fugitive dust emissions. Annual values for exhaust and dust may not add to the totals in the total column because of rounding. Daily results for exhaust and dust may not add to the totals in the total column because the table presents maximum emissions results for each individual pollutant component. For example, the maximum PM exhaust emissions may not occur on the same day as the maximum total dust emissions.

[d] In developing these thresholds, BAAQMD considered levels at which project emissions are cumulatively considerable. Consequently, exceedances of project-level thresholds would be cumulatively considerable.

[e] BAAQMD considers PM dust impacts to be less than significant with implementation of BMPs.

Table 23-40. Criteria Pollutant and Precursor Emissions from Construction of Alternative 4a in the Bay Area Air Quality Management District [a]

	Maximum Daily Emissions (lbs/day) [b]										Annual Emissions (tons/year)									
				PM10			PM2.5							PM10			PM2.5			
Year	ROG	NO_X	CO	Exhaust	Dust	Total [c]	Exhaust	Dust	Total [c]	SO_2	ROG	NO_X	CO	Exhaust	Dust	Total [c]	Exhaust	Dust	Total [c]	SO_2
Alternative 4a																				
PFIY 1	25	**170**	219	7	8	14	6	2	8	<1	<1	1	4	<1	<1	<1	<1	<1	<1	<1
PFIY 2	25	**170**	219	7	8	14	6	2	8	<1	<1	1	4	<1	<1	<1	<1	<1	<1	<1
CY 1	9	23	75	<1	50	51	<1	7	8	<1	<1	1	4	<1	2	2	<1	<1	<1	<1
CY 2	41	**95**	626	2	28	29	2	5	7	2	1	5	35	<1	1	1	<1	<1	<1	<1
CY 3	14	**77**	560	2	121	122	2	20	21	1	1	9	45	<1	10	10	<1	2	2	<1
CY 4	14	**101**	514	2	132	134	2	22	24	1	1	7	25	<1	12	12	<1	2	2	<1
CY 5	39	**240**	1209	5	372	376	4	59	63	3	3	24	122	<1	32	32	<1	5	6	<1
CY 6	32	**239**	1141	4	399	403	4	64	69	3	3	22	110	<1	30	30	<1	5	6	<1
CY 7	18	**192**	641	2	456	458	2	74	77	2	2	20	79	<1	59	59	<1	9	10	<1
CY 8	14	**104**	475	2	403	405	2	64	66	1	2	14	62	<1	66	66	<1	10	11	<1
CY 9	20	**276**	652	3	565	568	3	89	92	2	2	25	76	<1	83	83	<1	13	13	<1
CY 10	20	**280**	658	4	609	612	4	91	93	2	2	27	72	<1	89	89	<1	13	14	<1
CY 11	16	**237**	500	3	623	626	3	91	94	1	1	19	44	<1	91	91	<1	14	14	<1
CY 12	13	49	189	1	447	448	1	69	70	<1	<1	2	10	<1	73	73	<1	11	11	<1
CY 13	1	8	32	<1	399	399	<1	61	61	<1	<1	1	5	<1	73	73	<1	11	11	<1
CY 14	2	13	59	<1	82	82	<1	13	13	<1	<1	1	4	<1	15	15	<1	2	2	<1
Threshold [d]	*54*	*54*	–	*82*	*BMPs [e]*	–	*82*	*BMPs [e]*	–	–	–	–	–	–	–	–	–	–	–	–

BAAQMD = Bay Area Air Quality Management District; BMPs = best management practices; CO = carbon monoxide; lbs = pounds; NO_X = nitrogen oxides; PM10 = particulate matter that is 10 microns in diameter and smaller; PM2.5 = particulate matter that is 2.5 microns in diameter and smaller; ROG = reactive organic gases; SO_2 = sulfur dioxide; PFIY = preliminary field investigation year; CY = construction year.

[a] Emissions results include implementation of air quality Environmental Commitments EC-7 and EC-9 through EC-12. Exceedances of BAAQMD's thresholds are shown in **bolded underline**.

[b] Presents the highest emissions estimate during a single day of construction in each year, based on concurrent construction activities.

[c] Total PM10 and PM2.5 emissions consist of exhaust and fugitive dust emissions. Annual values for exhaust and dust may not add to the totals in the total column because of rounding. Daily results for exhaust and dust may not add to the totals in the total column because the table presents maximum emissions results for each individual pollutant component. For example, the maximum PM exhaust emissions may not occur on the same day as the maximum total dust emissions.

[d] In developing these thresholds, BAAQMD considered levels at which project emissions are cumulatively considerable. Consequently, exceedances of project-level thresholds would be cumulatively considerable.

[e] BAAQMD considers PM dust impacts to be less than significant with implementation of BMPs.

Table 23-41. Criteria Pollutant and Precursor Emissions from Construction of Alternative 4b in the Bay Area Air Quality Management District [a]

	Maximum Daily Emissions (lbs/day) [b]										Annual Emissions (tons/year)									
				PM10			PM2.5							PM10			PM2.5			
Year	ROG	NO_X	CO	Exhaust	Dust	Total [c]	Exhaust	Dust	Total [c]	SO_2	ROG	NO_X	CO	Exhaust	Dust	Total [c]	Exhaust	Dust	Total [c]	SO_2
Alternative 4b																				
PFIY 1	25	**170**	219	7	8	14	6	2	8	<1	<1	1	4	<1	<1	<1	<1	<1	<1	<1
PFIY 2	25	**170**	219	7	8	14	6	2	8	<1	<1	1	4	<1	<1	<1	<1	<1	<1	<1
CY 1	9	22	58	<1	49	50	<1	7	7	<1	<1	1	4	<1	2	2	<1	<1	<1	<1
CY 2	43	**148**	759	3	104	107	3	19	22	2	2	7	47	<1	3	4	<1	1	1	<1
CY 3	21	**147**	761	3	105	108	3	19	22	2	1	11	35	<1	9	10	<1	2	2	<1
CY 4	22	**161**	784	3	137	140	3	25	28	2	2	14	60	<1	12	12	<1	2	2	<1
CY 5	33	**199**	934	4	246	250	4	48	52	2	3	21	103	<1	22	22	<1	4	5	<1
CY 6	23	**173**	826	3	308	311	3	59	63	2	3	20	89	<1	35	36	<1	6	7	<1
CY 7	18	**166**	624	3	361	364	3	59	62	2	2	18	70	<1	49	50	<1	8	8	<1
CY 8	18	**149**	599	3	345	348	3	55	58	1	2	13	56	<1	47	48	<1	8	8	<1
CY 9	20	**241**	668	3	490	493	3	75	78	2	2	23	69	<1	71	72	<1	11	11	<1
CY 10	11	**203**	376	2	516	518	2	75	77	1	1	11	24	<1	73	74	<1	11	11	<1
CY 11	4	**60**	137	1	468	468	1	71	71	<1	<1	6	15	<1	76	76	<1	11	12	<1
CY 12	12	19	75	<1	6	6	<1	2	2	<1	<1	<1	2	<1	<1	<1	<1	<1	<1	<1
CY 13	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CY 14	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Threshold [d]	*54*	*54*	–	*82*	*BMPs [e]*	–	*82*	*BMPs [e]*	–	–	–	–	–	–	–	–	–	–	–	–

BAAQMD = Bay Area Air Quality Management District; BMPs = best management practices; CO = carbon monoxide; lbs = pounds; NO_X = nitrogen oxides; PM10 = particulate matter that is 10 microns in diameter and smaller; PM2.5 = particulate matter that is 2.5 microns in diameter and smaller; ROG = reactive organic gases; SO_2 = sulfur dioxide; PFIY = preliminary field investigation year; CY = construction year.

[a] Emissions results include implementation of air quality Environmental Commitments EC-7 and EC-9 through EC-12. Exceedances of BAAQMD's thresholds are shown in **bolded underline**.

[b] Presents the highest emissions estimate during a single day of construction in each year, based on concurrent construction activities.

[c] Total PM10 and PM2.5 emissions consist of exhaust and fugitive dust emissions. Annual values for exhaust and dust may not add to the totals in the total column because of rounding. Daily results for exhaust and dust may not add to the totals in the total column because the table presents maximum emissions results for each individual pollutant component. For example, the maximum PM exhaust emissions may not occur on the same day as the maximum total dust emissions.

[d] In developing these thresholds, BAAQMD considered levels at which project emissions are cumulatively considerable. Consequently, exceedances of project-level thresholds would be cumulatively considerable.

[e] BAAQMD considers PM dust impacts to be less than significant with implementation of BMPs.

Table 23-42. Criteria Pollutant and Precursor Emissions from Construction of Alternative 4c in the Bay Area Air Quality Management District [a]

	Maximum Daily Emissions (lbs/day) [b]										Annual Emissions (tons/year)									
				PM10			PM2.5							PM10			PM2.5			
Year	ROG	NO_X	CO	Exhaust	Dust	Total [c]	Exhaust	Dust	Total [c]	SO_2	ROG	NO_X	CO	Exhaust	Dust	Total [c]	Exhaust	Dust	Total [c]	SO_2
Alternative 4c																				
PFIY 1	25	**<u>170</u>**	219	7	8	14	6	2	8	<1	<1	1	4	<1	<1	<1	<1	<1	<1	<1
PFIY 2	25	**<u>170</u>**	219	7	8	14	6	2	8	<1	<1	1	4	<1	<1	<1	<1	<1	<1	<1
CY 1	9	23	62	<1	50	51	<1	7	8	<1	<1	1	4	<1	2	2	<1	<1	<1	<1
CY 2	31	**<u>66</u>**	514	2	64	66	2	12	13	1	1	5	35	<1	1	1	<1	<1	<1	<1
CY 3	13	**<u>67</u>**	514	2	103	104	2	18	19	1	1	8	34	<1	8	9	<1	1	2	<1
CY 4	13	**<u>92</u>**	469	2	121	123	2	20	22	1	1	7	23	<1	10	10	<1	2	2	<1
CY 5	33	**<u>187</u>**	978	4	296	299	4	55	58	2	3	20	101	<1	25	26	<1	5	5	<1
CY 6	24	**<u>173</u>**	857	3	296	299	3	55	58	2	2	17	85	<1	23	24	<1	4	5	<1
CY 7	18	**<u>154</u>**	617	2	389	391	2	62	65	1	2	17	73	<1	53	53	<1	9	9	<1
CY 8	14	**<u>97</u>**	461	2	397	399	2	63	65	1	2	12	56	<1	64	64	<1	10	10	<1
CY 9	15	**<u>156</u>**	514	2	480	482	2	73	75	1	2	17	61	<1	70	71	<1	11	11	<1
CY 10	16	**<u>211</u>**	549	3	525	527	3	80	83	1	2	20	50	<1	78	78	<1	12	12	<1
CY 11	10	**<u>180</u>**	314	2	494	496	2	74	76	1	1	14	27	<1	78	78	<1	12	12	<1
CY 12	12	26	108	<1	407	407	<1	63	63	<1	<1	2	5	<1	73	73	<1	11	11	<1
CY 13	1	11	42	<1	29	29	<1	5	5	<1	<1	<1	1	<1	5	5	<1	1	1	<1
CY 14	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Threshold [d]	*54*	*54*	–	*82*	*BMPs [e]*	–	*82*	*BMPs [e]*	–	–	–	–	–	–	–	–	–	–	–	–

BAAQMD = Bay Area Air Quality Management District; BMPs = best management practices; CO = carbon monoxide; lbs = pounds; NO_X = nitrogen oxides; PM10 = particulate matter that is 10 microns in diameter and smaller; PM2.5 = particulate matter that is 2.5 microns in diameter and smaller; ROG = reactive organic gases; SO_2 = sulfur dioxide; PFIY = preliminary field investigation year; CY = construction year.

[a] Emissions results include implementation of air quality Environmental Commitments EC-7 and EC-9 through EC-12. Exceedances of BAAQMD's thresholds are shown in **<u>bolded underline</u>**.

[b] Presents the highest emissions estimate during a single day of construction in each year, based on concurrent construction activities.

[c] Total PM10 and PM2.5 emissions consist of exhaust and fugitive dust emissions. Annual values for exhaust and dust may not add to the totals in the total column because of rounding. Daily results for exhaust and dust may not add because to the totals in the total column the table presents maximum emissions results for each individual pollutant component. For example, the maximum PM exhaust emissions may not occur on the same day as the maximum total dust emissions.

[d] In developing these thresholds, BAAQMD considered levels at which project emissions are cumulatively considerable. Consequently, exceedances of project-level thresholds would be cumulatively considerable.

[e] BAAQMD considers PM dust impacts to be less than significant with implementation of BMPs.

Table 23-43. Criteria Pollutant and Precursor Emissions from Construction of Alternative 5 in the Bay Area Air Quality Management District [a]

	Maximum Daily Emissions (lbs/day) [b]										Annual Emissions (tons/year)									
				PM10			PM2.5							PM10			PM2.5			
Year	ROG	NO_X	CO	Exhaust	Dust	Total [c]	Exhaust	Dust	Total [c]	SO_2	ROG	NO_X	CO	Exhaust	Dust	Total [c]	Exhaust	Dust	Total [c]	SO_2
Alternative 5																				
PFIY 1	25	**170**	219	7	8	14	6	2	8	<1	<1	1	4	<1	<1	<1	<1	<1	<1	<1
PFIY 2	25	**170**	219	7	8	14	6	2	8	<1	<1	1	4	<1	<1	<1	<1	<1	<1	<1
CY 1	15	31	75	<1	92	93	<1	13	14	<1	<1	2	5	<1	6	6	<1	1	1	<1
CY 2	3	16	52	<1	34	34	<1	4	4	<1	<1	1	2	<1	2	2	<1	<1	<1	<1
CY 3	4	28	134	<1	10	11	<1	1	2	<1	<1	3	13	<1	1	1	<1	<1	<1	<1
CY 4	19	**194**	635	2	80	82	2	17	19	1	1	13	46	<1	5	5	<1	1	1	<1
CY 5	29	**195**	704	2	123	124	2	20	22	2	2	20	71	<1	14	14	<1	3	3	<1
CY 6	20	**153**	681	3	247	249	3	42	44	2	2	15	57	<1	32	33	<1	5	5	<1
CY 7	14	**126**	450	2	243	244	2	34	36	1	2	15	55	<1	35	35	<1	5	5	<1
CY 8	21	**210**	729	3	297	299	3	42	44	2	2	20	72	<1	37	38	<1	5	6	<1
CY 9	21	**200**	739	2	276	278	2	38	40	2	2	22	81	<1	38	39	<1	5	6	<1
CY 10	21	**255**	701	2	334	336	2	43	46	2	2	26	69	<1	41	41	<1	6	6	<1
CY 11	10	**127**	351	1	88	90	1	11	12	1	1	7	21	<1	5	5	<1	1	1	<1
CY 12	3	7	48	<1	9	9	<1	1	1	<1	<1	1	4	<1	1	1	<1	<1	<1	<1
CY 13	10	6	35	<1	8	8	<1	1	1	<1	<1	<1	1	<1	<1	<1	<1	<1	<1	<1
CY 14	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Threshold [d]	*54*	*54*	–	*82*	*BMPs* [e]	–	*82*	*BMPs* [e]	–	–	–	–	–	–	–	–	–	–	–	–

BAAQMD = Bay Area Air Quality Management District; BMPs = best management practices; CO = carbon monoxide; lbs = pounds; NO_X = nitrogen oxides; PM10 = particulate matter that is 10 microns in diameter and smaller; PM2.5 = particulate matter that is 2.5 microns in diameter and smaller; ROG = reactive organic gases; SO_2 = sulfur dioxide; PFIY = preliminary field investigation year; CY = construction year.

[a] Emissions results include implementation of air quality Environmental Commitments EC-7 and EC-9 through EC-12. Exceedances of BAAQMD's thresholds are shown in **bolded underline**.

[b] Presents the highest emissions estimate during a single day of construction in each year, based on concurrent construction activities.

[c] Total PM10 and PM2.5 emissions consist of exhaust and fugitive dust emissions. Annual values for exhaust and dust may not add to the totals in the total column because of rounding. Daily results for exhaust and dust may not add to the totals in the total column because the table presents maximum emissions results for each individual pollutant component. For example, the maximum PM exhaust emissions may not occur on the same day as the maximum total dust emissions.

[d] In developing these thresholds, BAAQMD considered levels at which project emissions are cumulatively considerable. Consequently, exceedances of project-level thresholds would be cumulatively considerable.

[e] BAAQMD considers PM dust impacts to be less than significant with implementation of BMPs.

As shown in Tables 23-35 through 23-43, construction of Alternatives 2a and 4a is predicted to result in the highest total emissions for all pollutants compared to all other project alternatives. This is primarily because Alternatives 2a and 4a would involve construction of an additional tunnel launch shaft near the Banks Pumping Plant. The tunnel connecting to the Southern Complex under the eastern alternatives (Alternatives 3, 4a, 4b, and 4c) would be much longer than required under the central alternatives (Alternatives 1, 2a, 2b, and 2c). For this reason, there is greater variability in emissions estimated for the eastern alternatives when compared to the central alternatives of the same project design capacity. Total emissions of most pollutants estimated under Alternative 5 in the BAAQMD are also expected to be lower than other project alternatives. This is because Alternative 5 does not include major tunneling operations in the BAAQMD, such as those required at the Southern Complex (Alternatives 1-4c). Tunneling for the Bethany Reservoir Aqueduct under Alternative 5 only requires construction of two smaller and shallower aqueduct tunnels in the BAAQMD. All other alternatives include two southern launch shafts at the Southern Complex in the BAAQMD.

Even with incorporation of environmental commitments, construction of all project alternatives would result in a temporary impact on regional air quality because NO_X (ozone precursor) emissions would exceed BAAQMD's threshold. BAAQMD's thresholds were established to prevent emissions from new projects in the SFBAAB from contributing to violations of the CAAQS or NAAQS. Because construction emissions of NO_X would exceed BAAQMD's threshold, the project would contribute to regional air pollution within the SFBAAB. Construction of the project may also conflict with the *2001 San Francisco Bay Area Ozone Attainment Plan for the 1-Hour National Ozone Standard* or *2017 Clean Air Plan*, which were adopted to achieve regional attainment with the ambient air quality standards (Bay Area Air Quality Management District 2001, 2017a).

All project alternatives would result in maximum daily NO_X emissions above BAAQMD's threshold. The NO_X emissions profile is somewhat variable, with the intensity of NO_X emissions generally greatest between construction years 5 and 7, and then increasing again slightly a few years later. NO_X emissions are strongly influenced by types and number of equipment and vehicles required during construction. Concurrent construction activities at the Southern Complex under central and eastern conveyance alignment alternatives and at the Bethany Complex under Alternative 5 drive the demand for equipment and vehicles, and thus NO_X emissions in the BAAQMD.

BAAQMD does not have mass emissions thresholds for CO, total PM, or SO_2; localized air quality impacts from these pollutants are evaluated based on the air dispersion modeling of ambient air concentrations. Impact AQ-5 discusses the conclusions of the modeled ambient air concentrations.

Operations and Maintenance

O&M would be conducted daily or at varying frequencies, depending on the type of activity. Daily maintenance activities include inspections, security checks, and operations oversight. Less frequent maintenance activities include operability testing, cleaning, sediment removal, dewatering, and repaving. As discussed in Section 23.3.1.3, *Evaluation of Operations*, long-term operation of the project would require the use of electricity for pumping. While electrical-generating facilities powered by fossil fuels emit criteria pollutants, these facilities are regulated and permitted at a maximum emissions level. Therefore, operational emissions associated with electricity consumption are not included in the analysis because these emissions have already been evaluated and accounted for in existing permit and environmental documents.

Table 23-44 summarizes O&M emissions from the proposed project and alternatives that would be generated in BAAQMD in pounds per day and tons per year. Emissions were quantified under 2020 conditions to define baseline conditions, although the project would not be fully operational until around 2040. Based on current information, it is projected that the emissions intensity of equipment and vehicle operation in 2040 would be much lower than under 2020 conditions because of improvements in engine technology and regulations to reduce combustion emissions (see Appendix 23F, *Air Quality and Greenhouse Gases 2040 Analysis*). Accordingly, the emissions estimates presented in Table 23-44 are based on a conservative representation of emissions.

As shown in Table 23-44, O&M activities in BAAQMD would not exceed BAAQMD's thresholds. O&M emissions are expected to be comparable among all project alternatives, with Alternatives 2a and 4a resulting in slightly more emissions than other alternatives because of additional activity required to maintain the tunnel launch shaft near Banks Pumping Plant.

CEQA Conclusion—All Project Alternatives

The impact would be significant under CEQA for all project alternatives because construction could result in an exceedance of BAAQMD's maximum daily NO_X threshold before mitigation. No other thresholds would be exceeded during construction. O&M activities likewise would not result in criteria pollutant or precursor emissions above BAAQMD's numeric thresholds.

Fugitive dust emissions would be minimized through implementation of a dust control plan (Environmental Commitment EC-11: *Fugitive Dust Control*) and BMPs at new concrete batch plants (Environmental Commitment EC-12: *On-Site Concrete Batching Plants*). Exhaust-related pollutants would be reduced through use of renewable diesel, Tier 4 diesel engines, newer on-road and marine engines, and other BMPs, as required by Environmental Commitments EC-7: *Off-Road Haul Trucks* through EC-10: *Marine Vessels* and EC-13: *DWR Best Management Practices to Reduce GHG Emissions*. These environmental commitments would minimize air quality impacts through application of best available on-site controls to reduce construction emissions; however, even with these commitments, exceedances of BAAQMD's thresholds would occur, and the project would contribute a significant level of regional NO_X pollution within the SFBAAB.

DWR would implement Mitigation Measure AQ-3: *Offset Construction-Generated Criteria Pollutants in the San Francisco Bay Area Air Basin* to mitigate NO_X emissions to below BAAQMD's threshold. Because BAAQMD's thresholds were established to prevent emissions from new projects in the SFBAAB from contributing to CAAQS or NAAQS violations, mitigating emissions below the threshold levels would avoid potential conflicts with the ambient air quality plans and ensure that project construction would not contribute a significant level of air pollution such that regional air quality within the SFBAAB would be degraded. Accordingly, the impact would be less than significant with mitigation.

Table 23-44. Criteria Pollutant and Precursor Emissions from O&M Activities in the Bay Area Air Quality Management District [a]

	Maximum Daily Emissions (lbs/day) [a]										Annual Emissions (tons/year) [a]									
				PM10			PM2.5							PM10			PM2.5			
Alternative	ROG	NO_X	CO	Exhaust	Dust	Total [b]	Exhaust	Dust	Total [b]	SO_2	ROG	NO_X	CO	Exhaust	Dust	Total [b]	Exhaust	Dust	Total [b]	SO_2
1	33	40	138	1	9	9	1	4	5	<1	<1	<1	2	<1	<1	<1	<1	<1	<1	<1
2a	33	41	138	1	9	9	1	4	5	<1	<1	<1	2	<1	<1	<1	<1	<1	<1	<1
2b	33	40	138	1	9	9	1	4	5	<1	<1	<1	2	<1	<1	<1	<1	<1	<1	<1
2c	33	40	138	1	9	9	1	4	5	<1	<1	<1	2	<1	<1	<1	<1	<1	<1	<1
3	33	40	138	1	9	9	1	4	5	<1	<1	<1	2	<1	<1	<1	<1	<1	<1	<1
4a	33	41	138	1	9	9	1	4	5	<1	<1	<1	2	<1	<1	<1	<1	<1	<1	<1
4b	33	40	138	1	9	9	1	4	5	<1	<1	<1	2	<1	<1	<1	<1	<1	<1	<1
4c	33	40	138	1	9	9	1	4	5	<1	<1	<1	2	<1	<1	<1	<1	<1	<1	<1
5	29	19	81	<1	2	2	<1	<1	1	<1	<1	<1	1	<1	<1	<1	<1	<1	<1	<1
Threshold [c]	*54*	*54*	–	–	–	*82*	–	–	*54*	–	*10*	*10*	–	–	–	*15*	–	–	*10*	–

BAAQMD = Bay Area Air Quality Management District; CO = carbon monoxide; lbs = pounds; NO_X = nitrogen oxides; PM10 = particulate matter that is 10 microns in diameter and smaller; PM2.5 = particulate matter that is 2.5 microns in diameter and smaller; ROG = reactive organic gases; SO_X = sulfur oxide.

[a] The annual estimates include emissions from all monthly, quarterly, semiannual, and annual activities and conservatively assume all long-term activities would occur in that same year. The daily estimates are based on an assessment of the maximum amount of maintenance that could theoretically occur in a single day.

[b] Total PM10 and PM2.5 emissions consist of exhaust and fugitive dust emissions. Annual values for exhaust and dust may not add to the totals in the total column because of rounding. Daily results for exhaust and dust may not add to the totals in the total column because the table presents maximum emissions results for each individual pollutant component. For example, the maximum PM exhaust emissions may not occur on the same day as the maximum total dust emissions.

[c] In developing these thresholds, BAAQMD considered levels at which project emissions are cumulatively considerable. Consequently, exceedances of project-level thresholds would be cumulatively considerable.

Mitigation Measure AQ-3: Offset Construction-Generated Criteria Pollutants in the San Francisco Bay Area Air Basin

Performance Standard

Prior to issuance of construction contracts, DWR will enter into an MOU with the Bay Area Clean Air Foundation (Foundation), a public nonprofit and supporting organization for the BAAQMD, or develop an alternative or complementary mitigation program (as discussed below) to reduce NO_X. Emissions above the federal *de minimis* thresholds[11] will be reduced to net zero (0). Emissions not above the *de minimis* thresholds, but above BAAQMD's thresholds, will be reduced to quantities below the air district's thresholds.

Emissions generated by project construction have been quantified as part of this Draft EIR. Although this inventory could be used exclusively to inform the required mitigation commitment, the methods used to quantify emissions in the Draft EIR were conservative. They also do not account for any additional reductions that may be achieved by future state and federal regulations that reduce the emissions intensity of equipment and vehicles, nor do they account for reduction strategies that may be implemented by DWR pursuant to other mitigation measures (e.g., Mitigation Measure AQ-9). Accordingly, this Draft EIR likely overestimates actual emissions that would be generated by construction of the project. DWR may, therefore, reanalyze criteria pollutant emissions from construction of the project to update the required reduction commitment to achieve performance standard.

An updated emissions analysis conducted for the project will be performed using approved emissions models and methods available at the time of the reanalysis. The analysis must use the latest available engineering data for the project, inclusive of any required environmental commitments or emissions reduction strategies. Consistent with the methodology used in this Draft EIR, emissions factors may account for enacted regulations that will influence future year emissions intensities (e.g., fuel efficiency standards for on-road vehicles).

Mitigation Agreement with Bay Area Clean Air Foundation

1. DWR will enter into an MOU with the Foundation to reduce NO_X according to the performance standard described above.
    a. The mitigation offset fee amount will be determined at the time of mitigation to fund one or more emissions reduction projects within the SFBAAB. The Foundation will require an additional administrative fee of no less than 5% of the total offset fee. The mitigation offset fee will be determined by the Foundation based on the type of projects available at the time of mitigation. This fee is intended to fund emissions reduction projects to achieve reductions. Documentation of payment will be provided to DWR or its designated representative.
    b. The MOU will include details regarding the annual calculation of required offsets DWR must achieve, funds to be paid, administrative fee, and the timing of the emissions reduction projects. Acceptance of this fee by the Foundation will serve as an acknowledgment and commitment by the Foundation to (1) implement an emissions reduction project(s) within a timeframe to be determined based on the type of

[11] Federal *de minimis* thresholds are triggered if the project is subject to general conformity.

project(s) selected after receipt of the mitigation fee designed to achieve the emissions reduction objectives; and (2) provide documentation to DWR or its designated representative describing the project(s) funded by the mitigation fee, including the amount of emissions reduced (tons per year) from the emissions reduction project(s). To qualify under this mitigation measure, the specific emissions reduction project(s) must result in emissions reductions in the SFBAAB that are real, surplus, quantifiable, enforceable, and will not otherwise be achieved through compliance with existing regulatory requirements or any other legal requirement. Funding will need to be received prior to contracting with participants and should allow enough time to receive and process applications to fund off-site reduction projects prior to commencement of the project activities that are being offset. This will roughly equate to 1 year prior to the required mitigation; additional lead time may be necessary depending on the level of off-site emissions reductions required for a specific year.

Alternative or Complementary Mitigation Program

Should DWR be unable to enter what they regard as a satisfactory agreement with the Foundation, or should DWR enter an agreement with the Foundation but find themselves unable to meet the performance standards established above, DWR will develop an alternative or complementary off-site mitigation program to reduce NO_X emissions according to the performance standard described above.

DWR will establish a program to fund emissions reduction projects through grants, ERCs, or similar mechanisms. DWR may identify emissions reduction projects through consultation with BAAQMD, other regional air districts, CARB, CEC, local governments, transit agencies, or others, as needed. Potential projects could include but are not limited to the following.

- Alternative fuel, low-emissions school buses, transit buses, and other vehicles.
- Diesel engine retrofits and repowers.
- Locomotive retrofits and repowers.
- Electric vehicle or lawn equipment rebates.
- Electric vehicle charging stations and plug-ins.
- Video-teleconferencing systems for local businesses.
- Telecommuting start-up costs for local businesses.

As part of its alternative or complementary off-site mitigation program, DWR will develop pollutant-specific formulas to monetize, calculate, and achieve emissions reductions in a cost-effective manner. Payments can be allocated to emissions reductions projects in a grant-like manner. DWR will document the fee schedule basis, such as consistency with the CARB's Carl Moyer Program cost-effectiveness limits and capital recovery factors.

DWR will conduct annual reporting to verify and document that emissions reductions projects achieve a 1:1 reduction with construction emissions to ensure claimed offsets meet the required performance standard. Each report should describe the projects that were funded over the prior year, identify emissions reduction realized by the funded projects, document compliance with mitigation requirements, and identify corrective actions (if any) needed to ensure the offsetting program achieves the performance standards for NOx. DWR will retain a third-party expert to assist with its review and approval of the annual reports. Annual reports will be finalized and posted on DWR's website by December 31 of the following year.

Mitigation Impacts

Compensatory Mitigation

There would be no construction or O&M activity for compensatory mitigation in BAAQMD. Accordingly, no emissions would be generated and there would be no impact under CEQA for all project alternatives.

Other Mitigation Measures

Some mitigation measures would result in construction equipment exhaust, haul truck exhaust, employee vehicle exhaust, and dust from grading, clearing, excavation, and landscaping activities that would temporarily generate criteria air pollutant emissions and potentially affect regional air quality in the BAAQMD. The mitigation measures with potential to result in impacts on regional air quality are Mitigation Measures BIO-2c: *Electrical Power Line Support Placement*; SOILS-2: *Prepare and Implement Topsoil Salvage, Handling, Stockpiling and Reapplication Plans;* AG-3: *Replacement or Relocation of Affected Infrastructure Supporting Agricultural Properties*; AES-1c: *Implement Best Management Practices to Implement Project Landscaping Plan;* CUL-1: *Prepare and Implement a Built-Environment Treatment Plan in Consultation with Interested Parties*; and CUL-2: *Conduct a Survey of Inaccessible Properties to Assess Eligibility, Determine if These Properties Will Be Adversely Affected by the Project, and Develop Treatment to Resolve or Mitigate Adverse Impacts*. Temporary impacts on regional air quality resulting from implementation of mitigation measures would be similar to construction effects of the project alternatives, but of a much lesser magnitude. Environmental Commitments EC-7: *Off-Road Heavy-Duty Engines,* EC-8: *On-Road Haul Trucks*, and EC-13: *DWR Best Management Practices to Reduce GHG Emissions* would reduce construction equipment and vehicle exhaust emissions generated from implementation of mitigation measures. Environmental Commitments EC-11: *Fugitive Dust Control* and EC-12: *On-Site Site Concrete Batching Plants* are available to reduce fugitive dust. Mitigation Measure AQ-3: *Offset Construction-Generated Criteria Pollutants in the San Francisco Bay Area Air Basin* would offset any remaining emissions above BAAQMD thresholds and would reduce the severity of any potential air quality effects. Therefore, implementation of other mitigation measures is unlikely to result in regional air quality impacts in BAAQMD and would be less than significant with mitigation.

Overall, impacts on regional air quality in the BAAQMD from implementation of other mitigation measures, combined with project alternatives, would not change the less than significant with mitigation impact conclusion. There would be no contribution from compensatory mitigation because there are no compensatory mitigation sites in BAAQMD.

Impact AQ-4: Result in Impacts on Air Quality within the Yolo-Solano Air Quality Management District

All Project Alternatives

Project Construction

Construction activities within the YSAQMD would be limited to employee travel and equipment and material hauling, resulting in combustion and dust emissions from on-road vehicles. There would be no physical construction or activities related to compensatory mitigation sites. Tables 23-45 through 23-53 summarize on-road vehicle emissions from all alternatives that would be generated in the YSAQMD in pounds per day and tons per year.

Employee travel and equipment and material hauling emissions within the YSAQMD would not exceed YSAQMD's thresholds. In general, the greatest emissions would occur between construction years 5 and 10, driven primarily by physical construction activities occurring in the SMAQMD.

Operations and Maintenance

No physical O&M activities would occur in YSAQMD. However, similar to construction, there would be limited employee travel and equipment and material hauling through the district to support the intakes, resulting in combustion and dust emissions from on-road vehicles. Table 23-54 summarizes on-road vehicle emissions from the proposed project and alternatives that would be generated in YSAQMD in pounds per day and tons per year. Emissions were quantified under 2020 conditions to define baseline conditions, although the project would not be fully operational until around 2040. Based on current information, it is projected that the emissions intensity of equipment and vehicle operation in 2040 would be lower than under 2020 conditions because of improvements in engine technology and regulations to reduce combustion emissions (see Appendix 23F, *Air Quality and Greenhouse Gases 2040 Analysis*). Accordingly, the emissions estimates presented in Table 23-54 are based on a conservative representation of emissions.

As shown in Table 23-54, vehicle travel through YSAQMD required to support intake O&M in Sacramento County would not exceed YSAQMD's thresholds. O&M-related vehicle emissions in YSAQMD would be minor and are expected to be comparable among all project alternatives.

Table 23-45. Criteria Pollutant and Precursor Emissions from Construction of Alternative 1 in the Yolo-Solano Air Quality Management District [a]

	Maximum Daily Emissions (lbs/day) [b]										Annual Emissions (tons/year)									
				PM10			PM2.5							PM10			PM2.5			
Year	ROG	NO_X	CO	Exhaust	Dust	Total [c]	Exhaust	Dust	Total [c]	SO_2	ROG	NO_X	CO	Exhaust	Dust	Total [c]	Exhaust	Dust	Total [c]	SO_2
Alternative 1																				
PFIY 1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PFIY 2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CY 1	<1	<1	1	<1	1	1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
CY 2	<1	<1	2	<1	1	1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
CY 3	<1	<1	3	<1	1	1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
CY 4	<1	<1	3	<1	1	1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
CY 5	1	1	8	<1	4	4	<1	1	1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
CY 6	1	1	10	<1	5	5	<1	1	1	<1	<1	<1	1	<1	<1	<1	<1	<1	<1	<1
CY 7	1	1	11	<1	6	6	<1	2	2	<1	<1	<1	1	<1	<1	<1	<1	<1	<1	<1
CY 8	1	1	8	<1	5	5	<1	1	1	<1	<1	<1	1	<1	<1	<1	<1	<1	<1	<1
CY 9	1	<1	7	<1	4	4	<1	1	1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
CY 10	<1	<1	5	<1	3	3	<1	1	1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
CY 11	<1	<1	4	<1	3	3	<1	1	1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
CY 12	<1	<1	1	<1	1	1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
CY 13	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CY 14	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Threshold [d]	–	–	–	–	–	*80*	–	–	–	–	*10*	*10*	–	–	–	–	–	–	–	–

CO = carbon monoxide; lbs = pounds; NO_X = nitrogen oxides; PM10 = particulate matter that is 10 microns in diameter and smaller; PM2.5 = particulate matter that is 2.5 microns in diameter and smaller; ROG = reactive organic gases; SO_2 = sulfur dioxide; YSAQMD = Yolo-Solano Air Quality Management District.

[a] There are no exceedances of YSAQMD's thresholds.

[b] Presents the highest emissions estimate during a single day of construction in each year, based on concurrent construction activities.

[c] Total PM10 and PM2.5 emissions consist of exhaust and fugitive dust emissions. Annual values for exhaust and dust may not add to the totals in the total column because of rounding. Daily results for exhaust and dust may not add to the totals in the total column because the table presents maximum emissions results for each individual pollutant component. For example, the maximum PM exhaust emissions may not occur on the same day as the maximum total dust emissions.

[d] In developing these thresholds, YSAQMD considered levels at which project emissions are cumulatively considerable. Consequently, exceedances of project-level thresholds would be cumulatively considerable.

Table 23-46. Criteria Pollutant and Precursor Emissions from Construction of Alternative 2a in the Yolo-Solano Air Quality Management District [a]

	Maximum Daily Emissions (lbs/day) [b]										Annual Emissions (tons/year)									
				PM10			PM2.5							PM10			PM2.5			
Year	ROG	NO_X	CO	Exhaust	Dust	Total [c]	Exhaust	Dust	Total [c]	SO_2	ROG	NO_X	CO	Exhaust	Dust	Total [c]	Exhaust	Dust	Total [c]	SO_2
Alternative 2a																				
PFIY 1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PFIY 2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CY 1	<1	<1	1	<1	1	1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
CY 2	<1	<1	2	<1	1	1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
CY 3	<1	<1	3	<1	1	1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
CY 4	<1	<1	3	<1	1	1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
CY 5	1	1	9	<1	5	5	<1	1	1	<1	<1	<1	1	<1	<1	<1	<1	<1	<1	<1
CY 6	1	1	10	<1	6	6	<1	1	2	<1	<1	<1	1	<1	<1	<1	<1	<1	<1	<1
CY 7	1	1	12	<1	6	6	<1	2	2	<1	<1	<1	1	<1	<1	<1	<1	<1	<1	<1
CY 8	1	1	10	<1	6	6	<1	2	2	<1	<1	<1	1	<1	<1	<1	<1	<1	<1	<1
CY 9	1	<1	7	<1	4	4	<1	1	1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
CY 10	<1	<1	5	<1	3	3	<1	1	1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
CY 11	<1	<1	5	<1	3	3	<1	1	1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
CY 12	<1	<1	1	<1	1	1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
CY 13	<1	<1	1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
CY 14	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Threshold [d]	–	–	–	–	–	*80*	–	–	–	–	*10*	*10*	–	–	–	–	–	–	–	–

CO = carbon monoxide; lbs = pounds; NO_X = nitrogen oxides; PM10 = particulate matter that is 10 microns in diameter and smaller; PM2.5 = particulate matter that is 2.5 microns in diameter and smaller; ROG = reactive organic gases; SO_2 = sulfur dioxide; YSAQMD = Yolo-Solano Air Quality Management District.

[a] There are no exceedances of YSAQMD's thresholds.

[b] Presents the highest emissions estimate during a single day of construction in each year, based on concurrent construction activities.

[c] Total PM10 and PM2.5 emissions consist of exhaust and fugitive dust emissions. Annual values for exhaust and dust may not add to the totals in the total column because rounding. Daily results for exhaust and dust may not add to the totals in the total column because the table presents maximum emissions results for each individual pollutant component. For example, the maximum PM exhaust emissions may not occur on the same day as the maximum total dust emissions.

[d] In developing these thresholds, YSAQMD considered levels at which project emissions are cumulatively considerable. Consequently, exceedances of project-level thresholds would be cumulatively considerable.

Table 23-47. Criteria Pollutant and Precursor Emissions from Construction of Alternative 2b in the Yolo-Solano Air Quality Management District [a]

	Maximum Daily Emissions (lbs/day) [b]										Annual Emissions (tons/year)									
				PM10			PM2.5							PM10			PM2.5			
Year	ROG	NO_X	CO	Exhaust	Dust	Total [c]	Exhaust	Dust	Total [c]	SO_2	ROG	NO_X	CO	Exhaust	Dust	Total [c]	Exhaust	Dust	Total [c]	SO_2
Alternative 2b																				
PFIY 1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PFIY 2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CY 1	<1	<1	1	<1	1	1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
CY 2	<1	<1	3	<1	1	1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
CY 3	<1	<1	4	<1	2	2	<1	1	1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
CY 4	<1	<1	5	<1	3	3	<1	1	1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
CY 5	1	1	8	<1	4	4	<1	1	1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
CY 6	1	1	8	<1	5	5	<1	1	1	<1	<1	<1	1	<1	<1	<1	<1	<1	<1	<1
CY 7	1	1	8	<1	4	4	<1	1	1	<1	<1	<1	1	<1	<1	<1	<1	<1	<1	<1
CY 8	1	<1	6	<1	4	4	<1	1	1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
CY 9	1	<1	6	<1	4	4	<1	1	1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
CY 10	<1	<1	3	<1	2	2	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
CY 11	<1	<1	1	<1	1	1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
CY 12	<1	<1	1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
CY 13	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CY 14	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Threshold [d]	–	–	–	–	–	*80*	–	–	–	–	*10*	*10*	–	–	–	–	–	–	–	–

CO = carbon monoxide; lbs = pounds; NO_X = nitrogen oxides; PM10 = particulate matter that is 10 microns in diameter and smaller; PM2.5 = particulate matter that is 2.5 microns in diameter and smaller; ROG = reactive organic gases; SO_2 = sulfur dioxide; YSAQMD = Yolo-Solano Air Quality Management District.

[a] There are no exceedances of YSAQMD's thresholds.

[b] Presents the highest emissions estimate during a single day of construction in each year, based on concurrent construction activities.

[c] Total PM10 and PM2.5 emissions consist of exhaust and fugitive dust emissions. Annual values for exhaust and dust may not add to the totals in the total column because of rounding. Daily results for exhaust and dust may not add to the totals in the total column because the table presents maximum emissions results for each individual pollutant component. For example, the maximum PM exhaust emissions may not occur on the same day as the maximum total dust emissions.

[d] In developing these thresholds, YSAQMD considered levels at which project emissions are cumulatively considerable. Consequently, exceedances of project-level thresholds would be cumulatively considerable.

Table 23-48. Criteria Pollutant and Precursor Emissions from Construction of Alternative 2c in the Yolo-Solano Air Quality Management District [a]

	Maximum Daily Emissions (lbs/day) [b]										Annual Emissions (tons/year)									
				PM10			PM2.5							PM10			PM2.5			
Year	ROG	NO_X	CO	Exhaust	Dust	Total [c]	Exhaust	Dust	Total [c]	SO_2	ROG	NO_X	CO	Exhaust	Dust	Total [c]	Exhaust	Dust	Total [c]	SO_2
Alternative 2c																				
PFIY 1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PFIY 2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CY 1	<1	<1	1	<1	1	1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
CY 2	<1	<1	2	<1	1	1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
CY 3	<1	<1	2	<1	1	1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
CY 4	<1	<1	3	<1	1	1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
CY 5	1	1	8	<1	4	4	<1	1	1	<1	<1	<1	1	<1	<1	<1	<1	<1	<1	<1
CY 6	1	1	10	<1	5	5	<1	1	1	<1	<1	<1	1	<1	<1	<1	<1	<1	<1	<1
CY 7	1	1	11	<1	6	6	<1	2	2	<1	<1	<1	1	<1	<1	<1	<1	<1	<1	<1
CY 8	1	1	9	<1	5	5	<1	1	1	<1	<1	<1	1	<1	<1	<1	<1	<1	<1	<1
CY 9	1	1	9	<1	5	5	<1	1	1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
CY 10	<1	<1	5	<1	3	3	<1	1	1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
CY 11	<1	<1	3	<1	2	2	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
CY 12	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
CY 13	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CY 14	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Threshold [d]	–	–	–	–	–	*80*	–	–	–	–	*10*	*10*	–	–	–	–	–	–	–	–

CO = carbon monoxide; lbs = pounds; NO_X = nitrogen oxides; PM10 = particulate matter that is 10 microns in diameter and smaller; PM2.5 = particulate matter that is 2.5 microns in diameter and smaller; ROG = reactive organic gases; SO_2 = sulfur dioxide; YSAQMD = Yolo-Solano Air Quality Management District.

[a] There are no exceedances of YSAQMD's thresholds.

[b] Presents the highest emissions estimate during a single day of construction in each year, based on concurrent construction activities.

[c] Total PM10 and PM2.5 emissions consist of exhaust and fugitive dust emissions. Annual values for exhaust and dust may not add to the totals in the total column because of rounding. Daily results for exhaust and dust may not add to the totals in the total column because the table presents maximum emissions results for each individual pollutant component. For example, the maximum PM exhaust emissions may not occur on the same day as the maximum total dust emissions.

[d] In developing these thresholds, YSAQMD considered levels at which project emissions are cumulatively considerable. Consequently, exceedances of project-level thresholds would be cumulatively considerable.

Table 23-49. Criteria Pollutant and Precursor Emissions from Construction of Alternative 3 in the Yolo-Solano Air Quality Management District [a]

	Maximum Daily Emissions (lbs/day) [b]										Annual Emissions (tons/year)									
				PM10			PM2.5							PM10			PM2.5			
Year	ROG	NO_X	CO	Exhaust	Dust	Total [c]	Exhaust	Dust	Total [c]	SO_2	ROG	NO_X	CO	Exhaust	Dust	Total [c]	Exhaust	Dust	Total [c]	SO_2
Alternative 3																				
PFIY 1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PFIY 2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CY 1	<1	1	7	<1	4	4	<1	1	1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
CY 2	<1	<1	1	<1	1	1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
CY 3	<1	<1	1	<1	1	1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
CY 4	<1	<1	4	<1	2	2	<1	1	1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
CY 5	1	<1	7	<1	4	4	<1	1	1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
CY 6	1	1	9	<1	5	5	<1	1	1	<1	<1	<1	1	<1	<1	<1	<1	<1	<1	<1
CY 7	1	1	8	<1	4	4	<1	1	1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
CY 8	1	<1	6	<1	3	3	<1	1	1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
CY 9	1	<1	4	<1	2	2	<1	1	1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
CY 10	<1	<1	4	<1	2	2	<1	1	1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
CY 11	<1	<1	4	<1	2	2	<1	1	1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
CY 12	<1	<1	1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
CY 13	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
CY 14	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Threshold [d]	–	–	–	–	–	*80*	–	–	–	–	*10*	*10*	–	–	–	–	–	–	–	–

CO = carbon monoxide; lbs = pounds; NO_X = nitrogen oxides; PM10 = particulate matter that is 10 microns in diameter and smaller; PM2.5 = particulate matter that is 2.5 microns in diameter and smaller; ROG = reactive organic gases; SO_2 = sulfur dioxide; YSAQMD = Yolo-Solano Air Quality Management District.

[a] There are no exceedances of YSAQMD's thresholds.

[b] Presents the highest emissions estimate during a single day of construction in each year, based on concurrent construction activities.

[c] Total PM10 and PM2.5 emissions consist of exhaust and fugitive dust emissions. Annual values for exhaust and dust may not add to the totals in the total column because of rounding. Daily results for exhaust and dust may not add to the totals in the total column because the table presents maximum emissions results for each individual pollutant component. For example, the maximum PM exhaust emissions may not occur on the same day as the maximum total dust emissions.

[d] In developing these thresholds, YSAQMD considered levels at which project emissions are cumulatively considerable. Consequently, exceedances of project-level thresholds would be cumulatively considerable.

Table 23-50. Criteria Pollutant and Precursor Emissions from Construction of Alternative 4a in the Yolo-Solano Air Quality Management District [a]

	Maximum Daily Emissions (lbs/day) [b]										Annual Emissions (tons/year)									
				PM10			PM2.5							PM10			PM2.5			
Year	ROG	NO_X	CO	Exhaust	Dust	Total [c]	Exhaust	Dust	Total [c]	SO_2	ROG	NO_X	CO	Exhaust	Dust	Total [c]	Exhaust	Dust	Total [c]	SO_2
Alternative 4a																				
PFIY 1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PFIY 2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CY 1	<1	<1	1	<1	1	1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
CY 2	<1	<1	2	<1	1	1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
CY 3	<1	<1	3	<1	1	1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
CY 4	<1	<1	3	<1	2	2	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
CY 5	1	1	9	<1	5	5	<1	1	1	<1	<1	<1	1	<1	<1	<1	<1	<1	<1	<1
CY 6	1	1	10	<1	5	5	<1	1	1	<1	<1	<1	1	<1	<1	<1	<1	<1	<1	<1
CY 7	1	1	12	<1	7	7	<1	2	2	<1	<1	<1	1	<1	<1	<1	<1	<1	<1	<1
CY 8	1	1	10	<1	6	6	<1	2	2	<1	<1	<1	1	<1	<1	<1	<1	<1	<1	<1
CY 9	1	<1	7	<1	4	4	<1	1	1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
CY 10	<1	<1	6	<1	3	3	<1	1	1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
CY 11	<1	<1	5	<1	3	3	<1	1	1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
CY 12	<1	<1	2	<1	1	1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
CY 13	<1	<1	2	<1	1	1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
CY 14	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Threshold [d]	–	–	–	–	–	*80*	–	–	–	–	*10*	*10*	–	–	–	–	–	–	–	–

CO = carbon monoxide; lbs = pounds; NO_X = nitrogen oxides; PM10 = particulate matter that is 10 microns in diameter and smaller; PM2.5 = particulate matter that is 2.5 microns in diameter and smaller; ROG = reactive organic gases; SO_2 = sulfur dioxide; YSAQMD = Yolo-Solano Air Quality Management District.

[a] There are no exceedances of YSAQMD's thresholds.

[b] Presents the highest emissions estimate during a single day of construction in each year, based on concurrent construction activities.

[c] Total PM10 and PM2.5 emissions consist of exhaust and fugitive dust emissions. Annual values for exhaust and dust may not add to the totals in the total column because of rounding. Daily results for exhaust and dust may not add to the totals in the total column because the table presents maximum emissions results for each individual pollutant component. For example, the maximum PM exhaust emissions may not occur on the same day as the maximum total dust emissions.

[d] In developing these thresholds, YSAQMD considered levels at which project emissions are cumulatively considerable. Consequently, exceedances of project-level thresholds would be cumulatively considerable.

Table 23-51. Criteria Pollutant and Precursor Emissions from Construction of Alternative 4b in the Yolo-Solano Air Quality Management District [a]

	Maximum Daily Emissions (lbs/day) [b]										Annual Emissions (tons/year)									
				PM10			PM2.5							PM10			PM2.5			
Year	ROG	NO_X	CO	Exhaust	Dust	Total [c]	Exhaust	Dust	Total [c]	SO_2	ROG	NO_X	CO	Exhaust	Dust	Total [c]	Exhaust	Dust	Total [c]	SO_2
Alternative 4b																				
PFIY 1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PFIY 2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CY 1	<1	<1	1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
CY 2	<1	<1	3	<1	2	2	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
CY 3	<1	<1	4	<1	2	2	<1	1	1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
CY 4	<1	<1	5	<1	3	3	<1	1	1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
CY 5	1	<1	6	<1	3	3	<1	1	1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
CY 6	1	1	9	<1	5	5	<1	1	1	<1	<1	<1	1	<1	<1	<1	<1	<1	<1	<1
CY 7	1	1	8	<1	5	5	<1	1	1	<1	<1	<1	1	<1	<1	<1	<1	<1	<1	<1
CY 8	1	<1	7	<1	4	4	<1	1	1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
CY 9	<1	<1	6	<1	4	4	<1	1	1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
CY 10	<1	<1	4	<1	3	3	<1	1	1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
CY 11	<1	<1	2	<1	1	1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
CY 12	<1	<1	1	<1	1	1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
CY 13	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CY 14	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Threshold [d]	–	–	–	–	–	*80*	–	–	–	–	*10*	*10*	–	–	–	–	–	–	–	–

CO = carbon monoxide; lbs = pounds; NO_X = nitrogen oxides; PM10 = particulate matter that is 10 microns in diameter and smaller; PM2.5 = particulate matter that is 2.5 microns in diameter and smaller; ROG = reactive organic gases; SO_2 = sulfur dioxide; YSAQMD = Yolo-Solano Air Quality Management District.

[a] There are no exceedances of YSAQMD's thresholds.

[b] Presents the highest emissions estimate during a single day of construction in each year, based on concurrent construction activities.

[c] Total PM10 and PM2.5 emissions consist of exhaust and fugitive dust emissions. Annual values for exhaust and dust may not add to the totals in the total column because of rounding. Daily results for exhaust and dust may not add to the totals in the total column because the table presents maximum emissions results for each individual pollutant component. For example, the maximum PM exhaust emissions may not occur on the same day as the maximum total dust emissions.

[d] In developing these thresholds, YSAQMD considered levels at which project emissions are cumulatively considerable. Consequently, exceedances of project-level thresholds would be cumulatively considerable.

Table 23-52. Criteria Pollutant and Precursor Emissions from Construction of Alternative 4c in the Yolo-Solano Air Quality Management District [a]

	Maximum Daily Emissions (lbs/day) [b]										Annual Emissions (tons/year)									
				PM10			PM2.5							PM10			PM2.5			
Year	ROG	NO_X	CO	Exhaust	Dust	Total [c]	Exhaust	Dust	Total [c]	SO_2	ROG	NO_X	CO	Exhaust	Dust	Total [c]	Exhaust	Dust	Total [c]	SO_2
Alternative 4c																				
PFIY 1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PFIY 2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CY 1	<1	<1	1	<1	1	1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
CY 2	<1	<1	2	<1	1	1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
CY 3	<1	<1	2	<1	1	1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
CY 4	<1	<1	3	<1	1	1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
CY 5	1	1	8	<1	4	4	<1	1	1	<1	<1	<1	1	<1	<1	<1	<1	<1	<1	<1
CY 6	1	1	10	<1	5	5	<1	1	1	<1	<1	<1	1	<1	<1	<1	<1	<1	<1	<1
CY 7	1	1	11	<1	6	6	<1	2	2	<1	<1	<1	1	<1	<1	<1	<1	<1	<1	<1
CY 8	1	1	9	<1	5	5	<1	1	1	<1	<1	<1	1	<1	<1	<1	<1	<1	<1	<1
CY 9	1	1	8	<1	5	5	<1	1	1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
CY 10	<1	<1	5	<1	3	3	<1	1	1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
CY 11	<1	<1	4	<1	2	2	<1	1	1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
CY 12	<1	<1	1	<1	1	1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
CY 13	<1	<1	1	<1	1	1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
CY 14	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Threshold [d]	–	–	–	–	–	*80*	–	–	–	–	*10*	*10*	–	–	–	–	–	–	–	–

CO = carbon monoxide; lbs = pounds; NO_X = nitrogen oxides; PM10 = particulate matter that is 10 microns in diameter and smaller; PM2.5 = particulate matter that is 2.5 microns in diameter and smaller; ROG = reactive organic gases; SO_2 = sulfur dioxide; YSAQMD = Yolo-Solano Air Quality Management District.

[a] There are no exceedances of YSAQMD's thresholds.

[b] Presents the highest emissions estimate during a single day of construction in each year, based on concurrent construction activities.

[c] Total PM10 and PM2.5 emissions consist of exhaust and fugitive dust emissions. Annual values for exhaust and dust may not add to the totals in the total column because of rounding. Daily results for exhaust and dust may not add to the totals in the total column because the table presents maximum emissions results for each individual pollutant component. For example, the maximum PM exhaust emissions may not occur on the same day as the maximum total dust emissions.

[d] In developing these thresholds, YSAQMD considered levels at which project emissions are cumulatively considerable. Consequently, exceedances of project-level thresholds would be cumulatively considerable.

Table 23-53. Criteria Pollutant and Precursor Emissions from Construction of Alternative 5 in the Yolo-Solano Air Quality Management District [a]

	Maximum Daily Emissions (lbs/day) [b]										Annual Emissions (tons/year)									
				PM10			PM2.5							PM10			PM2.5			
Year	ROG	NO_X	CO	Exhaust	Dust	Total [c]	Exhaust	Dust	Total [c]	SO_2	ROG	NO_X	CO	Exhaust	Dust	Total [c]	Exhaust	Dust	Total [c]	SO_2
Alternative 5																				
PFIY 1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PFIY 2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CY 1	<1	<1	2	<1	1	1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
CY 2	<1	<1	2	<1	1	1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
CY 3	<1	<1	1	<1	1	1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
CY 4	1	<1	6	<1	3	3	<1	1	1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
CY 5	1	<1	7	<1	4	4	<1	1	1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
CY 6	1	1	11	<1	6	6	<1	2	2	<1	<1	<1	1	<1	<1	<1	<1	<1	<1	<1
CY 7	1	1	11	<1	6	6	<1	2	2	<1	<1	<1	1	<1	<1	<1	<1	<1	<1	<1
CY 8	1	1	10	<1	6	6	<1	2	2	<1	<1	<1	1	<1	<1	<1	<1	<1	<1	<1
CY 9	1	1	9	<1	5	5	<1	1	1	<1	<1	<1	1	<1	<1	<1	<1	<1	<1	<1
CY 10	<1	<1	6	<1	3	3	<1	1	1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
CY 11	<1	<1	5	<1	3	3	<1	1	1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
CY 12	<1	<1	2	<1	1	1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
CY 13	<1	<1	1	<1	1	1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
CY 14	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Threshold [d]	–	–	–	–	–	*80*	–	–	–	–	*10*	*10*	–	–	–	–	–	–	–	–

CO = carbon monoxide; lbs = pounds; NO_X = nitrogen oxides; PM10 = particulate matter that is 10 microns in diameter and smaller; PM2.5 = particulate matter that is 2.5 microns in diameter and smaller; ROG = reactive organic gases; SO_2 = sulfur dioxide; YSAQMD = Yolo-Solano Air Quality Management District.

[a] There are no exceedances of YSAQMD's thresholds.

[b] Presents the highest emissions estimate during a single day of construction in each year, based on concurrent construction activities.

[c] Total PM10 and PM2.5 emissions consist of exhaust and fugitive dust emissions. Annual values for exhaust and dust may not add to the totals in the total column because of rounding. Daily results for exhaust and dust may not add to the totals in the total column because the table presents maximum emissions results for each individual pollutant component. For example, the maximum PM exhaust emissions may not occur on the same day as the maximum total dust emissions.

[d] In developing these thresholds, YSAQMD considered levels at which project emissions are cumulatively considerable. Consequently, exceedances of project-level thresholds would be cumulatively considerable.

Table 23-54. Criteria Pollutant and Precursor Emissions from O&M Activities in the Yolo-Solano Air Quality Management District [a]

	Maximum Daily Emissions (lbs/day) [a]										Annual Emissions (tons/year) [a]									
				PM10			PM2.5							PM10			PM2.5			
Alternative	ROG	NO_X	CO	Exhaust	Dust	Total [b]	Exhaust	Dust	Total [b]	SO_2	ROG	NO_X	CO	Exhaust	Dust	Total [b]	Exhaust	Dust	Total [b]	SO_2
1	1	5	6	<1	1	1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
2a	1	5	6	<1	1	1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
2b	1	5	5	<1	1	1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
2c	1	5	6	<1	1	1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
3	1	5	6	<1	1	1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
4a	1	5	6	<1	1	1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
4b	1	5	5	<1	1	1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
4c	1	5	6	<1	1	1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
5	1	5	6	<1	1	1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Threshold [c]	–	–	–	–	–	*80*	–	–	–	–	*10*	*10*	–	–	–	–	–	–	–	–

CO = carbon monoxide; lbs = pounds; NO_X = nitrogen oxides; PM10 = particulate matter that is 10 microns in diameter and smaller; PM2.5 = particulate matter that is 2.5 microns in diameter and smaller; ROG = reactive organic gases; SO_2 = sulfur dioxide; YSAQMD = Yolo-Solano Air Quality Management District.

[a] The annual estimates include emissions from all monthly, quarterly, semiannual, and annual activities and conservatively assume all long-term activities would occur in that same year. The daily estimates are based on an assessment of the maximum amount of maintenance that could theoretically occur in a single day.

[b] Total PM10 and PM2.5 emissions consist of exhaust and fugitive dust emissions. Annual values for exhaust and dust may not add to the totals in the total column because of rounding. Daily results for exhaust and dust may not add to the totals in the total column because the table presents maximum emissions results for each individual pollutant component. For example, the maximum PM exhaust emissions may not occur on the same day as the maximum total dust emissions.

[c] In developing these thresholds, YSAQMD considered levels at which project emissions are cumulatively considerable. Consequently, exceedances of project-level thresholds would be cumulatively considerable.

CEQA Conclusion—All Project Alternatives

The impact would be less than significant under CEQA for all project alternatives because employee travel and equipment and material hauling emissions would not result in exceedance of YSAQMD's thresholds. O&M activities likewise would not result in criteria pollutant or precursor emissions above YSAQMD's numeric thresholds. YSAQMD's thresholds were established to help prevent emissions from new projects in the Yolo and Solano County portions of the SVAB and SFBAAB from contributing to regional violations of the ambient air quality standards. Because emissions would not exceed YSAQMD thresholds, the project would not worsen existing regional air quality or conflict with adopted ambient air quality attainment plans.

Mitigation Impacts

Compensatory Mitigation

Although the Compensatory Mitigation Plan described in Appendix 3F, Compensatory Mitigation Plan for Special-Status Species and Aquatic Resources, does not act as mitigation for criteria pollutant emissions from project construction or operations, its implementation could result in regional air quality impacts.

The compensatory mitigation to restore wetland, open-water, and upland communities on Bouldin Island and restore freshwater marsh along I-5 would not occur in the SMAQMD. These activities would occur in SJVAPCD are evaluated in Impact AQ-2.

As described in Appendix 3F, additional channel margin and tidal habitat may be created within the North Delta Arc as part of the Compensatory Mitigation Plan. The types of construction activities and equipment needed for channel margin and tidal habitat creation are similar to what would be required for construction of the project, although they would be of substantially lesser magnitude. While the specific design criteria required to support emissions quantification are not yet developed, based on the level of activity and emissions quantified for restoration along I-5 and on Bouldin Island (see Table 23-34), construction emissions are not expected to exceed YSAQMD thresholds. Accordingly, construction of the compensatory mitigation sites in YSAQMD would not worsen existing regional air quality or conflict with adopted ambient air quality attainment plans. Therefore, the project alternatives combined with compensatory mitigation would not change the overall construction impact conclusion of less than significant.

Following restoration, future site visits requiring vehicle trips, such as biological monitoring, would likely occur a few times per year. These activities required to monitor and maintain the compensatory mitigation sites would be less frequent and intense than current on-site agricultural practices. Accordingly, maintenance of new channel margin and tidal habitat sites would not result in exceedances of YSAQMD's thresholds. Therefore, the project alternatives combined with compensatory mitigation would not change the overall O&M impact conclusion of less than significant.

Other Mitigation Measures

Some mitigation measures would result in construction equipment exhaust, haul truck exhaust, employee vehicle exhaust, and dust from grading, clearing, excavation, and landscaping activities that would temporarily generate criteria air pollutant emissions and potentially affect regional air quality. The mitigation measures with potential to result in impacts on regional air quality are: Mitigation Measures BIO-2c: *Electrical Power Line Support Placement*; SOILS-2: *Prepare and Implement Topsoil Salvage, Handling, Stockpiling and Reapplication Plans*; AG-3: *Replacement or Relocation of Affected Infrastructure Supporting Agricultural Properties*; AES-1c: *Implement Best Management Practices to Implement Project Landscaping Plan;* CUL-2: *Conduct a Survey of Inaccessible Properties to Assess Eligibility, Determine if These Properties Will Be Adversely Affected by the Project, and Develop Treatment to Resolve or Mitigate Adverse Impacts*; and CUL-1: *Prepare and Implement a Built-Environment Treatment Plan in Consultation with Interested Parties*. Similar to construction of the project alternatives, emissions generating activities from these measures in the YSAQMD would be minor and limited to employee and vehicle pass-through trips. Moreover, anticipated vehicle trips required to implement the mitigation measures and associated emissions would be of a lesser magnitude than required for construction of the project alternatives. Therefore, implementation of other mitigation measures is unlikely to result in regional air quality impacts in YSAQMD and would be less than significant.

Overall, impacts on regional air quality in the YSAQMD for implementation of compensatory mitigation and other mitigation measures, combined with project alternatives, would not change the less than significant impact conclusion.

Impact AQ-5: Result in Exposure of Sensitive Receptors to Substantial Localized Criteria Pollutant Emissions

All Project Alternatives

<u>*Project Construction*</u>

Project construction has the potential to cause elevated criteria pollutant concentrations proximate to construction areas. These elevated concentrations may cause or contribute to exceedances of the short- and long-term NAAQS and CAAQS and affect local air quality and public health. The criteria pollutants of concern with established annual standards are NO_2, PM10, and PM2.5. The criteria pollutants of concern with established hourly or daily standards are the following.

- CO (1 hour and 8 hours)
- PM10 and PM2.5 (24 hours)
- NO_2 (1 hour)
- SO_2 (1 hour and 24 hours)

Tables 23-55 and 23-56 present the estimated maximum hourly and daily concentrations relative to the CAAQS and NAAQS, respectively. The tables present both the incremental project and total pollutant concentration; only the total pollutant concentration, which reflects the incremental project contribution plus the existing concentration, is compared to the CAAQS and NAAQS to determine if construction would cause an ambient air quality violation.

Table 23-57 presents the estimated maximum annual concentrations relative to the CAAQS and NAAQS. Like the hourly and daily analysis, only the total pollutant concentration (project plus background) is compared to the CAAQS and NAAQS.

As discussed in Section 23.2.2.2, *Exposure of Receptors to Localized Emissions*, background concentrations of PM2.5 and PM10 at several locations within the local air quality study area exceed the short-term or long-term PM2.5 and PM10 ambient air quality standards. Table 23-59 compares the incremental project increase in PM concentrations within these areas to the applicable SIL to analyze the potential for the project alternatives to worsen existing PM2.5 and PM10 violations.

The modeled concentrations presented in Tables 23-55 through 23-58 include implementation of quantifiable air quality environmental commitments. Criteria pollutant concentrations are estimated for major construction components (e.g., intakes) based on representative local meteorological conditions. Only the modeled maximum pollutant concentration in each air district with surface construction is reported (i.e., SMAQMD, BAAQMD, and SJVAPCD). The AAQA analysis was not conducted in the YSAQMD because criteria pollutant emissions from vehicle travel through the air district would not exceed YSAQMD's thresholds (Tables 23-45 through 23-53). As previously discussed, air district thresholds are developed in consideration of existing air quality concentrations and attainment designations under the NAAQS and CAAQS. The NAAQS and CAAQS are informed by a wide range of scientific evidence that demonstrates there are known safe concentrations of criteria pollutants. Accordingly, vehicle emissions generated in YSAQMD during project construction would not expose receptors to substantial localized pollution because emissions would not exceed any of YSAQMD's thresholds.

Table 23-55. Maximum Hourly and Daily CAAQS Criteria Pollutant Concentration Impacts from Construction of the Project and Compensatory Mitigation (µg/m^3) [a]

	CO 1-hour		CO 8-hour		NO_2 1-hour		SO_2 1-hour		SO_2 24-hour	
Alternative and Air District	Project [b]	Total [c]	Project [b]	Total [c]	Project [b]	Total [c]	Project [b]	Total [c]	Project [b]	Total [c]
Alternative 1										
SMAQMD	617	5,562	215	3,665	74	198	1	24	<1	5
SJVAPCD	1,923	5,488	430	3,535	151	287	4	26	<1	5
BAAQMD	381	3,141	188	2,603	72	151	1	26	<1	7
Compensatory Mitigation with Alternative 1										
SJVAPCD	1,931	5,496	431	3,536	151	287	4	26	<1	5
Alternative 2a										
SMAQMD	2,161	7,106	684	4,134	132	256	4	26	1	5
SJVAPCD	1,923	5,488	430	3,535	151	287	4	26	<1	5
BAAQMD	382	3,142	188	2,603	72	151	1	26	<1	7
Compensatory Mitigation with Alternative 2a										
SJVAPCD	1,931	5,496	431	3,536	151	287	4	26	<1	5
Alternative 2b										
SMAQMD	440	5,385	155	3,605	74	198	1	23	<1	5
SJVAPCD	1,923	5,488	430	3,535	151	287	4	26	<1	5
BAAQMD	381	3,141	188	2,603	72	151	1	26	<1	7
Compensatory Mitigation with Alternative 2b										
SJVAPCD	1,931	5,496	431	3,536	151	287	4	26	<1	5
Alternative 2c										
SMAQMD	617	5,562	214	3,664	72	196	1	24	<1	5
SJVAPCD	1,923	5,488	430	3,535	151	287	4	26	<1	5
BAAQMD	381	3,141	188	2,603	72	151	1	26	<1	7
Compensatory Mitigation with Alternative 2c										
SJVAPCD	1,931	5,496	431	3,536	151	287	4	26	<1	5
Alternative 3										
SMAQMD	617	5,562	215	3,665	74	198	1	24	<1	5
SJVAPCD	1,855	5,420	319	3,424	142	278	3	26	<1	5
BAAQMD	382	3,142	188	2,603	72	151	1	26	<1	7
Compensatory Mitigation with Alternative 3										
SJVAPCD	1,855	5,420	319	3,424	143	278	3	26	<1	5

Alternative and Air District	CO 1-hour		CO 8-hour		NO_2 1-hour		SO_2 1-hour		SO_2 24-hour	
	Project [b]	Total [c]	Project [b]	Total [c]	Project [b]	Total [c]	Project [b]	Total [c]	Project [b]	Total [c]
Alternative 4a										
SMAQMD	2,161	7,106	684	4,134	132	256	4	26	1	5
SJVAPCD	1,855	5,420	319	3,424	142	278	3	26	<1	5
BAAQMD	382	3,142	188	2,603	72	151	1	26	<1	7
Compensatory Mitigation with Alternative 4a										
SJVAPCD	1,855	5,420	319	3,424	143	278	3	26	<1	5
Alternative 4b										
SMAQMD	440	5,385	155	3,605	74	198	1	23	<1	5
SJVAPCD	1,855	5,420	319	3,424	142	278	3	26	<1	5
BAAQMD	382	3,142	188	2,603	72	151	1	26	<1	7
Compensatory Mitigation with Alternative 4b										
SJVAPCD	1,855	5,420	319	3,424	143	278	3	26	<1	5
Alternative 4c										
SMAQMD	617	5,562	214	3,664	72	196	1	24	<1	5
SJVAPCD	1,855	5,420	319	3,424	142	278	3	26	<1	5
BAAQMD	382	3,142	188	2,603	72	151	1	26	<1	7
Compensatory Mitigation with Alternative 4c										
SJVAPCD	1,855	5,420	319	3,424	143	278	3	26	<1	5
Alternative 5										
SMAQMD	624	5,569	215	3,665	74	198	1	24	<1	5
SJVAPCD	2,288	5,853	665	3,770	181	316	3	26	<1	5
BAAQMD	368	3,128	135	2,550	65	144	1	26	<1	7
Compensatory Mitigation with Alternative 5										
SJVAPCD	2,288	5,853	665	3,770	181	316	3	26	<1	5
CAAQS	–	*23,000*	–	*10,000*	–	*339*	–	*655*	–	*105*

$\mu g/m^3$ = microgram per cubic meter; BAAQMD = Bay Area Air Quality Management District; CAAQS = California ambient air quality standards; CO = carbon monoxide; NO_2 = nitrogen dioxide; SJVAPCD = San Joaquin Valley Air Pollution Control District; SMAQMD = Sacramento Metropolitan Air Quality Management District; SO_2 = sulfur dioxide; YSAQMD = Yolo-Solano Air Quality Management District.

[a] Only the highest modeled concentration is presented for each pollutant. Emissions results include implementation of air quality environmental commitments. Exceedances of the CAAQS are shown in **bolded underline**. Note that background particulate matter concentrations exceed the CAAQS in all project locations. Consequently, the potential for the project to contribute to the existing violations is analyzed in Table 23-58.

[b] Represents the maximum incremental off-site concentration from project construction.

[c] Represents the maximum project-level incremental contribution plus background concentration.

Table 23-56. Maximum Hourly and Daily NAAQS Criteria Pollutant Concentration Impacts from Construction of the Project and Compensatory Mitigation (µg/m^3) [a]

Alternative and Air District	CO 1-hour		CO 8-hour		NO_2 1-hour		PM10 24-hour		PM2.5 24-Hour		SO_2 1-hour	
	Project[b]	Total[c]	Project[b]	Total[c]	Project[b]	Total[c]	Project[b]	Total[c]	Project[b]	Total[c]	Project[b]	Total[c]
Alternative 1												
SMAQMD	589	5,534	154	3,604	30	131	–[d]	–[d]	–[d]	–[d]	1	8
SJVAPCD	1,879	5,444	343	3,448	128	**234**	35	**153**	–[d]	–[d]	3	10
BAAQMD	357	3,117	129	2,544	33	81	73	116	–[d]	–[d]	<1	9
Compensatory Mitigation with Alternative 1												
SJVAPCD	1,879	5,444	343	3,448	128	**234**	35	**153**	–[d]	–[d]	3	10
Alternative 2a												
SMAQMD	2,039	6,984	562	4,012	70	171	–[d]	–[d]	–[d]	–[d]	2	9
SJVAPCD	1,879	5,444	343	3,448	128	**234**	38	**157**	–[d]	–[d]	3	10
BAAQMD	357	3,117	129	2,544	33	81	72	115	–[d]	–[d]	<1	9
Compensatory Mitigation with Alternative 2a												
SJVAPCD	1,879	5,444	343	3,448	128	**234**	38	**157**	–[d]	–[d]	3	10
Alternative 2b												
SMAQMD	414	5,359	108	3,558	42	143	–[d]	–[d]	–[d]	–[d]	<1	7
SJVAPCD	1,879	5,444	343	3,448	128	**234**	25	144	–[d]	–[d]	3	10
BAAQMD	357	3,117	129	2,544	33	81	73	116	–[d]	–[d]	<1	9
Compensatory Mitigation with Alternative 2b												
SJVAPCD	1,879	5,444	343	3,448	128	**234**	25	144	–[d]	–[d]	3	10
Alternative 2c												
SMAQMD	589	5,534	154	3,604	31	132	–[d]	–[d]	–[d]	–[d]	1	8
SJVAPCD	1,879	5,444	343	3,448	128	**234**	31	**150**	–[d]	–[d]	3	10
BAAQMD	357	3,117	129	2,544	33	81	73	116	–[d]	–[d]	<1	9
Compensatory Mitigation with Alternative 2c												
SJVAPCD	1,879	5,444	343	3,448	128	**234**	31	**150**	–[d]	–[d]	3	10
Alternative 3												
SMAQMD	589	5,534	154	3,604	30	131	–[d]	–[d]	–[d]	–[d]	1	8
SJVAPCD	1,777	5,342	272	3,377	77	183	79	**198**	–[d]	–[d]	1	8
BAAQMD	357	3,117	129	2,544	33	81	73	116	–[d]	–[d]	<1	9
Compensatory Mitigation with Alternative 3												
SJVAPCD	1,777	5,342	272	3,377	77	183	79	**198**	–[d]	–[d]	1	8

Alternative and Air District	CO 1-hour Project[b]	CO 1-hour Total[c]	CO 8-hour Project[b]	CO 8-hour Total[c]	NO_2 1-hour Project[b]	NO_2 1-hour Total[c]	PM10 24-hour Project[b]	PM10 24-hour Total[c]	PM2.5 24-Hour Project[b]	PM2.5 24-Hour Total[c]	SO_2 1-hour Project[b]	SO_2 1-hour Total[c]
Alternative 4a												
SMAQMD	2,039	6,984	562	4,012	70	171	–[d]	–[d]	–[d]	–[d]	2	9
SJVAPCD	1,777	5,342	272	3,377	77	183	79	**198**	–[d]	–[d]	1	8
BAAQMD	357	3,117	129	2,544	33	81	72	115	–[d]	–[d]	<1	9
Compensatory Mitigation with Alternative 4a												
SJVAPCD	1,777	5,342	272	3,377	77	183	79	**198**	–[d]	–[d]	1	8
Alternative 4b												
SMAQMD	414	5,359	108	3,558	42	143	–[d]	–[d]	–[d]	–[d]	<1	7
SJVAPCD	1,777	5,342	272	3,377	77	183	78	**197**	–[d]	–[d]	1	8
BAAQMD	357	3,117	129	2,544	33	81	73	123	–[d]	–[d]	<1	9
Compensatory Mitigation with Alternative 4b												
SJVAPCD	1,777	5,342	272	3,377	77	183	79	**197**	–[d]	–[d]	1	8
Alternative 4c												
SMAQMD	589	5,534	154	3,604	31	132	–[d]	–[d]	–[d]	–[d]	1	8
SJVAPCD	1,777	5,342	272	3,377	77	183	79	**197**	–[d]	–[d]	1	8
BAAQMD	357	3,117	129	2,544	33	81	73	116	–[d]	–[d]	<1	9
Compensatory Mitigation with Alternative 4c												
SJVAPCD	1,777	5,342	272	3,377	77	183	79	**197**	–[d]	–[d]	<1	8
Alternative 5												
SMAQMD	595	5,540	158	3,608	29	130	–[d]	–[d]	–[d]	–[d]	1	8
SJVAPCD	2,250	5,815	647	3,752	131	**237**	79	**198**	–[d]	–[d]	2	9
BAAQMD	277	3,037	92	2,507	31	78	15	58	–[d]	–[d]	<1	9
Compensatory Mitigation with Alternative 5												
SJVAPCD	2,250	5,815	647	3,752	131	**237**	79	**198**	–[d]	–[d]	2	9
NAAQS	–	*40,000*	–	*10,000*	–	*188*	–	*150*	–	*35*	–	*196*

$\mu g/m^3$ = microgram per cubic meter; BAAQMD = Bay Area Air Quality Management District; CAAQS = California ambient air quality standards; CO = carbon monoxide; NAAQS = national ambient air quality standards; NO_2 = nitrogen dioxide; PM10 = particulate matter that is 10 microns in diameter and smaller; PM2.5 = particulate matter that is 2.5 microns in diameter and smaller SJVAPCD = San Joaquin Valley Air Pollution Control District; SMAQMD = Sacramento Metropolitan Air Quality Management District; SO_2 = sulfur dioxide; YSAQMD = Yolo-Solano Air Quality Management District.

[a] Only the highest modeled concentration is presented for each pollutant. Emissions results include implementation of air quality environmental commitments. Exceedances of the NAAQS are shown in **bolded underline**.

[b] Represents the maximum incremental off-site concentration from project construction.

[c] Represents the maximum project-level incremental contribution plus background concentration.

[d] Background concentrations exceed the NAAQS. Consequently, the potential for the project to contribute to the existing violation is analyzed in Table 23-58.

Table 23-57. Maximum Annual CAAQS and NAAQS Criteria Pollutant Concentration Impacts from Construction of the Project and Compensatory Mitigation (µg/m^3) [a]

Alternative and Air District	NO_2 (CAAQS) Annual		NO_2 (NAAQS) Annual		PM10 (CAAQS) Annual		PM2.5 (CAAQS) Annual		PM2.5 (NAAQS) Annual	
	Project [b]	Total [c]	Project [b]	Total [c]	Project [b]	Total [c]	Project [b]	Total [c]	Project [b]	Total [c]
Alternative 1										
SMAQMD	2	19	2	19	– [d]	– [d]	– [d]	– [d]	<1	9
SJVAPCD	1	24	1	24	– [d]	– [d]	– [d]	– [d]	– [d]	– [d]
BAAQMD	1	10	1	10	40	**56**	6	**17**	5	**13**
Compensatory Mitigation with Alternative 1										
SJVAPCD	1	24	1	24	– [d]	– [d]	– [d]	– [d]	– [d]	– [d]
Alternative 2a										
SMAQMD	5	22	5	22	– [d]	– [d]	– [d]	– [d]	1	9
SJVAPCD	1	24	1	24	– [d]	– [d]	– [d]	– [d]	– [d]	– [d]
BAAQMD	1	10	1	10	35	**51**	5	**17**	4	**13**
Compensatory Mitigation with Alternative 2a										
SJVAPCD	1	24	1	24	– [d]	– [d]	– [d]	– [d]	– [d]	– [d]
Alternative 2b										
SMAQMD	2	18	2	18	– [d]	– [d]	– [d]	– [d]	<1	9
SJVAPCD	1	24	1	24	– [d]	– [d]	– [d]	– [d]	– [d]	– [d]
BAAQMD	1	10	1	10	40	**56**	6	**17**	5	**13**
Compensatory Mitigation with Alternative 2b										
SJVAPCD	1	24	1	24	– [d]	– [d]	– [d]	– [d]	– [d]	– [d]
Alternative 2c										
SMAQMD	2	19	2	19	– [d]	– [d]	– [d]	– [d]	<1	9
SJVAPCD	1	24	1	24	– [d]	– [d]	– [d]	– [d]	– [d]	– [d]
BAAQMD	1	10	1	10	40	**56**	6	**17**	5	**13**
Compensatory Mitigation with Alternative 2c										
SJVAPCD	1	24	1	24	– [d]	– [d]	– [d]	– [d]	– [d]	– [d]
Alternative 3										
SMAQMD	2	19	2	19	– [d]	– [d]	– [d]	– [d]	<1	9
SJVAPCD	1	24	1	24	– [d]	– [d]	– [d]	– [d]	– [d]	– [d]
BAAQMD	1	10	1	10	39	**54**	6	**17**	5	**13**
Compensatory Mitigation with Alternative 3										
SJVAPCD	1	24	1	24	– [d]	– [d]	– [d]	– [d]	– [d]	– [d]

Alternative and Air District	NO_2 (CAAQS) Annual		NO_2 (NAAQS) Annual		PM10 (CAAQS) Annual		PM2.5 (CAAQS) Annual		PM2.5 (NAAQS) Annual	
	Project[b]	Total[c]	Project[b]	Total[c]	Project[b]	Total[c]	Project[b]	Total[c]	Project[b]	Total[c]
Alternative 4a										
SMAQMD	5	22	5	22	–[d]	–[d]	–[d]	–[d]	1	9
SJVAPCD	1	24	1	24	–[d]	–[d]	–[d]	–[d]	–[d]	–[d]
BAAQMD	1	10	1	10	35	**51**	5	**17**	4	**13**
Compensatory Mitigation with Alternative 4a										
SJVAPCD	1	24	1	24	–[d]	–[d]	–[d]	–[d]	–[d]	–[d]
Alternative 4b										
SMAQMD	2	18	2	18	–[d]	–[d]	–[d]	–[d]	<1	9
SJVAPCD	1	24	1	24	–[d]	–[d]	–[d]	–[d]	–[d]	–[d]
BAAQMD	1	10	1	10	39	**54**	6	**17**	5	**13**
Compensatory Mitigation with Alternative 4b										
SJVAPCD	1	24	1	24	–[d]	–[d]	–[d]	–[d]	–[d]	–[d]
Alternative 4c										
SMAQMD	2	19	2	19	–[d]	–[d]	–[d]	–[d]	<1	9
SJVAPCD	1	24	1	24	–[d]	–[d]	–[d]	–[d]	–[d]	–[d]
BAAQMD	1	10	1	10	39	**54**	6	**17**	5	**13**
Compensatory Mitigation with Alternative 4c										
SJVAPCD	1	24	1	24	–[d]	–[d]	–[d]	–[d]	–[d]	–[d]
Alternative 5										
SMAQMD	2	19	2	19	–[d]	–[d]	–[d]	–[d]	<1	9
SJVAPCD	1	24	1	24	–[d]	–[d]	–[d]	–[d]	–[d]	–[d]
BAAQMD	1	11	1	11	3	18	<1	12	<1	9
Compensatory Mitigation with Alternative 5										
SJVAPCD	1	24	1	24	–[d]	–[d]	–[d]	–[d]	–[d]	–[d]
Standard	–	*57*	–	*100*	–	*20*	–	*12*	–	*12*

$\mu g/m^3$ = microgram per cubic meter; BAAQMD = Bay Area Air Quality Management District; YSAQMD = Yolo-Solano Air Quality Management District; NAAQS = national ambient air quality standards; CAAQS = California ambient air quality standards; CO = carbon monoxide; SJVAPCD = San Joaquin Valley Air Pollution Control District; SMAQMD = Sacramento Metropolitan Air Quality Management District; SO_2 = sulfur dioxide; NO_2 = nitrogen dioxide; PM10 = particulate matter that is 10 microns in diameter and smaller; PM2.5 = particulate matter that is 2.5 microns in diameter and smaller.

[a] Only the highest modeled concentration is presented for each pollutant. Emissions results include implementation of air quality environmental commitments. Exceedances of the CAAQS or NAAQS are shown in **bolded underline**.

[b] Represents the maximum incremental off-site concentration from project construction.

[c] Represents the maximum project-level incremental contribution plus background concentration.

[d] Background concentrations exceed the NAAQS or CAAQS. Consequently, the potential for the project to contribute to the existing violation is analyzed in Table 23-58.

Table 23-58. Maximum Incremental PM10 and PM2.5 Concentrations from Construction of the Project and Compensatory Mitigation in Areas with Background Concentrations in Excess of the Ambient Air Quality Standard ($\mu g/m^3$) [a]

Alternative and Air District	PM10 (NAAQS) 24-Hour [b]	PM10 (CAAQS) 24-Hour [b]	PM10 (CAAQS) Annual [b]	PM2.5 (NAAQS) 24-Hour [b]	PM2.5 (NAAQS) Annual [b]	PM2.5 (CAAQS) Annual [b]
Alternative 1						
SMAQMD	33.0	60	1	2.7	–[c]	0.4
SJVAPCD	–[c]	50	5	2.9	0.6	0.6
BAAQMD	–[c]	87	–[c]	7.9	–[c]	–[c]
Compensatory Mitigation with Alternative 1						
SJVAPCD	–[c]	50	5	2.9	0.6	0.6
Alternative 2a						
SMAQMD	8.7	14	4	1.4	–[c]	0.7
SJVAPCD	–[c]	56	2	2.8	0.5	0.5
BAAQMD	–[c]	86	–[c]	7.9	–[c]	–[c]
Compensatory Mitigation with Alternative 2a						
SJVAPCD	–[c]	56	2	2.8	0.5	0.5
Alternative 2b						
SMAQMD	48.4	57	1	5.1	–[c]	0.4
SJVAPCD	–[c]	37	2	2.6	0.5	0.5
BAAQMD	–[c]	87	–[c]	7.9	–[c]	–[c]
Compensatory Mitigation with Alternative 2b						
SJVAPCD	–[c]	37	2	2.6	0.5	0.5
Alternative 2c						
SMAQMD	31.7	37	<1	2.7	–[c]	0.3
SJVAPCD	–[c]	46	2	2.6	0.5	0.5
BAAQMD	–[c]	86	–[c]	7.9	–[c]	–[c]
Compensatory Mitigation with Alternative 2c						
SJVAPCD	–[c]	46	2	2.6	0.5	0.5
Alternative 3						
SMAQMD	45.9	49	1	2.7	–[c]	0.4
SJVAPCD	–[c]	111	4	9.3	0.5	0.5
BAAQMD	–[c]	86	–[c]	7.9	–[c]	–[c]
Compensatory Mitigation with Alternative 3						
SJVAPCD	–[c]	111	4	9.3	0.5	0.5

Alternative and Air District	PM10 (NAAQS) 24-Hour [b]	PM10 (CAAQS) 24-Hour [b]	PM10 (CAAQS) Annual [b]	PM2.5 (NAAQS) 24-Hour [b]	PM2.5 (NAAQS) Annual [b]	PM2.5 (CAAQS) Annual [b]
Alternative 4a						
SMAQMD	**8.0**	**14**	**3**	**1.2**	–[c]	**0.7**
SJVAPCD	–[c]	**111**	**4**	**9.3**	**0.6**	**0.6**
BAAQMD	–[c]	**86**	–[c]	**7.9**	–[c]	–[c]
Compensatory Mitigation with Alternative 4a						
SJVAPCD	–[c]	**111**	**4**	**9.3**	**0.6**	**0.6**
Alternative 4b						
SMAQMD	**48.4**	**57**	**1**	**5.1**	–[c]	**0.4**
SJVAPCD	–[c]	**110**	**3**	**9.3**	**0.4**	**0.4**
BAAQMD	–[c]	**87**	–[c]	**7.9**	–[c]	–[c]
Compensatory Mitigation with Alternative 4b						
SJVAPCD	–[c]	**110**	**3**	**9.3**	**0.4**	**0.4**
Alternative 4c						
SMAQMD	**31.7**	**37**	<1	**2.7**	–[c]	**0.3**
SJVAPCD	–[c]	**110**	**3**	**9.3**	**0.4**	**0.5**
BAAQMD	–[c]	**86**	–[c]	**7.9**	–[c]	–[c]
Compensatory Mitigation with Alternative 4c						
SJVAPCD	–[c]	**110**	**3**	**9.3**	**0.4**	**0.5**
Alternative 5						
SMAQMD	**8.8**	**10**	**1**	**1.1**	–[c]	**0.4**
SJVAPCD	–[c]	**111**	**3**	**9.3**	**0.5**	**0.5**
BAAQMD	–[c]	**22**	–[c]	**1.5**	–[c]	–[c]
Compensatory Mitigation with Alternative 5						
SJVAPCD	–[c]	**111**	**3**	**9.3**	**0.5**	**0.5**
SIL	*5.0*	*5.0*	*1.0*	*1.2*	*0.2*	*0.2*

$\mu g/m^3$ = microgram per cubic meter; BAAQMD = Bay Area Air Quality Management District; CAAQS = California ambient air quality standards; NAAQS = national ambient air quality standards; PM10 = particulate matter that is 10 microns in diameter and smaller; PM2.5 = particulate matter that is 2.5 microns in diameter and smaller; SIL = significant impact level; SJVAPCD = San Joaquin Valley Air Pollution Control District; SMAQMD = Sacramento Metropolitan Air Quality Management District; YSAQMD = Yolo-Solano Air Quality Management District.

[a] Only the highest modeled concentration is presented for each pollutant. Emissions results include implementation of air quality environmental commitments. Exceedances of the SIL are shown in **bolded underline**.

[b] Represents the maximum incremental off-site concentration from project construction.

[d] Background concentrations does not exceed the NAAQS or CAAQS. Refer to Tables 23-56 and 23-57.

Even with incorporation of environmental commitments, construction of all alternatives would result in an impact on local air quality.

Within SMAQMD, construction of any project alternative would generate maximum 24-hour PM10 concentrations above the SIL (CAAQS/CAAQS). Construction of all alternatives except Alternatives 2c and 4c would generate maximum annual PM10 concentrations above the SIL (NAAQS). Construction of any project alternative would generate maximum 24-hour PM2.5 and annual PM2.5 concentrations above the SIL (NAAQS and CAAQS, respectively). The highest exceedances are predicted to occur along the construction fence line of the double launch shaft at the Twin Cities Complex.

Within the SJVAPCD, construction of any project alternative would generate maximum 24-hour PM10 concentrations above the NAAQS and SIL (CAAQS), maximum annual PM2.5 concentrations above the SIL (CAAQS and NAAQS), and maximum 24-hour PM2.5 concentrations above the SIL (NAAQS). These violations would primarily occur along the fence line of shaft locations. Construction of Alternatives 1, 2a, 2b, 2c, and 5 would generate maximum 1-hour NO_2 concentrations above the NAAQS.

Within the BAAQMD, construction of the Southern Complex would result in higher maximum annual PM10 and PM2.5 concentrations, compared to construction of the Bethany Complex. Accordingly, construction of any project alternative except Alternative 5 would generate maximum annual PM2.5 concentrations above the NAAQS and CAAQS and maximum annual PM10 concentrations above the CAAQS along the construction fence line of the Southern Complex. Construction of all project alternatives would generate maximum 24-hour PM2.5 and PM10 above the SIL (NAAQS and CAAQS, respectively) along the construction fence line of the Southern Complex (central and eastern alignment alternatives) and Bethany Complex (Bethany Reservoir alternative).

Exceedances of the PM10 and PM2.5 ambient air quality standards and SILs are primarily associated with earthmoving activities and travel of vehicles over unpaved surfaces. Violations of the NO_2 NAAQS are primarily associated with diesel-powered equipment and vehicles. The predicted results combine worst-case meteorological conditions with the highest daily and annual construction emissions estimates. This approach is conservative and, therefore, is not necessarily representative of actual hourly or annual concentrations that would occur during the construction period. Additionally, concentrations were modeled along the construction fence line to represent the closest point to which the public may be exposed to construction-generated emissions. Because pollutant concentrations emitted from these low-level emissions sources regularly decline as a function of distance from the emissions source, actual concentrations at homes and businesses, which are not adjacent to the construction fence line, would be much lower than presented in this analysis. For example, at Lower Roberts Shaft Work Area in San Joaquin County, annual PM10 concentrations decrease by 55 and 64% at 50 and 100 meters, respectively, from the construction fence line, and 24-hour PM10 concentrations decrease by 29 and 40% at 50 and 100 meters, respectively, from the construction fence line.

Carbon Monoxide from On-Road Vehicles

Off-site construction traffic may contribute to increased roadway congestion, which could lead to conditions conducive to CO hotspot formation at intersections throughout Northern California. However, the highest peak hour traffic volumes with the project—1,770 vehicles per hour—on those intersections included in the transportation analysis would occur at Hood Franklin/I-5 under

Alternative 2a. While this is less than 10% of the congested traffic volume modeled by BAAQMD (24,000 vehicles per hour) that would be needed to contribute to a localized CO hotspot, project traffic would degrade LOS at some study area intersections (refer to Appendix 20A, *Delta Conveyance 2020 Traffic Analysis*). Degradation of intersection LOS conflicts with SJVAPCD's screening criteria and could conflict with BAAQMD's third screening criteria regarding consistency with local CMPs.

Accordingly, CO concentrations at three intersections (one in each SMAQMD, SJVAPCD, and BAAQMD) identified in the traffic analysis (Appendix 20A) as having the highest traffic volumes and the worst levels of congestion/delay were modeled. Because project traffic would be prohibited from using Delta roads, there would be no impact on local intersections within YSAQMD. The CO concentrations were conservatively modeled under 2020 roadway conditions and emissions intensities, even though peak construction traffic would occur after the fifth year of construction. CO concentrations for the three intersections were modeled for Alternatives 2a, 4, and 5, respectively. These alternatives have the highest projected off-site construction volumes at these locations.

Table 23-59 shows the CO concentrations associated with project construction vehicles would not contribute to a localized violation of the health protective CAAQS at intersections throughout the transportation network.

Table 23-59. Maximum Carbon Monoxide Concentrations Resulting from Off-Site Construction Traffic (parts per million)

Intersection	Receptor [a]	1-Hour CO Concentration [b]	8-Hour CO Concentration [c]
Hood Franklin Road/ Southbound I-5 On/Off-Ramps	1	3.4	2.2
	2	3.4	2.2
	3	3.4	2.2
	4	3.4	2.2
SR 12/Terminous Drive	1	3.4	2.4
	2	3.3	2.3
	3	3.3	2.3
	4	3.5	2.5
Byron Hwy/Clifton Court Road	1	3.0	2.2
	2	2.8	2.1
	3	2.9	2.2
	4	2.8	2.1
State standard	–	20	9
Federal standard	–	35	9

CO = carbon monoxide.

[a] Receptors are located at 9.8 feet from the intersection, at each of the four corners to represent the nearest location at which a receptor could potentially be adjacent to a traveled roadway.

[b] Based on the intersection location, average 1-hour background concentrations from Table 23-4 were added to the modeled project CO concentrations.

[c] Based on the intersection location, average 8-hour background concentrations from Table 23-4 were added to the modeled project CO concentrations.

Operations and Maintenance

O&M would be conducted daily or at varying frequencies, depending on the type of activity. Daily and weekly activities include inspections, security checks, and operations oversight that would only generate emissions from employee commute vehicles. Less frequent activities (e.g., monthly, quarterly, annually, long-term) may result in additional emissions from trucks and equipment. Emissions generated by these activities would be limited in duration, with some activities requiring less than a day to complete only once per year.

As shown in Tables 23-23, 23-33, 23-44, and 23-54, maximum daily and total annual criteria pollutant emissions estimated for O&M activities would be well below all air district thresholds. Air districts develop region-specific mass emissions thresholds in consideration of existing air quality concentrations and attainment designations under the NAAQS and CAAQS. While recognizing that air quality is a cumulative problem, air districts typically consider projects that generate criteria pollutant and ozone precursor emissions below these thresholds to be minor in nature and to not adversely affect air quality such that the NAAQS or CAAQS would be exceeded. Moreover, estimated O&M emissions are comparable (and for some pollutants, lower) than those estimated for construction of the compensatory mitigation sites, and as shown in Tables 23-61 through 23-64, those emissions would not cause an ambient air quality violation.

Off-site O&M traffic would be minor; for example, daily and weekly employee travel required for all Sacramento County locations would result in only 20 vehicle trips, assuming all activities take place on the same day. Accordingly, the project would not degrade intersection operations in any air district and would not exceed any of the air district screening criteria for localized CO hotspots.

CEQA Conclusion—All Project Alternatives

The impact would be significant under CEQA for all project alternatives because construction could contribute to existing violations or create new violations of the PM2.5 and PM10 standards. Construction of Alternatives 1, 2a, 2b, 2c, and 5 would generate maximum 1-hour NO_2 concentrations above the NAAQS.

No other violations of the ambient air quality standards would result during project construction. Likewise, off-site construction traffic would not contribute to a localized violation of the CAAQS or NAAQS at intersections throughout the transportation network. Emissions from long-term O&M activities would not cause or contribute to violations of the CAAQS and NAAQS.

Environmental Commitments EC-7: *Off-Road Heavy-Duty Engines* through EC-13: *DWR Best Management Practices to Reduce GHG Emissions* would minimize construction emissions through implementation of the best available on-site controls. However, exceedances of the SILs and ambient air quality standards would still occur, and the project would contribute a significant level of localized air pollution within the local air quality study area.

Mitigation Measure AQ-5: *Avoid Public Exposure to Localized Particulate Matter and Nitrogen Dioxide Concentrations* is required to reduce potential public exposure to elevated ambient concentrations of PM and NO_2 during construction.[12] As discussed above, the predicted results presented in

[12] Although Mitigation Measures AQ-1 through AQ-3 will offset NOx and PM emissions, as required, these offsets could occur regionally throughout the SVAB, SJVAB, and SFBAAB. Accordingly, the emissions reductions achieved by these offsets may not contribute to enough localized reductions to avoid a project-level violation of the ambient air quality standards or SIL.

Tables 23-55 through 23-58 are conservative because they combine worst-case meteorological conditions with the highest daily and annual construction emissions estimates. Mitigation Measure AQ-5 requires additional PM and NO_2 modeling to provide a more refined estimate of hourly and annual concentrations that are expected to occur during the construction period. If the refined modeling predicts an exceedance of the SIL or violation of the NO_2 NAAQS, the measure requires DWR to conduct ambient air quality monitoring during construction. Results of the monitoring would be used to inform decision-making on further actions to reduce pollutant concentrations. While these actions would lower exposure to project-generated air pollution, it may not be feasible to completely eliminate all localized exceedances of the SILs and ambient air quality standards. Accordingly, this impact is determined to be significant and unavoidable.

Mitigation Measure AQ-5: Avoid Public Exposure to Localized Particulate Matter and Nitrogen Dioxide Concentrations

1. DWR will employ a tiered approach to reduce ambient exposure to localized PM and NO_2 concentrations. The approach will be taken in the following way.

    a. Conduct refined PM and NO_2 concentration modeling at locations identified in the air quality analysis as exceeding the SIL or ambient air quality standards (as appliable, depending on background concentrations). NO_2 modeling will be refined by using seasonal and diurnal hourly background NO_2 concentration data for the local air quality study area. In addition, ozone data from the same hourly meteorological period will be used to perform a Tier 3 analysis of 1-hour NO_2 using the EPA's ozone limiting method. The refined PM modeling (both PM2.5 and PM10) will be performed using local site-specific representative data collected for silt loading and soil moisture content. The measurement will be completed using specific test methods as described in EPA AP-42 Appendix C.1. *Procedures for Sampling Surface/Bulk Dust Loading* and EPA AP-42 Appendix C.2. *Procedures for Laboratory Analysis of Surface/Bulk Dust Loading Samples*. These site-specific silt loading and soil moisture measurements will be used to determine emissions estimates for use in the refined PM concentration modeling.

    b. If the refined modeling shows an exceedance of the SIL or ambient air quality standards (as appliable), DWR will conduct real-time air quality monitoring for PM and/or NO_2 during construction at locations identified in the refined modeling as potentially exceeding the SIL or ambient air quality standards (as appliable, depending on background concentrations). The monitoring will be conducted according to the following requirements.

        i. **Background Monitoring During Construction**: DWR will identify representative background PM and/or NO_2 air quality monitors in coordination with the local air district. CARB and air districts maintain a network of air quality monitoring sites designed to monitor background concentrations within the air district. Project construction features must be within the spatial scale[13] of representativeness for the selected monitors. DWR will identify background monitoring stations based

[13] 40 CFR Part 58, Appendix D defines spatial scale as the "physical dimensions of the air parcel nearest to a monitoring site throughout which actual pollutant concentrations are reasonably similar." The six scales are microscale (several meters to 100 meters), middle scale (100 meters to 0.5 kilometer), neighborhood scale (0.5 kilometer to 4.0 kilometers), urban scale (4.0 kilometers to 50 kilometers), regional scale (tens to hundreds of kilometers), and national and global scales.

on their proximity to project construction features and registered spatial scale. DWR will confirm with the local air district that the selected stations are representative of ambient air quality for the study area(s). DWR will also confirm with the station administrator (CARB or local air district) that the selected monitoring stations will operate during construction of those features for which the background concentrations will be applied and real-time monitoring results will be accessible to DWR.

In the event that there are no CARB or air district monitoring stations within an appropriate distance of project construction features (as determined through consultation with the local air district), or those stations will not operate during project construction and/or real-time data would not be available to DWR, DWR will consult with the local air district to identify alternative monitoring stations, which may include establishment of a DWR operated background station. Any alternative monitoring station used to collect background monitoring data must meet the network design criteria for ambient air quality monitoring defined in 40 CFR Part 58, Appendix D. DWR must obtain confirmation from the local air district that the alternative monitoring station(s) meet these design standards.

ii. **On-Site Construction Monitoring:** Downwind monitoring during construction will be conducted by DWR in the prevailing downwind direction from the construction activity at the fence line location. The location of the monitor may be moved from time to time to follow changes in active construction. DWR will use a monitoring method that is equivalent to the method used at the background station (e.g., Federal Reference Method). This will allow real-time differences in PM concentrations to be determined through a comparison of the construction monitoring data collected by DWR to the background monitoring maintained by the air district. The difference in concentrations between the monitoring results represents the incremental project contribution for comparison to the SILs.

iii. **Increment:** If the real-time construction monitoring concentration is found to be within 80% of the 24-hour PM10 CAAQS (50 $\mu g/m^3$) or 24-hour PM2.5 NAAQS (35 $\mu g/m^3$), and the real-time hourly increment (construction minus background) concentrations are found to be within 80% of the 24-hour PM10 SIL (5 $\mu g/m^3$) or 24-hour PM2.5 SIL (1.2 $\mu g/m^3$), then DWR will take corrective action to reduce incremental concentrations to acceptable levels. Likewise, if the real-time construction monitoring concentration is found to be within 80% of the 1-hour NO_2 CAAQS (188 $\mu g/m^3$), then DWR will take corrective action to reduce total concentrations to acceptable levels. Actions may include potentially limiting construction activity during adverse meteorological conditions (e.g., during high wind events), relocating construction activity during the adverse period, or taking additional corrective activities to limit emissions (e.g., temporary covering of portions of the storage piles, reducing equipment operation).

iv. **Timing:** DWR will select the background monitoring station(s) prior to obtaining the authority to construct permit for the construction activities. Background monitoring (i) and on-site construction monitoring (ii) will occur daily over the entire duration of construction activities.

v. **Reporting:** DWR will conduct monthly reviews of the concentration data and maintain a record of data throughout construction. If the measured increment concentrations attributable to on-site construction activities exceed the performance standard (SIL or ambient air quality standard), DWR will report this information to the local air district and describe the action(s) taken to reduce the increment concentrations (as described under [iii]).

Mitigation Impacts

Compensatory Mitigation

Although the Compensatory Mitigation Plan described in Appendix 3F, *Compensatory Mitigation Plan for Special-Status Species and Aquatic Resources,* does not act as mitigation for criteria pollutant emissions from project construction or operations, its implementation could expose sensitive receptors to localized pollution.

As described in Appendix 3F, actions undertaken for compensatory mitigation would restore freshwater marsh along I-5 and wetland, open-water, and upland communities on Bouldin Island in SJVAPCD. Tables 23-60 and 23-61 present the estimated maximum hourly and daily pollutant concentrations generated by compensatory mitigation activities relative to the CAAQS and NAAQS, respectively. Table 23-62 presents the estimated maximum annual concentrations relative to the CAAQS and NAAQS. The tables present both the incremental project and total pollutant concentrations; only the total pollutant concentration, which reflects the incremental project contribution plus the existing concentration, is compared to the CAAQS and NAAQS to determine if construction would cause an ambient air quality violation. Table 23-63 compares the incremental project increase in PM concentrations within areas where background concentrations exceed the NAAQS or CAAQS to the applicable SIL. Only the modeled maximum pollutant concentration is reported.

No violations of the ambient air quality standards or SIL would occur during construction of the compensatory mitigation sites along I-5 or on Bouldin Island. Off-site construction traffic for compensatory mitigation would likewise be minor and would not exceed any of the air district screening criteria for localized CO hotspots. While the specific design criteria required to support emissions quantification for channel margin and tidal habitat restoration activities within the North Delta Arc are not yet developed, based on the level of activity and concentrations quantified for restoration along I-5 and on Bouldin Island, no violations of the ambient air quality standards or SIL are expected. Therefore, the project alternatives combined with compensatory mitigation would not change the overall impact conclusion of significant and unavoidable.

Table 23-60. Maximum Hourly and Daily CAAQS Criteria Pollutant Concentration Impacts from Compensatory Mitigation Along I-5 and on Bouldin Island (μg/m³) [a]

	CO 1-Hour		CO 8-Hour		NO_2 1-Hour		SO_2 1-Hour		SO_2 24-Hour	
Air District	Project [b]	Total [c]	Project [b]	Total [c]	Project [b]	Total [c]	Project [b]	Total [c]	Project [b]	Total [c]
Compensatory Mitigation										
SJVAPCD	8	8	1	1	<1	<1	<1	<1	<1	<1
CAAQS	–	23,000	–	10,000	–	339	–	655	–	105

μg/m³ = microgram per cubic meter; CAAQS = California ambient air quality standards; CO = carbon monoxide; NO_2 = nitrogen dioxide; SJVAPCD = San Joaquin Valley Air Pollution Control District; SMAQMD = Sacramento Metropolitan Air Quality Management District; SO_2 = sulfur dioxide.

[a] Only the highest modeled concentration is presented for each pollutant. Emissions results include implementation of air quality environmental commitments. Note that background particulate matter concentrations exceed the CAAQS in all project locations. Consequently, the potential for the project to contribute to the existing violations is analyzed in Table 23-63.

[b] Represents the maximum incremental off-site concentration from project construction.

[c] Represents the maximum project-level incremental contribution plus background concentration.

Table 23-61. Maximum Hourly and Daily NAAQS Criteria Pollutant Concentration Impacts from Compensatory Mitigation Along I-5 and on Bouldin Island (μg/m³) [a]

	CO 1-Hour		CO 8-Hour		NO_2 1-Hour		PM10 24-Hour		PM2.5 24-Hour		SO_2 1-Hour	
Air District	Project [b]	Total [c]	Project [b]	Total [c]	Project [b]	Total [c]	Project [b]	Total [c]	Project [b]	Total [c]	Project [b]	Total [c]
Compensatory Mitigation												
SJVAPCD	<1	<1	<1	<1	<1	<1	<1	<1	– [d]	– [d]	<1	<1
NAAQS	–	*40,000*	–	*10,000*	–	*188*	–	*150*	–	*35*	–	*196*

μg/m³ = microgram per cubic meter; CO = carbon monoxide; NAAQS = national ambient air quality standards; NO_2 = nitrogen dioxide; PM10 = particulate matter that is 10 microns in diameter and smaller; PM2.5 = particulate matter that is 2.5 microns in diameter and smaller; SJVAPCD = San Joaquin Valley Air Pollution Control District; SMAQMD = Sacramento Metropolitan Air Quality Management District; SO_2 = sulfur dioxide.

[a] Only the highest modeled concentration is presented for each pollutant. Emissions results include implementation of air quality environmental commitments.

[b] Represents the maximum incremental off-site concentration from project construction.

[c] Represents the maximum project-level incremental contribution plus background concentration.

[d] Background concentrations exceed the NAAQS or CAAQS. Consequently, the potential for the project to contribute to the existing violation is analyzed in 23-63.

Table 23-62. Maximum Annual CAAQS and NAAQS Criteria Pollutant Concentration Impacts from Compensatory Mitigation Along I-5 and on Bouldin Island ($\mu g/m^3$) [a]

	NO_2 (CAAQS) Annual		NO_2 (NAAQS) Annual		PM10 (CAAQS) Annual		PM2.5 (CAAQS) Annual		PM2.5 (NAAQS) Annual	
Air District	Project [b]	Total [c]	Project [b]	Total [c]	Project [b]	Total [c]	Project [b]	Total [c]	Project [b]	Total [c]
Compensatory Mitigation										
SJVAPCD	<1	<1	<1	<1	– [d]	– [d]	– [d]	– [d]	– [d]	– [d]
Standard	–	*57*	–	*100*	–	*20*	–	*12*	–	*12*

$\mu g/m^3$ = microgram per cubic meter; NAAQS = national ambient air quality standards; CAAQS = California ambient air quality standards; CO = carbon monoxide; SMAQMD = Sacramento Metropolitan Air Quality Management District; SJVAPCD = San Joaquin Valley Air Pollution Control District;SO_2 = sulfur dioxide; NAAQS = national ambient air quality standards; NO_2 = nitrogen dioxide; PM10 = particulate matter that is 10 microns in diameter and smaller; PM2.5 = particulate matter that is 2.5 microns in diameter and smaller.

[a] Only the highest modeled concentration is presented for each pollutant. Emissions results include implementation of air quality environmental commitments.

[b] Represents the maximum incremental off-site concentration from project construction.

[c] Represents the maximum project-level incremental contribution plus background concentration.

[d] Background concentrations exceed the NAAQS or CAAQS. Consequently, the potential for the project to contribute to the existing violation is analyzed in 23-63.

Table 23-63. Maximum Incremental PM10 and PM2.5 Concentrations from Compensatory Mitigation Along I-5 and on Bouldin Island in Areas with Background Concentrations in Excess of the Ambient Air Quality Standard ($\mu g/m^3$) [a]

Air District	PM10 (NAAQS) 24-Hour [b]	PM10 (CAAQS) 24-Hour [b]	PM10 (CAAQS) Annual [b]	PM2.5 (NAAQS) 24-Hour [b]	PM2.5 (NAAQS) Annual [b]	PM2.5 (CAAQS/NAAQS) Annual [b]
Compensatory Mitigation						
SJVAPCD	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
SIL	*5.0*	*5.0*	*1.0*	*1.2*	*0.2*	*0.2*

$\mu g/m^3$ = microgram per cubic meter; SJVAPCD = San Joaquin Valley Air Pollution Control District; SMAQMD = Sacramento Metropolitan Air Quality Management District; YSAQMD = Yolo-Solano Air Quality Management District; NAAQS = national ambient air quality standards; CAAQS = California ambient air quality standards; PM10 = particulate matter that is 10 microns in diameter and smaller; PM2.5 = particulate matter that is 2.5 microns in diameter and smaller; SIL = significant impact level.

[a] Only the highest modeled concentration is presented for each pollutant. Emissions results include implementation of air quality environmental commitments.

[b] Represents the maximum incremental off-site concentration from project construction.

Other Mitigation Measures

Some mitigation measures would result in construction equipment exhaust, haul truck exhaust, employee vehicle exhaust, and dust from grading, clearing, excavation, and landscaping activities that would temporarily generate criteria air pollutant emissions and potentially expose sensitive receptors to substantial localized pollution. The mitigation measures with potential to result in localized air quality impacts on sensitive receptors are: Mitigation Measures BIO-2c: *Electrical Power Line Support Placement*; SOILS-2: *Prepare and Implement Topsoil Salvage, Handling, Stockpiling and Reapplication Plans*; AG-3: *Replacement or Relocation of Affected Infrastructure Supporting Agricultural Properties*; AES-1c: *Implement Best Management Practices to Implement Project Landscaping Plan*; CUL-1: *Prepare and Implement a Built-Environment Treatment Plan in Consultation with Interested Parties*; and CUL-2: *Conduct a Survey of Inaccessible Properties to Assess Eligibility, Determine if These Properties Will Be Adversely Affected by the Project, and Develop Treatment to Resolve or Mitigate Adverse Impacts*. Construction emissions resulting from implementation of mitigation measures would be similar to those generated by construction of the project alternatives, but of a much lesser magnitude. Environmental Commitments EC-7: *Off-Road Heavy-Duty Engines,* EC-8: *On-Road Haul Trucks*, and EC-13: *DWR Best Management Practices to Reduce GHG Emissions* would reduce construction equipment and vehicle emissions generated from implementation of mitigation measures. Environmental Commitments EC-11: *Fugitive Dust Control* and EC-12: *On-Site Site Concrete Batching Plants* are available to reduce fugitive dust. Mitigation Measure AQ-5: *Avoid Public Exposure to Localized Particulate Matter and Nitrogen Dioxide Concentrations* would reduce the severity of potential public exposure to elevated ambient concentrations of PM and NO_2 during construction but exceedances of the SILs and ambient air quality standards may still occur. Therefore, implementation of other mitigation measures could contribute to localized air pollution, and impacts would be significant and unavoidable with mitigation.

Overall, impacts on sensitive receptors from implementation of compensatory mitigation and other mitigation measures, combined with project alternatives, would not change the significant and unavoidable with mitigation impact conclusion.

Impact AQ-6: Result in Exposure of Sensitive Receptors to Substantial Toxic Air Contaminant Emissions

All Project Alternatives

Project Construction

Inhalation of DPM from construction of the project alternatives has the potential to create health risks, which may exceed air district significance thresholds for increased cancer and noncancer health hazards at receptor locations adjacent to the project. Construction would result in DPM emissions primarily from diesel-fueled off-road equipment and heavy-duty trucks, as well as toxic metal emissions from concrete batch plants. Cancer risk from exposure to diesel exhaust is much higher than the risk associated with any other air toxic from construction of the project.

Table 23-65 shows estimated construction-related health risks relative to the air district thresholds for all project alternatives. The modeled health risks include implementation of Environmental Commitments EC-7: *Off-Road Heavy-Duty Engines*, EC-9: *On-Site Locomotives*, and EC-10: *Marine Vessels* (EC-11: *Fugitive Dust Control* and EC-12: *On-Site Concrete Batching Plants* would not affect risks, and EC-8: *On-Road Haul Trucks* and EC-13: *DWR Best Management Practices to Reduce GHG*

Emissions were not quantified). Local topography and meteorology can greatly influence DPM air concentrations and the resulting exposure and health risk. Consequently, health risks along the conveyance alignment were estimated based on representative local meteorological conditions. The health risks shown in Table 23-64 represent the highest modeled off-site risk within each air district, which typically occurs at the receptor closest to the construction footprint. Cancer risk for this analysis (Table 23-64) is the likelihood or chance of developing cancer over a 70-year lifetime if a person was continuously exposed to project-generated DPM emissions during construction. The predicted cancer risk reflects the "excess" risk, or additional probability of developing cancer above the existing background risk level. For example, CARB (2007:20) estimates that regional background cancer risk in the SJVAB caused by ambient DPM exposure is about 390 per million (based on 2000 data). This means that per one million people, 390 individuals could develop cancer over a lifetime of exposure to ambient DPM concentrations. If the predicted excess cancer risk attributed to the project is 10 per million, this means that per one million people, 10 more individuals could develop cancer from exposure to project-generated DPM emissions. In other words, based on the CARB estimates for the SJVAB, the total potential cancer burden per one million people would be 400—potentially 10 additional cases over the background rate of occurrence in a population.

While excess cancer risk is expressed per million people, this does not mean that one million people would be exposed to project-generated emissions. The predicted excess cancer risk shown in Table 23-64 can be expressed on an individual basis by dividing the risk by one million. For example, the maximum modeled excess cancer risk for the project is 26 per million, or 0.000026 potential cases. In other words, the maximum excess cancer burden attributed to project construction is predicted to afflict less than one person on an individual basis. This result is only applicable to an individual continuously located immediately north of Intake A (as discussed further below) over the entire duration of construction activities. Based on modeling conducted for the project, DPM concentrations, and thus excess cancer risk from exposure to DPM, declines as a function of distance from the emissions source. For example, at Intake A in Sacramento County, annual DPM concentrations decrease by 57 and 72% at 50 and 100 meters, respectively, from the construction fence line of Intake A. Accordingly, excess cancer risk to individuals beyond the immediate construction area would be much lower than presented in this analysis.

Table 23-64. Excess Cancer and Noncancer Health Risks Associated with Construction of the Project and Compensatory Mitigation [a]

Alternative and Air District	Maximum Modeled Excess Cancer (potential cases per million) [b]	Maximum Modeled Chronic HI [c]	Maximum Modeled Acute HI [c]
Alternative 1			
SMAQMD	8	<0.1	0.2
SJVAPCD	1	<0.1	0.2
BAAQMD	1	<0.1	0.2
YSAQMD	1	<0.1	0.2
Compensatory Mitigation with Alternative 1			
SJVAPCD	1	<0.1	0.2
Alternative 2a			
SMAQMD	**<u>26</u>**	<0.1	0.3
SJVAPCD	2	<0.1	0.3

Alternative and Air District	Maximum Modeled Excess Cancer (potential cases per million) [b]	Maximum Modeled Chronic HI [c]	Maximum Modeled Acute HI [c]
BAAQMD	2	<0.1	0.2
YSAQMD	1	<0.1	0.2
Compensatory Mitigation with Alternative 2a			
SJVAPCD	2	<0.1	0.3
Alternative 2b			
SMAQMD	4	<0.1	0.2
SJVAPCD	2	<0.1	0.3
BAAQMD	1	<0.1	0.2
YSAQMD	1	<0.1	0.2
Compensatory Mitigation with Alternative 2b			
SJVAPCD	2	<0.1	0.3
Alternative 2c			
SMAQMD	8	<0.1	0.2
SJVAPCD	2	<0.1	0.3
BAAQMD	1	<0.1	0.2
YSAQMD	1	<0.1	0.2
Compensatory Mitigation with Alternative 2c			
SJVAPCD	2	<0.1	0.3
Alternative 3			
SMAQMD	8	<0.1	0.2
SJVAPCD	3	<0.1	0.3
BAAQMD	1	<0.1	0.2
YSAQMD	1	<0.1	0.2
Compensatory Mitigation with Alternative 3			
SJVAPCD	3	<0.1	0.3
Alternative 4a			
SMAQMD	**26**	<0.1	0.3
SJVAPCD	3	<0.1	0.3
BAAQMD	2	<0.1	0.2
YSAQMD	1	<0.1	0.2
Compensatory Mitigation with Alternative 4a			
SJVAPCD	3	<0.1	0.3
Alternative 4b			
SMAQMD	4	<0.1	0.2
SJVAPCD	3	<0.1	0.3
BAAQMD	1	<0.1	0.2
YSAQMD	1	<0.1	0.2
Compensatory Mitigation with Alternative 4b			
SJVAPCD	3	<0.1	0.3

Alternative and Air District	Maximum Modeled Excess Cancer (potential cases per million) [b]	Maximum Modeled Chronic HI [c]	Maximum Modeled Acute HI [c]
Alternative 4c			
SMAQMD	8	<0.1	0.2
SJVAPCD	3	<0.1	0.3
BAAQMD	1	<0.1	0.2
YSAQMD	1	<0.1	0.2
Compensatory Mitigation with Alternative 4c			
SJVAPCD	3	<0.1	0.3
Alternative 5			
SMAQMD	8	<0.1	0.2
SJVAPCD	4	<0.1	0.4
BAAQMD	1	<0.1	0.1
YSAQMD	1	<0.1	0.2
Compensatory Mitigation with Alternative 5			
SJVAPCD	4	<0.1	0.4
Threshold	*20.0 (SJVAPCD)* *10.0 (all others)*	*1.0*	*1.0*

BAAQMD = Bay Area Air Quality Management District; HI = hazard index; NO_2 = nitrogen dioxide; NO_X = nitrogen oxides; SJVAPCD = San Joaquin Valley Air Pollution Control District; SMAQMD = Sacramento Metropolitan Air Quality Management District; YSAQMD = Yolo-Solano Air Quality Management District.

[a] Only the highest modeled off-site risk is presented with each air district. The reported risk includes impacts from combined construction of all features (e.g., intakes, access roads, shafts, concrete batch plants). Exceedances of air district thresholds are shown in **bolded underline**.

[b] Excess cancer risk represents the incremental increase in the number of cancers in a population of one million. Risks are cumulative of inhalation, dermal, soil, mother's milk, and crop pathways.

[c] HI is shown by pollutant contributions to the most affected organ system (respiratory). All NO_2 risks assume an 80% ambient ratio to NO_X concentrations.

Table 23-65 presents maximum PM2.5 concentrations by alternative within the BAAQMD, consistent with air district guidance. The modeled concentrations include implementation of air quality Environmental Commitments EC-7: *Off-Road Heavy-Duty Engines* and EC-9: *On-Site Locomotives* through EC-12: *On-Site Concrete Batching Plants*.

Table 23-65. Localized PM2.5 Concentrations Associated with Construction of the Project in the Bay Area Air Quality Management District (μg/m^3) [a]

Alternative	Maximum Modeled PM2.5 Concentration
Project Alternative	
Alternative 1	0.1
Alternative 2a	0.1
Alternative 2b	0.1
Alternative 2c	0.1
Alternative 3	0.1
Alternative 4a	0.1

Alternative	Maximum Modeled PM2.5 Concentration
Alternative 4b	0.1
Alternative 4c	0.1
Alternative 5	0.1
Threshold	*0.3*

μg/m[3] = microgram per cubic meter; PM2.5 = particulate matter that is 2.5 microns in diameter and smaller.
[a] Only the highest modeled off-site concentration is presented. The reported concentration includes impacts from combined construction of all features (e.g., intakes, access roads, shafts, concrete batch plants). Exceedances of BAAQMD's threshold are shown in **bolded underline**.

As shown in Table 23-64, construction activities under Alternatives 2a and 4a could expose residential receptors to a significant increase in excess cancer risk in SMAQMD. The maximally exposed receptor is located along Scribner Road just north of Intake A There are two other receptors along Scribner Road that could be exposed to cancer risks above SMAQMD's threshold. Predicted cancer risk would below all air district thresholds at all other receptors in the local air quality study area. Noncancer health hazards and PM2.5 concentrations are likewise not modeled to exceed any thresholds.

Exceedances of SMAQMD's excess cancer risk threshold under Alternatives 2a and 4a are primarily associated with diesel combustion during construction of Intake A. The predicted results combine worst-case meteorological conditions with the highest annual construction emissions estimates. This approach is conservative and, therefore, is not necessarily representative of actual risks that would occur during the construction period. Additionally, cancer risks were estimated following OEHHA's conservative guidance assuming a receptor would be continuously exposed to project-generated pollution beginning in utero during the third trimester of pregnancy.

Operations and Maintenance

O&M would be conducted daily or at varying frequencies, depending on the type of activity. Daily and weekly activities include inspections, security checks, and operations oversight that would only generate emissions from predominately gasoline-powered employee commute vehicles. Less frequent activities (e.g., monthly, quarterly, annually, long-term) may result in additional emissions from diesel-powered trucks and mobile equipment. As shown in Tables 23-23, 23-33, 23-44, and 23-54, total annual PM10 and PM2.5 exhaust emissions from project O&M would not exceed 1 ton per year in any air district. Diesel emissions from vehicles and mobile equipment would also be limited in duration, with some activities requiring less than a day to complete only once per year. Accordingly, vehicles and mobile equipment would not expose receptors to substantial pollutant concentrations or result in significant cancer and noncancer health risks.

Standby engine generators would be maintained at each of the intakes, Southern/Bethany Complex, South Delta Outlet and Control Structure, Delta Mendota Canal Control Structure, and Bethany Reservoir Outlet Structure to provide emergency backup power in the event of an electricity outage. These generators would be tested monthly. Because the standby engine generators are stationary sources that would remain at the same location and result in regular (monthly) emissions, potential health risks resulting from standby engine generator testing were estimated. Table 23-66 represents the highest modeled off-site risks associated with each generator location. All standby engine generators would be in SMAQMD or BAAQMD.

Table 23-66. Excess Cancer and Noncancer Health Risks Associated with Standby Engine Generator Testing [a]

Generator Location	Maximum Modeled Excess Cancer (potential cases per million)	Maximum Modeled Chronic HI	Maximum Modeled Acute HI
Intake A [b]	<1	<0.1	<0.1
Intake B [c]	<1	<0.1	<0.1
Intake C [d]	<1	<0.1	<0.1
Southern Complex [e]	<1	<0.1	<0.1
South Delta Outlet and Control Structure [b]	<1	<0.1	<0.1
Delta Mendota Canal Control Structure [f]	<1	<0.1	<0.1
Bethany Reservoir Surge Basin [f]	<1	<0.1	<0.1
Bethany Reservoir Discharge Structure [f]	<1	<0.1	<0.1
Bethany Reservoir Outlet Structure [f]	<1	<0.1	<0.1
Threshold	*10*	*1.0*	*1.0*

HI = hazard index.
[a] Only the highest modeled off-site risk is presented.
[b] Alternatives 2a and 4a only.
[c] Alternatives 1, 2a, 2c, 3, 4a, 4c, and 5.
[d] All project alternatives.
[e] All alternatives except Alterative 5.
[f] Alternative 5 only.

Table 23-67 presents maximum PM2.5 concentrations for those standby engine generators that would be in the BAAQMD, consistent with air district guidance.

Table 23-67. Localized PM2.5 Concentrations Associated with Standby Engine Generator Testing in the Bay Area Air Quality Management District ($\mu g/m^3$) [a]

Generator Location	Maximum Modeled PM2.5 Concentration
Southern Complex [b]	<0.1
South Delta Outlet and Control Structure [c]	<0.1
Delta Mendota Canal Control Structure [d]	<0.1
Bethany Reservoir Surge Basin [d]	<0.1
Bethany Reservoir Discharge Structure [d]	<0.1
Threshold	*0.3*

$\mu g/m^3$ = microgram per cubic meter; PM2.5 = particulate matter that is 2.5 microns in diameter and smaller.
[a] Only the highest modeled off-site concentration is presented.
[b] All alternatives except Alterative 5.
[c] Alternatives 2a and 4a only.
[d] Alternative 5 only.

As shown in Tables 23-66 and 23-67, regular testing of stationary standby engine generators would not result in cancer or noncancer health risks above air district thresholds.

CEQA Conclusion—Alternatives 2a and 4a

The impact would be significant under CEQA because excess cancer risk is predicted to exceed SMAQMD's threshold at three receptor locations north of Intake A. Predicted excess cancer risk would be below all air district thresholds at all other receptors in the local air quality study area. Noncancer health hazards and PM2.5 concentrations are likewise not modeled to exceed any thresholds.

DPM generated during construction of Intake A would be reduced through use of renewable diesel, Tier 4 diesel engines, newer on-road and marine engines, and other BMPs, as required by Environmental Commitments EC-7: *Off-Road Heavy-Duty Engines* through EC-10: *Marine Vessels* and EC-13: *DWR Best Management Practices to Reduce GHG Emissions*. These environmental commitments would minimize receptor exposure to DPM through application of best available on-site controls to reduce construction emissions; however, even with these commitments, exceedances of SMAQMD's excess cancer risk threshold would occur, and the project would expose residential occupants of the three homes north of Intake A to substantial pollutant concentrations. As discussed above, because of conservative modeling assumptions that were made consistent with OEHHA guidance, excess cancer risk numbers predicted for the project represent an upper limit of potential risk. Actual risks are likely to be lower than presented in this analysis.

DWR would implement Mitigation Measure AQ-6: *Avoid Residential Exposure to Localized Diesel Particulate Matter* to reduce receptor exposure to DPM and thus excess cancer risk. The measure outlines two feasible options for impacted receptors—installation of high-efficiency HVAC filters or relocation. If either option were accepted by the residential occupants, the impact would be reduced to less than significant. Specifically, high-efficiency HVAC filters remove a greater fraction of ambient PM2.5 compared to conventional filters. Minimum Efficiency Reporting Value (MERV) 15 air filters can reduce indoor PM10 concentrations by 64% to 99%, depending on installation and other variables (Dillon et al. 2019:Table 11). If all impacted residential receptors were to accept MERV 15 filters, estimated excess cancer risk at the maximally exposed receptor could be reduced to less than one to nine per million. Relocation during construction would eliminate all exposure to project-generated DPM and associated excess cancer risk.

While Mitigation Measure AQ-6 could reduce this impact to less than significant, renters and homeowners may not elect to accept DWR's assistance for MERV filters or relocation. If this occurs, a significant impact in the form of excess cancer risk above SMAQMD's threshold would occur. Therefore, this impact is conservatively concluded to be significant and unavoidable.

Mitigation Measure AQ-6: Avoid Residential Exposure to Localized Diesel Particulate Matter

1. DWR will coordinate with the occupants of the three homes north of Intake A where projected cancer risk exceeds 10 per million. DWR will offer residential occupants the following options to reduce exposure to project-generated DPM.

    a. Minimum Efficiency Reporting Value (MERV) 15 air filters: DWR will provide financial assistance for the purchase of up to two filters per year, or at a frequency per manufacturer recommendations, during construction of Intake A. If a resident's home is not equipped with a heating, ventilation, and air conditioning (HVAC) system that can accept a MERV 15 air filter, DWR will purchase an EnergyStar certified portable home air cleaning device (or up to the number of devices needed to clear multi-room homes, consistent with manufacturer's recommendations). DWR will establish an online procurement system (or similar) to facilitate the purchase and distribution of the filters to residents electing to participate in the program.

b. Relocation assistance: DWR will provide full compensation for expenses related to the procurement of either: (i) temporary housing during construction of Intake A; or (ii) permanent replacement housing of the same market value as the housing being vacated by the residents or greater. Under either scenario, DWR will provide, in compliance with the Uniform Relocation Assistance and Real Property Acquisition Policies Act and the California Relocation Assistance Act, relocation and replacement expenses, including relocation advisory services, moving cost reimbursement, and reimbursement for related expenses.

CEQA Conclusion—Alternatives 1, 2b, 2c, 3, 4b, 4c, and 5

The impact would be less than significant under CEQA because chronic cancer and noncancer health risks are not predicted to exceed air district thresholds. Thus, neither project construction nor long-term O&M would expose sensitive receptors to substantial pollutant concentrations.

Mitigation Impacts

Compensatory Mitigation

Although the Compensatory Mitigation Plan described in Appendix 3F, *Compensatory Mitigation Plan for Special-Status Species and Aquatic Resources,* does not act as mitigation for construction-related health risks from project construction or operations, its implementation could expose sensitive receptors to DPM concentrations.

As described in Appendix 3F, actions undertaken for compensatory mitigation would restore freshwater marsh along I-5 and wetland, open-water, and upland communities on Bouldin Island in SJVAPCD. Table 23-68 presents the estimated highest modeled off-site health risks from construction of compensatory mitigation sites.

Table 23-68. Excess Cancer and Noncancer Health Risks Associated with Compensatory Mitigation Along I-5 and on Bouldin Island [a]

Air District	Maximum Modeled Excess Cancer (potential cases per million) [b]	Maximum Modeled Chronic HI [c]	Maximum Modeled Acute HI [c]
Compensatory Mitigation			
SJVAPCD	<1	<0.1	<0.1
Threshold	*20.0*	*1.0*	*1.0*

HI = hazard index; NO_2 = nitrogen dioxide; NO_X = nitrogen oxides; SJVAPCD = San Joaquin Valley Air Pollution Control District;

[a] Only the highest modeled off-site risk is presented with each air district.

[b] Excess cancer risk represents the incremental increase in the number of cancers in a population of one million. Risks are cumulative of inhalation, dermal, soil, mother's milk, and crop pathways.

[c] HI is shown by pollutant contributions to the most affected organ system (respiratory). All NO_2 risks assume an 80% ambient ratio to NO_X concentrations.

As shown in Table 23-68, chronic cancer and noncancer health risks associated with construction of the compensatory mitigation sites along I-5 and on Bouldin Island are not predicted to exceed SJVAPCD thresholds. While the specific design criteria required to support emissions quantification for channel margin and tidal habitat restoration activities within the North Delta Arc are not yet developed, based on the level of activity and health risks quantified for restoration along I-5 and on Bouldin Island, no violations of SMAQMD's or YSAQMD's health risk thresholds are expected. Therefore, the project alternatives combined with compensatory mitigation would not change the overall significant and unavoidable with mitigation impact conclusion for Alternatives 2a and 4a, or the less than significant impact conclusion for Alternatives 1, 2b, 2c, 3, 4b, 4c, and 5.

Other Mitigation Measures

Some mitigation measures would result in construction equipment exhaust, haul truck exhaust, employee vehicle exhaust, and dust from grading, clearing, excavation, and landscaping activities that would temporarily generate DPM and PM2.5 emissions. The mitigation measures with potential to result in construction-related health risks are: Mitigation Measures BIO-2c: *Electrical Power Line Support Placement*; SOILS-2: *Prepare and Implement Topsoil Salvage, Handling, Stockpiling and Reapplication Plans*; AG-3: *Replacement or Relocation of Affected Infrastructure Supporting Agricultural Properties*; AES-1c: *Implement Best Management Practices to Implement Project Landscaping Plan*; CUL-1: *Prepare and Implement a Built-Environment Treatment Plan in Consultation with Interested Parties*; and CUL-2: *Conduct a Survey of Inaccessible Properties to Assess Eligibility, Determine if These Properties Will Be Adversely Affected by the Project, and Develop Treatment to Resolve or Mitigate Adverse Impacts*. DPM and PM2.5 emissions would be similar to those generated by construction of the project alternatives, but of a much lesser magnitude and temporal extent. Environmental Commitments EC-7: *Off-Road Heavy-Duty Engines,* EC-8: *On-Road Haul Trucks*, and EC-13: *DWR Best Management Practices to Reduce GHG Emissions* would reduce construction equipment and vehicle emissions generated from implementation of mitigation measures and would reduce receptor exposure to DPM. Environmental Commitments EC-11: *Fugitive Dust Control* and EC-12: *On-Site Site Concrete Batching Plants* are available to reduce fugitive dust and receptor exposure to PM2.5 emissions. Ultimately, given the limited number of diesel-generating activities expected under the mitigation measures compared to the project alternatives, and the results of the project analysis that show less than significant impacts at all locations expect near Intake A where extensive construction would occur, implementation of other mitigation measures are not expected to expose receptors to substantial DPM or PM2.5 emissions. The impact would be less than significant under CEQA for all project alternatives.

Overall, potential health risks from implementation of compensatory mitigation and other mitigation measures, combined with project alternatives, would not change the significant and unavoidable with mitigation impact conclusion for Alternatives 2a and 4a, or the less than significant impact conclusion for Alternatives 1, 2b, 2c, 3, 4b, 4c, and 5.

Impact AQ-7: Result in Exposure of Sensitive Receptors to Asbestos, Lead-Based Paint, or Fungal Spores That Cause Valley Fever

All Project Alternatives

Naturally occurring asbestos (NOA) could become airborne if excavating or tunneling occurs through ultramafic and metavolcanic bedrock. Demolition of existing structures may disperse asbestos-containing materials (ACM) if they were used during construction of those structures.

Some structures may also be contaminated with residual lead, which was used as a pigment and drying agent in oil-based paint until the Lead-Based Paint Poisoning Prevention Act of 1971 prohibited such use. While there are several factors that influence receptor exposure and development of Valley fever, earthmoving activities during construction could release *C. immitis* spores if the spores are present in the soil.

Project Construction

According to mapping from the California Department of Conservation, there are no geologic features normally associated with NOA (i.e., serpentine rock or ultramafic rock near fault zones) in or near the project area (ESRI 2020). As such, there is no potential for impacts related to NOA emissions during construction activities, and none of the project alternatives would expose sensitive receptors to substantial NOA concentrations.

Alternatives 2a and 4a would require the most demolition to construct three intakes and, therefore, would have the highest potential to encounter and expose receptors to impacts from asbestos and lead-based paint. However, the demolition of ACM and lead-based paint is subject to the limitations of the National Emissions Standards for Hazardous Air Pollutants (40 CFR Parts 61 and 63) regulations. SMAQMD, SJVAPCD, and BAAQMD would be consulted before demolition begins. The project would include strict compliance with existing asbestos regulations, as required by law. DWR would also implement Mitigation Measure HAZ-2: *Perform a Phase I Environmental Site Assessment Prior to Construction Activities and Remediate*, which would require a Phase I Environmental Site Assessment in conformance with the American Society for Testing and Materials Standard Practice E1527-05. If materials such as ACM or lead-based paint are identified through the assessment, these materials would be properly managed and disposed of prior to or during the demolition process.

Receptors adjacent to the construction area may be exposed to increased risk of inhaling *C. immitis* spores and subsequent development of Valley fever. Alternatives 2a and 4a would require the most earthmoving and, therefore, would have the highest potential to encounter spores and expose receptors to health effects from Valley fever. Dust control measures are the primary defense against infection (U.S. Geological Survey 2000:2). The project would include all best available fugitive dust control measures (Environmental Commitment EC-11: *Fugitive Dust Control*), which would avoid dusty conditions and reduce the risk of contracting Valley fever through routine watering and other measures.

Operations and Maintenance

Once constructed, the project would not require any further demolition, grading, or excavation beyond periodic roadway maintenance. Accordingly, none of the project alternatives would expose sensitive receptors to asbestos, lead-based paint, or fungal spores that cause Valley fever during O&M.

CEQA Conclusion—All Project Alternatives

The impact would be less than significant under CEQA because compliance with existing asbestos and lead-based paint handling and disposal standards would prevent exposure of sensitive receptors to substantial pollutant concentrations with respect to ACM and lead-based paint. Soil movement during construction of the project alternatives would have limited to no potential to disturb or expose receptors to NOA. The project would include all best available fugitive dust control measures (Environmental Commitment EC-11: *Fugitive Dust Control*) that would avoid dusty conditions and reduce the risk of contracting Valley fever through routine watering and other measures. Accordingly, the project alternatives would not expose receptors to substantial public health risks related to asbestos, lead-based paint, or Valley fever. Because the impact would be less than significant, no mitigation is required for any alternative.

Mitigation Impacts

Compensatory Mitigation

Although the Compensatory Mitigation Plan described in Appendix 3F, *Compensatory Mitigation Plan for Special-Status Species and Aquatic Resources,* does not act as mitigation for exposure to asbestos, lead-based paint, or fungal spores from project construction or operations, its implementation could expose sensitive receptors to increased public health risks.

There are no geologic features normally associated with NOA (i.e., serpentine rock or ultramafic rock near fault zones) in or near the I-5 pond, Bouldin Island, or channel margin and tidal habit in within the North Delta Arc compensatory mitigation areas. No demolition would be required. Earthmoving may release *C. immitis* spores if the spores are present in the soil. The same control measures (Environmental Commitment EC-11: *Fugitive Dust Control*) to reduce fugitive dust in the project footprints would be implemented for the compensatory mitigation. Therefore, the project alternatives combined with compensatory mitigation would not change the overall impact conclusion of less than significant.

Other Mitigation Measures

Some mitigation measures would result in demolition and earthmoving activities that may expose sensitive receptors to asbestos, lead-based paint, or fungal spores that cause Valley fever. The mitigation measures with potential to expose sensitive receptors to asbestos, lead-based paint, or fungal spores that cause Valley fever are: Mitigation Measures BIO-2c: *Electrical Power Line Support Placement*; SOILS-2: *Prepare and Implement Topsoil Salvage, Handling, Stockpiling and Reapplication Plans*; AG-3: *Replacement or Relocation of Affected Infrastructure Supporting Agricultural Properties*; AES-1c: *Implement Best Management Practices to Implement Project Landscaping Plan*; CUL-1: *Prepare and Implement a Built-Environment Treatment Plan in Consultation with Interested Parties*; and CUL-2: *Conduct a Survey of Inaccessible Properties to Assess Eligibility, Determine if These Properties Will Be Adversely Affected by the Project, and Develop Treatment to Resolve or Mitigate Adverse Impacts*. Sensitive receptor exposure to asbestos, lead-based paint, or fungal spores that cause Valley fever from implementation of mitigation measures would be similar to construction effects of the project alternatives, but of a much lesser magnitude. Mitigation Measure HAZ-2: *Perform a Phase I Environmental Site Assessment Prior to Construction Activities and Remediate* would identify materials such as ACM or lead-based paint for proper management and disposal prior to or during the demolition process. Additionally, Environmental Commitment EC-11: *Fugitive Dust Control* would avoid dusty conditions and reduce the risk of contracting Valley fever. Therefore, implementation of other mitigation measures is unlikely to expose sensitive receptors to asbestos, lead-based paint, or fungal spores that cause Valley fever, and impacts would be less than significant.

Overall, impacts on public health related to asbestos, lead-based paint, or Valley fever for construction and operation of compensatory mitigation and implementation of other mitigation measures, combined with project alternatives, would not change the less than significant impact conclusion.

Impact AQ-8: Result in Exposure of Sensitive Receptors to Substantial Odor Emissions

All Project Alternatives

The generation and severity of odors is dependent 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 cause discomfort, leading to complaints to regulatory agencies. SMAQMD (2020a:7-2) considers wastewater treatment plants, sanitary landfills, composting and recycling facilities, petroleum refineries, chemical manufacturing plants, painting/coating operations, rendering plants, and food packaging facilities as potential odor emitting facilities. SJVAPCD (2015a:103) and BAAQMD (2017b:3-4) maintain similar definitions of odor-generating sources. None of the project alternatives would result in the addition of such facilities associated with odors.

Project Construction

Potential sources of odor during construction would include diesel exhaust from construction equipment, asphalt paving, and excavated organic matter from the removal of surface soils and sediment. Several construction sites would maintain underground septic systems to process on-site wastewater from employee bathrooms. DWR would require maintenance of the bathrooms and septic systems to avoid sources of foul odor.

All air districts in the local air quality study area have adopted rules that limit the amount of VOC emissions from cutback asphalt. Accordingly, potential odors generated during asphalt paving would be addressed through mandatory compliance with air district rules (SMAQMD Rule 453, SJVAPCD Rule 4641, BAAQMD Regulation 8, Rule 15, and YSAQMD Rule 2.28). Odors from equipment exhaust would be localized and generally confined to the immediate area surrounding the construction site. These odors would be temporary and localized, and they would cease once construction activities have been completed.

Odors from excavated materials are primarily generated from hydrogen sulfide gases through decomposition of organic materials in the soil particles (Reinhart et al. 2004:10). Hydrogen sulfide is commonly described as having a foul or “rotten egg” smell (Occupational Safety and Health Administration 2005). Hydrogen sulfide results from the anaerobic metabolism by soil microbes in flooded or water-logged soils. Testing shows that surface soils in the local air quality study area are predominately composed of silt and clay with a variety of non-odorous inorganic materials (California Department of Water Resources 2010:3-1–3-23). Leachate sampling and published literature further indicate volatile sulfides in surface soil are below the method detection limits and are thus unlikely to cause a nuisance impact on humans (Hansen et al. 2018:1–9; Office of Environmental Health Hazard Assessment 2008). Drying and stockpiling of the removed surface soil and sediment would also occur under aerobic conditions, which would further limit any potential malodorous products.

RTM excavation would occur at least 120 feet below the ground surface. Testing shows that subsurface RTM does not contain substantial organic material and is predominately composed of silt, clay, and other inorganic materials (California Department of Water Resources 2010:3-1–3-23). If hydrogen sulfide gas was present, these chemical compounds would generally be dissolved in the groundwater and not absorbed onto soil particles and retained in the RTM. A ventilation system would be installed in the tunnel and at the tunnel launch shaft to control the excavation atmosphere to acceptable levels in accordance with Cal/OSHA's Tunnel Safety Orders so that the tunnel can be excavated in a safe manner. As disclosed in the project's *Volume 1: Delta Conveyance Final Draft Engineering Project Report, Central and Eastern Options* and *Volume 1: Delta Conveyance Final Draft Engineering Project Report—Bethany Reservoir Alternative*, collected gas would be extracted through the ventilation system back to the tunnel launch shaft to be treated prior to release into the air (Delta Conveyance Design and Construction Authority 2022a, 2022b). The specific treatment methods would depend upon chemical analysis completed as part of the future geotechnical investigations. However, the treatment methods would meet all federal, state, and local regulatory criteria.

<u>Operations and Maintenance</u>

The primary source of odors during O&M is diesel exhaust from heavy equipment and vehicles. Heavy equipment and vehicles would be used minimally. Testing of the intake and Southern or Bethany Complex generators would occur monthly. Cleaning of trash racks at the Southern Complex would require a front-end loader daily for about 30 minutes during the aquatic weed season. Additional equipment and vehicles would be needed for annual and long-term O&M. Any potential odors from diesel combustion from these activities would be infrequent and spread throughout the project facilities (e.g., intakes, tunnel shafts). DWR would also require regular disposal of trash rack contents to avoid sources of foul odor.

Sediment would be periodically collected from the intakes and hauled away for disposal.[14] As discussed above, if present in the sediment, anaerobic decay of organic material can generate odors. However, the collection system is designed to trap only larger sediment particles. Organic materials are generally too small and light to be captured by the system and, therefore, are unlikely to be present in the material extracted for drying and disposal. Likewise, water held in the sediment basins is unlikely to become a source of odors because minimum flow requirements would continually cycle water through the basin, thereby preventing it from becoming stagnant and potentially odorous.

As discussed in Chapter 9, *Water Quality*, problematic *Microcystis* blooms have not occurred in the export service areas, but microcystins produced in waters of the Delta have been exported from Banks and Jones pumping plants to the SWP and CVP. *Microcystis* blooms are not known for producing odors unless there is a large bloom undergoing decay (where odors are generated through the decay process). As discussed in Chapter 9, *Water Quality*, implementation of the proposed project and alternatives would not cause substantial increases in blooms such that any mitigation measures would need to be implemented. Accordingly, large blooms that may be subject to decay are not anticipated as a result of the project alternatives. Moreover, any odors generated by decay of *Microcystis* bloom would be localized to the waterway and would dissipate as a function of distance. Accordingly, they would be lower at sensitive receptor locations, which are often separated

[14] Sediment removed from the intakes is anticipated to be large silt and sand particles. The drained sediment is expected to have an initial moisture content of 20 to 24%, which is equivalent to that of sandy loam and sandy soils. Following collection and prior to hauling, the moisture content would be reduced to approximately 11 to 21% because of natural evaporation. Soils with moisture content in this range would not be subject to wind erosion from within the drying basins.

from the water by levees or riparian habitat or are otherwise not immediately adjacent to the waterway.

CEQA Conclusion—All Project Alternatives

The impact would be less than significant under CEQA because odors generated during construction and long-term operation of the water conveyance facility would not be expected to affect a substantial number of people or result in nuisance complaints. Potential odors from equipment and vehicle operation would quickly dissipate as a function of distance from the emissions source to potential receptors and cease once construction is completed. Likewise, potential odors generated during asphalt paving would be addressed through mandatory compliance with air district rules and regulations. Drying and stockpiling of the removed surface soil would occur under aerobic conditions, which would limit any potential decomposition and associated malodorous products. Because RTM would be excavated in deep soil strata with minimal or no organic material, it is anticipated that the RTM soil particles would not directly or indirectly include chemical compounds that would result in odors in the vicinity of the tunnel launch shaft sites, RTM handling and testing areas, or RTM storage areas. The project would not cause substantial increases in *Microcystis* blooms. Because the impact would be less than significant, no mitigation is required for any alternative.

Mitigation Impacts

Compensatory Mitigation

Although the Compensatory Mitigation Plan described in Appendix 3F, *Compensatory Mitigation Plan for Special-Status Species and Aquatic Resources,* does not act as mitigation for odor emissions from project construction or operations, its implementation could expose sensitive receptors to odors.

As described in Appendix 3F, actions undertaken for compensatory mitigation would restore channel margin and tidal habitat within the North Delta Arc, and restore freshwater marsh along I-5 and wetland, open-water, and upland communities on Bouldin Island. Diesel emissions from earthmoving equipment could generate temporary odors, but these would quickly dissipate and cease once restoration is completed. Among the land use types affected by the program, the compensatory mitigation would restore wetland and upland habitats, both of which can generate odors from natural processes. Odors from wetlands, if present, are typically caused from organic decomposition. While restored land uses associated with compensatory mitigation have the potential to generate odors from natural processes, the emissions would be similar in origin and magnitude to the existing land use types in the restoration areas (e.g., seasonal wetlands, agriculture). Moreover, based on a public records review of odor complaints submitted to SJVAPCD, there have been no specific odor complaints directly associated with natural lands in San Joaquin County in the past 5 years.

Therefore, the project alternatives combined with compensatory mitigation would not change the overall impact conclusion of less than significant.

Other Mitigation Measures

Some mitigation measures would result in potential sources of odors from construction equipment exhaust, haul truck exhaust, employee vehicle exhaust, asphalt paving, and excavated organic matter from the removal of surface soils and sediment. The mitigation measures with potential to generate odors are: Mitigation Measures BIO-2c: *Electrical Power Line Support Placement*; SOILS-2: *Prepare and Implement Topsoil Salvage, Handling, Stockpiling and Reapplication Plans*; AG-3: *Replacement or Relocation of Affected Infrastructure Supporting Agricultural Properties*; AES-1c: *Implement Best Management Practices to Implement Project Landscaping Plan*; CUL-1: *Prepare and Implement a Built-Environment Treatment Plan in Consultation with Interested Parties*; and CUL-2: *Conduct a Survey of Inaccessible Properties to Assess Eligibility, Determine if These Properties Will Be Adversely Affected by the Project, and Develop Treatment to Resolve or Mitigate Adverse Impacts*. Potential odors from implementation of mitigation measures would be similar in origin and magnitude to odors generated during construction and long-term operation of the project alternatives. Therefore, implementation of other mitigation measures would not affect a substantial number of people or result in nuisance complaints, and impacts would be less than significant.

Overall, odor impacts on sensitive receptors for construction and operation of compensatory mitigation and implementation of other mitigation measures, combined with project alternatives, would not change the less than significant impact conclusion.

23.3.3.3 Impacts of the Project Alternatives on Global Climate Change

Impact AQ-9: Result in Impacts on Global Climate Change from Construction and O&M

All Project Alternatives

Project Construction

Construction of the project alternatives would generate GHG emissions from heavy-duty construction equipment, construction worker vehicles, haul trucks, locomotives, marine vessels, helicopters, wastewater generation, circuit breakers, and electricity consumption. Table 23-69 summarizes total estimated GHG emissions resulting from project construction, exclusive and inclusive of the Compensatory Mitigation Plan. Because GHG emissions are global pollutants and disperse widely in the atmosphere, GHG emissions have global effects and not air district level–effects, and thus only the overall totals by alternative are presented in Table 23-69 (as opposed to emissions by air district, as are presented for criteria pollutant and ozone precursors). The emissions results assume implementation of Environmental Commitments EC-7: *Off-Road Heavy-Duty Engines*, EC-9: *On-Site Locomotives*, and EC-10: *Marine Vessels.* (EC-11: *Fugitive Dust Control* and EC-12: *On-Site Concrete Batching Plants* would not affect GHG emissions, and EC-8: *On-Road Haul Trucks* and EC-13: *DWR Best Management Practices to Reduce GHG Emissions* were not quantified.)

Table 23-69. Total GHG Emissions from Construction of the Project Alternatives Due to Construction Equipment (metric tons CO_2e)

Alternative	Project Alternative [a]	Compensatory Mitigation with Project Alternative
Alternative 1	627,486	631,056
Alternative 2a	782,883	786,453
Alternative 2b	452,397	455,966
Alternative 2c	500,967	504,537
Alternative 3	644,279	647,849

Alternative	Project Alternative [a]	Compensatory Mitigation with Project Alternative
Alternative 4a	788,449	792,019
Alternative 4b	460,640	464,210
Alternative 4c	510,754	514,324
Alternative 5	495,442	499,012

CO_2e = carbon dioxide equivalent.

[a] The analysis accounts for all emissions directly and indirectly generated by construction activities for which DWR has practical control and program responsibility. Emissions generated upstream (e.g., material manufacturing) and downstream (e.g., recycling) of construction, otherwise known as "lifecycle emissions," are not included in the analysis, consistent with guidance from the California Natural Resources Agency (2018:41–42). While the origin of most raw materials is not known, and thus an emissions analysis would be speculative, construction of the project would require concrete from on- and off-site batch plants. Lifecycle emissions for cement and aggregate manufacturing, which is upstream of the concrete batching process, have been studied in various literature. Accordingly, for the purposes of disclosure, upstream CO_2 emissions resulting from cement and aggregate manufacturing were quantified using emissions factors from Marceau et al. (2007:Tables E1b and G1b). It was assumed the precast tunnel segments would require a compression strength of 7,500 pounds per square inch and all other infrastructure would require a compression strength of 5,000 pounds per square inch. The analysis indicates that cement and aggregate manufacturing would generate 429,000 to 1.2 million metric tons CO_2e, depending on the alternative. These emissions would be generated upstream of construction and through activities for which DWR has no practical control. Furthermore, CARB directly regulates the industrial emissions associated with cement manufacturing and thus those emissions would be regulated by CARB consistent with overall meeting of California GHG reduction targets over time. The emissions associated with cement manufacturing are therefore disclosed for informational purposes only.

Table 23-69 indicates that total estimated GHG emissions from project construction are between 452,397 and 788,449 metric tons CO_2e (exclusive of compensatory mitigation), with Alternative 4a generating the most emissions, and Alternative 2b generating the least.

Operations and Maintenance

O&M of the project would generate GHG emissions from fossil fuel–powered equipment, on-road crew trucks, employee vehicle traffic, and circuit breakers. Changes in operational SWP pumping and displaced purchases of CVP electricity would result in emissions from electricity consumption.

Table 23-70 summarizes long-term GHG emissions associated with the proposed project and alternatives from O&M, increased SWP pumping, and displaced purchases of CVP electricity. Emissions were quantified under 2020 conditions to define baseline conditions, although full operation of the project would not start until around 2040. Based on current information, it is projected that the carbon intensity of equipment and vehicle operation in 2040 would be lower than under 2020 conditions because of improvements in engine technology and regulations to reduce combustion emissions. Likewise, the projections regarding carbon intensity of electricity generation would be much lower in 2040 because of Senate Bill 100, which requires that zero-carbon resources comprise 100% of electric retail sales to end-use customers by 2045. Accordingly, the emissions estimates presented in Table 23-71 are based on a conservative representation of emissions.

As discussed in Section 23.3.1.3, *Evaluation of Operations and Maintenance*, emissions from maintenance equipment and vehicles is assumed to be zero under existing conditions. Total SWP pumping emissions and emissions from displaced purchases of CVP electricity are compared to 2020 existing conditions to calculate the net change in GHGs.

Table 23-70 GHG Emissions from O&M, Increased SWP Pumping, and Displaced Purchases of CVP Electricity under 2020 Conditions (metric tons CO_2e per year)

	DWR Controlled Sources				Displaced Purchases of CVP Electricity		
		Increased SWP Pumping					
Alternative	O&M	Existing	With Project	Net [a]	Existing	With Project	Net [a]
Alternative 1	527	1,378,633	1,594,399	215,766	275,511	272,509	7,397
Alternative 2a	631	1,378,633	1,588,090	209,457	275,511	272,509	13,966
Alternative 2b	475	1,378,633	1,547,084	168,451	275,511	272,509	4,418
Alternative 2c	525	1,378,633	1,577,432	198,798	275,511	272,509	6,657
Alternative 3	524	1,378,633	1,595,037	216,404	275,511	272,509	7,397
Alternative 4a	627	1,378,633	1,589,432	210,799	275,511	272,509	14,175
Alternative 4b	471	1,378,633	1,546,419	167,785	275,511	272,509	4,418
Alternative 4c	522	1,378,633	1,577,432	198,798	275,511	272,509	6,657
Alternative 5	425	1,378,633	1,633,134	254,501	275,511	272,509	7,443

CO_2e = carbon dioxide equivalent; CVP = Central Valley Project; DWR = California Department of Water Resources; SWP = State Water Project.

[a] Difference between with project emissions and emissions under existing conditions.

Addition of the project would add approximately 821 to 1,245 GWh of additional net electricity demand to operation of the SWP each year assuming 2020 operating conditions. Conditions in 2020 are used for this analysis because they yield the largest potential additional net electricity requirements and, therefore, represent the largest potential impact on the SWP. This 821 to 1,245 GWh range is based on assumptions for existing conditions and includes all additional energy required to operate the project including any additional energy associated with additional water being moved through the SWP.

In Update 2020, DWR developed estimates of historical, current, and future GHG emissions. Figure 23-6 shows those emissions as they were projected in Update 2020 and how those emissions projections would change with the additional electricity demands needed to operate the SWP with the addition of Alternative 5, which is the alternative with the highest additional pumping demand. As shown in Figure 23-6, in 2040, the earliest year the project is projected to go online based on current information, DWR total emissions increase from around 200,000 metric tons of CO_2e to approximately 300,000 metric tons of CO_2e. This elevated level is approximately 35,000 metric tons of CO_2e above DWR's designated GHG emissions reduction trajectory (red line, which is the linear interpolation between DWR's 2020 GHG emissions goal and DWR's 2045 GHG emissions goal). The projection indicates that after the initial increase in emissions, planned GHG emissions reduction measures implemented by DWR as part of Update 2020 would bring the elevated GHG emissions level back down below DWR's GHG emissions reduction trajectory by 2040. Accordingly, as discussed further below, through DWR's existing and planned GHG emissions reduction measures, DWR would still achieve its GHG emissions reduction goal by 2045 with implementation of the project.

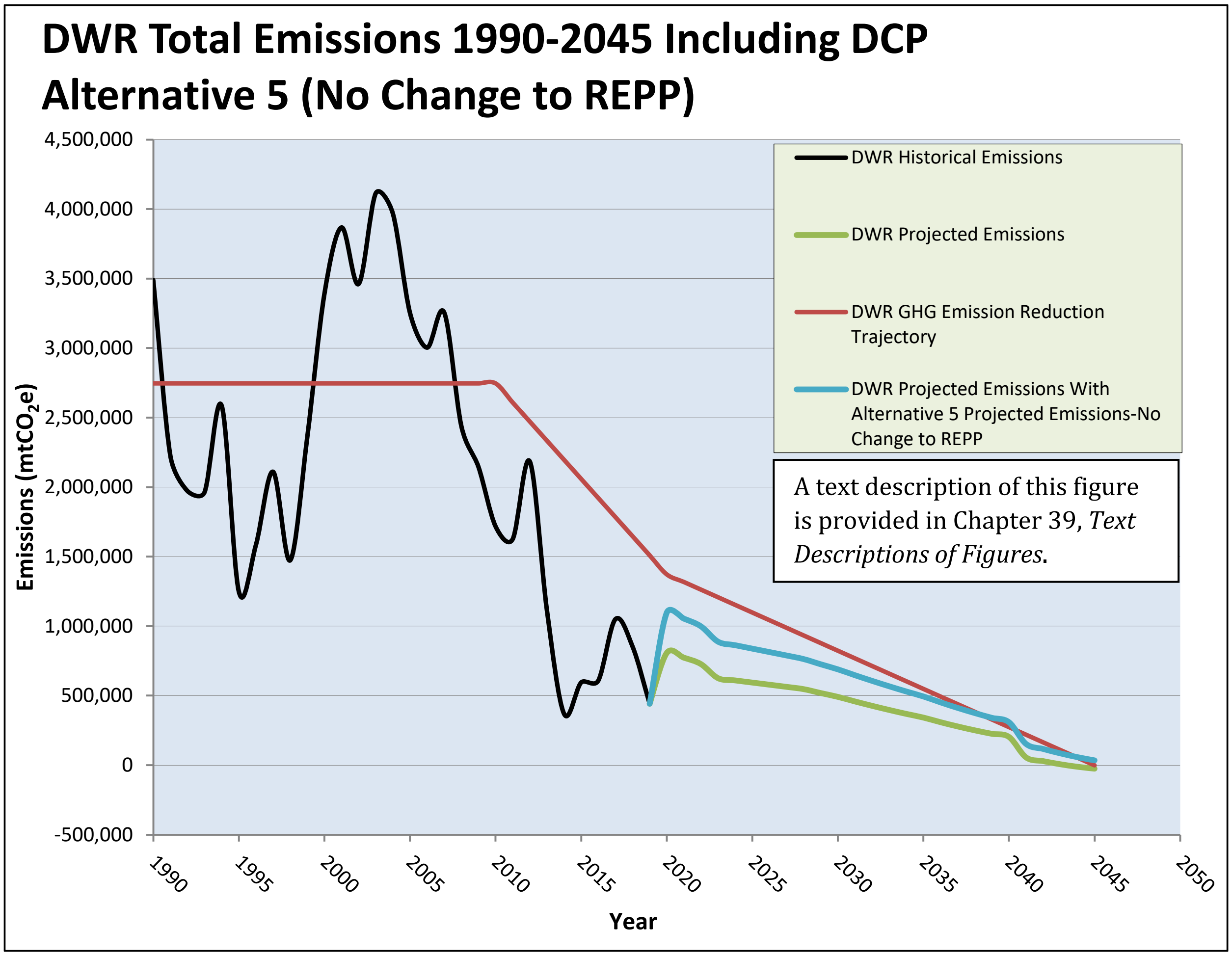

Figure 23-6. DWR Total Emissions 1990-2045 including Alternative 5

Update 2020 sets forth DWR's plan to manage its activities and operations to achieve its GHG emissions reduction goals. Update 2020 commits DWR to monitoring its emissions each year and evaluating its emissions every 5 years to determine whether it is on a trajectory to achieve its GHG emissions reduction goals. If it appears that DWR will not meet the GHG emissions reduction goals established in the plan, DWR may adjust existing emissions reduction measures, devise new measures to ensure achievement of the goals, or take other action.

Given the scale of additional emissions the Delta Conveyance alternatives would add to DWR's total GHG emissions, DWR has evaluated the most likely method that it would use to compensate for such an increase in GHG emissions: modification of DWR's REPP. The DWR REPP (GHG emissions reduction measures OP-3 in Update 2020) describes the amount of additional renewable energy that DWR expects to purchase each year to meet its GHG emissions reduction goals. The REPP lays out a long-term strategy for renewable energy purchases, though actual purchases of renewable energy may not exactly follow the schedule in the REPP and would ultimately be governed by actual operations, measured emissions, and contracting.

Table 23-71 shows how the REPP could be modified to accommodate all project alternatives and shows how additional renewable energy resources over what was programmed in the original REPP could be purchased between 2035 and 2045. The net result of this change is that by 2045, DWR's energy portfolio would contain about 800 GWh of additional renewable energy (in addition to hydropower generated at SWP facilities). This renewable energy surplus is more than the amount required by DWR's original REPP (4,700 GWh compared to 4,000 GWh). Figure 23-7 shows how modification of the REPP would affect DWR's projected future emissions when considering emissions from Alternative 5.

Table 23-71. Changes in Expected Renewable Energy Purchases 2011–2045 (Alternative 5)

	Additional GWh of Renewable Power Purchased (above previous year)		
Year(s)	Original REPP	New REPP [a]	Change [b]
2011–2020	36	36	0
2021–2030	72	72	0
2031–2035	108	108	0
2036–2040	180	264	84
2041–2045	288	365	77
Total (2011–2045)	42,660	47,162	4,502

Sources: DWR modeling.

GWh = gigawatt hours; REPP = Renewable Energy Procurement Plan.

[a] While Alternative 5 would have the greatest emissions impact on the SWP, there is no material difference in the amount of renewable energy that would need to be purchased to accommodate any of the Delta Conveyance alternatives.

[b] Difference between New REPP and Original REPP.

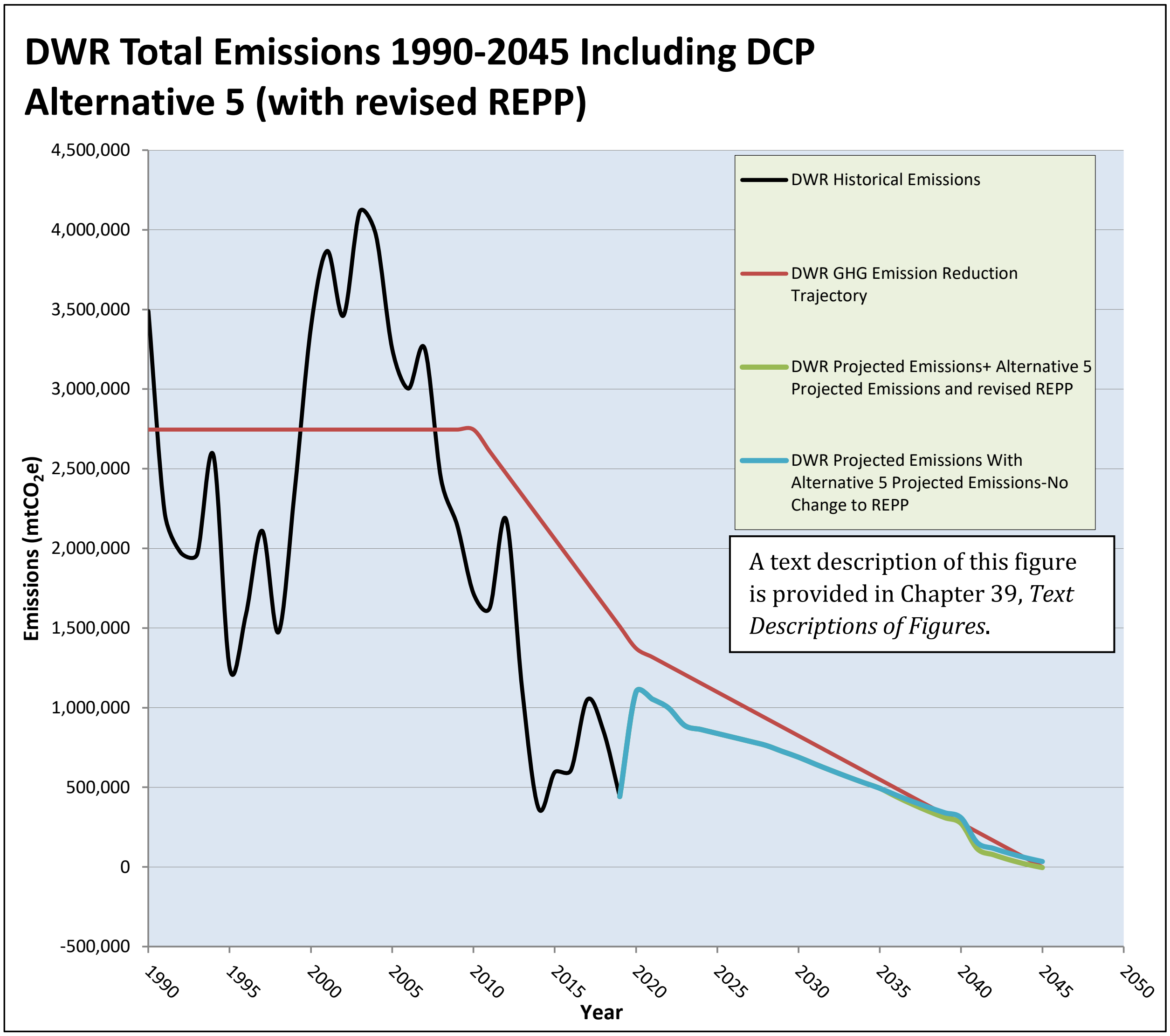

Figure 23-7. DWR Total Emissions 1990-2045 including Alternative 5 (revised REPP)

As previously discussed, DWR's Update 2020 cannot be used to evaluate environmental impacts associated with the CVP because the CVP is not under DWR's control, and indirect emissions from displaced purchases of CVP electricity are not included in Update 2020. Operation of the CVP yields the generation of clean, GHG emissions-free, hydroelectric energy. This electricity is sold into the California electricity market or directly to energy users. Operation of the project would add approximately 22 to 69 GWh of additional net electricity demand to operation of the CVP each year, depending on the alternative. This demand would result in a corresponding reduction of 22 to 69 GWh of electricity available for sale from the CVP to electricity users. This reduction in the supply of GHG emissions-free electricity to California electricity users could result in a potential indirect effect of the project, as these electricity users would have to acquire substitute electricity supplies that may result in GHG emissions (although additional conservation would likely occur as well).

It is unknown what type of power source (e.g., renewable, natural gas) would be substituted for CVP electricity or if some of the lost power would be supplied from higher efficiency sources. Given state mandates for increasing penetration of renewable energy and incentives for energy efficiency, it is possible that a considerable amount of this power would be replaced by renewable resources or cease to be needed because of higher efficiency. However, to ensure a conservative analysis, indirect emissions were quantified for the entire quantity of electricity using the current (2020) statewide energy mix to define baseline conditions. As shown in Table 23-70, substitution of 22 to 69 GWh of electricity with a mix of sources similar to the current (2020) statewide mix would result in emissions of 4,418 to 14,175 metric tons of CO_2e.

CEQA Conclusion—All Project Alternatives

The CEQA Guidelines generally offer two paths to evaluating GHG emissions impacts in CEQA documents:

- Projects can tier off a plan or similar document for the reduction of GHG emissions (as defined in CEQA Guidelines § 15183.5(b)) where the plan addresses GHG emissions for a range of project types within a geographic area.
- Projects can evaluate and determine significance by calculating GHG emissions and assessing their significance using a performance standard (CEQA Guidelines § 15064.4).

As discussed in Section 23.3.2, *Thresholds of Significance*, this analysis uses both evaluation pathways to appropriately consider the planning and regulatory frameworks most applicable to the project's emissions sources.

O&M and SWP pumping activities are covered by DWR's Update 2020, which was prepared by DWR to provide a departmental strategy for meeting the State's 2030 and 2045 emissions reduction goals articulated in SB 32 and EO B-55-18, respectively. Update 2020 is a plan for the reduction of GHG emissions and as such, GHG emissions from project O&M and SWP pumping activities are eligible to tier from the environmental document (California Department of Water Resources 2020b) for Update 2020 to evaluate project-level significance.

Construction of the project alternatives and the CVP are not covered by DWR's Update 2020 and are, therefore, not eligible for tiering to evaluate whether project-level GHG emissions would result in a significant impact under CEQA. Accordingly, this analysis evaluates the significance of GHG emissions resulting from construction and displaced purchases of CVP electricity against a net zero threshold. As discussed in Section 23.3.2, *Thresholds of Significance*, a net zero threshold was selected by DWR given the project's long-term implementation timeframe and in recognition of scientific evidence that concludes carbon neutrality must be achieved by mid-century to avoid the most severe climate change impacts.

While by different mechanisms, both pathways assess the project against the larger threshold of carbon neutrality by 2045 (or earlier), as discussed below, which is consistent with the State's long-term climate change goal and emissions reduction trajectory (EO B-55-18).

Operations and Maintenance and SWP Pumping

As shown in Figure 23-6 and consistent with the analysis contained in Update 2020 and the associated *Addendum to the Initial Study and Negative Declaration for DWR Climate Action Plan Phase 1*, the project would not impede DWR's ability to achieve the GHG emissions reduction goals set forth in Update 2020. SWP GHG emissions currently are below 1990 levels and achievement of the goals of Update 2020 means that total DWR GHG emissions will be reduced to 60% of 1990 levels by 2030 and net zero by 2045. Implementation of the project would not affect DWR's established emissions reduction goals or baseline (1990) emissions and therefore would not result in a change in total DWR emissions that would be considered significant. Prior adoption of Update 2020 by DWR provides a commitment on the part of DWR to make all necessary modifications to DWR's REPP or any other emissions reduction measures that are necessary to achieve DWR's GHG emissions reduction goals (as discussed above). Therefore, no amendment to the approved Update 2020 is necessary to ensure the occurrence of the additional GHG emissions reduction activities needed to account for project-related SWP operational or O&M emissions. The project would not conflict with any of DWR's specific action GHG emissions reduction measures and implements all applicable project-level GHG emissions reduction measures as set forth in Update 2020. The project is, therefore, consistent with the analysis performed in Update 2020.

Construction and Displaced Purchases of CVP Electricity

GHG emissions generated by construction and displaced purchases of CVP electricity would occur at different times and over different timescales. Construction emissions would be generated over a 12-to-14-year construction period, depending on the alternative. While indirect electricity emissions are presented under a 2020 plus project scenario in Table 23-70, these emissions would not actually occur until the project is fully operational around 2040. Indirect GHG emissions from increased load on the statewide electric grid from displaced purchases of CVP electricity are expected to decline annually with implementation of the state's Renewables Portfolio Standard (RPS).

Tables 23-72 through 23-74 present annual emissions from construction and displaced purchases of CVP electricity between the start of construction to 2045. For the purposes of this summation, indirect electricity emissions were recalculated to account for the change over time in GHG intensity factors from implementation of the state's RPS. While the project would continue to operate beyond 2045, indirect emissions from displaced purchases of CVP electricity within the state's electric grid would achieve carbon neutrality pursuant to Senate Bill 100. Beyond 2045, this analysis conservatively includes SF_6 emissions from electrical transmission. CARB is proposing amendments to the Regulation for Reducing Sulfur Hexafluoride Emissions from Gas Insulated Switchgear (SF_6 Switchgear Regulation) that would ban SF_6 as an insulator in electricity transmission after 2033 (California Air Resources Board 2020g). However, because these amendments have not been formally adopted, this analysis includes SF_6 emissions.

Table 23-72. Annual Additional Emissions from Construction and Displaced Purchases of CVP Electricity for the Central Alignment Alternatives (metric tons CO_2e)

	Alternative 1			Alternative 2a			Alternative 2b			Alternative 2c		
Year	Construction [a]	Displaced CVP Electricity [b]	Total	Construction [a]	Displaced CVP Electricity [b]	Total	Construction [a]	Displaced CVP Electricity [b]	Total	Construction [a]	Displaced CVP Electricity [b]	Total
PFIY 1	7,974	0	7,974	8,820	0	8,820	7,382	0	7,382	7,974	0	7,974
PFIY 2	7,631	0	7,631	8,321	0	8,321	7,193	0	7,193	7,631	0	7,631
CY 1	5,489	0	5,489	7,751	0	7,751	5,197	0	5,197	7,679	0	7,679
CY 1	7,177	0	7,177	9,439	0	9,439	6,886	0	6,886	9,368	0	9,368
CY 2	16,389	0	16,389	16,057	0	16,057	19,046	0	19,046	16,498	0	16,498
CY 2	18,257	0	18,257	17,925	0	17,925	20,914	0	20,914	18,366	0	18,366
CY 3	21,671	0	21,671	20,353	0	20,353	19,974	0	19,974	17,990	0	17,990
CY 3	21,685	0	21,685	20,366	0	20,366	19,988	0	19,988	18,003	0	18,003
CY 4	24,671	0	24,671	24,123	0	24,123	32,167	0	32,167	20,227	0	20,227
CY 5	86,765	0	86,765	93,016	0	93,016	71,341	0	71,341	67,101	0	67,101
CY 6	109,378	0	109,378	126,584	0	126,584	81,012	0	81,012	91,910	0	91,910
CY 7	116,460	0	116,460	151,183	0	151,183	74,905	0	74,905	91,705	0	91,705
CY 8	83,808	0	83,808	116,100	0	116,100	53,269	0	53,269	68,389	0	68,389
CY 9	68,490	0	68,490	86,185	0	86,185	49,520	0	49,520	47,176	0	47,176
CY 10	50,806	0	50,806	68,747	0	68,747	22,393	0	22,393	37,280	0	37,280
CY 11	24,681	0	24,681	44,019	0	44,019	7,757	0	7,757	17,240	0	17,240
CY 12	2,957	0	2,957	9,740	0	9,740	943	0	943	1,850	0	1,850
CY 13	158	0	158	1,680	0	1,680	149	0	149	158	0	158
CY 14	158	0	158	205	0	205	149	0	149	158	0	158
FBY	0	719	719	0	1,809	1,809	0	330	330	0	0	0
OY 1	0	579	579	0	1,456	1,456	0	266	266	0	0	0
OY 2	0	439	439	0	1,104	1,104	0	201	201	0	0	0
OY 3	0	299	299	0	752	752	0	137	137	0	0	0
OY 4	0	159	159	0	399	399	0	73	73	0	0	0
OY 5+ [c]	0	19	19	0	47	47	0	9	9	0	0	0
Total A	627,486	2,212	629,698	782,883	5,567	788,451	452,397	1,016	453,412	500,967	0	500,967
Total B	631,056	2,212	633,267	786,453	5,567	792,020	455,966	1,016	456,982	504,537	0	504,537

CO_2e = carbon dioxide equivalent; CVP = Central Valley Project; PFIY = preliminary field investigation year; CY = construction year; FBY = full build year; OY = operational year.

[a] Two construction emissions estimates are presented for CY1 through CY3. The first estimate (and Total A) is emissions without construction of the compensatory mitigation restoration sties. The second estimate (and Total B) includes these construction emissions.

[b] Emissions account for the change over time in GHG intensity factors from implementation of the State's RPS. Emissions are net relative to no project emissions over the analysis period.

[c] SF_6 emissions from electrical transmission. These emissions were quantified using the average SF_6 emissions intensity of the statewide electrical grid in 2018. CARB is proposing amendments to the SF_6 Switchgear Regulation that would ban SF_6 as an insulator in electricity transmission after 2033. If adopted, the estimated emissions presented in this table for OY 5 and beyond would not occur.

Table 23-73. Annual Additional Emissions from Construction and Displaced Purchases of CVP Electricity for the Eastern Alignment Alternatives (metric tons CO_2e)

	Alternative 3			Alternative 4a			Alternative 4b			Alternative 4c		
Year	Construction [a]	Displaced CVP Electricity [b]	Total	Construction [a]	Displaced CVP Electricity [b]	Total	Construction [a]	Displaced CVP Electricity [b]	Total	Construction [a]	Displaced CVP Electricity [b]	Total
PFIY 1	7,172	0	7,172	8,005	0	8,005	6,592	0	6,592	7,172	0	7,172
PFIY 2	6,828	0	6,828	7,507	0	7,507	6,403	0	6,403	6,828	0	6,828
CY 1	5,590	0	5,590	7,666	0	7,666	5,060	0	5,060	7,521	0	7,521
CY 1	7,278	0	7,278	9,354	0	9,354	6,748	0	6,748	9,210	0	9,210
CY 2	14,525	0	14,525	14,749	0	14,749	19,180	0	19,180	14,366	0	14,366
CY 2	16,393	0	16,393	16,617	0	16,617	21,048	0	21,048	16,233	0	16,233
CY 3	16,797	0	16,797	17,012	0	17,012	14,009	0	14,009	14,650	0	14,650
CY 3	16,811	0	16,811	17,026	0	17,026	14,022	0	14,022	14,663	0	14,663
CY 4	20,201	0	20,201	19,636	0	19,636	29,685	0	29,685	16,064	0	16,064
CY 5	87,377	0	87,377	92,685	0	92,685	70,686	0	70,686	66,912	0	66,912
CY 6	111,909	0	111,909	125,430	0	125,430	82,602	0	82,602	92,762	0	92,762
CY 7	117,639	0	117,639	150,203	0	150,203	75,365	0	75,365	93,507	0	93,507
CY 8	84,621	0	84,621	113,641	0	113,641	55,614	0	55,614	70,417	0	70,417
CY 9	70,706	0	70,706	83,902	0	83,902	49,749	0	49,749	49,286	0	49,286
CY 10	54,176	0	54,176	68,823	0	68,823	27,273	0	27,273	41,658	0	41,658
CY 11	30,223	0	30,223	47,499	0	47,499	16,673	0	16,673	21,816	0	21,816
CY 12	11,195	0	11,195	18,531	0	18,531	1,428	0	1,428	6,407	0	6,407
CY 13	5,127	0	5,127	9,196	0	9,196	172	0	172	1,231	0	1,231
CY 14	192	0	192	3,965	0	3,965	149	0	149	158	0	158
FBY	0	719	719	0	1,862	1,862	0	330	330	0	0	0

Year	Alternative 3			Alternative 4a			Alternative 4b			Alternative 4c		
	Construction [a]	Displaced CVP Electricity [b]	Total	Construction [a]	Displaced CVP Electricity [b]	Total	Construction [a]	Displaced CVP Electricity [b]	Total	Construction [a]	Displaced CVP Electricity [b]	Total
OY 1	0	579	579	0	1,499	1,499	0	266	266	0	0	0
OY 2	0	439	439	0	1,137	1,137	0	201	201	0	0	0
OY 3	0	299	299	0	774	774	0	137	137	0	0	0
OY 4	0	159	159	0	411	411	0	73	73	0	0	0
OY 5+ [c]	0	19	19	0	48	48	0	9	9	0	0	0
Total A	644,279	2,212	646,491	788,449	5,731	794,180	460,640	1,016	461,656	510,754	0	510,754
Total B	647,849	2,212	650,061	792,019	5,731	797,750	464,210	1,016	465,226	514,324	0	514,324

CO_2e = carbon dioxide equivalent; CVP = Central Valley Project; PFIY = preliminary field investigation year; CY = construction year; FBY = full build year; OY = operational year.

[a] Two construction emissions estimates are presented for CY1 through CY3. The first estimate (and Total A) is emissions without construction of the compensatory mitigation restoration sties. The second estimate (and Total B) includes these construction emissions.

[b] Emissions account for the change over time in GHG intensity factors from implementation of the State's RPS. Emissions are net relative to no project emissions over the analysis period.

[c] SF_6 emissions from electrical transmission. These emissions were quantified using the average SF_6 emissions intensity of the statewide electrical grid in 2018. CARB is proposing amendments to the SF_6 Switchgear Regulation that would ban SF_6 as an insulator in electricity transmission after 2033. If adopted, the estimated emissions presented in this table for OY 5 and beyond would not occur.

Table 23-74. Annual Additional Emissions from Construction and Displaced Purchases of CVP Electricity for the Bethany Reservoir Alternative (metric tons CO_2e)

	Alternative 5		
Year	Construction [a]	Displaced CVP Electricity [b]	Total
PFIY 1	6,974	0	6,974
PFIY 2	6,630	0	6,630
CY 1	5,408	0	5,408
CY 1	7,096	0	7,096
CY 2	5,199	0	5,199
CY 2	7,067	0	7,067
CY 3	10,816	0	10,816
CY 3	10,829	0	10,829
CY 4	26,043	0	26,043
CY 5	66,215	0	66,215
CY 6	88,352	0	88,352
CY 7	82,518	0	82,518
CY 8	61,919	0	61,919
CY 9	56,048	0	56,048
CY 10	46,995	0	46,995
CY 11	22,005	0	22,005
CY 12	8,736	0	8,736
CY 13	1,427	0	1,427
CY 14	158	0	158
FBY	0	718	718
OY 1	0	578	578
OY 2	0	438	438
OY 3	0	298	298
OY 4	0	159	159
OY 5+ [c]	0	19	19
Total A	495,442	2,209	497,652
Total B	499,012	2,209	501,221

CO_2e = carbon dioxide equivalent; CVP = Central Valley Project; PFIY = preliminary field investigation year; CY = construction year; FBY = full build year; OY = operational year.

[a] Two construction emissions estimates are presented for CY1 through CY3. The first estimate (and Total A) is emissions without construction of the compensatory mitigation restoration sties. The second estimate (and Total B) includes these construction emissions.

[b] Emissions account for the change over time in GHG intensity factors from implementation of the State's RPS. Emissions are net relative to no project emissions over the analysis period.

[c] SF_6 emissions from electrical transmission. These emissions were quantified using the average SF_6 emissions intensity of the statewide electrical grid in 2018. CARB is proposing amendments to the SF_6 Switchgear Regulation that would ban SF_6 as an insulator in electricity transmission after 2033. If adopted, the estimated emissions presented in this table for OY 5 and beyond would not occur.

As shown in Tables 23-72 through 23-74, annual emissions from project construction and displaced purchases of CVP electricity under all project alternatives would exceed the analysis threshold of net zero emissions. Maximum annual emissions would occur during construction. Net additional emissions from displaced purchases of CVP electricity would begin at full build but reach near-zero in 2045 because of the State's RPS that requires zero-carbon resources comprise 100% of electric retail sales to end-use customers by this date. As noted above, beyond 2045, SF_6 emissions from electrical transmission may occur, but these are likely to be eliminated through forthcoming state regulation.

Total net additional emissions from project construction and displaced purchases of CVP electricity are estimated to be between 453,412 and 794,180 metric tons CO_2e, with Alternative 4a generating the most emissions and Alternative 2b generating the least. This would be a significant impact. DWR would implement Mitigation Measure AQ-9: *Develop and Implement a GHG Reduction Plan to Reduce GHG Emissions from Construction and Net CVP Operational Pumping to Net Zero* to mitigate GHG emissions generated during construction to net zero and demonstrate that ongoing net emissions from displaced purchases of CVP electricity are reduced to zero in advance of Senate Bill 100 and forthcoming amendments to the SF_6 Switchgear Regulation.

As shown in Tables 23-72 through 23-74, based on the best information currently available, maximum total net emissions from project construction and displaced purchases of CVP electricity without implementation of Mitigation Measure AQ-9 are estimated to be 794,180 metric tons CO_2e, or 797,750 metric tons CO_2e inclusive of construction emissions for the Compensatory Mitigation Plan. This represents the project's maximum total mitigation commitment, which may be recalculated and achieved on a phase-by-phase basis as described under Mitigation Measure AQ-9. The mitigation obligation may, therefore, change over time as the project is implemented, regulations change, and new control technologies become available and effective.

Mitigation Measure AQ-9 outlines a menu of feasible GHG reduction strategies that can be individually or collectively implemented to achieve the magnitude of GHG reductions required to meet the project's maximum total mitigation commitment (797,750 metric tons CO_2e). Importantly, the mitigation commitment does not take credit for GHG reductions that will be achieved overtime because of project-induced land use change. As discussed further in Impact AQ-10, the total cumulative land use GHG effect of the project with the Compensatory Mitigation Plan is a net reduction of 42,087 to 149,788 metric tons CO_2e by 2070. While these reductions will help offset a portion of the emissions generated by project construction and O&M, DWR is committed to fully mitigating the project's near-term construction and O&M GHG effect absent inclusion of land use change emissions benefits that will materialize overtime.

<u>Summary</u>

The impact would be significant under CEQA for all project alternatives because emissions from construction and displaced purchases of CVP electricity would exceed the net zero analysis threshold before mitigation. Implementation of Mitigation Measure AQ-9 would mitigate emissions from construction and displaced purchases of CVP electricity to net zero through the development and implementation of a GHG mitigation program. This measure ensures net additional emissions from construction, and displaced purchases of CVP electricity would not result in a significant GHG impact. O&M and SWP pumping activities are consistent with DWR's Update 2020 and would not impede DWR's ability to achieve carbon neutrality by mid-century. Accordingly, through a combination of project-specific mitigation and tiering from DWR's Update 2020, GHG impacts from these sources would be less than significant.

Mitigation Measure AQ-9: Develop and Implement a GHG Reduction Plan to Reduce GHG Emissions from Construction and Net CVP Operational Pumping to Net Zero

Prior to issuance of the first construction or grading permit for the project, DWR will retain a qualified consultant to develop a GHG Reduction Plan (Plan) to mitigate GHG emissions resulting from construction and displaced purchases of CVP electricity to net zero. Net additional GHG emissions from construction and displaced purchases of CVP electricity have been quantified as part of this Draft EIR and total between 453,412 and 794,180 metric tons CO_2e, depending on the alternative. Construction of the compensatory mitigation restoration sites is predicted to generate an additional 3,570 metric tons CO_2e. This yields a reduction commitment of up to 797,750 metric tons CO_2e needed to meet the net zero performance standard. The net zero performance standard may be achieved based on actual emissions calculations, as described below. The reduction commitment may therefore change based on project activities and adoption of new state regulations. Notably, if CARB's amendments to the Regulation for Reducing Sulfur Hexafluoride Emissions from Gas Insulated Switchgear (SF_6 Switchgear Regulation) are not adopted, DWR must reduce annual ongoing SF_6 from electrical transmission beyond 2045. This is further discussed below.

Required content for the Plan is identified in Section A below, including potential GHG reduction strategies to achieve the net zero performance standard. Monitoring, reporting, and enforcement requirements for future implementation of the Plan are outlined in Section B.

A. Required Plan Contents

1) *Emissions Quantities and Reduction Commitments:* GHG emissions from construction and displaced purchases of CVP electricity must be mitigated to net zero on a continual basis throughout construction and operations. This will require DWR to constantly "stay ahead" of the estimated emissions through early investment in GHG reduction efforts prior to construction (to ensure mitigation of unavoidable initial construction GHG emissions) and advanced planning for GHG reductions so that throughout the construction and operational period, the net effect of project emissions and this mitigation is that the project will not result in any increase in GHG emissions over baseline conditions. Since some of the planning will rely on the estimated GHG reduction value of future actions during construction and operation, there may be some need for "catch up" GHG reductions if emissions are higher than expected or reduction results are lower than expected. Conversely, if emissions are lower than expected or reduction results are higher than expected, there may be some building up of "forward credits" for the next phase of construction and/or operations.

2) *Plan Development:* Developing a fixed and rigid implementation strategy up-front to cover 12 to 14 years of construction, depending on the alternative, followed by project operation will be restrictive and will potentially preclude DWR from pursing future reduction technologies that could be economically or environmentally superior to options that are currently available.

   Given the constraints associated with developing a fixed and rigid reduction plan to cover all project emissions, the Plan may be developed and implemented over multiple phases. A phased approach provides increased implementation and management flexibility. It also enhances Plan quality as lessons learned during initial phases are applied to future reduction efforts. The first phase of the Plan must address no fewer than the first 5 years of construction. The Plan will be amended to provide implementation details for subsequent phases according to the requirements in Section B below.

The Plan will identify the amount of GHG emissions anticipated in the covered phase, as well as emissions from prior phases (if applicable) and the projected total net emissions of the project. This Draft EIR presents an estimate of annual GHG emissions generated by project construction and displaced purchases of CVP electricity. Although this inventory could be used exclusively to inform the required mitigation commitment, the methods used to quantify emissions in the Draft EIR were conservative. They also do not account for any GHG reduction strategies that may be implemented by DWR pursuant to this measure. Accordingly, this Draft EIR likely overestimates actual GHG emissions that would be generated by the project. DWR may therefore reanalyze GHG emissions for any phase of the project to update the required reduction commitment to achieve net zero.

An updated emissions analysis conducted for the Plan will be performed using approved emissions models and methods available at the time of the reanalysis. The analysis must use the latest available engineering data for the project, inclusive of any required environmental commitments or GHG emissions reduction strategies. Consistent with the methodology used in this Draft EIR, emissions factors may account for enacted regulations that will influence future year emissions intensities (e.g., fuel efficiency standards for on-road vehicles). Emissions from displaced purchases of CVP electricity will be derived by subtracting the project total energy consumption from what would have been generated by the system without implementation of the project, and then multiplying the net change in energy consumption by the statewide grid average emissions intensity.

3) *GHG Reduction Strategies*: Each phase of the Plan will identify the GHG reduction strategies that will be implemented during that phase to achieve the net zero performance standard. Strategies that could be used in formulating the Plan are summarized below. GHG reduction strategies must be verifiable and feasible to implement. The Plan will identify the entity responsible for implementing each strategy (if not DWR) and the estimated GHG reduction that will be achieved by implementation of the strategy. If the selected strategies are shown to exceed total net emissions of that phase, the estimated surplus can be applied as a credit in future phase(s), as explained in Section B.1.

Environmental commitments (Section A.3a) are required project design features that must be incorporated into the Plan. Following environmental commitments, DWR will prioritize selected strategies as: (1) on-site construction strategies (Section A.3b); (2) off-site strategies (Section A.3c); and (3) GHG credits (Section A.3d). The order of priority for the location of selected strategies will be: (1) within the project right-of-way; (2) within communities surrounding the water conveyance alignment (e.g., Hood); (3) throughout California's Central Valley and Northern California; (4) in the State of California; (5) in the United States; and (6) outside of the United States. If the Plan proposes GHG reduction strategies that do not conform to the priorities outlined above, it must present substantial evidence to justify the deviation or explain why higher priority strategies were deemed infeasible as defined under CEQA.

It is possible that some of the strategies could independently achieve the net zero performance standard for the project. Various combinations of strategies could also be pursued to optimize total costs or community co-benefits. DWR will be responsible for determining the overall mix of strategies necessary to ensure the performance standard to mitigate the significant GHG impact is met.

The list of strategies presented in this section is not exclusive. DWR may include additional or new strategies to reduce GHG emissions to the extent that they become commercially available and cost effective and earn a track-record for reliability in real-world conditions. This may include new equipment and vehicle systems (e.g., autonomous construction equipment, fuel-cells), new energy systems (e.g., battery storage), or other technologies (e.g., carbon capture and storage).

a. Environmental Commitments: All phases of the Plan must incorporate the following environmental commitments. Refer to Appendix 3B, *Environmental Commitments and Best Management Practice*, for measure descriptions.

   i. EC-7: *Off-Road Heavy-Duty Engines*

   ii. EC-8: *On-Road Haul Trucks*

   iii. EC-9: *On-Site Locomotives*

   iv. EC-10: *Marine Vessels*

   v. EC-13: *DWR Best Management Practices to Reduce GHG Emissions*

b. On-Site Construction Strategies: Strategies to reduce on-site construction emissions may include but are not limited to the following.

   i. *Purchase Zero-Carbon Electricity:* Enter into a power purchase agreement, where feasible, with utilities that provide electricity service to the study area to purchase construction electricity from renewable sources. Renewable sources must be zero-carbon energy sources (e.g., wind, solar, hydro) and may not be accounted to utility RPS goals.

   ii. *Install Electric Vehicle (EV) Charging Stations at Park-and-Ride Lots:* Install EV charging stations at employee park-and-ride lots.

   iii. *Use Electric Shuttles and Buses:* Require electric shuttles and buses to transport employees from the park-and-ride lots to construction sites.

   iv. *Optimize Delivery Logistics:* Utilize freight instead of on-road haul trucks to deliver construction materials and equipment, if feasible.

c. Off-Site Strategies: Off-site strategies to reduce emissions may include but are not limited to the following.

   i. *Support Community Building Energy Efficiency Improvements:* In coordination with local utilities, fund or contribute to an energy efficiency improvement program to achieve reductions in residential and commercial natural gas and electricity usage. Potential building improvements may include energy efficient appliances, energy efficient boilers, installation of alternative water heaters in place of natural gas storage tank heaters, installation of induction cooktops in place of gas ranges, or installation of cool roofs or green roofs.

ii. *Support Community Renewable Energy Projects:* In coordination with local utilities, fund or contribute to community solar, wind, or other renewable energy projects or programs. This could include providing funding to support utility programs that will allow homeowners to install solar photovoltaic systems at zero or minimal up-front cost. All projects installed under this measure must be designed for high performance (e.g., optimal full-sun location, solar orientation) and additive to utility RPS goals.

iii. *Support Energy Decarbonization Projects:* In coordination with local utilities, fund or contribute to community infrastructure projects (e.g., retirement of natural gas facilities) to support decarbonization of the electric power sector.

iv. *Support Community Transit Programs:* In coordination with local transit providers, fund or contribute to programs to increase the use of public transit (e.g., increased transit frequency, reduced transit fares).

v. *Support Community Pedestrian Network Improvements:* In coordination with local authorities, fund or contribute to programs to increase sidewalk coverage to improve pedestrian access and interconnectivity of the pedestrian network.

vi. *Support Community Bicycle Network Improvements:* In coordination with local authorities, fund or contribute to programs to construct or improve bicycle lane facilities (Class I, II, or IV) or bicycle boulevards.

vii. *Support Community Carshare or Bikeshare Programs:* In coordination with local authorities, fund or contribute to the deployment of neighborhood/city conventional or electric carshare or bikeshare programs.

viii. *Support Transportation Decarbonization Projects:* In coordination with local authorities, utilities, or transit providers, fund or contribute to community infrastructure projects (e.g., electric-transit buses, EV infrastructure) to support decarbonization of the transportation sector.

ix. *Support Biomass Waste Digestion and Conversion Facilities:* Fund or contribute financing to facility development either through long-term power purchase agreements or up-front project financing. Projects should be awarded through a competitive bidding process and chosen for GHG reduction and other environmental benefits to the project area. Projects could provide a range of final products: electricity generation, compressed natural gas for transportation fuels, and pipeline quality biomethane.

x. *Support Agriculture Waste Conversion Development:* Fund or contribute financing to the re-commissioning of thermal chemical conversion facilities to process collected agricultural biomass residues**.** Project funding should provide incentives to farmers in the project area to deliver agricultural wastes to existing facilities.

xi. *Increase Renewable Energy Purchases for Operations:* Increase renewable energy purchases under DWR's REPP) to reduce project emissions. The REPP identifies the quantity of renewable electricity resources that DWR will purchase each year to achieve the GHG emissions reduction goals laid out in its Update 2020.

xii. *Support Tidal Wetland Inundation Projects:* Expand the number of subsidence reversal and/or carbon sequestration projects currently being undertaken by DWR on Sherman and Twitchell Islands. Existing research at the Twitchell Wetlands Research Facility demonstrates that wetland restoration can sequester 25 tons of carbon per acre per year. Measure funding could be used to finance permanent wetlands for waterfowl or rice cultivation, creating co-benefits for wildlife and local farmers.

xiii. *Support Urban Tree Planting:* In coordination with local authorities, fund, contribute to, or implement a program to expand urban tree planting. The program should prioritize native tree species that require minimal water and maintenance, low-biogenic VOC emitting tree species, and low-allergen tree species. All trees should be appropriately distanced from buildings, especially in high fire areas.

xiv. *Conserve Agricultural Lands:* In coordination with local authorities, fund a program to protect agricultural lands from conversion to urban or rural residential development.

d. GHG Credits: A GHG credit enables development projects to compensate for their GHG emissions and associated environmental impacts by financing reductions in GHG emissions elsewhere. GHG credits derived from completed prior actions are referred to as "GHG offsets" or "carbon offsets." GHG credits derived from future contracted actions are referred to as "GHG future credits" or "GHG future mitigation units" (FMUs). GHG credits (including offsets) are classified as either compliance credits or voluntary credits. Compliance offsets can be purchased by covered entities subject to the cap-and-trade regulation to meet predetermined regulatory targets (to date, the cap-and-trade regulation only allows the use of GHG offsets, not GHG future credits). Voluntary offsets or voluntary GHG future credits are not associated with the cap-and-trade regulation and are purchased with the intent to voluntarily meet carbon neutral or other environmental obligations.

As of June 2021, DWR has 59,552 credits registered with the American Carbon Registry (ACR). One credit is equal to a GHG reduction or GHG removal enhancement of 1 metric ton of CO_2e. All GHG credits must be created through a CARB-approved registry. These registries are currently the ACR, Climate Action Reserve, and Verra, although additional registries may be accredited by CARB in the future. These registries use robust accounting protocols for all GHG credits created for their exchange, including the six currently approved CARB protocols. This mitigation measure specifically requires GHG credits created for the project to originate from a CARB-approved protocol or a protocol that is equal to or more rigorous than CARB requirements under 17 Cal. Code Regs. Section 95972. The selected protocol must demonstrate that the reduction of GHG emissions are real, permanent, quantifiable, verifiable, enforceable, and additional. Definitions of these terms from 17 Cal. Code Regs. Section 95802(a) are provided below (the original text used the term *offset*, which has been replaced in the text below with the generic term *GHG credit,* as this measure allows for use of both offsets and FMUs).

- **Real:** GHG reductions or GHG enhancements result from a demonstrable action or set of actions, and are quantified using appropriate, accurate, and conservative methodologies that account for all GHG emissions sources, GHG sinks, and GHG reservoirs within the [GHG credit] project boundary and account for uncertainty and the potential for activity-shifting leakage and market-shifting leakage.
- **Additional:** GHG reductions or removals that exceed any GHG reduction or removals otherwise required by law, regulation, or legally binding mandate, and that exceed any GHG reductions or removals that would otherwise occur in a conservative business-as-usual scenario.
- **Permanent:** GHG reductions and GHG removal enhancements are not reversible, or when GHG reductions and GHG removal enhancements may be reversible, mechanisms are in place to replace any reversed GHG emissions reductions and GHG removal enhancements to ensure that all credited reductions endure for at least 100 years.
- **Quantifiable:** The ability to accurately measure and calculate GHG reductions or GHG removal enhancements relative to a project baseline in a reliable and replicable manner for all GHG emissions sources, GHG sinks, or GHG reservoirs included within the [GHG credit] project boundary, while accounting for uncertainty and activity-shifting leakage and market-shifting leakage.
- **Verified:** A [GHG credit] project report assertion is well documented and transparent such that it lends itself to an objective review by an accredited verification body.
- **Enforceable:** The authority for CARB to hold a particular party liable and to take appropriate action if any of the provisions of this article are violated.

  Note that this definition of enforceability is specific to the cap-and-trade regulation, where CARB holds enforcement authority, but this measure will employ GHG credits from the voluntary market, where CARB has no enforcement authority. Applying the definition to this mitigation measure means that GHG reductions must be owned by a single entity and be backed by a legal instrument or contract that defines exclusive ownership.

GHG credits may be in the form of GHG offsets for prior reductions of GHG emissions verified through protocols or FMUs for future committed GHG emissions meeting protocols. Because emissions reductions from GHG offsets have already occurred, their benefits are immediate and can be used to compensate for an equivalent quantity of project-generated emissions at any time. GHG credits from FMUs must be funded and implemented within 5 years of project GHG emissions to qualify as a GHG credit under this measure (i.e., there can only be a maximum of 5 years lag between project emissions and their real-world reductions through funding an FMU in advance and implementing the FMU on the ground). Any use of FMUs that result in a time lag between project emissions and their reduction by GHG credits from FMUs must be compensated through a pro-rated surcharge of additional FMUs proportional to the effect of the delay. Since emissions of CO_2 in the atmosphere reach their peak radiative forcing within 10 years, a surcharge of 10% for every year of lag between project emissions and their reduction through an FMU will be added to the GHG credit requirement (i.e., 1.10 FMUs will be required to mitigate 1 metric ton of project GHG emissions generated in the year prior to funding and implementation of the FMU).

Consistent with the priorities outlined above in Section A.2, GHG credits from reduction projects in geographies closest to the water conveyance alignment (i.e., Sacramento and Central Valley) will be prioritized before projects in larger geographies (i.e., Southern California, California, United States, internationally). DWR will inform brokers of the required geographic prioritization for the procurement of GHG credits. GHG credits from reduction projects identified in the Sacramento and Central Valley that are of equal or lesser cost compared to the settlement price of the latest cap-and-trade auction must be included in the transaction. GHG credits from reduction projects in larger geographies may be purchased if adequate credits cannot be found in the Sacramento and Central Valley or they exceed the price maximum identified above. The economic and geographic analysis undertaken to inform the selection of GHG credits must be provided as part of the required documentation discussed below in Section B.3.

All GHG credits will be verified by an independent verifier accredited by the ANSI National Accreditation Board (ANAB) or CARB, or an expert with equivalent qualifications to the extent necessary to assist with the verification. Following the standards and requirements established by the accreditation board (ANAB or CARB), the verifier will certify the following.

- GHG credits conform to a CARB-approved protocol or a protocol that is equal to or more rigorous than CARB requirements under 17 Cal. Code Regs. Section 95972. Verification of the latter requires certification that the credits meet or exceed the standards in 17 Cal. Code Regs. Section 95972.
- GHG credits are real, permanent, quantifiable, verifiable, enforceable, and additional, as defined in this measure.
- GHG credits were purchased according to the geographic prioritization standard defined in this measure.

Verification of GHG offsets must occur as part of the certification process for compliance with the accounting protocol. Because FMUs are GHG credits that will result from future projects, additional verification must occur beyond initial certification. Verification for FMUs must include initial certification and independent verification every 5 years over the duration of the FMU generating the GHG credits. The verification will examine both the GHG credit realization on the ground and its progress toward delivering future GHG credits. DWR will retain an independent verifier meeting the qualifications described above to certify reductions achieved by FMUs are achieved following completion of the future reduction project.

B. Implementation and Enforcement

1) *Phased Analysis and Plan Amendments:* As described above in Section A.1, the Plan may be developed and implemented over multiple phases. Prior to the start of each phase, DWR will update the Plan to calculate the amount of GHG emissions anticipated in the

covered phase, as well as emissions from prior phases (if applicable) and the projected total net emissions of the project. The Plan will identify the specific GHG reduction strategies that will be implemented to meet the net zero performance standard for the covered phase and quantify the expected reductions that will be achieved by each strategy. All emissions and reductions will be quantified in accordance with the requirements outlined in Section A.1.

DWR will retain a qualified professional firm where the supervising staff has at least 10 years of experience performing air quality and GHG analysis to assist with its review and approval of the Plan. Subsequent amendments to the Plan will identify reductions that have been achieved during prior phases and determine if those reductions exceed emissions generated by the project. If the GHG reduction strategies implemented by DWR result in a surplus of reductions above the net zero performance standard, the balance of those reductions may be credited to subsequent phases.

The final phase of the Plan must address operational emissions following construction, accounting for regulations adopted at that time that will reduce project emissions. Specifically, DWR will confirm statewide emissions from electricity transmission will achieve carbon neutrality no later than December 31, 2045, pursuant to SB 100 and the SF_6 Switchgear Regulation (or subsequent regulations). If GHG emissions from displaced purchases of CVP electricity are expected to persist beyond 2045, DWR will calculate the amount of GHG emissions anticipated until the industry achieves carbon neutrality. The final Plan will identify GHG reduction strategies that will be implemented by DWR to meet the net zero performance standard for these emissions.

2) *Timing and Execution:* DWR will prepare the Plan (or first phase of the Plan) prior to issuance of the first construction or grading permit for the project. If DWR elects to use a phased approach, the first phase of the Plan must identify the expected future phases and schedule for amending the Plan to cover future phases.

Environmental Commitments and selected on-site construction strategies will be included in construction permits (as appliable) and contractor bid packages/agreements. Selected off-site strategies will be completed or operational before completion of the applicable phase. If GHG credits are pursued, DWR will enter the necessary contract(s) to purchase credits prior to the start of each phase. All credits must be retired before completion of the applicable phase.

3) *Reporting:* DWR will conduct annual reporting to verify and document that selected strategies achieve sufficient emissions reductions to mitigate project emissions to net zero. Each report should describe the GHG reduction strategies that were implemented over the prior year, summarize past, current, and anticipated project phasing, document compliance with Plan requirements, and identify corrective actions (if any) needed to ensure the Plan achieves the net zero performance standard. If GHG credits have been purchased to reduce emissions for the reporting year, the annual report must include copies of the offset retirement verification.

DWR will retain a qualified professional firm where the supervising staff has at least 10 years of experience performing air quality and GHG analysis to assist with its review and approval of the annual reports. Annual reports will be finalized and posted on DWR's website by December 31 of the following year.

Mitigation Impacts

Compensatory Mitigation

Construction of compensatory mitigation sites described in Appendix 3F, *Compensatory Mitigation Plan for Special-Status Species and Aquatic Resources,* would result in short-term GHG emissions.

As described in Appendix 3F, actions undertaken for initial compensatory mitigation would restore freshwater marsh along I-5 and wetland, open-water, and upland natural communities on Bouldin Island. Compensatory mitigation would also convert existing agriculture land on Bouldin Island to wetlands, riparian habitat, ponds, and grassland. For the I-5 ponds, it is proposed that the existing grasslands, riparian habitat, wetlands, and ponds would be replaced by improved grassland, wetland, riparian, and open-water habitat. The types of construction activities and equipment needed for habitat restoration are similar to what would be required for construction of the project, although they would be of substantially lesser magnitude. Table 23-75 summarizes emissions that would be generated by construction equipment utilized for initial compensatory mitigation restoration activities, which are expected to occur during the first 3 years of construction. The emissions estimates include implementation of air quality environmental commitments.

Table 23-75. GHG Emissions from Construction of Initial Compensatory Mitigation Sites (metric tons CO_2e)

Year	I-5 Ponds	Bouldin Island	Total
CY 1	1,425	263	1,688
CY 2	1,573	295	1,868
CY 3	13	0	13
Total [a]	3,011	558	3,570

CO_2e = carbon dioxide equivalent; CY = construction year; I- = Interstate.
[a] Values may not add due to rounding.

As shown in Table 23-75, annual emissions from construction of the initial compensatory mitigation sites would exceed the analysis threshold of net zero emissions. Additional channel margin and tidal habitat may be created within the North Delta Arc as part of the Compensatory Mitigation Plan that could increase construction emissions, although the specific design criteria required to support emissions quantification are not yet developed. This would be a significant impact. Implementation of Mitigation Measure AQ-9 would mitigate emissions from construction to net zero through the development and implementation of a GHG mitigation program. This measure ensures emissions from construction of the compensation mitigation restoration sites would not result in a significant GHG impact. Therefore, the project alternatives combined with compensatory mitigation would not change the overall impact conclusion of less than significant with mitigation.

Other Mitigation Measures

Some mitigation measures would result in GHG emissions from heavy-duty construction equipment, worker vehicles, and haul trucks. The mitigation measures with potential to generate GHG emissions are Mitigation Measures BIO-2c: *Electrical Power Line Support Placement*; SOILS-2: *Prepare and Implement Topsoil Salvage, Handling, Stockpiling and Reapplication Plans*; AG-3: *Replacement or Relocation of Affected Infrastructure Supporting Agricultural Properties*; AES-1c: *Implement Best Management Practices to Implement Project Landscaping Plan*; CUL-1: *Prepare and Implement a*

Built-Environment Treatment Plan in Consultation with Interested Parties; and CUL-2: *Conduct a Survey of Inaccessible Properties to Assess Eligibility, Determine if These Properties Will Be Adversely Affected by the Project, and Develop Treatment to Resolve or Mitigate Adverse Impacts*. GHG emissions from implementation of mitigation measures would be similar to GHG emissions generated during construction of the project alternatives, but of a lesser magnitude. Environmental Commitments EC-7: *Off-Road Heavy-Duty Engines,* EC-8: *On-Road Haul Trucks*, and EC-13: *DWR Best Management Practices to Reduce GHG Emissions* would reduce GHG emissions from equipment and vehicles. Mitigation Measure AQ-9: *Develop and Implement a GHG Reduction Plan to Reduce GHG Emissions from Construction and Net CVP Operational Pumping to Net Zero* would implement a GHG mitigation program and mitigate GHG emissions generated during construction and from operational sources not covered by DWR's 2020 Update to net zero. This measure could be extended to cover GHG emissions generated by implementation of other mitigation measures. Therefore, impacts from implementation of other mitigation measures would be less than significant with mitigation.

Overall, impacts on GHG emissions from implementation of compensatory mitigation and other mitigation measures, combined with project alternatives, would not change the less than significant with mitigation impact conclusion.

Impact AQ-10: Result in Impacts on Global Climate Change from Land Use Change

All Project Alternatives

Land use changes and earthmoving during construction would alter existing GHG emissions and sequestration. Crops would be removed temporarily or permanently or there would be construction of facilities and roads that replace crops. For affected crops on mineral soils, this can result in a temporary or permanent removal of a GHG sink. Removal of permanent crops (trees and vines) would remove carbon stored in the biomass, which is assumed to be converted to CO_2. After crop removal, organic and highly organic mineral soils exposed to air would continue to release GHGs. Excavated peat and topsoil placed in stockpiles would result in CO_2 and N_2O emissions from oxidation of organic material.

Table 23-76 summarizes the net GHG impact of project construction based on the change in land use GHG emissions and sequestration relative to present-day land use conditions. Unlike construction emissions from equipment and vehicles (analyzed under Impact AQ-9), which cease when the engine is turned off, many of the GHG emissions and sequestration associated with land use change occur annually and can vary depending on the growth rate of vegetation and other factors. Accordingly, GHG emissions induced by land use change from project construction were quantified through 2070. The confidence in emissions projections beyond 2070 is limited and would be speculative, as discussed further in Appendix 23A, *Mass Emissions Estimation Methodology*, Attachments 23A.1 and 23A.2. Accordingly, this analysis uses 2070 as the analysis horizon for the consideration of future GHG effects from land use change. The emissions estimates presented in Table 23-76 represent the cumulative sum of project emissions and removals, which included vegetation removal and replacement and peat piles, minus the cumulative sum of the baseline scenario emissions and removals over this period. Cumulative net average annual emissions per acre are also provided.

Emissions were estimated for Alternatives 2a, 4a, and 5. Alternative 4a would yield the greatest net increase in emissions relative to baseline, whereas Alternative 5 would yield the smallest net increase in emissions. This is discussed further below. Land use change emissions under all other alternatives would fall between the estimates presented for Alternatives 2a, 4a, and 5.

GHG flux rates from land use change are dynamic and extremely variable. There is an inherent amount of uncertainty in the underlying models, which is compounded when emissions from multiple sources are combined (e.g., peat oxidation, woody vegetation removal). Every effort was made to control and reduce model uncertainty for the analysis. However, given the spatial variability of organic matter content and depth of groundwater throughout the study area, the analysis uncertainty is calculated at plus or minus 30%. This is discussed in greater detail in Appendix 23A, Attachments 23A.1 and 23A.2. Table 23-76 presents the upper- and lower-bound estimates of the average net cumulative GHG effect of land use change in recognition of this variability.

Table 23-76. Net Cumulative Land Use Change Emissions from Construction of Alternatives 2a, 4a, and 5 (metric tons CO_2e)

Analysis and Alternative	Cumulative Net Emissions Through		Cumulative Net Average Annual Emissions per Acre Through	
	FBY	2070	FBY	2070
Lower-Bound				
Alternative 2a	11,901	-8,502	3.35	-4.45
Alternative 4a	24,709	22,333	6.86	6.20
Alternative 5	-41	-16,235	-0.03	-13.64
Upper-Bound				
Alternative 2a	22,102	-15,790	8.14	-2.39
Alternative 4a	45,888	41,475	16.66	11.52
Alternative 5	-77	-30,150	-0.02	-7.35

CO_2e = carbon dioxide equivalent; FBY = full build year.

The net cumulative GHG effect of land use changes due to construction activities through full buildout is estimated to range from a decrease of 77 to 45,888 metric tons CO_2e over the confidence interval and depending on the alternative. Through 2070, the net cumulative GHG effect would range from a decrease of 30,150 to an increase of 41,475 metric tons CO_2e. The increased cumulative emissions under Alternatives 2a and 4a to full buildout would result mainly from the removal of crops on mineral soils, such as alfalfa and wheat, and the removal of woody crops such as grapes and pears. The largest GHG effect is predicted under Alternative 4a. Effects of Alternatives 2a and 5 would be one order of magnitude lower than effects of Alternative 4a. The capping of organic and highly organic mineral soils provided by construction at Bouldin Island represents a significant benefit in decreasing emissions to 2070 with respect to baseline for Alternative 2a. Alternative 5 is notably different due to the absence of emissions associated with construction in the Southern Complex, which is the most relevant feature for Alternatives 2a and 4a in terms of GHG emissions and removals.

As indicated by the decrease in annual per acre values in Table 23-76, cumulative net emissions would continue to decrease with time. This is due primarily to diminishing effects of peat oxidation and the long-term benefit resulting from project features that provided capping or wetting to organic and highly organic mineral soils. Also, the effects of temporary crop removal would disappear within 20 years after construction due to regrowth of permanent woody crops.

CEQA Conclusion—Alternatives 1, 2a, 2b, 2c, and 5

The impact would be less than significant under CEQA for Alternatives 1, 2a, 2b, 2c, and 5 because cumulative emissions from land use change are projected to decrease relative to baseline by 2070. Initial construction activities would result in GHG increases early in project implementation. The alternatives would achieve a yearly net negative emissions rate approximately 4 to 6 years after groundbreaking, and a cumulative net negative GHG impact 15 to 28 years later, depending on the alternative. As shown in Table 23-76, cumulative net reductions projected through 2070 are estimated to range from 8,502 to 15,790 metric tons CO_2e for the central conveyance alignment alternatives and 16,235 to 30,150 metric tons CO_2e for Alternative 5. Because cumulative GHG emissions from land use change would not exceed net zero, implementation of Alternatives 1, 2a, 2b, 2c, and 5 would not result in a significant impact on GHG emissions or impede DWR's or the state's ability to achieve their GHG reduction goals.

CEQA Conclusion—Alternatives 3, 4a, 4b, and 4c

The impact would be significant under CEQA for Alternatives 3, 4a, 4b, and 4c because cumulative emissions from land use change are projected to remain positive relative to baseline by 2070. Initial construction activities would result in GHG increases early in project implementation. While the alternatives would achieve yearly net negative emissions following construction, these emissions removals would not be sufficient to offset the emissions generated from initial land conversion. As shown in Table 23-76, cumulative net emissions through 2070 are projected to range from 22,333 to 41,475 metric tons CO_2e. Because cumulative GHG emissions from land use change would exceed net zero, implementation of Alternatives 3, 4a, 4b, and 4c would result in a significant impact on GHG emissions. Implementing Mitigation Measure CMP: *Compensatory Mitigation Plan* would offset GHG emissions from construction land use change through expanded habitat creation (Tables 23-77 and 23-78). Therefore, GHG impact from land use change under Alternatives 3, 4a, 4b, and 4c would be less than significant with mitigation.

Mitigation Measure CMP: Compensatory Mitigation Plan

Under the CMP that DWR will implement, mitigation sites on Bouldin Island would be designed to provide compensatory mitigation for aquatic resources impacts and the I-5 ponds would provide compensatory mitigation for special-status species habitat. The net gain in habitat, once changes from existing land cover are accounted for, is summarized for wetlands and other waters in Appendix 3F, *Compensatory Mitigation Plan for Special-Status Species and Aquatic Resources,* Table 3F-3. DWR commits to providing the funding for the initial establishment and long-term management of the mitigation sites to ensure that it continues to meet the established goals of the CMP and any subsequent management plans. This includes the initial 5-year establishment period for the mitigation sites, all activities associated with ongoing maintenance, as well as future actions associated with an adaptive management strategy. Refer to Appendix 3F, Section SF.5, *Assurances*, for additional information.

Mitigation Impacts

Compensatory Mitigation

The Compensatory Mitigation Plan described in Appendix 3F, *Compensatory Mitigation Plan for Special-Status Species and Aquatic Resources,* indirectly acts as mitigation for project GHG emissions by increasing the sequestration capacity of the land.

Land use change during construction of the compensatory mitigation restoration sites would alter existing GHG emissions. However, the proposed mitigation habitats (e.g., freshwater ponds, tidal) would contribute to mitigating existing emissions sources by providing increased sequestration. Present-day activities on the proposed mitigation sites that generate GHG emissions include oxidation of organic and highly organic mineral soils, agriculture activities on mineral soils (including fallowed/idle areas), farming activities, seasonal wetlands, and grasslands.

Table 23-77 summarizes the net GHG impact of the proposed initial compensatory mitigation based on the change in land use emissions and sequestration relative to present-day land use conditions. Similar to the project land use analysis, GHG emissions induced by land use change were quantified through full build and 2070. The emissions estimates presented in Table 23-77 represent the cumulative sum of initial compensatory mitigation emissions and sequestration minus the cumulative sum of the baseline scenario emissions and sequestration through full build and over this period. Upper- and lower-bound emissions estimates are presented to capture the potential uncertainty associated with GHG flux analyses. Cumulative net average annual emissions per acre are also provided.

Table 23-77. Net Cumulative Land Use Change Emissions from Initial Compensatory Mitigation (Bouldin Island and I-5 Ponds) (metric tons CO_2e)

	Cumulative Net Emissions Through		Cumulative Net Average Annual Emissions per Acre Through	
Analysis	FBY	2070	FBY	2070
Lower-Bound	-20,831	-64,420	-21.35	-67.55
Upper-Bound	-38,685	-119,638	-39.65	-125.45

CO_2e = carbon dioxide equivalent; FBY = full build year.

The proposed initial Compensatory Mitigation Plan would result in a cumulative emissions reduction of 20,831 to 38,685 metric tons CO_2e by 2040 and 64,420 to 119,638 metric tons CO_2e by 2070. Additional channel margin and tidal habitat within the North Delta Arc may be created under the Compensatory Mitigation Plan that could increase emissions removals, although the specific design criteria required to support emissions quantification are not yet developed. The impact would be less than significant under CEQA for all project alternatives because cumulative net total GHG emissions would not exceed the net zero analysis threshold.

When considered alongside the project alternatives, the magnitude of net cumulative GHG removals under Alternatives 1, 2a, 2b, 2c, and 5 would increase. Likewise, Alternatives 3, 4a, 4b, and 4c would achieve a cumulative net reduction in land use change emissions by 2070. This is shown in Table 23-78, which shows that the total cumulative GHG effect of the project inclusive of the Compensatory Mitigation Plan is a net reduction of 42,087 and 149,788 metric tons CO_2e by 2070.

Table 23-78. Net Cumulative Land Use Change Emissions from Construction and Initial Compensatory Mitigation (metric tons CO_2e)

	Cumulative Net Emissions Through	
Alternative and Analysis	FBY	2070
Alternative 2a		
Lower-Bound	-8,929	-72,923
Upper-Bound	-16,583	-135,428

Alternative and Analysis	Cumulative Net Emissions Through FBY	Cumulative Net Emissions Through 2070
Alternative 4a		
Lower-Bound	3,878	-42,087
Upper-Bound	7,203	-78,162
Alternative 5		
Lower-Bound	-20,872	-80,655
Upper-Bound	-38,762	-149,788

CO_2e = carbon dioxide equivalent; FBY = full build year.

Other Mitigation Measures

Some mitigation measures would involve ground disturbance and could change existing land use GHG emissions or removals. The mitigation measures with potential to result in land use change emissions are Mitigation Measures BIO-2c: *Electrical Power Line Support Placement*; SOILS-2: *Prepare and Implement Topsoil Salvage, Handling, Stockpiling and Reapplication Plans*; AG-3: *Replacement or Relocation of Affected Infrastructure Supporting Agricultural Properties*; AES-1c: *Implement Best Management Practices to Implement Project Landscaping Plan*; *and* CUL-1: *Prepare and Implement a Built-Environment Treatment Plan in Consultation with Interested Parties*. None of the measures are expected to materially affect land use–based GHG emissions processes (e.g., sequestration, removal of existing carbon stock), but there could be some minor changes in emissions and/or removals. Any cumulative increase in GHG emissions resulting from implementation of mitigation would be reduced through Mitigation Measure CMP: *Compensatory Mitigation Plan*. Therefore, impacts from implementation of other mitigation measures would be less than significant with mitigation.

Overall, impacts on GHG emissions from implementation of compensatory mitigation and other mitigation measures, combined with project alternatives, would not change the less than significant with mitigation impact conclusion.

23.3.4 Cumulative Analysis

The evaluation of regional air quality at the air basin level and global climate change at the global level is an inherently cumulative approach because criteria pollutant and GHG emissions, once emitted, mix into the atmosphere and affect a larger area than any individual project site. Thus, the regional air quality and global GHG analysis does not consider individual planned projects in the vicinity of the project. Rather, it uses the same thresholds as the project-level thresholds developed by SMAQMD, SJVAPCD, BAAQMD, and YSAQMD, which are based on projections of future development compared to existing conditions. Criteria pollutant emissions that exceed air quality thresholds under modeled conditions are considered to reflect the cumulative impacts resulting from contributors within the air basins. Exceedance of project-level thresholds indicates that there would be both a project-level and a cumulative impact.

The evaluation of localized air quality impacts from receptor exposure to TAC and criteria pollutant concentrations considers both project-level and cumulative thresholds, depending on location. As discussed further in this analysis, exceedances of SMAQMD's, SJVAPCD's, and YSAQMD's project-level cancer and noncancer thresholds constitute a significant cumulative impact. Thus, individual cumulative projects in the vicinity of construction and operational activities in these air districts are not considered, consistent with air district guidance (Sacramento Metropolitan Air Quality Management District 2020a:8-8; Siong pers. comm.; Yolo-Solano Air Quality Management District 2007). The HRA in the BAAQMD compares the project's incremental TAC risk and cumulative TAC risks from sources within 1,000 feet of the project to BAAQMD's cumulative risk thresholds. With respect to localized CO, NO_2, and SO_2 concentrations, the analysis adds the increase in construction-generated pollutant concentrations to existing cumulative concentrations to estimate the total ambient air pollutant concentration for comparison with the ambient air quality standards, which are cumulative standards. Because existing concentrations of PM in most of the project area already exceed the ambient air quality standards, the analysis compares only the incremental increase in PM concentrations from construction to the applicable SILs in these locations.

23.3.4.1 Cumulative Impacts of the No Project Alternative on Air Quality and Global Climate Change

The ongoing projects and programs in the Delta under the No Project Alternative would require construction resulting in emissions from combustion sources (e.g., equipment and vehicles) and earthmoving activities. Emissions would vary depending on the level of activity, length of the activity, specific operations, types of equipment, number of personnel, wind and precipitation conditions, and soil moisture content. Some projects and program would require operational activities, such as inspections, monitoring, testing, maintenance, and facility operations. These activities could generate emissions from mobile and stationary equipment, on-road vehicles, energy consumption, and fugitive processes. While some activities (e.g., routine O&M, including inspections and minor repairs) may not substantially increase O&M activities relative to existing conditions, other projects would install entirely new facilities representing a new long-term source of emissions that could exceed adopted thresholds. Likewise, more intensive construction may be required for new or expanded facilities, including desalination, groundwater recovery, and water recycling facilities, which may generate emissions above local air district thresholds. Measures similar to those proposed for the Delta Conveyance Project are likely to be available to reduce emissions generated by the No Project Alternative. However, without specific information on the location, types, and design parameters of each project, it is unknown to what extent mitigated emissions levels would be reduced. Emissions above adopted air district thresholds would be cumulatively considerable and the cumulative air quality impact significant.

23.3.4.2 Cumulative Impacts of the Project on Air Quality

Regional Ozone Precursors and Criteria Pollutants

Project Construction

SVAB, SJVAB, and SFBAAB are in nonattainment status for the CAAQS and NAAQS for multiple pollutants because of the emissions from past and present projects. Construction and operations of future projects, including the project alternatives, may further contribute to regional nonattainment of the CAAQS and NAAQS. As discussed under Impacts AQ-1 through AQ-4, construction-phase emissions, compared to air district thresholds, are as follows.

- Construction of any of the project alternatives would result in maximum daily NOx and PM10 emissions above SMAQMD's thresholds.

- Construction of Alternatives 2a and 4a would result in annual PM10 emissions above SMAQMD's threshold.
- Construction of any of the project alternatives would result in annual NO_X emissions above SJVAPCD's threshold.
- Construction of Alternative 5 would result in annual PM10 emissions above SJVAPCD's threshold.
- Construction of any of the project alternatives would result in maximum daily NOx emissions above BAAQMD's threshold.
- Construction of any of the project alternatives would not exceed YSAQMD's thresholds.

Table 23-79 shows the highest annual and daily construction emissions for each alternative within the jurisdiction of SMAQMD, SJVAPCD, BAAQMD, and YSAQMD. Emissions results include those generated by construction of compensatory mitigation sites.

Table 23-79. Summary of Highest Annual and Daily Emissions from Construction of Any of the Project Alternatives [a]

	Daily Emissions (lbs/day) [b]										Annual Emissions (tons/year)									
				PM10			PM2.5							PM10			PM2.5			
Alternative	ROG	NO_X	CO	Exhaust	Dust	Total [c]	Exhaust	Dust	Total [c]	SO_2	ROG	NO_X	CO	Exhaust	Dust	Total [c]	Exhaust	Dust	Total [c]	SO_2
Sacramento Metropolitan Air Quality Management District																				
1	49	**697**	1,349	10	204	**209**	9	47	53	5	4	67	141	1	14	14	1	3	4	<1
2a	72	**1,072**	2,218	10	253	**262**	9	59	68	7	7	91	233	1	20	**21**	1	4	5	1
2b	42	**559**	739	10	166	**166**	9	36	38	3	3	49	90	<1	9	10	0	3	3	<1
2c	49	**729**	1,341	10	201	**207**	9	47	53	5	4	62	131	1	12	12	1	3	3	<1
3	50	**694**	1,353	10	196	**202**	9	45	50	5	5	70	145	1	14	**15**	1	3	4	<1
4a	71	**1,042**	2,215	10	256	**265**	9	59	68	7	7	89	233	1	20	**21**	1	5	5	1
4b	42	**609**	772	10	162	**163**	9	35	39	3	3	49	91	<1	9	10	<1	3	3	<1
4c	48	**700**	1,340	10	203	**209**	9	47	53	5	4	61	131	1	12	13	1	3	3	<1
5	48	**591**	1,332	10	171	**176**	9	41	46	4	4	58	141	1	13	14	1	3	4	<1
Threshold	–	*85*	–	–	–	*80[d]*	–	–	*82[d]*	–	–	–	–	–	–	*14.6[d]*	–	–	*15[d]*	–
San Joaquin Valley Air Pollution Control District																				
1	15	**185**	**251**	1	85	85	1	18	18	1	2	**23**	31	<1	11	11	<1	2	2	<1
2a	16	**267**	**271**	1	113	**113**	1	23	24	1	2	**33**	34	<1	14	14	<1	3	3	<1
2b	14	**152**	**257**	1	60	60	1	13	14	1	2	**19**	32	<1	7	7	<1	2	2	<1
2c	14	**161**	**215**	1	68	69	1	17	17	1	2	**20**	27	<1	9	9	<1	2	2	<1
3	15	**212**	**246**	1	73	73	1	16	17	1	2	**26**	31	<1	9	9	<1	2	2	<1
4a	16	**273**	**269**	1	92	92	1	21	22	1	2	**34**	34	<1	12	12	<1	3	3	<1
4b	11	**162**	**197**	1	65	66	1	15	15	1	1	**20**	25	<1	8	8	<1	2	2	<1
4c	15	**177**	**247**	1	75	75	1	16	17	1	2	**22**	31	<1	9	9	<1	2	2	<1
5	15	**200**	**259**	1	145	**145**	1	25	26	1	2	**25**	32	<1	18	**18**	<1	3	3	<1
Threshold	*100*	*100*	*100*	–	–	*100*	–	–	*100*	*100*	*10*	*10*	*100*	–	–	*15*	–	–	*15*	*27*

	Daily Emissions (lbs/day) [b]										Annual Emissions (tons/year)									
				PM10			PM2.5							PM10			PM2.5			
Alternative	ROG	NO_X	CO	Exhaust	Dust	Total [c]	Exhaust	Dust	Total [c]	SO_2	ROG	NO_X	CO	Exhaust	Dust	Total [c]	Exhaust	Dust	Total [c]	SO_2
Bay Area Air Quality Management District																				
1	33	**266**	959	7	439	442	6	64	68	2	3	22	100	<1	87	87	<1	13	13	<1
2a	39	**283**	1200	7	535	538	6	79	82	3	3	27	121	<1	75	75	<1	11	12	<1
2b	33	**224**	926	7	503	505	6	75	78	2	3	23	104	<1	75	76	<1	11	11	<1
2c	33	**216**	974	7	525	527	6	80	83	2	3	20	100	<1	78	78	<1	12	12	<1
3	33	**280**	959	7	627	629	6	92	94	2	3	23	100	<1	92	93	<1	14	14	<1
4a	39	**280**	1209	7	623	626	6	91	94	3	3	27	122	<1	91	91	<1	14	14	<1
4b	33	**241**	934	7	516	518	6	75	78	2	3	23	103	<1	76	76	<1	11	12	<1
4c	33	**211**	978	7	525	527	6	80	83	2	3	20	101	<1	78	78	<1	12	12	<1
5	29	**255**	739	7	334	336	6	43	46	2	2	26	81	<1	41	41	<1	6	6	<1
Threshold	*54*	*54*	–	*82*	*BMPs*	–	*82*	*BMPs*	–	–	–	–	–	–	–	–	–	–	–	–
Yolo-Solano Air Quality Management District																				
1	1	1	11	<1	6	6	<1	2	2	<1	<1	<1	1	<1	<1	<1	<1	<1	<1	<1
2a	1	1	12	<1	6	6	<1	2	2	<1	<1	<1	1	<1	<1	<1	<1	<1	<1	<1
2b	1	1	8	<1	5	5	<1	1	1	<1	<1	<1	1	<1	<1	<1	<1	<1	<1	<1
2c	1	1	11	<1	6	6	<1	2	2	<1	<1	<1	1	<1	<1	<1	<1	<1	<1	<1
3	1	1	9	<1	5	5	<1	1	1	<1	<1	<1	1	<1	<1	<1	<1	<1	<1	<1
4a	1	1	12	<1	7	7	<1	2	2	<1	<1	<1	1	<1	<1	<1	<1	<1	<1	<1
4b	1	1	9	<1	5	5	<1	1	1	<1	<1	<1	1	<1	<1	<1	<1	<1	<1	<1
4c	1	1	11	<1	6	6	<1	2	2	<1	<1	<1	1	<1	<1	<1	<1	<1	<1	<1
5	1	1	11	<1	6	6	<1	2	2	<1	<1	<1	1	<1	<1	<1	<1	<1	<1	<1
Threshold	–	-	–	–	–	*80*	–	–	–	–	*10*	*10*	–	–	–	–	–	–	–	–

BMP = best management practices; CO = carbon monoxide; lbs = pounds; NO_X = nitrogen oxides; PM10 = particulate matter that is 10 microns in diameter and smaller; PM2.5 = particulate matter that is 2.5 microns in diameter and smaller; ROG = reactive organic gases; SO_2 = sulfur dioxide.

[a] Emissions results include implementation of air quality Environmental Commitments EC-7 and EC-9 through EC-12. Exceedances of thresholds are shown in **bolded underline**.

[b] In SMAQMD, BAAQMD, and YSAQMD, the highest emissions estimate during a single day of any construction year, based on concurrent construction activities. In SJVAPCD, presents the highest average daily emissions estimate during any construction year.

[c] Total PM10 and PM2.5 emissions consist of exhaust and fugitive dust emissions. Annual values for exhaust and dust may not add to the totals in the total column because of rounding. Daily results for exhaust and dust may not add to the totals in the total column because the table presents maximum emissions results for each individual pollutant component. For example, the maximum PM exhaust emissions may not occur on the same day as the maximum total dust emissions.

[d] Threshold applicable with implementation of all feasible dust control BMPs.

Environmental commitments would minimize air quality impacts through application of best available on-site controls to reduce construction emissions. Specifically, impacts associated with fugitive dust emissions would be minimized through implementation of a dust control plan (Environmental Commitment EC-11: *Fugitive Dust Control*) and BMPs at new concrete batch plants (Environmental Commitment EC-12: *On-Site Concrete Batching Plants*). Exhaust-related pollutants would be reduced through use of renewable diesel, Tier 4 diesel engines, newer on-road and marine engines, and other BMPs, as required by Environmental Commitments EC-7: *Off-Road Heavy-Duty Engines* through EC-10: *Marine Vessels* and EC-13: *DWR Best Management Practices for Reducing GHG Emissions.* However, even with these commitments, exceedances of air district thresholds would occur during project construction before mitigation.

DWR would implement Mitigation Measures AQ-1: *Offset Construction-Generated Criteria Pollutants in the Sacramento Valley Air Basin*, AQ-2: *Offset Construction-Generated Criteria Pollutants in the San Joaquin Valley Air Basin*, and AQ-3: *Offset Construction-Generated Criteria Pollutants in the San Francisco Bay Area Air Basin* to mitigate NO_X and PM10 emissions, as applicable, to below air district thresholds. The air district thresholds have been developed to prevent further deterioration of ambient air quality and consider relevant past, present, and reasonably foreseeable future projects within the project area. Because NO_X and PM10 emissions would be mitigated to below air district thresholds through the purchase of offsets, the project alternatives' contribution to cumulative NO_X and PM10 emissions during construction would not be cumulatively considerable.

Potential Human Health Consequences

As shown in Table 23-2, all criteria pollutants are associated with some form of health risk (e.g., wheezing, airway irritation, asphyxiation). Negative health effects associated with criteria pollutant emissions are highly dependent on a multitude of interconnected variables (e.g., cumulative concentrations, local meteorology and atmospheric conditions, the number and character of exposed individuals [e.g., age, gender]). Moreover, ozone precursors (ROG and NO_X) affect air quality on a regional scale. Health effects related to ozone, therefore, are the product of emissions generated by numerous sources throughout a region.

There is a nexus between air district mass emissions thresholds and avoidance of health effects from exposure to air pollution. As described in Section 23.3.2.1, *Impacts on Air Quality within SMAQMD, SJVAPCD, BAAQMD, or YSAQMD*, the air districts in the air quality study area have adopted mass emissions thresholds to support regional attainment of the ambient air quality standards, which are set to protect public health. While maintaining emissions levels below air district thresholds can be considered protective of public health, there are no significance thresholds related to human health consequences of project-generated criteria pollutant emissions. Accordingly, this analysis is presented for informational purposes only and has no bearing on the determination of significance. The analysis presents the extent to which unmitigated construction emissions (i.e., emissions without implementation of Mitigation Measures AQ-1 through AQ-3) would result in changes in ambient pollutant concentrations and evaluates the correlative health effect of those pollutant changes on human health.[15]

[15] Although Mitigation Measures AQ-1 through AQ-3 will offset NOx and PM emissions, as required, these offsets could occur regionally throughout the SVAB, SJVAB, and SFBAAB. The locations and types of emissions reduction projects funded by Mitigation Measures AQ-1 through AQ-3 are not know at this time. Accordingly, it is not possible to model ambient pollutant concentrations and potential resultant changes in human health with implementation

Tables 23-80 through 23-85 provide a conservative estimate of maximum potential changes in criteria pollutant concentrations and resultant health effects compared to "future ambient" conditions. The future ambient pollutant concentration represents conditions without any additional emissions generated by the project. The reported project contribution to the future ambient pollutant concentration is the 4-by-4-kilometer grid cell with the maximum increase in pollutant concentration between the project concentration and the future ambient concentration. Estimated changes in all other modeled grid cells would be less than those reported below. The future ambient health incidence is the average annual number of people that suffer from a health consequence in absence of project construction over the modeled regional area of around 12 million people.[16]

Modeled results are presented for Alternatives 2a, 4a, and 5. These alternatives were selected for analysis to provide a conservative representation of the three conveyance alignments. Among the central and eastern conveyance alignment alternatives, construction activities and associated mass emissions are greatest for Alternative 2a and Alternative 4a, respectively (Table 23-79). Emissions, and thus potential regional health consequences, under all other alternatives for the central and eastern conveyance alignment alternatives would be less than those reported for Alternatives 2a and 4a. The results for Alternative 5 are representative of the Bethany Reservoir conveyance alignment.

Table 23-80. Future Ambient and Maximum Increase in Regional Pollutant Ozone (ppb) and PM2.5 (μg/m³) Concentrations from Construction of Alternative 2a

	Pollutant Concentration		
Pollutant	Future Ambient [a]	Project Contribution [b]	Project Increase over Future Ambient (%) [c]
Max daily 8-hour ozone	71.94043	0.00001	0.0000%
Daily average PM2.5	67.62074	0.00022	0.0003%
Annual average PM2.5	15.65176	0.00023	0.0015%

μg/m³ = microgram per cubic meter; PM2.5 = particulate matter that is 2.5 microns in diameter and smaller; ppb = parts per billion.

[a] The future ambient pollutant concentration represents conditions without any additional emissions generated by the project.

[b] The reported project contribution to the future ambient pollutant concentration is the 4-by-4-kilometer grid cell with the maximum increase in pollutant concentration between the project concentration and the future ambient concentration.

[c] Project contribution divided by future ambient.

of Mitigation Measures AQ-1 through AQ-3. This is because the location (including proximity to population centers) and parameters (e.g., point vs. stationary source, continuous vs. variable emission rate) of the avoided emissions source (i.e., reduction project) influence the nonlinearity of ozone formation and particulate concentrations. Without specific details on the emissions reduction projects, which cannot be known in advance of individual contracts, mitigated results cannot be predicted with any degree of confidence.

[16] Further spatial disaggregation of modeled results is presented in Appendix 23D, *Criteria Pollutant Health Impact Assessment Methodology*.

Table 23-81. Conservative Estimate of Health Effect Incidence during Construction of Alternative 2a

Health Endpoint	Age Range [a]	Annual Incidence per Year: Future Ambient [b]	Annual Incidence per Year: Project Contribution [c]	Project Increase over Future Ambient (%) [d]
PM2.5 Emissions, Respiratory				
Incidence, asthma	0–4	17,205	1.63	0.0095%
Incidence, asthma	5–17	14,069	1.36	0.0096%
Hospital admissions, respiratory	0–18	12,237	0.07	0.0006%
Hospital admissions, respiratory	65–99	38,161	0.02	<0.0001%
PM2.5 Emissions, Cardiovascular				
Hospital admissions, cardiovascular	65–99	114,668	0.14	0.0001%
Acute myocardial infarction, nonfatal	18–99	22,162	0.17–1.12 [e]	0.0007%–0.0050% [e]
PM2.5 Emissions, Mortality				
Mortality, all cause	0–2 months	497	0.01	0.0015%
Mortality, all cause	30–99	92,715	1.01	0.0011%
Mortality, all Cause	65–99	80,633	1.04	0.0013%
ROG and NO_X Emissions, (ozone health effects) Respiratory				
Hospital admissions, respiratory	65–99	25,937	0.05	0.0002%
Emergency room visits, asthma	0–99	25,937	0.05	0.0002%
ROG and NO_X Emissions, (ozone health effects) Mortality				
Mortality, respiratory	0–99	4,015	0.02	0.0005%
Mortality, respiratory	30–99	9,541	0.43	0.0045%

NO_X = nitrogen oxides; PM2.5 = particulate matter that is 2.5 microns in diameter and smaller; ROG = reactive organic gases.

[a] Individuals may be affected at other ages, but the age ranges shown are the ones used by EPA in their health assessments and are consistent with epidemiological study that is the basis of the health function.

[b] The future ambient health incidence is the average annual number of people that suffer from a health consequence in absence of project construction over the modeled regional area of around 12 million people.

[c] The project contribution is the average annual number of additional people that may suffer from a health consequence over the modeled regional area of around 12 million people due to the highest annual unmitigated project construction emissions. The project contribution during all other years of construction would be lower than the values presented in this table.

[d] Project contribution divided by future ambient.

[e] As a means of recognizing the strengths of the study used by EPA while also incorporating the newer evidence found in the four single and multi-city studies, the table present a range of acute myocardial infarction estimates. The upper end of the range is calculated using the study underpinning EPA's health assessment while the lower end of the range is the result of an equal-weights pooling of four newer studies.

Table 23-82. Future Ambient and Maximum Increase in Regional Pollutant Ozone (ppb) and PM2.5 (μg/m³) Concentrations from Construction of Alternative 4a

Pollutant	Pollutant Concentration: Future Ambient [a]	Pollutant Concentration: Project Contribution [b]	Project Increase over Future Ambient (%) [c]
Max daily 8-hour ozone	71.94043	0.00004	0.0001%
Daily average PM2.5	67.62074	0.00027	0.0004%

Pollutant	Pollutant Concentration		Project Increase over Future Ambient (%) [c]
	Future Ambient [a]	Project Contribution [b]	
Annual average PM2.5	15.65176	0.00024	0.0015%

µg/m³ = microgram per cubic meter; PM2.5 = particulate matter that is 2.5 microns in diameter and smaller; ppb = parts per billion.

[a] The future ambient pollutant concentration represents conditions without any additional emissions generated by the project.

[b] The reported project contribution to the future ambient pollutant concentration is the 4-by-4-kilometer grid cell with the maximum increase in pollutant concentration between the project concentration and the future ambient concentration.

[c] Project contribution divided by future ambient.

Table 23-83. Conservative Estimate of Health Effect Incidence during Construction of Alternative 4a

Health Endpoint	Age Range [a]	Annual Incidence per Year		Project Increase over Future Ambient (%) [d]
		Future Ambient [b]	Project Contribution [c]	
PM2.5 Emissions, Respiratory				
Incidence, asthma	0–4	17,205	1.57	0.0091%
Incidence, asthma	5–17	14,069	1.31	0.0093%
Hospital admissions, respiratory	0–18	12,237	0.07	0.0006%
Hospital admissions, respiratory	65–99	38,161	0.02	<0.0001%
PM2.5 Emissions, Cardiovascular				
Hospital admissions, cardiovascular	65–99	114,668	0.14	0.0001%
Acute myocardial infarction, nonfatal	18–99	22,162	0.16–1.08 [e]	0.0007%–0.0049% [e]
PM2.5 Emissions, Mortality				
Mortality, all cause	0–2 months	497	0.01	0.0014%
Mortality, all cause	30–99	92,715	0.98	0.0011%
Mortality, all Cause	65–99	80,633	1.00	0.0012%
ROG and NO_X Emissions, (ozone health effects) Respiratory				
Hospital admissions, respiratory	65–99	25,937	0.05	0.0002%
Emergency room visits, asthma	0–99	25,937	0.05	0.0002%
ROG and NO_X Emissions, (ozone health effects) Mortality				
Mortality, respiratory	0–99	4,015	0.02	0.0005%
Mortality, respiratory	30–99	9,541	0.43	0.0045%

NO_X = nitrogen oxides; PM2.5 = particulate matter that is 2.5 microns in diameter and smaller; ROG = reactive organic gases.

[a] Individuals may be affected at other ages, but the age ranges shown are the ones used by EPA in their health assessments and are consistent with epidemiological study that is the basis of the health function.

[b] The future ambient health incidence is the average annual number of people that suffer from a health consequence in absence of project construction over the modeled regional area of around 12 million people.

[c] The project contribution is the average annual number of additional people that may suffer from a health consequence over the modeled regional area of around 12 million people due to the highest annual unmitigated project construction emissions. The project contribution during all other years of construction would be lower than the values presented in this table.

[d] Project contribution divided by future ambient.

[e] As a means of recognizing the strengths of the study used by EPA while also incorporating the newer evidence found in the four single and multi-city studies, the table present a range of acute myocardial infarction estimates. The upper end of the range is calculated using the study underpinning EPA's health assessment while the lower end of the range is the result of an equal-weights pooling of four newer studies.

Table 23-84. Future Ambient and Maximum Increase in Regional Pollutant Ozone (ppb) and PM2.5 (μg/m³) Concentrations from Construction of Alternative 5

Pollutant	Pollutant Concentration		Project Increase over Future Ambient (%) [c]
	Future Ambient [a]	Project Contribution [b]	
Max daily 8-hour ozone	71.94043	0.00004	0.0001%
Daily average PM2.5	67.62074	0.00015	0.0002%
Annual average PM2.5	15.65176	0.00019	0.0012%

μg/m³ = microgram per cubic meter; PM2.5 = particulate matter that is 2.5 microns in diameter and smaller; ppb = parts per billion.

[a] The future ambient pollutant concentration represents conditions without any additional emissions generated by the project.

[b] The reported project contribution to the future ambient pollutant concentration is the 4-by-4-kilometer grid cell with the maximum increase in pollutant concentration between the project concentration and the future ambient concentration.

[c] Project contribution divided by future ambient.

Table 23-85. Conservative Estimate of Health Effect Incidence during Construction of Alternative 5

Health Endpoint	Age Range [a]	Annual Incidence per Year		Project Increase over Future Ambient (%) [d]
		Future Ambient [b]	Project Contribution [c]	
PM2.5 Emissions, Respiratory				
Incidence, asthma	0–4	17,205	1.34	0.0078%
Incidence, asthma	5–17	14,069	1.11	0.0079%
Hospital admissions, respiratory	0–18	12,237	0.06	0.0005%
Hospital admissions, respiratory	65–99	38,161	0.02	<0.0001%
PM2.5 Emissions, Cardiovascular				
Hospital admissions, cardiovascular	65–99	114,668	0.12	0.0001%
Acute myocardial infarction, nonfatal	18–99	22,162	0.14–0.92 [e]	0.0006%–0.0041% [e]
PM2.5 Emissions, Mortality				
Mortality, all cause	0–2 months	497	0.01	0.0012%
Mortality, all cause	30–99	92,715	0.84	0.0009%
Mortality, all Cause	65–99	80,633	0.86	0.0011%
ROG and NO_X Emissions, (ozone health effects) Respiratory				
Hospital admissions, respiratory	65–99	25,937	0.03	0.0001%
Emergency room visits, asthma	0–99	25,937	0.03	0.0001%
ROG and NO_X Emissions, (ozone health effects) Mortality				
Mortality, respiratory	0–99	4,015	0.01	0.0003%
Mortality, respiratory	30–99	9,541	0.27	0.0029%

NO_X = nitrogen oxides; PM2.5 = particulate matter that is 2.5 microns in diameter and smaller; ROG = reactive organic gases.

[a] Individuals may be affected at other ages, but the age ranges shown are the ones used by EPA in their health assessments and are consistent with epidemiological study that is the basis of the health function.

[b] The future ambient health incidence is the average annual number of people that suffer from a health consequence in absence of project construction over the modeled regional area of around 12 million people.

[c] The project contribution is the average annual number of additional people that may suffer from a health consequence over the modeled regional area of around 12 million people due to the highest annual unmitigated project construction emissions. The project contribution during all other years of construction would be lower than the values presented in this table.

[d] Project contribution divided by future ambient.

[e] As a means of recognizing the strengths of the study used by EPA while also incorporating the newer evidence found in the four single and multi-city studies, the table present a range of acute myocardial infarction estimates. The upper end of the range is calculated using the study underpinning EPA's health assessment while the lower end of the range is the result of an equal-weights pooling of four newer studies.

The estimated changes in ambient air quality and health effects attributed to project-related unmitigated emissions are minimal considering background pollutant concentrations and health incidences. As shown in Tables 23-81, 23-83, and 23-85, the project contribution to all health endpoints during the year with the greatest construction emissions is less than 2 incidences, and for many health endpoints, considerably less than 1 incident. The change in potential regional health conditions attributed to project construction is less than 0.001%. Similar trends are observed for project-induced changes in ambient air quality (Tables 23-80, 23-82, and 23-84).

While the estimated health effects shown in Tables 23-81, 23-83, and 23-85 and the proportion of those effects relative to the background health incidence are low, it is important to acknowledge that the analysis does not take into account population subgroups with greater vulnerabilities to air pollution, except in the analysis of age ranges for certain endpoints. As noted in SMAQMD's guidance, "the health effects of increased air pollution emissions may occur disproportionately in areas where the population is more susceptible to health effects from air pollution" (Ramboll 2020:20). The five determinates for increased susceptibility, as reported by the Centers for Disease Control and Prevention (2019), are genetics, behavior, environmental and physical influences, medical care, and social factors. The Public Health Alliance of Southern California has developed a Healthy Places Index (HPI) to characterize local community conditions, including several of these determinates (Public Health Alliance of Southern California 2021). As discussed in Section 23.1.5.3, *Environmental Burdens*, OEHHA's CalEnviroScreen also provides relative rankings of census tracts based on environmental, health, demographic, and socioeconomic indicators. These data can be used to compare the overall relative health vulnerability of geographic areas.

In general, health conditions, as measured by the HPI and CalEnviroScreen indicators, are poorest along the central part of the conveyance alignments through San Joaquin County and improve moving north and west. As shown in Figure 23-2, the census tracts including Bacon Island, Lower Roberts Island, Upper and Lower Jones Tract, Mandeville Island, and Boggs Tract have the highest (poorest) CalEnviroScreen scores in the project area, indicating that communities in this part of the study area have relatively high existing pollution burdens and population sensitivities. Similarly, the HPI indicates that these areas have relatively low levels of health-promoting community conditions (healthier conditions than only 35% to 41% of other California census tracts) (Public Health Alliance of Southern California 2021).

Ultimately, a large portion of the study area does not currently attain the ozone and particulate matter ambient air quality standards. Certain individuals residing in areas that do not meet the ambient air quality standards could be exposed to pollutant concentrations that cause or aggravate acute and/or chronic health conditions, regardless of project construction. The small increase in health incidence estimated for the project is a small fraction of the total background health incidence, demonstrating that project construction would have minimal human health consequence. The modeled health effects presented above reflect the best available tools and guidance, but as discussed in Section 23.3.1.2, *Evaluation of Construction Activities*, there are many compounding variables and uncertainties that could affect the reported results. The estimation of health effects was done using conservative modeling parameters and very likely overestimates the project's contribution to future health effects in the region.

Operations and Maintenance

Operation of future projects, including the project alternatives, would generate ozone precursor and criteria pollutant emissions that would influence overall regional air quality and attainment of the NAAQS and CAAQS in the SVAB, SJVAB, and SFBAAB. As disclosed under Impacts AQ-1 through AQ-4, project O&M activities would not exceed any air district threshold. Because project-generated O&M emissions would not exceed air district thresholds, none of the project alternatives would result in a cumulatively significant impact, nor would any alternative contribute to a cumulatively considerable impact on regional air quality once the project is operational.

Localized Criteria Pollutants

Project Construction

There are areas throughout the local air quality study area where background concentrations already exceed the PM2.5 and PM10 CAAQS and NAAQS. Construction and operations of future projects, including the project alternatives, would increase PM10 and PM2.5 emissions, further contributing to existing violations of ambient air quality standards and potentially leading to new violations in areas currently in attainment. Construction of Alternatives 1, 2a, 2b, 2c, and 5 would also increase localized NO_2 concentrations above existing levels at the Staten Island Shaft (central alignment) and Upper Jones Shaft (Bethany Reservoir alignment), potentially contributing to new violations of the NO_2 NAAQS.

Environmental commitments would collectively reduce localized criteria pollutant emissions. Specifically, fugitive dust emissions would be minimized through implementation of a dust control plan (Environmental Commitment EC-11: *Fugitive Dust Control)* and BMPs at new concrete batch plants (Environmental Commitment EC-12: *On-Site Concrete Batching Plants*). Exhaust-related pollutants would be reduced through use of renewable diesel, Tier 4 diesel engines, newer on-road and marine engines, and other BMPs, as required by Environmental Commitments EC-7: *Off-Road Heavy-Duty Engines* through EC-10: *Marine Vessels* and EC-13: *DWR Best Practices to Reduce GHG Emissions*. However, even with these commitments, the project would contribute to existing or create new violations of the PM2.5, PM10, and NO_2 ambient air quality standards and, therefore, would result in localized cumulative impacts before mitigation. The project alternatives' contribution to this significant cumulative impact during construction would be cumulatively considerable because of new or worsened violations of the ambient air quality standards even after implementation of Mitigation Measure AQ-5.[17]

[17] While Mitigation Measures AQ-1 through AQ-3 would mitigate NO_X and PM, as required, these effects could occur regionally throughout the SVAB, SJVAB, and SFBAAB. Accordingly, the emissions reductions achieved by these

Operations and Maintenance

O&M activities would generate localized emissions from inspections, security checks, and other activities. Emissions generated by these activities would be limited in duration, with some activities requiring less than a day to complete only once per year. As discussed under Impact AQ-6, maximum daily and total annual criteria pollutant emissions estimated for O&M activities would be well below all air district thresholds. Off-site O&M traffic from regular employee commuting would also be minor and would not violate any of the air district screening criteria for localized CO hotspots. Accordingly, none of the project alternatives would result in a cumulatively significant impact, nor would any alternative contribute to a cumulatively considerable impact on local air quality once the project is operational.

Localized Toxic Air Contaminants

Project Construction

Multiple existing sources are located within 1,000 feet of the project footprint, including rail, roadway, and some stationary sources. Planned land use development in the region would also increase traffic levels and result in increased vehicle-related emissions along roadways, although over time, state and federal regulations would reduce the allowed emissions rates for new vehicles. Planned development may also generate additional DPM from generators and truck loading bays, as well as DPM during construction of near-term improvements. The combined effects of the TAC generated by these existing and planned sources represent the new emissions paradigm to which receptors would be exposed under a cumulative context.

A cumulative HRA was performed for project construction located within BAAQMD, consistent with BAAQMD requirements. As noted above, current SMAQMD, SJVAPCD, and YSAQMD guidance calls for evaluating the potential risks from all project emissions sources. Emission sources outside the project footprint should not be included in the cumulative assessment. If the project assessment demonstrates that potential health impacts are less than significant, one could conclude that the project would have a less than cumulatively significant impact (Sacramento Metropolitan Air Quality Management District 2020a:8-8; Siong pers. comm.; Yolo-Solano Air Quality Management District 2007). As discussed in Impact AQ-6, project construction in the SJVAPCD and YSAQMD would not exceed the local air districts' project-level health risk thresholds or result in a cumulative impact. Construction of Alternatives 2a and 4a would expose three receptor locations north of Intake A to excess cancer risk above SMAQMD's threshold. Mitigation Measure AQ-6 would reduce this impact to less than significant, but ultimately depends on acceptance by affected residential occupants. Accordingly, this impact is conservatively determined to be cumulatively considerable.

BAAQMD has developed online mapping and geographic information system (GIS) files that identify source-specific health risks throughout the SFBAAB (Bay Area Air Quality Management District 2021; Winkel pers. comm.). BAAQMD recommends identifying cumulative risks and hazards within a 1,000-foot radius around the project property boundary (Bay Area Air Quality Management District 2017b:5-2). Total cumulative health risks were calculated by adding the sources of background health risks to the health risk and hazard impacts of the project. The methods used to estimate project-related health risks are described in Section 23.3.1, *Methods for Analysis*.

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mitigation measures may not contribute to enough localized reductions to avoid project-level or cumulative violation of the ambient air quality standards or SIL.

Construction of surface features in the BAAQMD would span a relatively large area in eastern Contra Costa County, and under Alternative 5, Alameda County. The highest project-generated cancer risk, health hazard, and PM2.5 concentration would not occur at the same receptor locations as maximum risks generated by existing stationary, rail, and roadway sources. Moreover, receptors exposed to the highest existing background risks are farther from the project area than the receptor exposed to the maximum project-generated pollution (henceforth referred to as the Project maximumly exposed individual or "MEI"). Pollutant concentrations dissipate as a function of distance from the emissions source to the receptor. Accordingly, the project's contribution to cumulative health risks at the MEI for background sources (henceforth referred to as the Background MEI) is less than its contribution at the Project MEI. Conversely, existing background risks at the Project MEI from stationary, rail, and roadway sources are fewer than existing risks at the Background MEI. Given the geographic variability in project and background health risks, the following receptor locations were analyzed to capture the maximum potential cumulative cancer risk, chronic health hazard, and PM2.5 concentrations across the study area.

1. Project MEI for central and eastern conveyance alignment options (receptor off Cherry Hills Drive in Discovery Bay).
2. Project MEI for Bethany Reservoir alignment option (receptor off Mountain House Road and West Grantline Road).
3. Background MEI for central and eastern conveyance alignment options (receptor off SR 4 near Discovery Bay Boulevard).
4. Background MEI for Bethany Reservoir alignment option (receptor off West Grant Line Road near North Midway Road).

There is no material difference in the physical construction footprint within the BAAQMD for the central and eastern conveyance alignment alternatives. Among the central and eastern conveyance alignment alternatives, construction activities and associated health risks are greatest for Alternatives 2a and 4a (7,500 cfs), with Alternative 2a yielding slightly higher predicted cancer and health hazard risks and Alternative 4a yielding slightly higher predicted PM2.5 concentrations. Accordingly, cumulative risks for the central and eastern conveyance alignment options were only modeled for Alternatives 2a and 4a, which is the alternative with the highest projected off-site health risk impact. Results for Alternative 2a were used to characterize maximum cancer and health hazard impacts, and results for Alternative 4a were used to characterize maximum PM2.5 concentration impacts. Cumulative risks under all other central and eastern conveyance alignment alternatives would be less than those reported for Alternatives 2a and 4a.

Table 23-86 shows the maximum cumulative cancer risk, chronic health hazard, and PM2.5 concentration at the four analysis locations for the central and eastern conveyance alignment options. Table 23-87 shows the results for the Bethany Reservoir alignment option. Refer to Appendix 23C, *Health Risk Assessment and Ambient Air Quality Analysis Methodology*, Attachment 23C.1 for additional detail on the analysis, including graphics illustrating the MEI and background sources.

Table 23-86. Cumulative Cancer and Noncancer Health Risks in the Bay Area Air Quality Management District for the Central and Eastern Conveyance Alignment Options

Analysis Scenario and Source	Maximum Modeled Excess Cancer (potential cases per million)	Maximum Modeled HI	Maximum Modeled PM2.5 (μ/m^3)
Project MEI for Central and Eastern Conveyance Alignment Options [a]			
Contributions from existing sources at the Project MEI			
Rail	<1	<0.1	<0.1
Roadways	4	<0.1	0.1
Stationary	1	<0.1	<0.1
Contributions from project construction			
Alternative 2a/4a	2	0.2	0.1
Total Combined Risk	6	0.2	0.1
Background MEI for Central and Eastern Conveyance Alignment Options [b]			
Contributions from existing sources at the Background MEI			
Rail	1	<0.1	<0.1
Roadways	52	0.1	0.6
Stationary [c]	0	0.0	0.0
Contributions from project construction			
Alternative 2a/4a [d]	2	0.2	0.1
Total Combined Risk	54	0.3	0.7
BAAQMD Threshold	100	10.0	0.8

Sources: Bay Area Air Quality Management District 2021; Winkel pers. comm.

HI = hazard index; μg/m^3 = micrograms per cubic meter; MEI = maximally exposed individual.

[a] Project MEI for central and eastern conveyance alignment options (receptor off State Route 4 near Discovery Bay Boulevard).

[b] Background MEI for central and eastern conveyance alignment options (receptor off State Route 4 near Discovery Bay Boulevard).

[c] There are no stationary sources within 1,000 feet of the receptor location.

[d] Conservatively using the Project MEI risks, which occur about a mile to the east. Contributions from project construction at the Background MEI would be lower than reported.

Table 23-87. Cumulative Cancer and Noncancer Health Risks in the Bay Area Air Quality Management District for the Bethany Reservoir Alignment Option

Analysis Scenario and Source	Maximum Modeled Excess Cancer (potential cases per million)	Maximum Modeled HI	Maximum Modeled PM2.5 (μ/m^3)
Project MEI for Bethany Reservoir Alignment Option [a]			
Contributions from existing sources at the Project MEI			
Rail	1	<0.1	<0.1
Roadways	7	<0.1	0.1
Stationary [b]	0	0.0	0.0
Contributions from project construction			
Alternative 5	1	0.1	0.1
Total Combined Risk	9	0.2	0.2

Analysis Scenario and Source	Maximum Modeled Excess Cancer (potential cases per million)	Maximum Modeled HI	Maximum Modeled PM2.5 (μ/m^3)
Background MEI for Bethany Reservoir Alignment Option [c]			
Contributions from existing sources at the Background MEI			
Rail	1	<0.1	<0.1
Roadways	11	<0.1	0.2
Stationary [b]	0	0.0	0.0
Contributions from project construction			
Alternative 5 [d]	1	0.1	0.1
Total Combined Risk	13	0.2	0.2
BAAQMD Threshold	100	10.0	0.8

Sources: Bay Area Air Quality Management District 2021; Winkel pers. comm.

HI = hazard index; μ/m^3 = micrograms per cubic meter; MEI = maximally exposed individual.

[a] Background MEI for central and eastern conveyance alignment options (receptor off Byron Highway near Camino Diablo).

[b] There are no stationary sources within 1,000 feet of the receptor location.

[c] Background MEI for Bethany Reservoir alignment option (receptor off West Grant Line Road near North Midway Road).

[d] Conservatively using the Project MEI risks, which occur about a mile to the east. Contributions from project construction at the Background MEI would be lower than reported.

As shown in Tables 23-86 and 23-87, the combined level of health risks from the proposed project, alternatives, and other local sources of TACs would be less than BAAQMD's cumulative health risk thresholds. Therefore, the levels of health risk associated with TACs emitted by the project alternatives, in combination with the levels of health risk associated with other nearby TAC sources, would not result in a cumulatively significant local health risk impact in the BAAQMD.

Operations and Maintenance

While the project's contribution to cumulative cancer and noncancer risks would be greatest during construction, testing of diesel-powered standby engine generators at the Southern or Bethany Complex, South Delta Outlet and Control Structure, and Delta Mendota Canal Control Structure is a long-term emissions source that would occur following construction during O&M. If individuals near these facilities were to remain in the same location during and after construction, they would be exposed to project-generated emissions during construction and then any incremental changes in risk from project-generated emissions during O&M. However, as shown in Table 23-67, the highest modeled off-site cancer and noncancer risks and PM2.5 concentrations associated with each generator location are all less than 0.04. If this contribution were added to the cumulative construction risks presented in Tables 23-86 and 23-87, combined lifetime risks to long-term residents from all local and project sources, including O&M emissions, would be less than BAAQMD's cumulative health risk thresholds. Accordingly, none of the project alternatives would result in a cumulatively significant health risk impact, nor would O&M of any alternative contribute to a cumulatively considerable health risk impact.

23.3.4.3 Cumulative Impacts of the Project on Global Climate Change

Climate change occurs globally and GHGs are global pollutants, unlike criteria air pollutants (such as ozone precursors), which are primarily pollutants of regional and local concern. Given their long atmospheric lifetimes, GHGs emitted by sources worldwide accumulate in the atmosphere. No single emitter of GHGs is large enough to produce global climate change on its own. Rather, climate change is the result of the individual contributions of countless past, present, and future sources. Therefore, GHG impacts are inherently cumulative.

Global GHG emissions due to population growth and economic growth continue to increase and are worsening the effects of global climate change. While there are myriad efforts at local, state, national, and international levels to promote the reduction of GHG emissions overall, current projections are that these emissions will still increase for the following decades adding to the current GHG concentrations in the atmosphere.

Construction of any of the project alternatives would result in a one-time increase in GHG emissions. Construction activities would also alter existing land uses, resulting in changes to present-day (baseline) GHG emissions and removals. Following construction, O&M activities, changes in SWP operational pumping, and displaced purchases of CVP electricity would generate direct and indirect GHG emissions. These annual emissions would decline over time as improvements in engine technology and regulations to reduce combustion emissions reduce the carbon intensity of equipment, vehicles, and electricity generation.

As discussed under Impact AQ-9, total net additional emissions generated by project construction and displaced purchases of CVP electricity are estimated to be between 453,412 to 794,180 metric tons CO_2e without the Compensatory Mitigation Plan and 456,982 to 797,750 metric tons CO_2e with the Compensatory Mitigation Plan. Alternative 4a is estimated to generate the most emissions and Alternative 2b the least. DWR would implement Mitigation Measure AQ-9 to mitigate emissions from construction and displaced purchases of CVP electricity to net zero through the development and implementation of a GHG mitigation program. This measure ensures net additional emissions from these sources would not result in a significant cumulative contribution to impacts on global climate change.

As discussed under Impact AQ-10, cumulative GHG emissions through 2070 from land use change under Alternatives 1, 2a, 2b, 2c, and 5 are projected to decrease relative to baseline, and increase under Alternatives 3, 4a, 4b, and 4c. Implementing Mitigation Measure CMP: *Compensatory Mitigation Plan* would offset GHG emissions from construction land use change through expanded habitat creation. This measure ensures net additional emissions from land use changes under Alternatives 3, 4a, 4b, and 4c would not result in a significant cumulative contribution to impacts on global climate change.

O&M and SWP pumping activities are covered by DWR's Update 2020, which was prepared by DWR to provide a departmental strategy for meeting the State's 2030 and 2045 emissions reduction goals articulated under SB 32 and EO B-55-18, respectively. Update 2020 is a plan for the reduction of GHG emissions and as such, GHG emissions from project O&M and SWP pumping activities are eligible to tier from the environmental document (*Addendum to the Initial Study and Negative Declaration for DWR Climate Action Plan Phase 1*) for Update 2020 to evaluate project-level significance. As discussed above, O&M and SWP pumping activities are consistent with DWR's Update 2020 and, therefore, would not impede DWR's ability to achieve carbon neutrality by mid-century.

Accordingly, through a combination of project-specific mitigation and tiering from DWR's Update 2020, none of the project alternatives would result in a cumulatively significant GHG impact, nor would any alternative contribute to a cumulatively considerable impact on global climate change.