3 Affected Environment, Environmental Consequences, and Mitigation Measures

3.3 Air Quality and Global Climate Change

3.3.1 Introduction

Section 3.3, Air Quality and Global Climate Change, of the *Merced to Fresno Section: Central Valley Wye Draft Supplemental Environmental Impact Report (EIR)/Environmental Impact Statement (EIS)* (Draft Supplemental EIR/EIS) updates the *Merced to Fresno Final EIR/EIS* (Merced to Fresno Final EIR/EIS) (California High-Speed Rail Authority [Authority] and Federal Railroad Administration [FRA] 2012) with new and revised information relevant to air quality and global climate change, analyzes the potential impacts of the Central Valley Wye alternatives (including the No Project Alternative), and describes impact avoidance and minimization features (IAMF) and mitigation measures that would avoid, minimize, or reduce impacts. This section also defines the resource study areas (RSA) for air quality and global climate change and describes the affected environment within the RSA.

The analysis herein has similarities to and differences from the analysis conducted in the Merced to Fresno Final EIR/EIS. Both analyses evaluate construction emissions and operations emissions and compare them against federal and state air quality standards. Where information has changed or new information has become available since the Merced to Fresno Final EIR/EIS was prepared in 2012, the Central Valley Wye alternatives analysis uses the updated versions of these sources or datasets. Relevant portions of the Merced to Fresno Final EIR/EIS that remain unchanged are summarized and referenced in this section but are not repeated in their entirety. The analyses differ in the following ways:

- The present analysis evaluates air quality impacts against existing conditions in 2015 for California Environmental Quality Act (CEQA) purposes and future no project conditions in 2040 for National Environmental Policy Act (NEPA) purposes. The years selected for the Central Valley Wye alternatives analysis differ from the Merced to Fresno Final EIR/EIS years, which evaluated air quality impacts against existing conditions in 2009 and future year conditions expected in the Merced to Fresno Section design year of 2035.
- The present analysis evaluates air quality impacts during operation of the Central Valley Wye alternatives for two ridership scenarios, as presented in the HSR 2016 Business Plan (Authority 2016a). The Merced to Fresno Final EIR/EIS evaluated operational air quality impacts for a range of ridership scenarios based on an assumed relationship between high-speed rail (HSR) ticket prices and airfare ticket prices. In the Merced to Fresno Final EIR/EIS, the high ridership scenario is an assumed HSR ticket price of 50 percent of airfare, and the low ridership scenario is an assumed HSR ticket price of 75 percent of airfare. In addition, both ridership scenarios in the Merced to Fresno Final EIR/EIS were based on an assumption that both Phase 1 and Phase 2 of the HSR system would be operational in 2035, whereas the 2016 Business Plan presents phased implementation for only Phase 1 of the HSR system (Authority 2016a).

The *Merced to Fresno Section: Central Valley Wye Air Quality and Global Climate Change Technical Report* (Air Quality and Global Climate Change Technical Report) (Authority and FRA 2016) provides additional technical details on air quality and global climate change.[1] This

[1] The Air Quality and Global Climate Change Technical Report was finalized in 2016; however, the content of this Draft Supplemental EIR/EIS has continued to evolve to incorporate the most current data and other sources of information relevant to the environmental analyses, some of which were not available at the time that the technical report was prepared. As a result, some of the information presented in the Draft Supplemental EIR/EIS is more current than the information presented in the technical report. To provide clarity on any information and data differences between the Draft Supplemental EIR/EIS and the technical report and the location of the most current information, a Central Valley Wye Technical Report Memorandum of Updates has been produced and included in Appendix 3.1-D, Central Valley Wye Technical Report Memorandum of Updates.

technical report is available on the Authority website: http://hsr.ca.gov/Programs/Environmental_Planning/supplemental_merced_fresno.html Additional details on air quality and global climate change are provided in the following appendices in Volume II of this Draft Supplemental EIR/EIS:

- Appendix 3.3-A, Local and Regional Plans and Laws Consistency Analysis, provides a discussion of inconsistencies or conflicts that may exist between the Central Valley Wye alternatives and regional or local plans or laws.
- Appendix 3.3-B, Memorandum Describing Consistency with the Merced to Fresno General Conformity Determination, provides a discussion of how the Central Valley Wye alternatives meet the General Conformity requirements.

Air quality in the surrounding San Joaquin Valley are important considerations for the development of the Central Valley Wye alternatives because of the generally poor air quality conditions in the San Joaquin Valley Air Basin (SJVAB), which routinely exceeds federal and state air quality health standards for ozone and particulates. The SJVAB air quality is among the worst in the nation because of natural geographic and climatic conditions. Two other resource sections in this Draft Supplemental EIR/EIS provide additional information related to air quality and global climate change:

- **Section 3.10, Hazardous Materials and Wastes**—Compliance with asbestos regulations and disposal of lead-based paint during construction of the Central Valley Wye alternatives
- **Section 3.18, Regional Growth**—Discussion of relevant background documents pertaining to transportation and land use planning, such as the regional transportation plans and sustainable community strategies for Merced and Madera Counties, and how the HSR system is consistent with the goals of these plans to reduce GHG emissions.

This Draft Supplemental EIR/EIS does not include a detailed analysis of objectionable odors from operations of the Central Valley Wye alternatives because the potential for impacts has not changed from that which was described in the Merced to Fresno Final EIR/EIS (Authority and FRA 2012: page 3.3-71).

Definition of Resources

The following are definitions for air quality and global climate change analyzed in this Draft Supplemental EIR/EIS. These definitions are consistent with the Merced to Fresno Final EIR/EIS (Authority and FRA 2012).

- **Air Quality**—Air quality describes the amount of air pollution to which the public is exposed.
- **Air Pollution**—Air pollution refers to one or more chemical substance that degrades the quality of the atmosphere. Air pollutants degrade the atmosphere by reducing visibility, damaging property, and combining to form smog. Air pollutants result in impacts on humans by reducing the productivity or vigor (i.e., a measure of the increase in plant growth or foliage volume through time after planting) of crops or natural vegetation and reducing human or animal health. Consistent with the Merced to Fresno Final EIR/EIS, three general classes of air pollutants are of concern for the Central Valley Wye alternatives: criteria pollutants, toxic air contaminants (TAC), and greenhouse gases (GHG).
  - **Criteria pollutants**—Criteria pollutants are pollutants for which the United States Environmental Protection Agency (USEPA) and the State of California have set ambient air quality standards or that are chemical precursors to compounds for which ambient standards have been set. The six major criteria pollutants include ozone (O_3), particulate matter (PM) (PM_{10} is PM smaller than or equal to 10 microns in diameter and $PM_{2.5}$ is PM smaller than or equal than 2.5 microns in diameter), carbon monoxide (CO), nitrogen dioxide (NO_2), sulfur dioxide (SO_2), and lead (Pb). The statewide standards established for California also incorporate additional standards for sulfates, hydrogen sulfide, vinyl chloride, and visibility-reducing particles.

  - **TACs**—The TACs of concern are seven mobile source air toxics (MSAT) identified by the USEPA as having significant contributions from mobile sources: acrolein, benzene, 1,3-butadiene, diesel particulate matter and diesel exhaust organic gases, formaldehyde, naphthalene, and polycyclic organic matter.
  - **GHGs**—GHGs are gaseous compounds that limit the transmission of Earth's radiated heat out to space. GHGs include ozone, water vapor, carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), and fluorinated gases (e.g., chlorofluorocarbons (CFC) and hydro chlorofluorocarbons (HCFC).). Long-lived GHGs include CO_2, CH_4, N_2O, and fluorinated gases.

- **Global Climate Change**—Global climate change refers to long-term changes in the Earth's climate, usually associated with recent global warming trends, as well as regional changes in weather and precipitation patterns, attributed to increasing concentrations of GHGs in the atmosphere.

3.3.2 Laws, Regulations, and Orders

This section identifies laws, regulations, and orders that are relevant to the analysis of air quality and global climate change in this Draft Supplemental EIR/EIS. Also provided are summaries of new, additional, or updated laws, regulations, and orders that have occurred since publication of the Merced to Fresno Final EIR/EIS.

3.3.2.1 Federal

The Conformity Rule (40 Code of Federal Regulations (C.F.R.) § 51 Subpart W, and 40 C.F.R. § 93, Subpart B "Determining Conformity of General Federal Actions to State or Federal Implementation Plans" (see 58 *Federal Register* (Fed. Reg.) 63214 [November 30, 1993], as amended, 75 Fed. Reg. 17253 [April 5, 2010]) is the same as described in Section 3.3.2, Laws, Regulations, and Orders, of the Merced to Fresno Final EIR/EIS (Authority and FRA 2012: page 3.3-1). New, additional, or updated federal laws, regulations and orders follow.

Clean Air Act

A description of the Clean Air Act (CAA) and related regulations was included in Section 3.3.2.1, Federal, of the Merced to Fresno Final EIR/EIS (Authority and FRA 2012: page 3.3-1). Certain CAA regulations have since been updated.

The CAA defines nonattainment areas as geographic regions designated as not meeting one or more of the National Ambient Air Quality Standards (NAAQS), which are standards the USEPA has established for criteria pollutants.[2] The CAA requires that a state implementation plan (SIP) be prepared for each nonattainment area and a maintenance plan be prepared for each former nonattainment area that subsequently demonstrated compliance with the standards. A SIP is a compilation of a state's air quality control plans and rules, approved by the USEPA. Section 176(c) of the CAA provides that federal agencies cannot engage, support, or provide financial assistance for licensing, permitting, or approving any project unless the project conforms to the applicable SIP. The state's goals and the USEPA's goals are to eliminate or reduce the severity and number of violations of the NAAQS and to achieve expeditious attainment of these standards.

The six major criteria pollutants subject to the NAAQS are O_3, PM, CO, NO_2, SO_2, and Pb. The California Ambient Air Quality Standards (CAAQS) are statewide standards established by the California Air Resources Board (CARB) that are generally more stringent than the NAAQS and incorporate additional standards for sulfates, hydrogen sulfide, vinyl chloride, and visibility-reducing particles.

[2] An air basin classified as "attainment" is an area that meets the national primary or secondary ambient air quality standard for a NAAQS. An area classified as "maintenance" is one that previously was designated as nonattainment and has since been redesignated to attainment and has a USEPA-approved plan to maintain that designation.

Table 3.3-1 summarizes state and federal standards by pollutant. Table 3.3-1 also lists the standards for each pollutant by the averaging time and method of measurement. The primary standards are intended to protect public health. The secondary standards are intended to protect the nation's welfare and account for air pollutant impacts on soil, water, visibility, materials, vegetation, and other aspects of the general welfare.

Since completion of the Merced to Fresno Final EIR/EIS, the USEPA has revised the NAAQS for 8-hour ozone. Table 3.3-1 summarizes the current CAAQS and NAAQS (as of May 2016).

Mobile Source Air Toxics/Hazardous Air Pollutants

A discussion of MSATs was included in Section 3.3.2.1 of the Merced to Fresno Final EIR/EIS (Authority and FRA 2012: page 3.3-2) but has since been updated. By 2010, the USEPA's existing programs had reduced MSATs by more than 1 million tons from 1999 levels (USEPA 2015a). In addition to controlling pollutants, such as hydrocarbons, PM, and nitrogen oxides (NO_X), recent USEPA regulations, including increased fuel efficiency standards for highway vehicles (October 2012 Corporate Average Fuel Economy standards for model year 2017 vehicles and beyond) and engine tier standards in nonroad equipment (Tier 4 engine emissions standards), controlling emissions from highway vehicles and nonroad equipment could result in large reductions in toxic emissions to the air. Furthermore, the USEPA is developing programs that could provide additional benefits (further controls) for small nonroad gasoline engines, diesel locomotives, and marine engines. A variety of USEPA programs reduce risk in communities. These programs include Clean School Bus USA, the Voluntary Diesel Retrofit Program, Best Workplaces for Commuters, and the National Clean Diesel Campaign.

Greenhouse Gas Regulations and Guidance

The then-existent greenhouse gas regulations were included in Section 3.3.2.1 of the Merced to Fresno Final EIR/EIS (Authority and FRA 2012: page 3.3-5) but have since been updated. This section summarizes key federal regulations relevant to the Central Valley Wye alternatives that have been promulgated since adoption of the Merced to Fresno Final EIR/EIS.

On September 15, 2011, the USEPA and National Highway Traffic Safety Administration (NHTSA) issued a Final Rule of Greenhouse Gas Emissions Standards and Fuel Efficiency Standards for Medium- and Heavy-Duty Engines and Vehicles (76 Fed. Reg. 57107). This final rule is tailored to each of the three regulatory categories of heavy-duty vehicles: combination tractors, heavy-duty pickup trucks and cars, and vocational vehicles. The USEPA and NHTSA estimated that the new fuel efficiency and greenhouse gas emissions standards in this rule will reduce CO_2 emissions by approximately 270 million metric tons (MMT) and save 530 million barrels of oil over the life of vehicles sold during the 2014 through 2018 model years. On August 16, 2016, the USEPA and the NHTSA signed Phase 2 of these fuel efficiency and greenhouse gas emissions standards, which apply to model years 2019–2027 medium- and heavy-duty vehicles. The USEPA and the NHTSA have determined that the Phase 2 standards will lower CO_2 emissions by approximately 1.1 billion metric tons and save up to 2 billion barrels of oil over the life of vehicles sold under the program (USEPA 2016).

Table 3.3-1 State and Federal Ambient Air Quality Standards

Pollutant	Averaging Time	California Standards [1]		National Standards [2]		
		Concentration [3]	Method [4]	Primary [3,5]	Secondary [3, 6]	Method [7]
Ozone (O_3) [8]	1 Hour	0.09 ppm (180 µg/m^3)	Ultraviolet Photometry	—	Same as Primary Standard	Ultraviolet Photometry
	8 Hour	0.070 ppm (137 µg/m^3)		0.070 ppm (137 µg/m^3)		
Respirable Particulate Matter (PM_{10})[9]	24 Hour	50 µg/m^3	Gravimetric or Beta Attenuation	150 µg/m^3	Same as Primary Standard	Inertial Separation and Gravimetric Analysis
	Annual Arithmetic Mean	20 µg/m^3		—		
Fine Particulate Matter ($PM_{2.5}$)[9]	24 Hour	—	—	35 µg/m^3	Same as Primary Standard	Inertial Separation and Gravimetric Analysis
	Annual Arithmetic Mean	12 µg/m^3	Gravimetric or Beta Attenuation	12.0 µg/m^3	15 µg/m^3	
Carbon Monoxide (CO)	1 Hour	20 ppm (23 mg/m^3)	Non-Dispersive Infrared Photometry	35 ppm (40 mg/m^3)	—	Non-Dispersive Infrared Photometry
	8 Hour	9.0 ppm (10 mg/m^3)		9 ppm (10 mg/m^3)	—	
	8 Hour (Lake Tahoe)	6 ppm (7 mg/m^3)		—	—	
Nitrogen Dioxide (NO_2)[10]	1 Hour	0.18 ppm (339 µg/m^3)	Gas Phase Chemiluminescence	100 ppb (188 µg/m^3)	—	Gas Phase Chemiluminescence
	Annual Arithmetic Mean	0.030 ppm (57 µg/m^3)		0.053 ppm (100 µg/m^3)	Same as Primary Standard	
Sulfur Dioxide (SO_2)[11]	1 Hour	0.25 ppm (655 µg/m^3)	Ultraviolet Fluorescence	75 ppb (196 µg/m^3)	—	Ultraviolet Fluorescence; Spectrophotometry (Pararosaniline Method)
	3 Hour	—		—	0.5 ppm (1300 µg/m^3)	
	24 Hour	0.04 ppm (105 µg/m^3)		0.14 ppm (for certain areas)[11]	—	
	Annual Arithmetic Mean	—		0.030 ppm (for certain areas)[11]	—	
Lead (Pb)[12,13]	30-Day Average	1.5 µg/m^3	Atomic Absorption	—	—	High Volume Sampler and Atomic Absorption
	Calendar Quarter	—		1.5 µg/m^3 (for certain areas)[12]	Same as Primary Standard	
	Rolling 3-Month Average	—		0.15 µg/m^3		

Pollutant	Averaging Time	California Standards [1]		National Standards [2]		
		Concentration [3]	Method [4]	Primary [3,5]	Secondary [3, 6]	Method [7]
Visibility-Reducing Particles[14]	8 Hour	See footnote 14	Beta Attenuation and Transmittance through Filter Tape	No National Standards		
Sulfates	24 Hour	25 µg/m^3	Ion Chromatography			
Hydrogen Sulfide	1 Hour	0.03 ppm (42 µg/m^3)	Ultraviolet Fluorescence			
Vinyl Chloride[12]	24 Hour	0.01 ppm (26 µg/m^3)	Gas Chromatography			

Source: CARB, 2016a

[1] California standards for ozone, carbon monoxide (except 8-hour Lake Tahoe), sulfur dioxide (1 and 24 hour), nitrogen dioxide, and particulate matter (PM_{10}, $PM_{2.5}$, and visibility reducing particles), are values that are not to be exceeded. All others are not to be equaled or exceeded. California ambient air quality standards are listed in the Table of Standards in Section 70200 of Title 17 of the California Code of Regulations.

[2] National standards (other than ozone, particulate matter, and those based on annual arithmetic mean) are not to be exceeded more than once a year. The ozone standard is attained when the fourth highest 8-hour concentration measured at each site in a year, averaged over 3 years, is equal to or less than the standard. For PM_{10}, the 24-hour standard is attained when the expected number of days per calendar year with a 24-hour average concentration above 150 µg/m^3 is equal to or less than 1. For $PM_{2.5}$, the 24-hour standard is attained when 98 percent of the daily concentrations, averaged over 3 years, are equal to or less than the standard. Contact the USEPA for further clarification and current national policies.

[3] Concentration is expressed first in units in which it was promulgated. Equivalent units given in parentheses are based upon a reference temperature of 25°C and a reference pressure of 760 torr. Most measurements of air quality are to be corrected to a reference temperature of 25°C and a reference pressure of 760 torr; ppm in this table refers to ppm by volume, or micromoles of pollutant per mole of gas.

[4] Any equivalent measurement method that can be shown to the satisfaction of the CARB to give equivalent results at or near the level of the air quality standard may be used.

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

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

[7] Reference method as described by the USEPA. An "equivalent method" of measurement may be used but must have a "consistent relationship to the reference method" and must be approved by the USEPA.

[8] On October 1, 2015, the national 8-hour ozone primary and secondary standards were lowered from 0.075 to 0.070 ppm.

[9] On December 14, 2012, the national annual $PM_{2.5}$ primary standard was lowered from 15 µg/m^3 to 12.0 µg/m^3. The existing national 24-hour $PM_{2.5}$ standards (primary and secondary) were retained at 35 µg/m^3, as was the annual secondary standard of 15 µg/m^3. The existing 24-hour PM_{10} standards (primary and secondary) of 150 µg/m^3 also were retained. The form of the annual primary and secondary standards is the annual mean, averaged over 3 years.

[10] To attain the 1-hour national standard, the 3-year average of the annual 98th percentile of the 1-hour daily maximum concentrations at each site must not exceed 100 ppb. Note that the national 1-hour standard is in units of parts per billion (ppb). California standards are in units of parts per million (ppm). To directly compare the national 1-hour standard to the California standards the units can be converted from ppb to ppm. In this case, the national standard of 100 ppb is identical to 0.100 ppm.

[11] On June 2, 2010, a new 1-hour SO_2 standard was established and the existing 24-hour and annual primary standards were revoked. To attain the 1-hour national standard, the 3-year average of the annual 99th percentile of the 1-hour daily maximum concentrations at each site must not exceed 75 ppb. The 1971 SO_2 national standards (24-hour and annual) remain in effect until 1 year after an area is designated for the 2010 standard, except that in areas designated nonattainment for the 1971 standards, the 1971 standards remain in effect until implementation plans to attain or maintain the 2010 standards are approved. Note that the 1-hour national standard is in units of ppb. California standards are in units of ppm. To directly compare the 1-hour national standard to the California standard the units can be converted to ppm. In this case, the national standard of 75 ppb is identical to 0.075 ppm.

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

[13] The national standard for lead was revised on October 15, 2008, to a rolling 3-month average. The 1978 lead standard (1.5 µg/m^3 as a quarterly average) remains in effect until 1 year after an area is designated for the 2008 standard, except that in areas designated nonattainment for the 1978 standard, the 1978 standard remains in effect until implementation plans to attain or maintain the 2008 standard are approved.

[14] In 1989, the CARB converted both the general statewide 10-mile visibility standard and the Lake Tahoe 30-mile visibility standard to instrumental equivalents, which are "extinction of 0.23 per kilometer" and "extinction of 0.07 per kilometer" for the statewide and Lake Tahoe Air Basin standards, respectively.

µg/m^3 = micrograms per cubic meter
mg/m^3 = milligram per cubic meter
PM_{10} = particulate matter smaller than or equal to 10 microns in diameter
$PM_{2.5}$= particulate matter smaller than or equal to 2.5 microns in diameter
ppb = parts per billion
ppm = parts per million

On October 15, 2012, the USEPA and the NHTSA issued Corporate Average Fuel Economy standards for model years 2017 and beyond; these standards would reduce GHG emissions by increasing the fuel economy of light duty vehicles to 48.7-49.7 miles per gallon (mpg) by model year 2025. To further California's support of the national program to regulate emissions, CARB submitted a proposal that would allow automobile manufacturer compliance with the USEPA's requirements to show compliance with California's requirements for the same model years. The Final Rulemaking Package was filed on December 6, 2012, and the final rulemaking became effective December 31, 2012. In July 2016, the USEPA, the NHTSA, and CARB released a mid-term evaluation of the October 2012 final rule in a draft technical assessment report (USEPA, CARB, and NHTSA 2016). The draft technical assessment report concludes the following:

- A wider range of technologies exist for manufacturers to use to meet the MY2022–2025 standards, and at costs that are similar or lower than, those projected in the 2012 rule.
- The auto industry can meet the standards primarily with advanced gasoline vehicle technologies and with very low levels of strong hybridization and full electrification (plug-in vehicles).
- The updated 2025 projections of fuel prices, car/truck mix, and the fleet-target illustrate that the footprint-based standards will continue to accommodate consumer choice and achieve significant GHG reductions and fuel savings across all vehicle types.

3.3.2.2 State

The following state laws, regulations, orders, and plans are the same as those described in Section 3.3.2.2, State, of the Merced to Fresno Final EIR/EIS (Authority and FRA 2012: pages 3.3-5 through 3.3-7):

- California Clean Air Act
- Asbestos Control Measures
- California Greenhouse Gas Regulations
  - Assembly Bill (AB) 1493
  - Executive Order (EO) S-3-05
  - AB 32
  - EO S-01-07
  - Senate Bill (SB) 375

New, additional, or updated state laws, regulations, and orders follow.

Mobile Source Air Toxics/Toxic Air Contaminants

California regulates TACs (equivalent to the federal hazardous air pollutants [HAP]) primarily through the Toxic Air Contaminant Identification and Control Act (Tanner Act) and the Air Toxics "Hot Spots" Information and Assessment Act of 1987 (Hot Spots Act). The Tanner Act created California's program to reduce exposure to TACs. The Hot Spots Act supplements the Tanner Act by requiring a statewide air toxics inventory, notification of people exposed to a significant health risk, and facility plans to reduce these risks.

In August 1998, CARB identified diesel particulate matter (DPM) from diesel-fueled engines as a TAC. In September 2000, CARB approved a comprehensive Diesel Risk Reduction Plan to reduce emissions from both new and existing diesel-fueled engines and vehicles. The goal of the plan is to reduce respirable DPM emissions and the associated health risk by 75 percent in 2010 and by 85 percent by 2020. The plan identifies 14 measures that target new and existing on-road vehicles (e.g., heavy-duty trucks and buses), off-road equipment (e.g., graders, tractors, forklifts, sweepers, and boats), portable equipment (e.g., pumps), and stationary engines (e.g., stand-by power generators).

CARB has adopted regulations to reduce emissions from both on-road and off-road, heavy-duty diesel vehicles (e.g., equipment used in construction). These regulations, known as Airborne Toxic Control Measures, reduce the idling of school buses and other commercial vehicles, control

DPM, and limit the emissions of ocean-going vessels in California waters. The regulations also include measures to control emissions of air toxics from stationary sources. The California Toxics Inventory, developed by interpolating from CARB estimates of total organic gases and PM, provides emissions estimates by stationary, area-wide, on-road mobile, off-road mobile, and natural sources (CARB 2013).

Greenhouse Gas Guidance

California Environmental Quality Act Guidelines Amendments to Address Greenhouse Gas Emissions

CEQA Guidelines specifically require lead agencies to address GHG emissions in determining the significance of environmental impacts and to consider feasible means to mitigate the significant impacts of GHG emissions. Provisions of the CEQA Guidelines pertaining to addressing GHG emissions include the following (California Natural Resources Agency 2009):

- A lead agency may consider the following when assessing the significance of impacts from GHG emissions:
  - The extent to which the project may increase or reduce GHG emissions as compared to the existing environmental setting
  - Whether the project emissions exceed a threshold of significance the lead agency determines is applicable to the project
  - The extent to which the project complies with regulations or requirements adopted to implement a statewide, regional, or local plan for the reduction or mitigation of GHG emissions
- When an agency makes a statement of overriding considerations, the agency may consider adverse environmental impacts in the context of region- or state-wide environmental benefits.
- Lead agencies shall consider feasible means of mitigating GHG emissions that may include the following:
  - Measures in an existing plan or mitigation program for the reduction of emissions that are required as part of the lead agency's decision
  - Reductions in emissions resulting from a project through implementation of project features, project design, or other measures
  - Off-site measures, including offsets
  - Measures that sequester GHGs
  - In the case of the adoption of a plan (e.g., general plan, long-range development plan, or GHG reduction plan), mitigation may include specific measures that may be implemented on a project-by-project basis. Mitigation may also incorporate specific measures or policies found in an adopted ordinance or regulation that reduces the cumulative impact of emissions.

Executive Order B-30-15

In April 2015, Governor Brown issued EO B-30-15, which expanded the goals of EO S-3-05 by calling for a new target of 40 percent below 1990 levels by 2030. This EO also directed all state agencies with jurisdiction over GHG-emitting sources to implement measures designed to achieve the new interim 2030 goal, as well as the pre-existing, long-term 2050 goal identified in EO S-3-05 of reducing emissions 80 percent under 1990 levels by 2050. The new emission reduction target of 40 percent below 1990 levels by 2030 is intended to make it possible to reach the state's ultimate goal set by EO S-3-05.

In October 2015, Governor Brown signed into legislation SB 350, which requires retail sellers and publicly owned utilities to procure 50 percent of their electricity from eligible renewable energy

resources by 2030, with interim goals of 40 percent by 2024, and 45 percent by 2027 (California Office of the Governor 2015).

Senate Bill 32, California Global Warming Solutions Act of 2006 (AB 32): Emissions Limit, and Assembly Bill 197, State Air Resources Board, Greenhouse Gases, Regulations

On September 8, 2016, Governor Brown signed into law SB 32, effectively extending California's landmark AB 32 to the year 2030. SB 32 effectively establishes a new greenhouse gas reduction goal for statewide emissions of 40 percent below 1990 levels by 2030. This goal is 40 percent more stringent than the current AB 32 mandated goal of 1990 levels by 2020. In terms of metric tons, this means that statewide, California not only needs to reduce emissions from 441.5 MMT of carbon dioxide equivalents (CO_2e) in 2014 to 431 MMT CO_2e by 2020, but will now need to cut emissions to 258.6 MMT CO_2e by 2030.

Air Quality Plans

State Implementation Plan

The San Joaquin Valley Air Pollution Control District (SJVAPCD) and CARB develop planning documents to regulate pollutants for which the SJVAB is classified as a federal nonattainment or maintenance area for approval by the USEPA. The SJVAB is presently guided by the California SIP (CARB 2016b) and other planning documents. The following are the relevant SIP documents for the SJVAB:

- 2016 8-Hour Ozone Plan (SJVAPCD 2016a)
- 2007 Ozone Plan (SJVAPCD 2007a)
- 2004 Extreme Ozone Attainment Demonstration Plan (SJVAPCD 2004)
- 2013 Plan for the Revoked 1-Hour Ozone Standard (SJVAPCD 2013)
- 2015 Plan for the 1997 $PM_{2.5}$ Standard (SJVAPCD 2015)
- 2016 Moderate Area Plan for the 2012 $PM_{2.5}$ Standard (SJVAPCD 2016b)
- 2004 Revision to the California State Implementation Plan for Carbon Monoxide (CARB 2004)
- 2007 PM_{10} Maintenance Plan and Request for Redesignation (SJVAPCD 2007b)

2016 Ozone Plan for the 2008 8-Hour Ozone Standard

On June 16, 2016, the SJVAPCD adopted its 2016 Ozone Plan for the 2008 8-Hour Ozone Standard. The 2016 plan addresses the federal mandates of the 2008 8-hour O_3 NAAQS by setting a strategy to attain the 75 parts per billion (ppb) 8-hour O_3 standard by no later than December 31, 2031. NO_X emissions, with implementation of the plan, are anticipated to be reduced by 60 percent between 2012 and 2031 (SJVAPCD 2016a).

2007 Ozone Attainment Plan

On May 5, 2010, the USEPA reclassified the 8-hour O_3 nonattainment of the San Joaquin Valley from "serious" to "extreme." The reclassification requires the State of California to incorporate more stringent requirements, such as lowering permitting thresholds and implementing reasonably available control technologies at more sources (USEPA 2015a).

The 2007 8-hour Ozone Air Quality Plan contained a comprehensive list of regulatory and incentive-based measures to reduce emissions of O_3 and PM precursors throughout the San Joaquin Valley. On December 18, 2007, the SJVAPCD Governing Board adopted the plan with an amendment to extend the rule adoption schedule for organic waste operations.

On January 8, 2009, the USEPA found that the motor vehicle budgets for 2011, 2014, and 2017 from the 2007 8-hour Ozone Plan were adequate for transportation conformity decisions, but that the 2008, 2020, and 2023 motor vehicle budgets from the 2007 8-hour Ozone Plan were not adequate for transportation conformity purposes (USEPA 2009a).

2004 Extreme Ozone Attainment Plan

Subsequent to the adoption of the San Joaquin Valley's 2004 Extreme Ozone Attainment Demonstration Plan, the USEPA revoked the 1-hour O_3 standard effective on June 15, 2005, for certain areas, including the SJVAB. The requirement for SJVAPCD to submit a plan for that standard remains in effect for the San Joaquin Valley (USEPA 2008). On March 8, 2010, the USEPA approved San Joaquin Valley's 2004 Extreme Ozone Attainment Demonstration Plan for 1-hour O_3. As a result of subsequent litigation, the USEPA withdrew its plan approval in November 2012 and the SJVAPCD and CARB withdrew this plan from consideration.

2013 Plan for the Revoked 1-Hour Standard

The SJVAPCD's 2013 Plan for the Revoked 1-Hour Ozone Standard was approved by the SJVAPCD Governing Board at a public hearing on September 19, 2013 (SJVAPCD 2013). As discussed in the plan, preliminary modeling confirms that the San Joaquin Valley would attain the revoked 1-hour O_3 standard by 2017.

2015 $PM_{2.5}$ Plan

The SJVAPCD Governing Board adopted the 2015 Plan for the 1997 $PM_{2.5}$ Standard on April 16, 2015. The Plan sets out the strategy to attain the federal 1997 24-hour $PM_{2.5}$ standard of 65 micrograms per cubic meter ($\mu g/m^3$) by 2018 and annual $PM_{2.5}$ standard of 15 $\mu g/m^3$ by 2020 (SJVAPCD 2012).

2016 $PM_{2.5}$ Plan

The SJVAPCD Governing Board adopted the 2016 Moderate Area Plan for the 2012 $PM_{2.5}$ Standard on September 15, 2016. The plan identifies a strategy to attain the federal annual $PM_{2.5}$ standard of 12 $\mu g/m^3$. Additionally, the plan satisfies the mandate to submit a Moderate attainment plan to the USEPA by October 2016, demonstrates that attaining the 2012 $PM_{2.5}$ standard by the Moderate nonattainment area deadline of 2021 would be impractical, and formally requests that the SJVAB be reclassified from a Moderate nonattainment area to a Serious nonattainment area (SJVAPCD 2016b).

2004 Revision to California State Implementation Plan for Carbon Monoxide

On July 22, 2004, CARB approved an update to the SIP that plans for 10 areas, including the SJVAB, to maintain the CO standard through 2018; revises emission estimates; and establishes new on-road motor vehicle emission budgets for transportation conformity purposes (CARB 2004). On November 30, 2005, the USEPA approved and promulgated the Implementation Plans and Designation of Areas for Air Quality Purposes (USEPA 2005). This revision provides a 10-year update to the CO maintenance plan and establishes new CO motor vehicle emissions budgets for the purposes of determining transportation conformity.

2007 PM_{10} Maintenance Plan and Request for Redesignation

CARB approved SJVAPCD's 2007 PM_{10} Maintenance Plan and Request for Redesignation with modifications to the transportation conformity budgets. On September 25, 2008, the USEPA redesignated the San Joaquin Valley as in attainment for the PM_{10} NAAQS and approved the PM_{10} Maintenance Plan (SJVAPCD 2007b).

3.3.2.3 Regional and Local

The SJVAPCD Rule 8011, General Requirements—Fugitive Dust Emissions Sources is the same as described in Section 3.3.2.3, Regional and Local, of the Merced to Fresno Final EIR/EIS (Authority and FRA 2012: page 3.3-8). New, additional, or updated regional and local laws, regulations, and orders follow.

San Joaquin Valley Air Pollution Control District

The SJVAPCD is responsible for:

- Implementing air quality regulations, including developing plans and control measures for stationary sources of air pollution to meet the NAAQS and CAAQS.
- Implementing permit programs for the construction, modification, and operation of sources of air pollution.
- Enforcing air pollution statutes and regulations governing stationary sources. With CARB oversight, the SJVAPCD administers local regulations.

The SJVAPCD prepared the *Guide for Assessing and Mitigating Air Quality Impacts* (GAMAQI) (SJVAPCD 2002) to assist lead agencies and project applicants in evaluating the potential air quality impacts of projects in the SJVAB. The GAMAQI provides SJVAPCD-recommended procedures for evaluating potential air quality impacts during the CEQA environmental review process. The GAMAQI provides guidance on evaluating short-term (construction) and long-term (operational) air emissions. The 2002 GAMAQI was updated and was adopted by the SJVAPCD Governing Board on March 19, 2015 (SJVAPCD 2015a). Conversation with SJVAPCD staff indicates projects that were initiated or had a Notice of Preparation issued prior to the adoption of the 2015 GAMAQI may continue to use the 2002 GAMAQI to evaluate project impacts (Siong pers. comm. 2015). Consequently, the Central Valley Wye alternatives air quality impact evaluation uses the SJVPACD's 2002 GAMAQI guidance on the following:

- Criteria and thresholds for determining whether a project may have a significant adverse air quality impact
- Specific procedures and modeling protocols for quantifying and analyzing air quality impacts
- Methods to mitigate air quality impacts
- Information for use in air quality assessments and environmental documents that would be updated more frequently, such as air quality data, regulatory setting, climate, and topography

SJVAPCD has specific air quality-related planning documents, rules, and regulations. This section summarizes the local planning documents and regulations that may be applicable to the Central Valley Wye alternatives as administered by SJVAPCD with CARB oversight. There are also city and county policies that pertain to air quality and climate change. The policies of the general plans focus on managing sources of air pollutants through mixed-use and transit- and pedestrian-friendly neighborhoods. Additional details regarding the applicable rules are available at the SJVAPCD web site: www.valleyair.org/rules/1ruleslist.htm.

Transportation Plans and Programs

Regional transportation planning agencies and metropolitan planning organizations (MPO) within the SJVAB (the Merced County Association of Governments [MCAG] and the Madera County Transportation Commission [MCTC]) are responsible for preparing Regional Transportation Plans (RTP). RTPs address a region's transportation goals, objectives, and policies for the next 20–25 years and identify the actions necessary to achieve those goals. MPOs prepare Federal Transportation Improvement Programs, which are 5-year programs of proposed projects that incrementally develop the RTP and contain a listing of proposed transportation projects for which funding has been committed. Transportation conformity projects are analyzed for air quality conformity with the SIP as components of RTPs and Federal Transportation Improvement Programs.[3] The MCAG adopted the 2014 RTP on September 25, 2014 (MCAG 2014), and MCTC adopted the 2014 RTP on July 11, 2014 (MCTC 2014). Both RTPs discuss the Central Valley Wye alternatives, but it is not included in the constrained project lists (i.e., a list of projects

[3] The RTP's for Stanislaus and Fresno Counties are not included because transportation-related improvements (i.e., the Central Valley Wye alternative alignments) are only located in Merced and Madera Counties.

for which funding has been committed), and the Central Valley Wye alternatives are therefore not included in the transportation conformity determination for either of these RTPs.

Associations of Governments

California has 25 regional planning agencies. The regional planning agencies in the vicinity of the Central Valley Wye alternatives are the MCAG and the MCTC. The MCAG comprises representatives from Merced County and the cities of Atwater, Dos Palos, Gustine, Livingston, Los Banos, and Merced. As a regional transportation planning agency and MPO, MCAG is the primary transportation facilitator in Merced County (MCAG 2015). The MCTC is the regional transportation planning agency and the designated MPO for Madera County, which includes the City of Madera (MCTC 2014).

Each planning agency is responsible for establishing the long-range priorities for the regional transportation system through the development of the 20-year RTP and transportation improvement program, as required by state law. These plans identify improvements across the entire system, including the road and highway network, bus and rail transit systems, freight transportation, the environment, and advanced technologies. As required under SB 375 (Steinberg), the two agencies considered Sustainable Communities Strategies (SCS) as part of their most recent RTPs. However, MCTC found it cannot meet its GHG reduction targets under SB 375 and has opted to adopt an Alternative Planning Strategy in place of the binding SCS, while MCAG adopted Amendment 1 on May 19, 2016, that contains its SCS. The current plans of the responsible planning agencies in the vicinity of the Central Valley Wye alternatives are discussed in the following section.

General Plan Policies and Ordinances

Table 3.3-2 lists county and city general plans, policies, and objectives relevant to the Central Valley Wye alternatives.

Table 3.3-2 Local Plans and Polices

Policy Title	Summary
Merced County	
2030 Merced County General Plan (2013)	Merced County adopted the *2030 Merced County General Plan* on December 10, 2013. The general plan includes the following goals and policies: ▪ Policy ED-1.7: Improving Merced County's Quality of Life (SO/PI). Economic development efforts shall include consideration of improving air quality, developing an educated workforce, promoting safe/crime-free communities, protecting water quality, and increasing recreational opportunities as a means to improve the quality of life for residents and workers and to attract new industries to the County. ▪ Policy LU-10.9: Air Quality Management Coordination (IGC). Coordinate with the San Joaquin Valley Air Pollution Control District and affected agencies and neighboring jurisdictions in the San Joaquin Valley Air Basin to confirm regional cooperation on cross-jurisdictional and regional transportation and air quality issues, and to establish parallel air quality programs and implementation measures, such as trip reduction ordinances and indirect source programs. ▪ Policy LU-10.10: San Joaquin Valley Air Pollution Control District Consultation (IGC). Consult with the San Joaquin Valley Air Pollution Control District during CEQA review for discretionary projects that have the potential for causing adverse air quality impacts. Certify that development projects are submitted to the District for CEQA comments and review of air quality analysis. ▪ Policy CIR-1.3: Transportation Efficiency (RDR). Encourage transportation programs that result in more efficient energy use, reduce greenhouse gas emissions and noise levels, and improve air quality.

Policy Title	Summary
	▪ Policy AQ-1.6: Air Quality Improvement (SO). Support and implement programs to improve air quality throughout the County by reducing emissions related to vehicular travel and agricultural practices. ▪ Policy AQ-2.3: Cumulative Impacts (RDR). Encourage the reduction of cumulative air quality impacts produced by projects that are not significant by themselves, but result in cumulatively significant impacts in combination with other development. ▪ Policy AQ-2.5: Innovative Mitigation Measures (RDR, IGC, JP). Encourage innovative mitigation measures and project redesign to reduce air quality impacts by coordinating with the San Joaquin Valley Air Pollution Control District, project applicants, and other interested parties. ▪ Air Quality Element Goal AQ-3. Improve air quality through improved public facilities and operations and to serve as a model for the private sector. ▪ Policy AQ-4.7: Planning Integration (RDR). Require land use, transportation, and air quality planning to be integrated for the most efficient use of resources and a healthier environment. ▪ Air Quality Element Goal AQ-6. Improve air quality in Merced County by reducing emissions of PM_{10}, $PM_{2.5}$, and other particulates from mobile and non-mobile sources.
Madera County	
Madera County General Plan (1995)	The *Madera County General Plan* was adopted in October 1995. The general plan includes the following policies, goals, and programs: ▪ Policy 2.H.6: The County shall work with other responsible agencies, including the Madera County Transportation Commission and the San Joaquin Valley Unified Air Pollution Control District, to develop other measures to reduce vehicular travel demand and meet air quality goals. ▪ Goal 5.J: To protect and improve air quality in Madera County and the region. ▪ Policy 5.J.1: The County shall cooperate with other agencies to develop a consistent and effective approach to air quality planning and management. To this end, the County shall coordinate with other jurisdictions in the San Joaquin Valley to establish parallel air quality programs and implementation measures. ▪ Policy 5.J.2: The County shall support the SJVUAPCD in its development of improved ambient air quality monitoring capabilities and the establishment of standards, thresholds, and rules to more adequately address the air quality impacts of new development. ▪ Goal 5.K: To integrate air quality planning with the transportation planning process. ▪ Implementation Program 5.10: The County shall coordinate with other local, regional, and state agencies, including the SJVUAPCD and the ARB, in incorporating regional and state clean air plans into County planning and project review procedures. The County shall also cooperate with the SJVUAPCD and ARB in the following efforts: ▪ a. Enforcing the provision of the California and Federal Clean Air Acts, state and regional policies, and established standards for air quality; ▪ b. Establishing monitoring stations to accurately determine the status of carbon monoxide, ozone, nitrogen dioxide, hydrocarbon, and PM_{10} concentrations; ▪ c. Developing consistent procedures and thresholds for evaluating both project-specific and cumulative air quality impacts for proposed projects.

Policy Title	Summary
Madera County General Plan Air Quality Element (2010)	The *Madera County General Plan Air Quality Element* was adopted in 2010 and provides goals, policies and objectives that will lead to improved air quality within its jurisdiction. ▪ AQ Policy A1.1.4: During project review, approval, and implementation, work with Caltrans, ARB, SJVAPCD, and MCTC to minimize the air quality, mobility, and social impacts of large-scale transportation projects on existing communities and planned sensitive land uses. ▪ AQ Policy C1.1.1: Assess and mitigate project air quality impacts using analysis methods and significance thresholds recommended by the SJVAPCD and require that projects do not exceed established SJVAPCD thresholds.
Fresno County	
Fresno County General Plan (2000)	Fresno County adopted the Fresno County General Plan on October 3, 2000, which has been amended through 2003. The Open Space and Conservation Element of the general plan includes the following goals and policies: ▪ Goal OS-G: To improve air quality and minimize the adverse effects of air pollution in Fresno County. ▪ Policy OS-G.2: The County shall ensure that air quality impacts identified during the CEQA review process are fairly and consistently mitigated. The County shall require projects to comply with the County's adopted air quality impact assessment and mitigation procedures.
Stanislaus County	
Stanislaus County General Plan (2016)	Stanislaus County adopted the Stanislaus County General Plan on August 23, 2016. The Conservation and Open Space Element of the general plan includes the following policy: ▪ Policy 19: The County will strive to accurately determine and fairly mitigate the local and regional air quality impacts of proposed projects.
City of Merced	
Merced Vision 2030 General Plan (2015)	The City of Merced adopted the *Merced Vision 2030 General Plan* on January 3, 2012 and has been amended through 2015. The Sustainable Development Element of the general plan includes the following policies: ▪ Policy SD-1.1: Accurately determine and fairly mitigate the local and regional air quality impacts of projects proposed in the City of Merced. ▪ Policy SD-1.6: Reduce emissions of PM_{10} and other particulates with local control potential.
City of Waterford	
Waterford Vision 2025 General Plan (2006)	The City of Waterford adopted the *Waterford Vision 2025 General Plan* on October 26, 2006. The Sustainable Development Element of the general plan includes the following policies: ▪ Policy SD-1.1: Accurately determine and fairly mitigate the local and regional air quality impacts of projects proposed in the City of Waterford. ▪ Policy SD-1.6: Reduce emissions of PM_{10} and other particulates with local control potential.

Policy Title	Summary
City of Chowchilla	
City of Chowchilla 2040 General Plan (2011)	The City of Chowchilla adopted the *City of Chowchilla 2040 General Plan* on May 2, 2011. The general plan includes the following policies, goals, and programs: ▪ Objective LU 21: Support the principles of reducing air pollutants through land use, transportation, and energy use planning. ▪ Policy LU 21.1: Encourage transportation modes that minimize contaminant emissions from motor vehicle use. ▪ Policy CI 10.2: Support coordination with other cities, counties and planning agencies concerning consideration and management of land use, jobs / housing balance and transportation planning as a means of improving air quality. ▪ Policy PS 10.12: Separate, buffer and protect sensitive receptors from significant sources of air pollutants to the greatest extent possible. ▪ Objective OS 23: To Implement and enforce State and Regional regulations pertaining to greenhouse gas emissions and climate change. ▪ Policy OS 23.1: The City supports local, regional, and statewide efforts to reduce the emission of greenhouse gases linked to climate change.

Sources: City of Chowchilla, 2011; City of Merced, 2012; City of Waterford, 2006; Fresno County, 2003; Madera County, 1995; Madera County, 2010; Merced County, 2013; Stanislaus County, 2016
ARB = California Air Resources Board
Caltrans = California Department of Transportation
MCTC = Madera County Transportation Commission
SJVAPCD = San Joaquin Valley Air Pollution Control Board
CEQA = California Environmental Quality Act
$PM_{2.5}$ = particulate matter smaller than or equal than 2.5 microns in diameter
PM_{10} = particulate matter smaller than or equal to 10 microns in diameter

3.3.3 Compatibility with Plans and Laws

As indicated in Section 3.1.3.3, Compatibility with Plans and Laws, CEQA and NEPA regulations[4] require a discussion of inconsistencies or conflicts between a proposed undertaking and federal, state, regional, or local plans and laws. As such, this Draft Supplemental EIR/EIS describes inconsistency of the Central Valley Wye alternatives with federal, state, regional, and local plans and laws to provide planning context.

Several federal and state laws and implementing regulations listed in Section 3.3.2.1, Federal, and Section 3.3.2.2, State, protect the air quality and public health at a regional and local level, and aim to curb GHG emissions and prevent the effects of global climate change from occurring. A summary of the federal and state requirements considered in this analysis follows:

- Federal and state acts and laws that set standards for the ambient air quality in air basins in the state and establish thresholds of significance to ensure that air basins in the state are conforming to the required standards.
- State laws and executive orders that require reductions in GHG emissions from on-road vehicles and establish GHG reduction targets to reduce statewide GHG emissions to minimize California's contribution to global warming.
- State plans approved by the ARB and prepared by the SJVAB that outline strategies for the SJVAPCD to achieve attainment with state and federal air quality standards. The SJVPACD's attainment of all applicable air quality standards are discussed in 3.3.5.1, Regional Air Quality.

[4] NEPA regulations refer to the regulations issued by the Council for Environmental Quality located at 40 CFR Part 1500.

The Authority, as the lead state agency proposing to construct and operate the HSR system, is required to comply with all federal and state laws and regulations and to secure all applicable federal and state permits prior to initiating construction on the selected alternative. Similarly, FRA, as federal lead agency, is required to comply with all federal laws and regulations. Therefore, there would be no inconsistencies between the Central Valley Wye alternatives and these federal and state laws and regulations.

The Authority is a state agency and therefore is not required to comply with local land use and zoning regulations; however, it has endeavored to design and construct the HSR project so that it is compatible with land use and zoning regulations. The CEQA and NEPA regulations require the discussion of inconsistencies or conflicts between a proposed undertaking and regional or local plans and laws. A total of 8 plans and 30 policies were reviewed. The Central Valley Wye alternatives are consistent with 28 policies and inconsistent with 2 policies. Further details and reconciliations are discussed in Appendix 3.3-A. The Central Valley Wye alternatives would be inconsistent with certain provisions of the following county plan:

- ***Madera County General Plan Air Quality Element*** (Madera County 2010)—Policy A1.1.4, Policy C1.1.1. Construction of the Central Valley Wye alternatives would not comply with these policies, as any of the alternatives would result in the temporary emissions of criteria pollutants that could result in an exceedance of thresholds established by the SJVAPCD and potentially expose sensitive receptors to increased cancer risks. The Authority has identified mitigation features that would reduce construction emissions, including off-road and on-road emissions and particulate emissions from concrete batch plants, and offset the remaining emissions. These mitigation measures are AQ-MM#1, Reduce Criteria Exhaust Emissions from Construction Equipment, AQ-MM#2, Reduce Criteria Exhaust Emissions from On-Road Construction Equipment, AQ-MM#3, Reduce the Potential Impact of Concrete Batch Plants, and AQ-MM#4, Offset Project Construction Emissions through an SJVAPCD Voluntary Emission Reduction Agreement (VERA). Because these mitigation measures would result in long-term benefits to air quality, the policy inconsistencies would be reconciled and the Central Valley Wye alternatives would be consistent with these two policies of the *Madera County General Plan Air Quality Element* (Madera County 2010).

Further details and reconciliations are discussed in Appendix 3.3-A.

3.3.4 Methods for Evaluating Impacts

The evaluation of impacts on air quality and global climate change is a requirement of NEPA and CEQA. The following sections summarize the RSAs and the methods used to analyze impacts on air quality and global climate change.

3.3.4.1 Definition of Resource Study Area

As defined in Section 3.1, Introduction, RSAs are the geographic boundaries in which the environmental investigations specific to each resource topic were conducted. The RSAs for impacts on air quality and global climate change are distinct because of the relatively short atmospheric lifetimes of criteria pollutants compared to the long atmospheric lifetimes of the primary GHGs of concern (i.e., CO_2, CH_4, N_2O, and fluorinated gases). Three geographic components—local, regional, and state—are used to define the RSAs, which vary based upon the nature of the impact evaluated.

The RSAs for impacts on air quality include (1) the project footprint for each of the Central Valley Wye alternatives plus local areas within 1,000 feet of the temporary features of each project footprint (with respect to localized health risk impacts during construction only); (2) the SJVAB (for construction and operations) and the San Francisco Bay Area Air Basin (SFBAAB) (for construction) for regional impacts; and (3) the entire state (with respect to ambient air quality standards during operations). The RSA for impacts on global climate change also includes the entire state and global atmosphere (during construction and operations) because long-lived GHGs are globally well mixed in the atmosphere.

Table 3.3-3 describes the two RSAs and includes a general definition and a boundary description for each RSA within the Central Valley Wye alternatives. Figure 3.3-1 illustrates the regional air quality RSA for the Central Valley Wye alternatives, including the subbasins within the SJVAB and SFBAAB, and the alternative alignments for the Central Valley Wye alternatives. The state, regional, and local components of the air quality and global climate change RSAs are described in greater detail following Table 3.3-3.

State Component (Air Quality and Global Climate Change)

The state component of the air quality RSA (for operations) was identified to evaluate potential changes in air quality from large-scale, non-localized impacts, such as HSR electric power requirements, changes in air traffic, and HSR conformance with the SIP. Similarly, the state component of the global climate change RSA (for construction and operations) captures the effects of these activities as they relate to greenhouse gases. A statewide RSA provides a policy context for California-specific goals within which to view air quality and global climate change issues.

Regional Component (Air Quality)

The regional component of the air quality RSA (for construction and operations) was identified to evaluate potential changes in regional air pollutant concentrations in the SJVAB. Figure 3.3-1 shows the Central Valley Wye alternative alignments in relation to the SJVAB, which includes all of Merced and Madera Counties. The SJVAB is approximately 250 miles long and 35 miles wide, is the second-largest air basin in the state, and comprises San Joaquin, Stanislaus, Merced, Madera, Fresno, Kings, and Tulare Counties and the Valley portion of Kern County. The SJVAB is defined by the mountain ranges of the Sierra Nevada to the east (8,000–14,000 feet in elevation), the Coast Range to the west (averaging 3,000 feet in elevation), and the Tehachapi Mountains to the south (6,000–8,000 feet in elevation). To the north, the valley opens to the sea at the Carquinez Strait, where the Sacramento–San Joaquin River Delta empties into San Francisco Bay.

During construction, the hauling of ballast material from quarries outside of the SJVAB to the Central Valley Wye alternatives vicinity could potentially affect regional air pollutant concentrations in the adjacent SFBAAB. Climate within the SFBAAB is divided into 11 climatological subregions, as local meteorological conditions vary greatly throughout the Bay Area because of topography, elevation, and proximity to local water bodies. The SFBAAB is an area that includes all of Alameda, Contra Costa, Marin, Napa, San Francisco, San Mateo, Santa Clara, the western half of Solano, and the southern half of Sonoma Counties. The regional climate within the SFBAAB is considered semi-arid and is characterized by warm summers, mild winters, infrequent seasonal rainfall, moderate daytime onshore breezes, and moderate humidity. For the analysis of material-hauling emissions, this air basin is considered part of the regional component of the RSA.

Local Component (Air Quality)

The local component of the air quality RSA (for construction) was identified to evaluate major air emission activities along Central Valley Wye alternative alignments, including areas where construction would occur. Local areas are generally defined as areas within 1,000 feet of the rail alignments of each of the Central Valley Wye alternatives or construction staging areas. Some locations are considered more sensitive to adverse effects from air pollution than others. These locations are termed *sensitive receptors* and include schools, daycare facilities, elderly care establishments, medical facilities, residences, and other areas that are populated with people considered more vulnerable to the effects of poor air quality. Analyses performed by CARB indicate that providing a separation of at least 1,000 feet from diesel sources and high-traffic areas would substantially reduce diesel particulate matter concentrations, public exposure, and asthma symptoms in children (CARB 2005).

Table 3.3-3 Definition of Resource Study Areas

Source	General Definition	RSA Boundary Definition
Air Quality		
Construction	**Local Component:** Localized air quality impacts from construction, such as health effects associated with CO or PM emissions, would occur in areas within 1,000 feet of the alignment and construction staging areas.	1,000 feet from project footprints 1,000 feet from footprint of EINU components (see detailed project description maps in Appendix 2-D.1, Detailed Project Descriptions)[1]
	Regional Component: Regional air quality impacts from construction, such as increased ozone formation, could occur in the SJVAB and in the San Francisco Bay Area Air Basin where materials-hauling trucks operate to bring ballast materials from outside of the SJVAB.	SJVAB and San Francisco Bay Area Air Basin[2,3]
Operations	**Regional and State Components:** The air quality RSA associated with operations of the Central Valley Wye alternatives is considered to be the SJVAB and the entire state. The Central Valley Wye alternatives could affect on-road emissions throughout the air basin and state and aircraft operations regionally and statewide. Emissions from power plants would occur at power facilities throughout the state. During operations of the Central Valley Wye alternatives, train movement would generate wind-induced dust emissions that would occur within the RSA, potentially affecting air quality. Thus, the resulting change in emissions from these sources from Central Valley Wye alternatives operations could affect regional and statewide air quality.	SJVAB (regional component) and State of California (state component)[3]
Global Climate Change		
Construction and Operations	**State Component:** The RSA associated with global climate change is considered to be the entire state for both construction and operations. Long-lived GHGs, once emitted, circulate worldwide throughout the atmosphere, and the associated impacts occur to varying degrees around the globe. California, through AB 32 and other approaches described in Section 3.3.2.2, State, has implemented actions to reduce its statewide GHG emissions. Thus, GHG emissions from Central Valley Wye alternatives construction equipment, power plants, and changes in on-road and aircraft operations could affect statewide climate change.	State of California and global atmosphere[3]

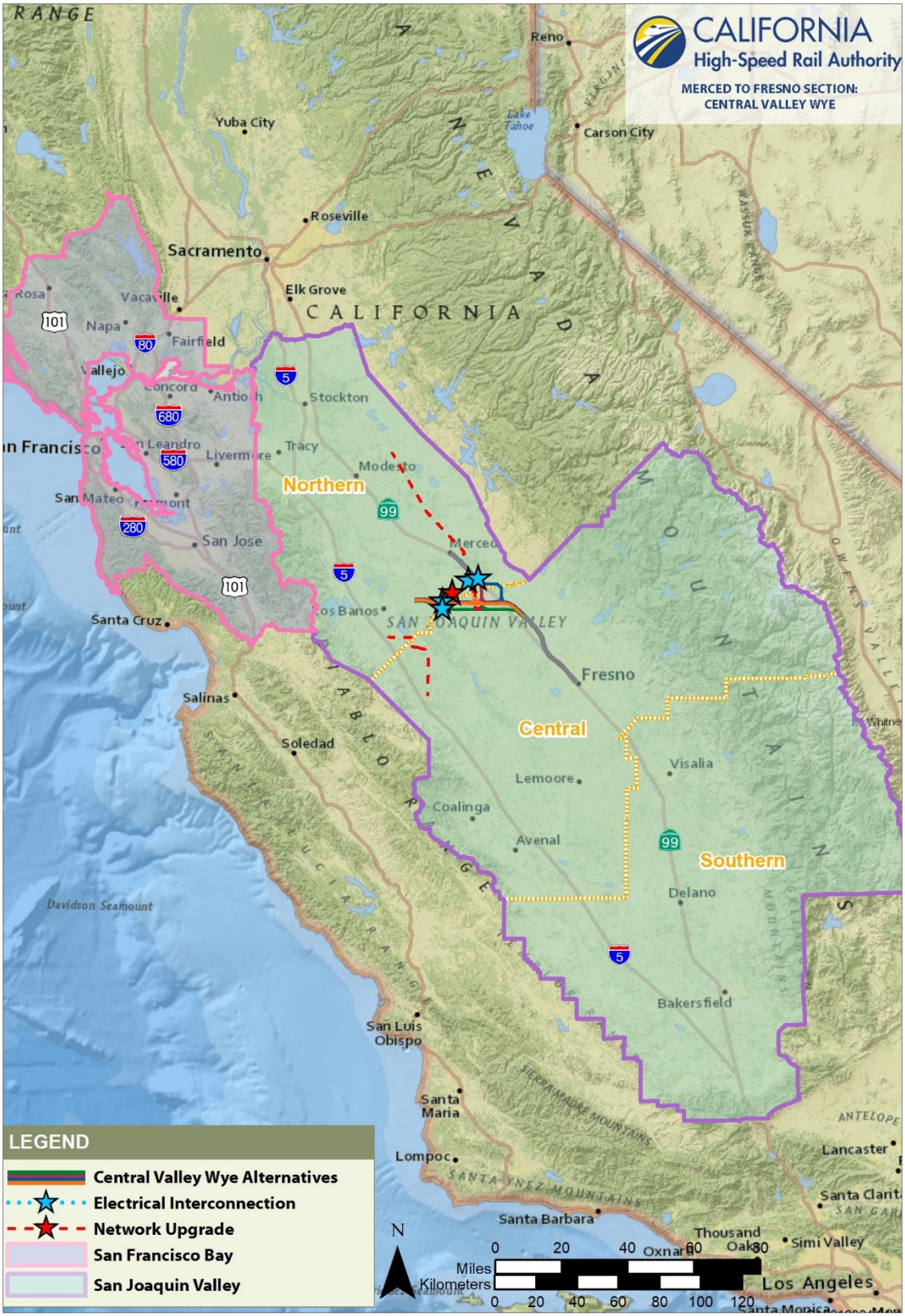
Source: Authority and FRA, 2017

[1] Given the site-specific and low-intensity construction activities involved with the EINU, as well as the minor extent of new, permanent features, the EINU RSAs are limited to the project footprints associated with construction and operation. Accordingly, figures in this section do not include the EINU. Detailed maps specific to the EINU are available in Appendix 2-D.1.

[2] The San Francisco Bay Area Air Basin is not applicable to the network upgrades.

[3] The footprint of EINU components is located within this RSA boundary.

SJVAB = San Joaquin Valley Air Basin
CO = carbon monoxide
GHG = greenhouse gas
HSR = high-speed rail
PM = particulate matter
RSA = resource study area
EINU = electrical interconnections and network upgrades
AB = Assembly Bill



Source: CARB, 2016c

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Figure 3.3-1 San Joaquin Valley and San Francisco Bay Air Basins

3.3.4.2 Impact Avoidance and Minimization Features

As noted in Section 2.2.3.7, Impact Avoidance and Minimization Features, the Central Valley Wye alternatives would incorporate standardized IAMFs to avoid and minimize impacts. The Authority would incorporate IAMFs during project design and construction and as such, the analysis of impacts of the Central Valley Wye alternatives in this section factors in all applicable IAMFs. Appendix 2-B, California High-Speed Rail: Impact Avoidance and Minimization Features, provides a detailed description of IAMFs that are included as part of the Central Valley Wye alternatives design. IAMFs applicable to air quality and global climate change include:

- AQ-IAMF#1, Fugitive Dust Emissions
- AQ-IAMF#2, Selection of Coatings

3.3.4.3 Methods for NEPA and CEQA Impact Analysis

This section describes the sources and methods the Authority and FRA used to analyze potential impacts from implementing the Central Valley Wye alternatives on air quality and global climate change. These methods apply to both NEPA and CEQA unless otherwise indicated. Refer to Section 3.1.3.4, Methods for Evaluating Impacts, for a description of the general framework for evaluating impacts under NEPA and CEQA. As described in Section 3.3.1, Introduction, and in the following discussions, the Authority and FRA have applied the same methods and many of the same data sources from the Merced to Fresno Final EIR/EIS to this Draft Supplemental EIR/EIS.

The primary difference in the two analyses is the Central Valley Wye alternatives analysis evaluates air quality impacts from construction and operations against existing conditions in 2015 for CEQA purposes and future no project conditions in 2040 for NEPA purposes, and the Merced to Fresno Final EIR/EIS analysis evaluated air quality impacts against existing conditions in 2009 and future year conditions in 2035. Refer to the Air Quality and Global Climate Change Technical Report (Authority and FRA 2016) for more information regarding the methods and data sources used in this analysis. The Air Quality and Global Climate Change Technical Report includes an analysis of air quality impacts evaluated against existing conditions in 2015 as well as future year conditions in 2040 when Phase 1 of the statewide HSR system would be fully operational. Laws, regulations, and orders (Section 3.3.2, Laws, Regulations, and Orders) that regulate air quality and global climate change were also considered in the evaluation of impacts on air quality and global climate change.

The impact analysis focuses on three types of air pollutants that are of greatest concern for the Central Valley Wye alternatives—criteria pollutants, TACs, and GHGs. These pollutants, defined in Section 3.3.1 under the subsection Definition of Resources, have not changed since publication of the Merced to Fresno Final EIR/EIS. Refer to Section 3.3.3, Pollutants for Analysis, of the Merced to Fresno Final EIR/EIS, for a complete definition of all pollutants. The impacts associated with these pollutants are evaluated using the methods described in this section.

The discussion of methods is organized to correspond to the discussion of impacts in Section 3.3.6, Environmental Consequences. The methods for evaluating construction impacts are discussed first followed by the methods for evaluating operations impacts.

Construction Impacts

The following discussion identifies the methods and assumptions used for evaluating construction-phase emissions and impacts on air quality and global climate change from implementing the Central Valley Wye alternatives. The Air Quality and Global Climate Change Technical Report (Authority and FRA 2016) provides additional information on the assumptions for the construction quantities, construction equipment fleets for each unit operation, and emission factors, as well as detailed model parameters and other assumptions.

Construction-phase emissions were quantitatively estimated for the earthwork and major civil construction activities of the following components of the Central Valley Wye alternatives:

- At-grade guideway segments

- Elevated guideway segments
- Retained-fill guideway segments
- Electrical substations
- Roadways and roadway overpasses

These major construction activities would account for the vast majority of earthwork, the most diesel-powered off-road construction equipment, and the majority of material to be hauled along public streets compared to other minor construction activities of the Central Valley Wye alternatives. Regional emissions and localized emissions from these major activities would account for the majority of construction emissions that would be generated by the construction of the Central Valley Wye alternatives. Regional and localized emissions from minor construction activities, such as mobilization and demobilization, were also quantified and would contribute to fewer emissions than the major construction activities. The estimated construction emissions from these major, as well as minor, activities were used to estimate the regional air quality impacts and localized air quality impacts that could occur during the construction phase.

Construction Schedule

Chapter 2, Alternatives, provides more information regarding construction methods for the Central Valley Wye alternatives. The Air Quality and Global Climate Change Technical Report (Authority and FRA 2016) provides the detailed equipment and workforce schedule underlying this analysis.

The categories of major construction activities and their schedules include:

- Mobilization: would occur at two main staging areas: December 2018–March 2019
- Site preparation, including demolition, land clearing, and grubbing: December 2018–March 2019
- Earthmoving: March 2019–March 2021
- Roadway crossings: June 2019–June 2021
- Elevated structures: June 2019–August 2021
- Demobilization: August 2021–December 2021
- Track laying: elevated, at-grade, and retained fill: December 2021–December 2022
- Material hauling emissions, including truck and rail: December 2021–December 2022
- Paralleling station: December 2021–June 2022
- Traction power substation: December 2021–December 2022
- Switching station: June 2022–December 2022
- Electrical interconnections: January 2021–June 2022
- Network upgrades: January 2031–December 2033

Construction Air Quality Impacts in the San Joaquin Valley Air Basin

The methods for evaluating emissions from construction activities differ from the Merced to Fresno Final EIR/EIS, which utilized the URBEMIS2007 model. The Authority revised the approach, in consultation with the SJVAPCD, to provide more modeling flexibility given the complexity associated with the proposed HSR construction activities. The analysis now estimates criteria pollutant and GHG emissions based on emissions factors from the CARB's OFFROAD 2011 and 2007 models (CARB 2016d). For emission rates not available in OFFROAD 2011, the analysis conservatively applied rates from OFFROAD 2007. The analysis calculates mobile-source emissions from worker vehicle trips and truck trips based on exhaust emission factors from the CARB emission factor program, EMission FACtors 2014 (EMFAC2014) and re-entrained dust emission factors from the USEPA's AP-42 (USEPA 2006b). Required fugitive dust control measures outlined in the Statewide Program EIR/EIS (such as watering unpaved access roads and disturbed areas three times daily, and promptly replacing ground cover over disturbed areas) were incorporated in the analysis as Central Valley Wye alternatives design features (see Chapter 2 and Appendix 2-C, Applicable Design Standards).

Detailed analysis of the construction emissions can be found in the Air Quality and Global Climate Change Technical Report (Authority and FRA 2016). The methods for estimating emissions for material hauling and concrete batch plants are provided in this section.

The analysis of construction emissions for the Central Valley Wye alternatives assumes that construction equipment would be comprised of a fleet average mix of engine tier standards (i.e. Tiers 1-4). However, subsequent to the preparation of the emissions analysis, the Authority implemented a new mandate for all construction contractors to use construction equipment that meets Tier 4 standards, which are the most stringent engine standards. The Authority's Tier 4 mandate has not been incorporated into the emissions analysis, because the analysis was completed before the Authority resolved to implement the Tier 4 mandate and, as such, the analysis as prepared represents a conservative estimate (the use of Tiers 1-4 would result in more emissions than a Tier 4-only fleet).

Material Hauling

Emissions from the exhaust of trucks used to haul material (including concrete slabs) to the construction sites were calculated using the heavy-duty truck emission factors from EMFAC2014 and anticipated travel distances of haul trucks within the SJVAB. Ballast and sub-ballast materials could potentially be hauled by rail within the air basin. Locomotive emission factors from the USEPA document Emission Factors for Locomotives (USEPA 2009b) and the travel distance by rail to the Central Valley Wye alternatives project footprints were used to estimate rail emissions.

Ballast and sub-ballast materials would be potentially transported from locations outside the SJVAB (refer to Construction Air Quality Impacts outside the San Joaquin Valley Air Basin later in this section). Quarries external to the SJVAB were analyzed to represent a worst-case hauling scenario in the event that quarries located within the SVJAB had insufficient capacity to supply sufficient ballast and sub-ballast materials required for the Central Valley Wye alternatives. For the regional emission analysis, emissions from ballast and sub-ballast material hauling were calculated using the distance traveled within the SJVAB. Heavy-duty truck emission factors using EMFAC2014 were used to estimate emissions from haul trucks. Locomotive emission factors based on USEPA guidance (USEPA 2009b) were used to estimate the rail emissions. Other construction materials likely would be delivered from supply facilities within the SJVAB. Additional information regarding the approach to evaluating air quality impacts resulting from material hauling outside the SJVAB is described under Construction Air Quality Impacts outside the San Joaquin Valley Air Basin later in this section.

Five potential quarries that provide ballast material were identified. All quarries identified are within 110 rail miles and 100 highway miles of the SJVAB and are in the SFBAAB. The capacity of the five quarries would be more than sufficient to provide the material needed for construction of the Central Valley Wye alternatives. Appendix D of the Air Quality and Global Climate Change Technical Report provides additional details on the capacity of the quarries (Authority and FRA 2016).

This analysis was based on the assumption that ballast and sub-ballast would be transferred by diesel truck from the quarry to rail (if there was no railhead on-site) and then by rail to the border of SJVAB, entirely by rail to the border of the SJVAB (if there was a railhead on-site), or by diesel truck from the quarry to the border of the SJVAB. As such, emissions associated with ballast material transport would occur outside of the SJVAB and within the SFBAAB (refer to Construction Air Quality Impacts Outside the San Joaquin Valley Air Basin later in this section).

Concrete Batch Plants

Concrete would also be required for construction of bridges used to support elevated sections of the Central Valley Wye alternatives and for construction of the retaining walls used to support the retained-fill sections of the alignment. To provide enough concrete on-site, batch plants would operate in the RSA during construction of the alignment sections. Because the locations of the concrete batch plants are unknown, emissions were estimated based on the total amount of concrete required and emission factors from AP-42 Chapter 11.12–Concrete Batching (USEPA 2006a). Included in material-hauling calculations in this analysis were emissions from on-road truck trips associated with transporting material to and from the concrete batch plants.

Compliance with Air Quality Plans

The emissions calculations for construction of the Central Valley Wye alternatives were evaluated against mass emission thresholds set by the SJVAPCD and general conformity (GC) thresholds.

Emissions above the SJVAPCD mass emission thresholds could have the potential to conflict with or obstruct implementation of the SJVAPCD's air quality plans, which have been prepared to attain federal and state ambient air quality standards. These plans include the SJVAPCD 8-hour Ozone Plan (SJVAPCD 2007a), the 2004 Extreme Ozone 1-hour Attainment Demonstration Plan[5] (SJVAPCD 2004), the 2007 PM_{10} Maintenance Plan, and the 2015 $PM_{2.5}$ Plan (SJVAPCD 2015). Section 3.3.4.4, Compliance with Conformity Rules, describes the methods for evaluating conformance with the GC and Transportation Conformity rules.

Construction Air Quality Impacts outside the San Joaquin Valley Air Basin

Construction emissions included in the regional impacts analysis (see Construction Air Quality Impacts in the San Joaquin Valley Air Basin) considered emissions within the SJVAB. However, materials that are hauled from the SFBAAB, which is outside the SJVAB, to the Central Valley Wye alternatives could result in air quality impacts in the SFBAAB. HSR railbed would be constructed using ballast, sub-ballast, and concrete slabs. Concrete slab would be available within the SJVAB; however, the sub-ballast and ballast potentially could be transported from the SFBAAB. A preliminary emissions evaluation was conducted for transporting ballast and sub-ballast materials from the SFBAAB to the border of the SJVAB. Six hauling scenarios were analyzed, representing a range of combinations of supply from the different quarries and different methods of hauling (either by truck to the nearest railhead and railway for the remainder of the distance, or by truck the entire distance). The total amount of ballast and sub-ballast that would be hauled was assumed to be the amounts that would be required for the SR 152 (North) to Road 19 Wye Alternative because this alternative would require the most amount of material and, thus, represents a conservative hauling scenario. Refer to Construction Air Quality Impacts in the San Joaquin Valley Air Basin for a general description of estimating emissions for material hauling. Details of the evaluation are presented in the Air Quality and Global Climate Change Technical Report (Authority and FRA 2016).

Greenhouse Gas Emissions

GHG emissions from all construction activities, including regional building demolition and construction of the at-grade rail segments, elevated rail segments, retained-fill rail segments, roadway crossings, and traction power substations, were calculated using emission factors from the CARB's OFFROAD 2011 and 2007 models (CARB 2016d). Refer to Construction Air Quality Impacts in the San Joaquin Valley Air Basin for additional details regarding methods for evaluating GHG emissions for construction.

Asbestos and Lead-Based Paint

Asbestos

Asbestos minerals occur in rock and soil as the result of natural geologic processes, often in veins near earthquake faults in the coastal ranges and the Sierra Nevada foothills and other areas of California. Naturally occurring asbestos (NOA) takes the form of long, thin, flexible, separable fibers. Natural weathering or human disturbance can break NOA down to microscopic fibers that are easily suspended in air. When inhaled, these thin fibers irritate tissues and resist the body's natural defenses. In addition, asbestos-containing materials may have been used in constructing buildings that would be demolished. Asbestos is a known human carcinogen, and causes cancers of the lung and the lining of internal organs, as well as asbestosis and pleural disease that inhibit lung function.

The USEPA is working to address concerns about the potential impacts of NOA in a number of areas in California. The California Geological Survey identifies ultramafic rocks in California to be the source of NOA and has published a report about the location of ultramafic rocks in the state: see *A General Location Guide for Ultramafic Rocks in California—Areas More Likely to Contain*

[5] The 1-hour O_3 standard was revoked by the USEPA, effective June 15, 2005, for areas including the SJVAB. However, the USEPA still approved the 2004 Extreme Ozone Attainment Demonstration Plan for 1-hour O_3 on March 8, 2010 (SJVAPCD n.d. (a)).

Naturally Occurring Asbestos (California Department of Conservation Division of Mines and Geology 2000).

Analysts used the California Geological Survey report on ultramafic rocks to determine if NOA would be located within the local RSA. In addition, this analysis identifies state and federal asbestos regulations that would minimize asbestos exposure during the demolition of asbestos-containing structures.

Lead-Based Paint

Lead exposure can result when a person swallows a lead object or breathes in lead dust. Lead can remain in a person's body and lead to serious health problems, especially in young children, because it can affect a child's developing nerves and brain. Prior to the passage of the Lead-Based Paint Poisoning Prevention Act of 1971, lead was used as a pigment and drying agent in oil-based paint. This analysis considers the procedures that would be undertaken to reduce exposure from demolition of buildings containing lead-based paint. Structures constructed prior to 1970 could contain lead-based paint, and, in structures set to be demolished and constructed before this year, compliance with proper handling and disposal standards of asbestos and lead-based paint would be sufficient to prevent harmful impacts on workers, residences, or other sensitive receptors.

Localized Health Impacts

This section discusses the methods used for conducting the localized impacts analysis for health impacts on sensitive receptors for construction activities, including construction of the guideway/alignment and concrete batch plants.

Guideway/Alignment and Electrical Infrastructure Construction

Sensitive receptors such as schools, daycare centers, hospitals, and residences are near the construction areas in Merced, Madera, Fresno, and Stanislaus Counties. Construction activities along the guideway/alignment (including the construction of road crossings, traction power substations, and switching stations) as well as required network upgrades to support operation of the HSR were evaluated for potential localized impacts. During construction, sensitive receptors would be exposed to DPM exhaust, which CARB classifies as a carcinogen. Other pollutants, including metals from batching operations and other exhaust emissions could also pose cancer and noncancer health impacts. Maximum excess cancer, chronic noncancer, and acute noncancer risks were computed for residential exposure to all pollutants emitted during construction, following guidance by the California Office of Environmental Health Hazard Assessment guidance (OEHHA 2015). Residences are located along the guideway/alignment within 1,000 feet of the Central Valley Wye alternatives project footprints, and the nearest residences are located adjacent to the fence line of where construction of the Central Valley Wye alternatives would occur. Excess cancer risk is expressed as chances per million people exposed. Noncancer health impacts were determined with the Hazard Index Approach, comparing concentrations to Reference Exposure Level, to determine potential noncancer health impacts (OEHHA 2015).

Localized-impact air dispersion modeling was conducted for construction of the Central Valley Wye alternatives. For details on the localized impact air dispersion modeling and health risk assessment, see the Air Quality and Global Climate Change Technical Report (Authority and FRA 2016). This analysis expands on the analysis conducted in the Merced to Fresno Final EIR/EIS by explicitly quantifying health risks associated with construction activities for the Central Valley Wye alternatives, as the Merced to Fresno Final EIR/EIS presented a qualitative analysis of health risks for construction and non-heavy maintenance facility operations. Additionally, the use of equipment that meets Tier 4 standards would be mandated by the Authority, but this requirement was not incorporated into the analysis of mass emissions. Consequently, the localized air dispersion analysis and health risk assessment represents a conservative assessment. Mass emissions and the resulting localized pollutant concentrations and health risks would be reduced with the Tier 4 equipment requirement.

Concrete Batching Activities

Concrete batch plants would be located along the each of the Central Valley Wye alternatives to provide concrete for the elevated structures (elevated rail) and retaining walls (retained fill rail). The emissions generated from operation of concrete batch plants were included in the total regional construction emissions and were also estimated separately. The air dispersion modeling and health risk analysis for fugitive dust emissions and their associated TAC constituents was prepared for the Central Valley Wye alternatives and evaluated against the applicable thresholds to determine significance.

Operations Impacts

The following discussion identifies the methods and assumptions used for evaluating operations-phase emissions and impacts on air quality and global climate change from implementing the Central Valley Wye alternatives.

The analysis assumes the Central Valley Wye alternatives would be constructed and in operation as part of the Silicon Valley to Central Valley (Valley to Valley) line by 2029, and the full Phase 1 of the statewide HSR system would be operational by 2040 (Authority 2016a). While the Central Valley Wye alternatives, as part of the Valley to Valley line, are anticipated to be operational by 2025, an analysis of 2029 ensures more mature ridership numbers are used given that the opening year does not likely represent the full anticipated ridership scenario. For the evaluation of the No Project Alternative under NEPA, operational emissions in 2040 are evaluated by comparing conditions with Phase 1 of the statewide HSR system with the Central Valley Wye alternatives to conditions with Phase 1 of the statewide HSR system without the Central Valley Wye alternatives. For the evaluation under CEQA, operational emissions in 2015 are evaluated by comparing conditions with the Central Valley Wye alternatives to conditions without the Central Valley Wye alternatives.[6] Operational emissions in 2029 have been evaluated in the Air Quality and Global Climate Change Technical Report (Authority and FRA 2016); however, the 2029 operational emissions scenario is not included in this analysis because the range of impacts between the 2015 analysis and 2040 analysis encompass the potential impacts that would occur under the 2029 operational emissions scenario. For instance, emissions impacts in 2015 would be more severe than either 2029 or 2040 because on-road vehicles and aircraft are projected to become less emissions intensive in future years. Similarly, any emissions benefits from operation of the Central Valley Wye alternatives would be more conservatively represented in the 2040 operational emissions scenario because the difference between the Central Valley Wye alternatives operational emissions scenario in 2040 and the background level of emissions in 2040 without the Central Valley Wye alternatives would be smaller (on-road vehicles and aircraft will have a lower emissions intensity in 2040, so switching from driving or flying to the HSR system in 2040 would result in a smaller benefit than compared to 2029).

Operations Air Quality Impacts in the San Joaquin Valley Air Basin

The emission burden analysis of a project determines a project's potential overall impact on air quality. The Central Valley Wye alternatives would affect long-distance, city-to-city vehicular travel along freeways and highways throughout the state, as well as long-distance, city-to-city aircraft take-offs and landings. The Central Valley Wye alternatives would also affect electrical demand throughout the state. Analysts calculated operational emissions for two ridership scenarios, a medium ridership and a high ridership scenario. These ridership scenarios are based on the level of ridership as presented in the HSR 2016 Business Plan (Authority 2016a). The emissions tables presented in Section 3.3.6, therefore, present two values for operational emissions for each pollutant, corresponding to these two ridership scenarios. The methods for evaluating operations-phase impacts associated with on-road vehicle emissions, power plant emissions, and aircraft emissions are described in the following subsections.

[6] Because the Central Valley Wye alternatives would not exist in isolation without the rest of the HSR system, the emissions scenarios with and without the Central Valley Wye alternatives also apply to the larger HSR system.

On-Road Vehicle Emissions

An on-road vehicle emission analysis was conducted using average daily vehicle miles traveled (VMT) estimates and associated average daily speed estimates for each affected county.[7] Emission factors were estimated by using the CARB emission factor program and EMFAC2014. Analysts set parameters in the program for each county to reflect their individual conditions, and statewide conditions are reflected with statewide parameters. The analysis was conducted for existing conditions in 2015 for CEQA purposes and future no project conditions in 2040 for NEPA purposes. To determine the overall pollutant burdens generated by on-road vehicles, the estimated VMT were multiplied by the specific pollutant's emission factors, which were based on speed, vehicle mix, and analysis year.

Emissions from Power Plants

Although the Authority is committed to purchasing 100% of power from renewable sources (i.e., non-emissions generating sources such as wind and solar), this analysis is based on the conservative assumption that power would be purchased from the existing power grid system.

The electrical demands necessary for propulsion of the trains and for the trains at terminal stations and in storage depots and maintenance facilities were calculated as part of Central Valley Wye alternatives design. Average emission factors for each kilowatt-hour required were derived from CARB statewide emission inventories of electrical and cogeneration facilities data along with USEPA eGRID electrical generation data. The energy estimates used in this analysis for the propulsion of the HSR include the use of regenerative brake power.

The HSR system would be powered by the state's electric grid. Because no dedicated generating facilities are proposed for the Central Valley Wye alternatives, no specific source facilities can be identified. Emission changes from power generation, therefore, can be predicted only on a statewide level. In addition, because of the state requirement that an increasing fraction (50 percent by 2030) of electricity generated for the state's power portfolio come from renewable energy sources, the emissions generated for the HSR system are expected to be lower in the future as compared to emissions estimated for this analysis, which are based on the state's current power portfolio. In addition, the Authority has adopted a goal to purchase the HSR system's power from renewable energy sources.

Aircraft Emissions

The Federal Aviation Administration's Emission and Dispersion Modeling System Version 5.1.4.1 (Federal Aviation Administration 2015) was used to estimate aircraft emissions. The Emission and Dispersion Modeling System estimates emissions generated from a specified number of landing and take-off cycles. Along with the emissions from the aircraft themselves, emissions generated from associated ground maintenance requirements are included. Average aircraft emissions were calculated based on the profile of aircraft currently servicing the San Francisco to Los Angeles Corridor. The number of air trips removed because of the HSR was estimated through the travel demand modeling analyses conducted for the Central Valley Wye alternatives, based on the ridership estimates presented in the HSR 2016 Business Plan (Authority 2016a).

Electrical Equipment and SF_6

Pacific Gas & Electric Company (PG&E) substations and switching stations would require the installation of electrical equipment including up to 12 power circuit breakers with sulfur hexafluoride (SF_6) gas type insulated switchgear. For the purposes of this analysis, it is assumed that the annual SF_6 leakage rates associated with the additional circuit breakers with switchgear equipment that use SF_6 (up to 230 pounds each) would not exceed 0.5 percent. Based on the global warming potential of SF_6, as noted in the USEPA's Mandatory Reporting Regulation (40 C.F.R. Part 98, Subpart A), the anticipated CO_2e emissions from the power circuit breakers are calculated and reported in the following subsections.

[7] VMT data are based on the Authority's 2016 Business Plan (Authority 2016a).

Air Quality Plans

The emissions calculations for operations of the Central Valley Wye alternatives were evaluated against mass emission thresholds set by the SJVAPCD. Emissions above these thresholds could have the potential to conflict with or obstruct implementation of the SJVAPCD's air quality plans, which have been prepared to attain federal and state ambient air quality standards. These plans include the SJVAPCD 8-hour Ozone Plan (SJVAPCD 2007a), the 2004 Extreme Ozone 1-hour Attainment Demonstration Plan (SJVAPCD 2004), the 2007 PM_{10} Maintenance Plan, the 2015 $PM_{2.5}$ Plan (SJVAPCD 2015), and the RTPs for Merced and Madera Counties (MCAG 2014; MCTC 2014).

Greenhouse Gas Emissions

The Central Valley Wye alternatives would reduce long-distance, city-to-city travel along freeways and highways throughout the state, as well as long-distance, city-to-city aircraft take-offs and landings. The Central Valley Wye alternatives would also affect electrical demand throughout the state. These elements would affect GHG emissions on both a statewide and regional resource study area level. As described in greater detail previously in Operations Air Quality Impacts in the San Joaquin Valley Air Basin, analysts calculated operations emissions for two ridership scenarios. The following sections discuss the methods for estimating GHG emissions associated with operations of the Central Valley Wye alternatives.

The SJVAPCD released a guidance document in December 2009 for addressing GHG impacts within the context of CEQA. For projects to have a less-than-significant impact on an individual and cumulative basis, the project must comply with an approved Climate Change Action Plan, demonstrate that it would not impede the state from meeting the statewide 2020 GHG emissions target, adopt the SJVAPCD's Best Performance Standards for stationary sources, or reduce or mitigate GHG emissions by 29 percent (SJVAPCD 2009b).

SVJAPCD's GHG guidance is intended to streamline CEQA review by pre-quantifying emissions reductions that would be achieved by implementing best performance standards (BPS). SJVAPCD guidance recommends quantification of GHG emissions for all projects in which an EIR is required, regardless of BPS score (SJVAPCD 2009b).

On-Road Vehicle Emissions

The on-road vehicle GHG emission analysis evaluated the change in emissions from on-road vehicles over time as travelers shift from motor vehicle travel to HSR. The evaluation was conducted using average daily VMT estimates and associated average daily speed estimates calculated for each affected county. GHG emission factors were estimated from EMFAC2014, using statewide parameters set within the program. The analysis was conducted for existing conditions in 2015 for CEQA purposes and future no project conditions in 2040 for NEPA purposes. To determine overall GHG burdens generated by on-road vehicles, estimated VMTs are multiplied by appropriate GHG emission factors, which are based on speed, vehicle mix, and analysis year.

Power Plant Emissions

The electrical demands necessary for propulsion of the trains, for the trains at terminal stations, and in storage depots and in maintenance facilities were calculated as part of Central Valley Wye alternatives design. The HSR system would be powered by the state's electric grid. Because no dedicated generating facilities are proposed for the Central Valley Wye alternatives, no specific source facilities can be identified. GHG emission changes from power generation, therefore, were predicted on a statewide level. An average GHG emission factor of 652.8 pounds of CO_2e for each megawatt hour required was utilized, consistent with the USEPA's eGRID emission factors for the Western Electricity Coordinating Council region (USEPA 2015b). This factor represents the estimated emission rate for new electrical loads on the system. In addition, because of the state requirement that an increasing fraction (50 percent by 2030) of electricity generated for the state's power portfolio come from renewable energy sources, the emissions generated for the HSR system are expected to be lower in the future when compared to emissions estimated for this analysis (California Energy Commission 2017).

Aircraft Emissions

The aircraft GHG emission analysis evaluated the change in emissions from aircraft over time as travelers shift from air travel to HSR. Aircraft emissions were calculated by using the fuel consumption factors and emission factors from the CARB's *2000–2012 Greenhouse Gas Emissions Inventory* technical support document and the accompanying appendix (CARB 2014b). The emission factors include both landing and take-off and cruise operations (formula: aircraft emission per flight = fuel consumption x emission factor; aircraft emission = flights removed x aircraft emission per flight). Average aircraft GHG emissions are calculated based on the profile of the aircraft currently servicing the San Francisco to Los Angeles corridor. The number of air trips removed because of the Central Valley Wye alternatives was estimated through the travel demand modeling analysis conducted for the Central Valley Wye alternatives based on the ridership estimates presented in the HSR 2016 Business Plan (Authority 2016a).

Localized Mobile Source Air Toxics

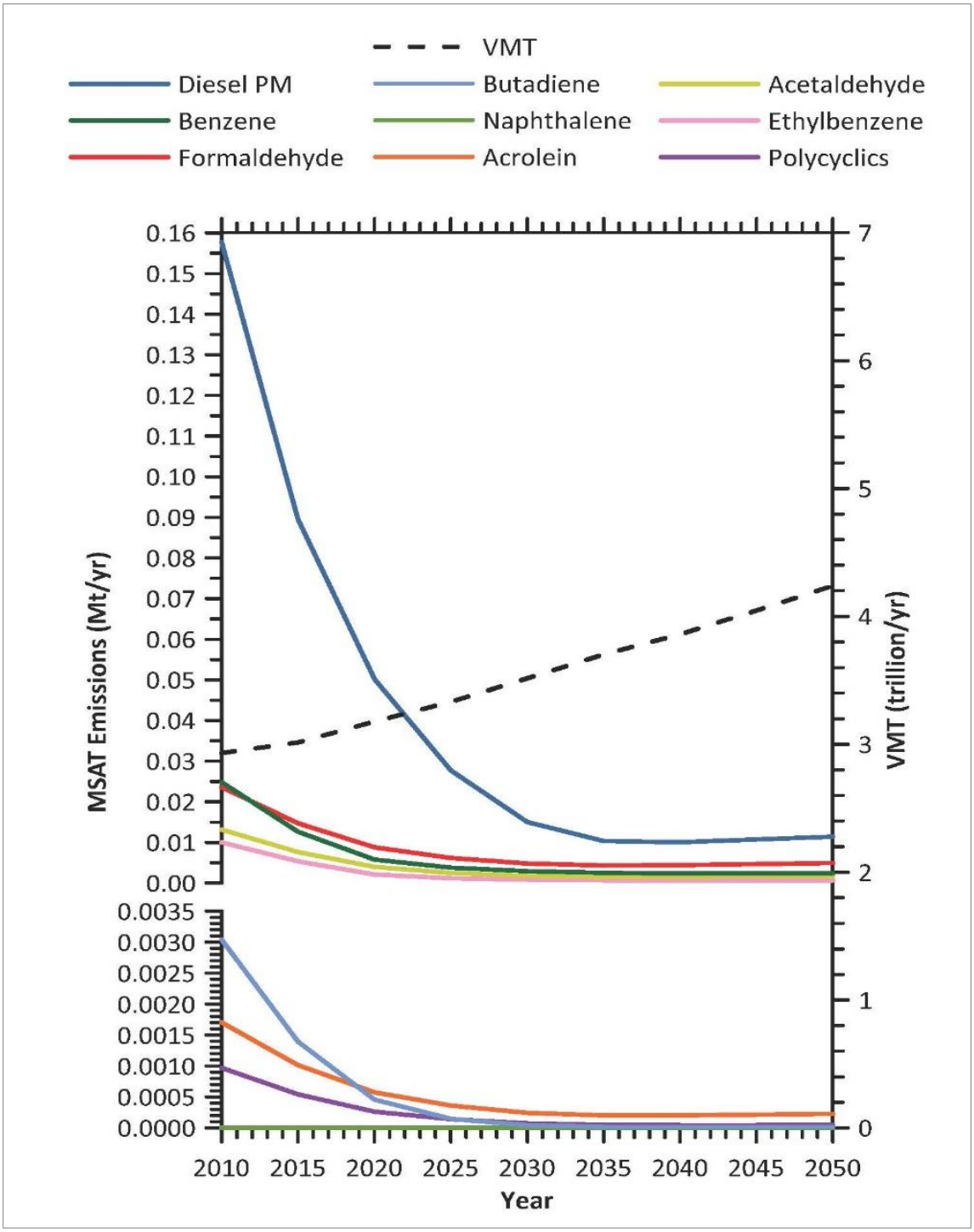
Controlling air toxic emissions became a national priority with the passage of the CAA Amendments of 1990, whereby Congress mandated that the USEPA regulate 188 air toxics, also known as HAPs. The USEPA assessed this expansive list in its latest rule on the Control of Hazardous Air Pollutants from Mobile Sources (72 Fed. Reg. 8430 [February 26, 2007]) and identified 93 compounds emitted from mobile sources that are listed in its Integrated Risk Information System (USEPA 2015a). In addition, the USEPA identified seven compounds with significant contributions from mobile sources that are among the national- and regional-scale cancer-risk drivers from its 1999 National Air Toxics Assessment (USEPA 1999). These seven compounds are acrolein, benzene, 1,3-butadiene, DPM plus diesel-exhaust organic gases, formaldehyde, naphthalene, and polycyclic organic matter.

Under the 2007 rule, the USEPA sets standards on fuel composition, vehicle exhaust emissions, and evaporative losses from portable containers. The new standards are estimated to reduce total emissions of MSATs by 330,000 tons in 2030, including 61,000 tons of benzene. Concurrently, total emissions of VOCs would be reduced by more than 1.1 million tons in 2030 as a result of adopting these standards. Future emissions likely would be lower than present levels as a result of the USEPA's national control programs that are projected to reduce MSAT emissions by approximately 91 percent from 2010 to 2050, even if VMT increases by 45 percent. This reduction is illustrated graphically on Figure 3.3-2.

On February 3, 2006, the Federal Highway Administration (FHWA) released Interim Guidance on Air Toxic Analysis in NEPA Documents. This guidance was superseded on September 30, 2009, by the FHWA's Interim Guidance Update on Mobile Source Air Toxic Analysis in NEPA Documents, and was most recently updated on October 16, 2016 (FHWA 2016). The FHWA's guidance advises on when and how to analyze MSATs in the NEPA process for highway projects. This guidance is interim because MSAT science is still evolving. As the science progresses, the FHWA will update the guidance. The FHWA's Interim Guidance groups projects into the following tier categories:

- No analysis for projects that have no potential for meaningful MSAT impacts
- Qualitative analysis for projects with a low potential for MSAT impacts
- Quantitative analysis to differentiate alternatives for projects with a higher potential for MSAT impacts

The Central Valley Wye alternatives have a low potential for MSAT impacts. Accordingly, a qualitative analysis was used to provide a basis for identifying and comparing the potential differences among MSAT emissions, if any, from the Central Valley Wye alternatives. The qualitative assessment is derived in part from an FHWA study, *A Methodology for Evaluating Mobile Source Air Toxic Emissions among Transportation Project Alternatives* (FHWA 2011). The Impact AQ#10, Continuous Permanent Direct Impacts on Air Quality – Localized Mobile Source Air Toxics, summarizes the findings of the qualitative analysis of MSAT impacts provided in the Air Quality and Global Climate Change Technical Report (Authority and FRA 2016).



Source: FHWA, 2016

[1] Trends for specific locations may be different, depending on locally derived information representing vehicle miles traveled, vehicle speeds, vehicle mix, fuels, emission-control programs, meteorology, and other factors.

Figure 3.3-2 Projected National Mobile Source Air Toxic Emission Trends (2010–2050) for Vehicles Operating on Roadways using USEPA's MOVES2014a model

Localized Carbon Monoxide Impacts

A microscale CO analysis, commonly referred to as a CO hot-spot analysis, is an estimation of potential localized CO concentrations and a comparison of those concentrations to the NAAQS. Because the Central Valley Wye alternatives do not include any stations, heavy maintenance facilities, or other sources of substantial vehicle traffic, a CO hot-spot analysis was not conducted. Because the Merced to Fresno Final EIR/EIS included stations, a microscale CO analysis was conducted in the Merced to Fresno Final EIR/EIS (Authority and FRA 2012: page 3.3-56).

Particulate Matter Hot-Spot Concentrations

Although the Central Valley Wye alternatives portion of the HSR is subject to the GC guidelines and not the transportation conformity guidelines, the RSA is classified as a nonattainment area for $PM_{2.5}$ and a federal maintenance area for PM_{10}. Analysts conducted a hot-spot analysis following the USEPA's *Transportation Conformity Guidance for Quantitative Hot-Spot Analyses in $PM_{2.5}$ and PM_{10} Nonattainment and Maintenance Areas* (USEPA 2013). The analysis focused on potential air quality concerns from Central Valley Wye alternatives' impacts on roads and followed the recommended practice in the USEPA's Final Rule regarding the localized or "hot-spot" analysis of $PM_{2.5}$ and PM_{10} (40 C.F.R. § 93, issued March 10, 2006).

The USEPA specifies in 40 C.F.R. Part 93.123(b)(1) that only projects of air quality concern are required to undergo a $PM_{2.5}$ and PM_{10} hot-spot analysis. A *hot-spot analysis* is an estimation of likely future localized PM with an aerodynamic diameter less than or equal to 10 microns and PM with an aerodynamic diameter less than or equal to 2.5 microns pollutant concentrations and a comparison of those concentrations to the NAAQS (40 C.F.R. § 93.101). The USEPA defines *projects of air quality concern* as certain highway and transit projects that involve significant levels of diesel traffic or any other project that is identified by the $PM_{2.5}$ SIP as a localized air quality concern. Projects of air quality concern, as defined by 40 C.F.R. Part 93.123(b)(1), include the following:

- New or expanded highway projects that have a significant number of, or significant increase, in diesel vehicles
- Projects affecting intersections that are at Level-of-Service D, E, or F with a significant number of diesel vehicles or those that would degrade to Level-of-Service D, E, or F because of increased traffic volumes from a significant number of diesel vehicles related to the project
- New bus and rail terminals and transfer points that have a significant number of diesel vehicles congregating at a single location
- Projects in, or affecting, locations, areas, or categories of sites that are identified in the $PM_{2.5}$- or PM_{10}-applicable implementation plan or implementation plan submission, as appropriate, as sites of violation or possible violation

For purposes of identifying and evaluating potential impacts under NEPA and CEQA, a PM hot-spot analysis was required for analysis because the area where the Central Valley Wye alternatives would be located is designated nonattainment for $PM_{2.5}$ and maintenance for PM_{10}. In November 2013, the USEPA released its *Transportation Conformity Guidance for Quantitative Hot-Spot Analyses in $PM_{2.5}$ and PM_{10} Nonattainment and Maintenance Areas* (USEPA 2013), which was used for the analysis.

3.3.4.4 Compliance with Conformity Rules

Projects requiring approval of funding from federal agencies that are in areas designated as nonattainment or maintenance for the NAAQS are subject to the USEPA's Conformity Rule. The two types of federal conformity are GC, which applies to the Central Valley Wye alternatives because of FRA funding, and transportation conformity, which does not apply at this time but could apply to future actions related to the Central Valley Wye alternatives' minor expansions or realignments of local roadways. Note that compliance with conformity rules is in addition to CEQA and NEPA requirements.

General Conformity

To determine whether projects are subject to the GC determination requirements, the USEPA has established GC applicability threshold values (in tons per calendar year) for each of the criteria pollutants for each type of designated nonattainment and maintenance area. If the annual emissions generated by construction or operations of a project (on an area-wide basis) are less than these *de minimis* threshold values, the GC rule is not applicable and no additional analyses are required for purposes of GC.[8] If the emissions are greater than these values, compliance with the GC Rule must be demonstrated.

The SJVAB, is in an area designated as extreme nonattainment for the 8-hour O_3 standard, nonattainment for $PM_{2.5}$, and maintenance for PM_{10} and CO.[9] The GC threshold values for this area, according to 40 C.F.R. Part 93, are 10 tons per year for VOC, 10 tons per year for NO_X, and 100 tons per year for SO_2, $PM_{2.5}$, and PM_{10}.

Because the regional emissions for the applicable pollutants are expected to be lower under the operational phase of the Central Valley Wye alternatives than for the No Project Alternative (as shown in the analysis presented under Section 3.3.6), only emissions generated during the construction phase need to be compared to these threshold values to determine whether the GC Rule is applicable.

If construction-phase emissions in the SJVAB are greater than the GC *de minimis* threshold(s), the project must demonstrate compliance with the GC Rule before construction begins. Compliance with the GC Rule can be demonstrated in one or more of the following ways:

- By offsetting the project's construction-phase pollutant emissions that exceed the annual GC *de minimis* thresholds. For example, if the VOC threshold would be exceeded in 2021, the project would offset those emissions to net zero in that year.
- By showing that the construction-phase emissions are included in the area's emission budget for the SIP.
- By demonstrating that the state agrees to include the emission increases in the SIP without exceeding emission budgets.

A GC determination was prepared for the Merced to Fresno Final EIR/EIS, which concluded that GC compliance would be demonstrated because all construction pollutant emissions that exceed the *de minimis* thresholds (NO_X and VOC) have been and would continue to be fully offset to net zero. A separate GC determination has not been conducted for the Central Valley Wye alternatives because the conclusions of this Draft Supplemental EIR/EIS are generally consistent with or less severe than the conclusions in the Merced to Fresno Final EIR/EIS. Construction of both the Merced to Fresno section as analyzed in the Merced to Fresno Final EIR/EIS and the Central Valley Wye alternatives would result in NO_X emissions that would exceed the *de minimis* thresholds during multiple years of construction, but both would result in emissions below the *de minimis* thresholds for CO, PM_{10}, and $PM_{2.5}$. Additionally, the Central Valley Wye alternatives would not result in an exceedance of the VOC *de minimis* threshold. Thus, because the Central Valley Wye alternatives would not result in any additional pollutants exceeding the *de minimis* thresholds relative to the Merced to Fresno Final EIR/EIS, and the emissions of NO_X would continue to be fully offset to net zero, no further action is required to demonstrate the Central Valley Wye alternatives' compliance with GC. The Memorandum Describing Consistency with the Merced to Fresno General Conformity Determination for the Central Valley Wye alternatives has been prepared to provide additional justification for the consistency and is presented in Appendix 3.3-B.

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[8] The project must meet CEQA and NEPA analysis nonetheless, which are separate from GC analysis requirements.

[9] Only the urban portions of Fresno County and Kern County are maintenance areas for CO, and no portions of the Central Valley Wye alternatives alignments are in maintenance areas subject to conformity requirements. Therefore, an analysis of CO emissions is not required under general conformity requirements.

Transportation Conformity

Transportation conformity is an analytical process required for all federally funded highway and transit transportation projects but does not apply to the Central Valley Wye alternatives because transportation conformity applies to those projects that will have FHWA or Federal Transit Authority (FTA) funding or require FHWA/FTA approval. GC applies to those projects that will have funding or require approval from any federal agency other than FHWA/FTA.

Under the 1990 CAA Amendments, the U.S. Department of Transportation cannot fund, authorize, or approve federal highway and transit actions that are not first found to conform to the SIP for achieving the goals of the CAA requirements. Transportation conformity with the CAA takes place at both the regional level and the project level.

The Central Valley Wye alternatives are not subject to the transportation conformity rule. However, if future actions to implement the Central Valley Wye alternatives meet the definition of a project element subject to transportation conformity, additional determinations and associated analysis would be completed as may be required. Nonetheless, this analysis of the Central Valley Wye alternatives uses the transportation conformity rule analytical approach to evaluate whether the Central Valley Wye alternatives are consistent with local RTPs, as well as impacts of localized particulate matter hot-spot concentrations. As discussed in 3.3.6, Environmental Consequences, localized carbon monoxide hot-spot concentrations were not quantitatively evaluated using the transportation conformity analytical approach, because the Central Valley Wye alternatives would not worsen traffic conditions to non-acceptable level-of-service conditions, and therefore no further analysis is warranted.

3.3.4.5 Determining Significance under CEQA

CEQA requires that an EIR identify the significant environmental impacts of a project (CEQA Guidelines § 15126). One of the primary differences between NEPA and CEQA is that CEQA requires a significance determination for each impact using a threshold-based analysis (see 3.1.3.4, for further information). By contrast, under NEPA, significance is used to determine whether an EIS will be required; NEPA requires that an EIS is prepared when the proposed federal action (project) as a whole has the potential to "significantly affect the quality of the human environment." Accordingly, Section 3.3.9, CEQA Significance Conclusions, summarizes the significance of the environmental impacts on air quality and global climate change for each Central Valley Wye alternative. The Authority is using the following thresholds to determine if a significant impact on air quality and global climate change would occur as a result of the Central Valley Wye alternatives. A significant impact is one that would:

- Conflict with or obstruct implementation of the applicable air quality plan.
- Exceed or contribute to an exceedance of any air quality standard or contribute substantially to an existing or projected air quality violation (see discussion immediately below under "Local Thresholds and Methods").
- Result in a cumulatively considerable net increase of any criteria pollutant for which the project region is nonattainment under an applicable federal or state ambient air quality standard (including releasing emissions that exceed quantitative thresholds for O_3 precursors).
- Expose sensitive receptors to substantial pollutant concentrations.
- Create objectionable odors affecting a substantial number of people.
- Generate GHG emissions, either directly or indirectly, that may have a significant impact on the environment.
- Conflict with an applicable plan, policy, or regulation adopted for the purpose of reducing the emissions of GHG.

Quantitative emission thresholds that can be used to evaluate the significance level of impacts have been developed on the local level by the SJVAPCD and are discussed under Local Thresholds and Methods.

Local Thresholds and Methods

The SJVAPCD's GAMAQI (SJVAPCD 2002) contains emissions thresholds used to evaluate the significance of a project's emissions (Table 3.3-4). If a project's emissions are below the significance thresholds, impacts would be considered less than significant; if the construction- or operational-phase emissions are greater than these values, impacts for that phase would be considered significant unless localized air-dispersion modeling can demonstrate that the emissions would not cause or contribute substantially to an existing or projected air quality violation of any ambient air quality standard.

Table 3.3-4 San Joaquin Valley Air Pollution Control District CEQA Construction and Operational Thresholds of Significance

Pollutant	Thresholds (tons/year)
NO_X	10
ROG	10
PM_{10}	15
$PM_{2.5}$	15

Source: Siong pers. comm., 2011
CEQA = California Environmental Quality Act
NO_X -= nitrogen oxide
ROG = reactive organic gas
PM_{10} = particulate matter smaller than or equal to 10 microns in diameter
$PM_{2.5}$ = particulate matter smaller than or equal to 2.5 microns in diameter

For CO, NO_2, and SO_2, the threshold is the ambient air quality standard for each respective pollutant. The increase in pollutant concentration associated with the project emissions is added to the background concentration to estimate the ambient air pollutant concentration for comparison with the threshold.

Pre-project background concentrations of PM_{10} in the SJVAB exceed their respective ambient air quality standards. Therefore, the SJVAPCD recommends comparing the incremental increase in PM_{10} concentrations to the applicable significant impact levels for PM_{10}. For volumes sources, such as construction activities, the SJVAPCD-recommended significant impact levels are 10.4 µg/m^3 for the 24-hour average concentration and 2.08 µg/m^3 for the annual average concentration. For point sources, such as smoke stacks, the SJVAPCD-recommended significant impact levels are 5.0 µg/m^3 for the 24-hour average concentration and 1.0 µg/m^3 for the annual average concentration (Reed pers. comm. 2015). This analysis uses the volume sources thresholds. An incremental increase that does not exceed these significant impact levels would not be considered to substantially contribute to further exceedances of the ambient air quality standards. The SJVAPCD has indicated that the $PM_{2.5}$ significant impact levels are no longer relevant, and no concentration analysis is necessary for this pollutant (Reed pers. comm. 2015).

The SJVAPCD 2002 GAMAQI does not have quantitative SO_2 mass-emission thresholds, and SO_2 is not expected to be a pollutant of concern given the low background concentrations in the area and limited amount of SO_2 emissions associated with the Central Valley Wye alternatives. The SJVAPCD does not have a construction or operations CO CEQA emission threshold. The impact of CO emissions is evaluated through a CO hot-spot analysis, as discussed previously.

Cancer risks were compared with the SJVAPCD CEQA threshold of 20 in 1 million to assess the level of impacts. Chronic and acute hazard indices were compared with the SJVAPCD CEQA unit-less threshold value of 1 to assess the level of impacts (Authority and FRA 2016).

According to the SVJAPCD's GHG guidance, projects are considered to have a less-than-significant cumulative impact on climate change if any of the following conditions are met:

- Comply with an approved GHG reduction plan
- Achieve a score of at least 29 using any combination of approved operational BPS[10]
- Reduce operational GHG emissions by at least 29 percent over business-as-usual conditions (demonstrated quantitatively)

This analysis uses consistency with a GHG reduction plan through AB 32 and SB 32 to evaluate impacts associated with the Central Valley Wye alternatives.

Note that SJVAPCD adopted an updated GAMAQI on March 19, 2015. The major revisions associated with the SJVAPCD's 2015 GAMAQI are that it:

- Formalizes quantitative construction mass emission thresholds (tons/year)
- Formalizes quantitative mass emission thresholds for CO, SO_X, PM_{10}, and $PM_{2.5}$ (tons/year)
- Requires an ambient air quality analysis with dispersion modeling (aka "hot-spot" analysis) for all criteria pollutants if mass emissions from any criteria pollutant exceeds a 100 pounds/day screening level
- Ties SJVAPCD Indirect Source Review Rule 9510 into its CEQA process

On behalf of the Authority, consultant staff contacted SJVAPD planning staff on May 4, 2015, to discuss whether the CEQA analysis for the Central Valley Wye alternatives should use the SJVAPCD's 2002 or 2015 CEQA GAMAQI (Siong pers. comm. 2015). SJVAPCD indicated that projects may continue to use the 2002 GAMAQI if they were initiated prior to the adoption of the 2015 GAMAQI. In addition, a project's NOP date can be used for determining whether a project should use the 2015 GAMAQI relative to the adoption of the 2015 GAMAQI. Consequently, although the SJVAPCD most recently adopted GAMAQI were adopted on March 19, 2015, the Central Valley Wye alternatives CEQA impact analysis uses SJVAPCD's 2002 GAMAQI based on the guidance received on May 4, 2015, as the NOP for the Central Valley Wye alternatives was issued prior to the March 19, 2015, adoption of the updated GAMAQI (Siong pers. comm. 2015).

However, while the SJVAPCD's 2002 GAMAQI is used to evaluate impacts associated with the Central Valley Wye alternatives, an analysis was conducted to evaluate whether the Central Valley Wye alternatives would exceed the thresholds from the 2015 GAMAQI. The results of this analysis indicate the Central Valley Wye alternatives would not exceed any thresholds from the 2015 GAMAQI.

3.3.5 Affected Environment

This section discusses the affected environment related to air quality and global climate change in the respective RSAs. The affected environment would be identical for all Central Valley Wye alternatives because all Central Valley Wye alternatives would be within the same regional air basin. This section also discusses air quality and global climate changes in the San Joaquin Valley since publication of the Merced to Fresno Final EIR/EIS. This information provides the context for the environmental analysis and evaluation of impacts.

3.3.5.1 Local Air Quality

Sensitive receptors located in close proximity to the project footprints of the Central Valley Wye alternatives are shown in Table 3.3-5. The local area includes the project footprints and a 1,000-foot buffer.

[10] A score of 29 represents a 29 percent reduction in GHG emissions relative to unmitigated conditions (1 point = 1 percent). This goal is consistent with the reduction targets established by AB 32.

Table 3.3-5 Sensitive Receptors within 1,000 Feet from the Footprint of the Central Valley Wye Alternatives

Sensitive Receptors[1]	SR 152 (North) to Road 13 Wye	SR 152 (North) to Road 19 Wye	Avenue 21 to Road 13 Wye	SR 152 (North) to Road 11 Wye
Alview Elementary School[2]	N/A	N/A	Within footprint	N/A
Chowchilla Seventh-day Adventist Church[3]	N/A	N/A	Within footprint	N/A
Fairmead Head Start Childcare Center	350	300	N/A	350
Fairmead Elementary School	460	410	N/A	460
Washington Elementary School[4]	N/A	350	N/A	N/A
El Capitan High School[4]	N/A	200	N/A	N/A
Richard Bernasconi Neighborhood Park[4]	N/A	600	N/A	N/A
Yosemite Church[4]	N/A	700	N/A	N/A
Residences[5]	Adjacent to project footprint	Adjacent to project footprint	Adjacent to project footprint	Adjacent to project footprint

Source: Authority and FRA, 2017

[1] The Berenda Slough is a water body that leads to the Berenda Reservoir, which is an outdoor recreational area where sensitive individuals could congregate. Although the Berenda Slough is located within the alignment of the SR 152 (North) to Road 19 Wye Alternative, it consists of a water channel and maintenance roads and is not anticipated to be an area where sensitive receptors could congregate. The Berenda Reservoir itself is not located within 1,000 feet of any of the Central Valley Wye alternatives. The Berenda Slough is thus not considered in this analysis.

[2] The Avenue 21 to Road 13 Wye Alternative's project footprint requires a permanent utility easement that encroaches on the property of Alview Elementary. While the school buildings are relatively distant from the most intensive construction activities, some work associated with this utility easement would occur on the western side of the school property for brief trenching activities.

[3] Located within the farmland mitigation buffer of the Avenue 21 to Road 13 Wye Alternative.

[4] Located within 1,000 feet of the Site 7—Le Grand Junction/Sandy Mush Road, Warnerville–Wilson 230 kV Transmission Line associated with the SR 152 (North) to Road 19 Wye Alternative.

[5] Scattered residential land uses are located throughout the alignment. The residential land uses nearest to the project footprints are located adjacent to the fence line of where construction would occur.

N/A indicates that the sensitive receptor is not within 1,000 feet of the alternative.

SR = State Route

3.3.5.2 Regional Air Quality

Meteorological Conditions

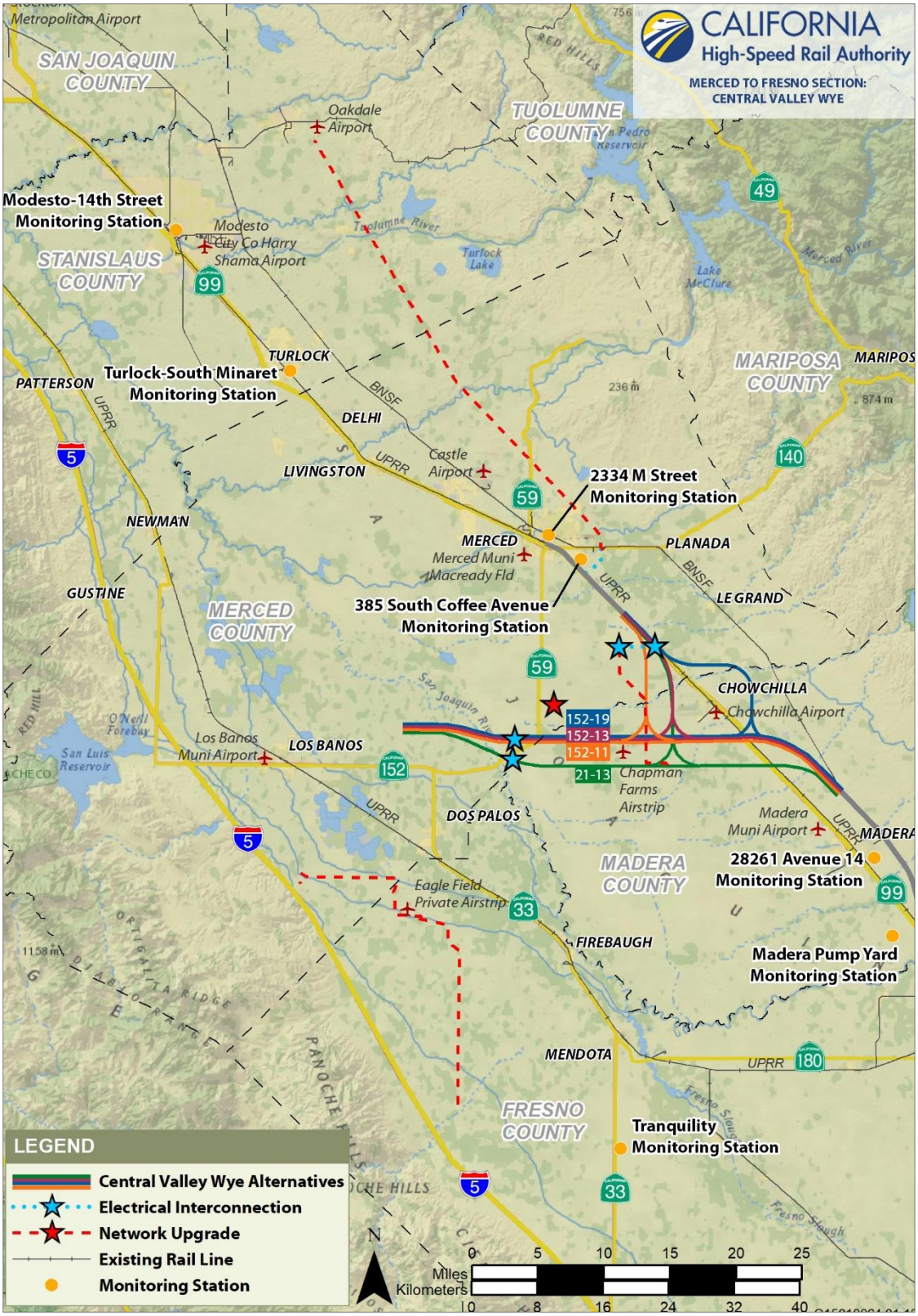
The regional meteorological conditions for the Central Valley Wye alternatives have not changed since publication of the Merced to Fresno Final EIR/EIS. The rate and location of pollutant emissions and the meteorological conditions that influence movement and dispersal of pollutants in the atmosphere affect air quality. Atmospheric conditions, such as wind speed, wind direction, and air temperature gradients, along with local topography, provide the link between air pollutant emissions and local air quality levels.

Elevation and topography can greatly affect localized air quality. The hills and mountains surrounding the San Joaquin Valley restrict air movement throughout the majority of the basin. The SJVAB encompasses the southern two-thirds of California's Central Valley. Mountain ranges border the sides and southern boundary of the SJVAB. The valley's weather conditions include frequent temperature inversions; long, hot summers; and stagnant, foggy winters, all of which are conducive to forming and retaining air pollutants (SJVAPCD 2009a).

The SJVAB is typically arid in the summer, with cool temperatures and prevalent Tule fog (i.e., a dense ground fog) in the winter and fall. The average high temperature in the summer is in the mid-90s, and the average low temperature in the winter is in the high 40s. January is typically the wettest month of the year, with an average of approximately 2 inches of rain. Wind direction is typically from the northwest, with mean wind speeds around 5 to 8 miles per hour (Western Regional Climate Center n.d.).

Monitored Air Quality Data

CARB maintains ambient air monitoring stations for criteria pollutants throughout California. The stations closest to the Central Valley Wye alternatives are the Merced Coffee Avenue, Merced M Street, Madera Pump Yard, Merced Avenue 14, Turlock-South Minaret, Modesto 14th Street, and Tranquility monitoring stations. These stations, as shown on Figure 3.3-3, monitor NO_2, O_3, PM_{10}, $PM_{2.5}$. The stations do not monitor for SO_2, but the Madera Pump Yard Station monitored for CO for two years of the three-year period. CARB has released updated monitoring data for these stations since the Merced to Fresco Final EIR/EIS was completed. Table 3.3-6 and Table 3.3-7 summarize the results of ambient monitoring at the seven stations for the 3-year period from 2013 to 2015, which are the most recent years for which monitoring data are available. The land uses in the region range from urban and residential to rural and agricultural. As shown in the tables, exceedances of the NAAQS and CAAQS, primarily for O_3 and PM, have been recorded.



Source: CARB, 2016e

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Figure 3.3-3 Air Quality Ambient Air Monitors

Table 3.3-6 Ambient Criteria Pollutant Concentrations at Air Quality Monitoring Stations Closest to the Central Valley Wye Alternatives

Air Pollutant	Standard/Exceedance	Merced Coffee Station			Merced M Street Station			Madera Pump Yard Station			Madera Avenue 14 Station		
		2013	2014	2015	2013	2014	2015	2013	2014	2015	2013	2014	2015
Carbon Monoxide (CO)	Year coverage	NM	NM	NM	NM	NM	NM	NM	N/A	N/A	NM	NM	NM
	Max. 1-hour concentration (ppm)	NM	NM	NM	NM	NM	NM	NM	2.7	5.8	NM	NM	NM
	Max. 8-hour concentration (ppm)	NM	NM	NM	NM	NM	NM	NM	0.9	3.1	NM	NM	NM
	# Days>federal 1-hour std. of >35 ppm	NM	NM	NM	NM	NM	NM	NM	0	0	NM	NM	NM
	# Days>Federal 8-hour Std. of >9 ppm	NM	NM	NM	NM	NM	NM	NM	0	0	NM	NM	NM
	# Days>California 8-hour Std. of >9 ppm	NM	NM	NM	NM	NM	NM	NM	0	0	NM	NM	NM
Ozone (O_3)	Year Coverage[1]	94	96	83	NM	NM	NM	84	85	82	90	88	96
	Max. 1-hour Concentration (ppm)	0.100	0.100	0.102	NM	NM	NM	0.100	0.108	0.111	0.121	0.102	0.108
	Max. 8-hour Concentration (ppm)	0.092	0.088	0.090	NM	NM	NM	0.088	0.098	0.087	0.101	0.095	0.086
	# Days>Federal 8-hour Std. of >0.07 ppm	29	40	29	NM	NM	NM	23	45	29	43	33	28
	# Days>California 1-hour Std. of >0.09 ppm	5	3	2	NM	NM	NM	2	6	1	3	3	3
	# Days>California 8-hour Std. of >0.07 ppm	31	44	34	NM	NM	NM	24	45	31	46	37	28
Nitrogen Dioxide (NO_2)	Year Coverage	91	91	90	NM	NM	NM	52	83	91	NM	NM	NM
	Max. 1-hour Concentration (ppm)	0.052	0.054	0.035	NM	NM	NM	0.060	0.043	0.033	NM	NM	NM
	Annual Average (ppm)	N/A	N/A	N/A	NM	NM	NM	N/A	N/A	N/A	NM	NM	NM
	# Days>California 1-hour Std. of >0.18 ppm	0	0	0	NM	NM	NM	0	0	0	NM	NM	NM
Respirable Particulate Matter (PM_{10})	Year Coverage	NM	NM	NM	90	95	98	NM	NM	NM	N/A	N/A	N/A
	Max. 24-hour Concentration (µg/m^3)	NM	NM	NM	80.5	92.7	94.0	NM	NM	NM	110.3	92.3	112.0
	#Days>Fed. 24-hour Std. of >150 µg/m^3	NM	NM	NM	0	0	0	NM	NM	NM	0	0	0
	#Days>California 24-hour Std. of >50 µg/m^3	NM	NM	NM	13	9	5	NM	NM	NM	N/A	N/A	N/A
	Annual Average (µg/m^3)	NM	NM	NM	36.2	31.0	30.6	NM	NM	NM	37.4	35.2	32.9

Air Pollutant	Standard/Exceedance	Merced Coffee Station			Merced M Street Station			Madera Pump Yard Station			Madera Avenue 14 Station		
		2013	2014	2015	2013	2014	2015	2013	2014	2015	2013	2014	2015
Fine Particulate Matter ($PM_{2.5}$)	Year Coverage	99	99	99	92	90	100	NM	NM	NM	100	100	99
	Max. 24-hour Concentration (µg/m^3)	75.1	64.5	61.2	68.9	53.7	60.8	NM	NM	NM	87.5	80.2	62.0
	State Annual Average (µg/m^3)	13.2	N/A	N/A	N/A	N/A	N/A	NM	NM	NM	17.9	14.0	13.9
	#Days>Fed. 24-hour Std. of >35 µg/m^3	16	16	15	11	5	5	NM	NM	NM	24	24	12
	Annual Average (µg/m^3)	13.2	10.8	12.7	13.5	11.2	12.6	NM	NM	NM	17.8	13.5	13.7

Source: CARB, 2016b
[1] Coverage is for an 8-hour standard.
CARB = California Air Resources Board
µg/m^3 = micrograms per cubic meter
NM = not monitored
N/A = not available
> = greater than
Std. = standard
Max = maximum
ppm = parts per million

Table 3.3-7 Ambient Criteria Pollutant Concentrations at Air Quality Monitoring Stations Closest to the Central Valley Wye Alternatives

Air Pollutant	Standard/Exceedance	Turlock-South Minaret Station			Modesto-14th Street Station			Tranquility Station		
		2013	2014	2015	2013	2014	2015	2013	2014	2015
Carbon Monoxide (CO)	Year coverage	NM	NM	NM	NM	NM	NM	NM	NM	NM
	Max. 1-hour concentration (ppm)	NM	NM	NM	NM	NM	NM	NM	NM	NM
	Max. 8-hour concentration (ppm)	NM	NM	NM	NM	NM	NM	NM	NM	NM
	# Days>federal 1-hour std. of >35 ppm	NM	NM	NM	NM	NM	NM	NM	NM	NM
	# Days>Federal 8-hour Std. of >9 ppm	NM	NM	NM	NM	NM	NM	NM	NM	NM
	# Days>California 8-hour Std. of >9 ppm	NM	NM	NM	NM	NM	NM	NM	NM	NM
Ozone (O_3)	Year Coverage[1]	89	86	88	93	98	97	96	90	98
	Max. 1-hour Concentration (ppm)	0.095	0.102	0.113	0.088	0.103	0.111	0.087	0.086	0.088
	Max. 8-hour Concentration (ppm)	0.085	0.092	0.100	0.082	0.091	0.093	0.079	0.078	0.081
	# Days>Federal 8-hour Std. of >0.07 ppm	14	12	17	2	12	16	3	3	5
	# Days>California 1-hour Std. of >0.09 ppm	1	4	5	0	1	5	0	0	0
	# Days>California 8-hour Std. of >0.07 ppm	24	30	31	13	24	24	18	11	11
Nitrogen Dioxide (NO_2)	Year Coverage	98	91	95	NM	NM	NM	NM	NM	NM
	Max. 1-hour Concentration (ppm)	54	55	42	NM	NM	NM	NM	NM	NM
	Annual Average (ppm)	11	N/A	9	NM	NM	NM	NM	NM	NM
	# Days>California 1-hour Std. of >0.18 ppm	0	0	0	NM	NM	NM	NM	NM	NM
Respirable Particulate Matter (PM_{10})	Year Coverage	98	92	95	100	0	0	NM	NM	NM
	Max. 24-hour Concentration (µg/m^3)	82.9	98.2	75.2	98.8	127.7	90.3	NM	NM	NM
	#Days>Fed. 24-hour Std. of >150 µg/m^3	0	0	0	0	0	0	NM	NM	NM
	#Days>California 24-hour Std. of >50 µg/m^3	73.7	N/A	50.6	57.7	37.6	31.3	NM	NM	NM
	Annual Average (µg/m^3)	35.9	N/A	32.8	30.9	29.6	27.7	NM	NM	NM

Air Pollutant	Standard/Exceedance	Turlock-South Minaret Station			Modesto-14th Street Station			Tranquility Station		
		2013	2014	2015	2013	2014	2015	2013	2014	2015
Fine Particulate Matter ($PM_{2.5}$)	Year Coverage	95	100	90	97	100	64	94	86	87
	Max. 24-hour Concentration (µg/m^3)	74.9	61.0	60.9	83.2	58.2	46.4	60.1	46.0	50.9
	State Annual Average (µg/m^3)	15.1	N/A	N/A	14.3	11.4	N/A	N/A	N/A	N/A
	#Days>Fed. 24-hour Std. of >35 µg/m^3	40.3	23.9	16.8	37.6	17.0	N/A	7.5	N/A	7.6
	Annual Average (µg/m^3)	15.1	12.3	14.2	14.3	11.3	N/A	8.3	N/A	10.0

Source: CARB, 2016b
[1] Coverage is for an 8-hour standard.
CARB = California Air Resources Board
µg/m^3 = micrograms per cubic meter
NM = not monitored
N/A = not available
> = greater than
Std. = standard
Max = maximum
ppm = parts per million

Attainment Status of Air Quality Resource Study Area

Both the USEPA and CARB designate each air basin (or portions of air basins) within California as attainment, maintenance, or nonattainment based on the area's ability to maintain ambient air concentrations below the air quality standards. The current attainment status of the air quality RSA is provided in Table 3.3-8 and has not changed since publication of the Merced to Fresno Final EIR/EIS because the SJVAB has not been redesignated under federal or state criteria for any criteria pollutants during that time. Refer to the Merced to Fresno Final EIR/EIS (Authority and FRA 2012) and the Air Quality and Global Climate Change Technical Report (Authority and FRA 2016) for additional information.

Table 3.3-8 Federal and State Attainment Status for the SJVAB

Pollutant	Federal Classification	State Classification
O_3	Nonattainment (Extreme)	Nonattainment
PM_{10}	Maintenance	Nonattainment
$PM_{2.5}$	Nonattainment	Nonattainment
CO	Urban areas of Fresno, Kern, San Joaquin, and Stanislaus Counties: Maintenance Remaining Basin: Attainment	Attainment/Maintenance
NO_2	Attainment	Attainment
SO_2	Attainment	Attainment

Sources: USEPA, 2017; SJVAPCD 2015
CO = carbon monoxide
NO_2 = nitrogen dioxide
O_3 = ozone
PM_{10} = particulate matter smaller than or equal to 10 microns in diameter
$PM_{2.5}$ = particulate matter smaller than or equal to 2.5 microns in diameter
SO_2 = sulfur dioxide
SJVAPCD = San Joaquin Valley Air Pollution Control District
USEPA = United States Environmental Protection Agency

Under the federal criteria, the SJVAB is currently designated as nonattainment for the 8-hour O_3 standard, the 1997 $PM_{2.5}$ standard (annual standard of 15 µg/m^3 and 24-hour standard of 65 µg/m^3), and the 2006 24-hour $PM_{2.5}$ standard (35 µg/m^3). The SJVAB is a maintenance area for PM_{10} and CO,[11] and is in attainment for NO_2 and SO_2, and unclassified for Pb.

Under the state criteria, the SJVAB is currently designated as nonattainment for the 1-hour O_3 and 8-hour O_3, PM_{10}, and $PM_{2.5}$ standards. The SJVAB is an attainment/unclassified area for the state CO standard and an attainment area for the state NO_2, SO_2, and Pb standards. The SJVAB is an unclassified area for the state hydrogen sulfide and the visibility-reducing particle standards; it is an attainment area for the sulfates and vinyl chloride standards.

3.3.5.3 Air Quality Plans and Programs

State Implementation Plans

Planning documents for pollutants for which the air quality RSA is classified as a federal nonattainment or maintenance area are developed by the SJVAPCD and CARB and approved by the USEPA. Table 3.3-9 summarizes the planning documents relevant to the air quality RSA. The full list of State Implementation Plans relevant to the Central Valley Wye alternatives is included in Section 3.3.2.2.

[11] Urban areas of Fresno, Kern, San Joaquin, and Stanislaus Counties are classified as maintenance areas for CO, while the remainder of the SJVAB is classified as an attainment area for CO.

Table 3.3-9 Planning Documents Relevant to the Air Quality Resource Study Area

Type of Plan	Status
1-Hour O_3 Attainment Plan	On March 8, 2010, the USEPA approved San Joaquin Valley's 2004 Extreme Ozone Attainment Plan for the 1-hour O_3 standard. However, effective June 15, 2005, the USEPA revoked the federal 1-hour O_3 standard for some areas, including the SJVAB. As a result of subsequent litigation, the USEPA withdrew its plan approval in November 2012, and the SJVAPCD and CARB withdrew this plan from consideration. SJVAPCD adopted the 2013 Plan for the Revoked 1-Hour Ozone Standard on September 19, 2013, which confirms the San Joaquin Valley will attain the revoked 1-hour ozone standard by 2017. In February 2016, CARB submitted a final recommendation to the USEPA with a supporting document indicating that the Valley be designated in attainment of the federal 1-hour ozone standard. USEPA approved the SJVAPCD's 2013 Plan on April 5, 2016, and redesignated the San Joaquin Valley as having attained the 1-hour ozone standard on July 18, 2016, effective August 17, 2016.
8-Hour O_3 Attainment Plan	On June 16, 2016, the SJVAPCD adopted its 2016 Ozone Plan for the 2008 8-Hour Ozone Standard. The 2016 plan addresses the federal mandates of the 2008 8-hour ozone NAAQS by setting a strategy to attain the 75 ppb 8-hour ozone standard by no later than December 31, 2031. NOx emissions, with implementation of the plan, are anticipated to be reduced by 60% between 2012 and 2031. On May 5, 2010, the USEPA reclassified the 8-hour O_3 nonattainment status of San Joaquin Valley from "serious" to "extreme." The reclassification requires the state to incorporate more-stringent requirements, such as lower permitting thresholds and implementing reasonably available control technologies at more sources. The 2007 8-hour Ozone Plan contained a comprehensive and exhaustive list of regulatory and incentive-based measures to reduce emissions of O_3 and PM precursors throughout the San Joaquin Valley. On December 18, 2007, the SJVAPCD Governing Board adopted the plan with an amendment to extend the rule adoption schedule for organic waste operations. On January 8, 2009, the USEPA found that the motor vehicle budgets for 2008, 2020, and 2030 from the 2007 8-hour Ozone Plan were not adequate for transportation conformity purposes.
PM_{10} Maintenance Plan	On September 25, 2008, the USEPA redesignated the San Joaquin Valley to attainment for the PM_{10} NAAQS and approved the 2007 PM_{10} Maintenance Plan.
$PM_{2.5}$ Attainment Plan	The SJVAPCD Governing Board adopted the 2015 $PM_{2.5}$ Plan on April 16, 2015, following a public hearing. The plan includes measures to attain the 1997 24-hour $PM_{2.5}$ standard of 65 µg/m^3 by 2018 and annual $PM_{2.5}$ standard of 15 µg/m^3 by 2020.
CO Maintenance Plan	On July 22, 2004, CARB approved an update to the SIP that shows how 10 areas, including the SJVAB, would maintain the CO standard through 2018. On November 30, 2005, the USEPA approved and promulgated the implementation plans and designation of areas for air quality purposes.

Sources: SJVAPCD, 2004, 2007a, 2007b, 2012, 2015, 2016a; CARB, 2004, 2014a
µg/m^3 = micrograms per cubic meter
CARB = California Air Resources Board
CO = carbon monoxide
NAAQS = National Ambient Air Quality Standards
O_3 = ozone
PM_{10} = particulate matter smaller than or equal to 10 microns in diameter
$PM_{2.5}$ = particulate matter smaller than or equal to 2.5 microns in diameter
SIP = State Implementation Plan
SJVAB = San Joaquin Valley Air Basin
SJVAPCD = San Joaquin Valley Air Pollution Control District
USEPA = U.S. Environmental Protection Agency

Transportation Plans and Programs

The MCAG and the MCTC adopt Transportation Improvement Programs, which are five-year programs including proposed transportation projects programmed to receive local funding (i.e., constrained projects). The MCAG and MCTC adopted their respective 2014 RTPs and updated transportation conformity analyses in 2014. Both RTPs discuss the HSR project, but because there is no local funding, it is not included in the constrained project list or the transportation conformity determination (MCAG 2014; MCTC 2014).

3.3.6 Environmental Consequences

3.3.6.1 Overview

This section evaluates how the No Project Alternative and the Central Valley Wye alternatives could affect air quality and global climate change. The impacts of the Central Valley Wye alternatives are described and organized in Section 3.3.6.3, Central Valley Wye Alternatives, as follows:

Construction Impacts

- Impact AQ#1: Temporary Direct Impacts on Air Quality within the SJVAB
- Impact AQ#2: Temporary Direct Impacts on Implementation of an Applicable Air Quality Plan
- Impact AQ#3: Temporary Indirect Impacts on Air Quality outside the SJVAB
- Impact AQ#4: Permanent Direct and Indirect Impacts on Global Climate Change—Greenhouse Gas Emissions
- Impact AQ#5: Temporary Direct Impacts on Air Quality—Asbestos and Lead-Based Paint
- Impact AQ#6: Temporary Direct Impacts on Air Quality—Localized Health Impacts

Operations Impacts

- Impact AQ#7: Continuous Permanent Direct Impacts on Air Quality within the SJVAB—On-Road Vehicle, Power Plant, and Aircraft Emissions
- Impact AQ#8: Continuous Permanent Direct Impacts on Implementation of an Applicable Air Quality Plan
- Impact AQ#9: Continuous Permanent Direct and Indirect Impacts on Global Climate Change—Greenhouse Gas Emissions—On-Road Vehicle, Power Plant, Electrical Equipment, and Aircraft Emissions
- Impact AQ#10: Continuous Permanent Direct Impacts on Air Quality—Localized Mobile Source Air Toxics
- Impact AQ#11: Continuous Permanent Direct Impacts on Air Quality—Carbon Monoxide
- Impact AQ#12: Continuous Permanent Direct Impacts on Air Quality—Particulate Matter

3.3.6.2 No Project Alternative

The population in the San Joaquin Valley is expected to grow through 2040 (see Section 2.2.2.2, Planned Land Use). Development in the San Joaquin Valley to accommodate the population increase would continue under the No Project Alternative and result in associated direct and indirect impacts on air quality and global climate change. Such planned projects anticipated to be constructed by 2040 include residential, commercial, industrial, recreational, transportation, and agricultural projects.

Planned transportation improvements that are to be constructed and become operational by 2040 under the No Project Alternative could contribute to regional air quality conditions. Future development projects in Merced and Madera Counties include dairy farm expansions, implementation of airport development and land use plans, and implementation of general and

specific plans throughout both counties. Planned projects under the No Project Alternative would also include increased production at wineries, expansion of an existing almond processing operation, proposed solar power projects, and transportation projects such as the expansion of SR 99. A full list of anticipated future development projects is provided in Appendix 3.19-A, Cumulative Plans and Non-Transportation Projects List, and Appendix 3.19-B, Cumulative Transportation Projects Lists. Development of these projects would result in emissions from on-road vehicles, aircraft, and power plant sources. The emissions efficiency of on-road vehicles and aircraft would improve in the future, and these improvements are incorporated into the No Project Alternative analysis. Additionally, because of the state requirement that an increasing fraction (50 percent by 2030) of electricity generated for the state's power portfolio come from renewable energy sources, it is likely that the emissions from power plant sources in the future would be lower than the emissions estimated for this analysis.

Table 3.3-10 summarizes estimated statewide emission burdens under No Project Alternative conditions in the years 2015 and 2040 under the medium ridership scenario, as previously described in Section 3.3.4.3, Methods for NEPA and CEQA Impact Analysis. Table 3.3-11 summarizes estimated statewide emission burdens under No Project Alternative conditions in the years 2015 and 2040 under the high ridership scenario. The ridership scenarios apply to the No Project Alternative because the ridership scenarios involve population and growth assumptions for the state and region in the absence of the Central Valley Wye alternatives.

As shown in Table 3.3-10 and Table 3.3-11, total statewide emissions of VOC, CO, and NO_X in 2040 would be lower than the levels in 2015. The decreases in emissions for these pollutants would occur because of the anticipated increased efficiencies and improvements in vehicle emission technology in future years, despite increases in aircraft and power plants emissions resulting from increased population and economic growth. In contrast, emissions of SO_2, PM_{10}, and $PM_{2.5}$ in 2040 would be higher than the levels in 2015 for both ridership scenarios because emissions of these pollutants are dependent on factors other than vehicle emission technology. Improvements in vehicle emission technology would not reduce PM_{10} and $PM_{2.5}$ emissions that are emitted by noncombustion processes, such as through brake wear or other sources of on-road dust. SO_2 emissions, which are most commonly generated from power plants and other industrial facilities, are expected to increase as demand for energy and industrial products rise along with population and economic growth.

Emissions of SO_2, PM_{10}, and $PM_{2.5}$ would increase on a statewide level by 16 to 22 percent between 2015 and 2040, as shown in Table 3.3-10 and Table 3.3-11. These increases in emissions would lead to a degradation of regional air quality in air basins throughout the state.

Table 3.3-10 No Project Alternative Estimated Statewide Emissions without the Central Valley Wye Alternatives[1]: Medium Ridership Scenario[2]

Project Element	VOC (tons/yr)	CO (tons/yr)	NO_X (tons/yr)	SO_2 (tons/yr)	PM_{10} (tons/yr)	$PM_{2.5}$ (tons/yr)
Year 2015						
Roadways	7,785	323,019	33,326	816	22,977	6,238
Aircraft	338	2,888	2,779	299	84	84
Power Plants	1,646	29,616	15,531	2,303	2,953	2,683
Total	9,768	355,523	51,636	3,418	26,013	9,004

Project Element	VOC (tons/yr)	CO (tons/yr)	NO_X (tons/yr)	SO_2 (tons/yr)	PM_{10} (tons/yr)	$PM_{2.5}$ (tons/yr)
Year 2040						
Roadways	996	86,627	6,312	489	27,540	7,091
Aircraft	474	3,968	3,908	423	118	118
Power Plants	2,205	45,146	20,858	3,177	3,921	3,564
Total	3,675	135,741	31,077	4,089	31,580	10,773

Source: Authority and FRA, 2017
[1] Because the Central Valley Wye alternatives would not exist in isolation without the rest of the HSR system, this table also applies to the larger HSR system. Emissions in this table show statewide emissions without either the Central Valley Wye alternatives or HSR system.
[2] The medium ridership scenario applies to the No Project Alternative because the ridership scenarios involve population and growth assumptions for the state and region in the absence of the Central Valley Wye alternatives.
Totals may not add up exactly because of rounding.
CO = carbon monoxide
NO_X = nitrogen oxide
PM_{10} = particulate matter smaller than or equal to 10 microns in diameter
$PM_{2.5}$ = particulate matter smaller than or equal to 2.5 microns in diameter
SO_2 = sulfur dioxide
VOC = volatile organic compounds
yr = year

Table 3.3-11 No Project Alternative Estimated Statewide Emissions without the Central Valley Wye Altenatives[1]: High Ridership Scenario[2]

Project Element	VOC (tons/yr)	CO (tons/yr)	NO_X (tons/yr)	SO_2 (tons/yr)	PM_{10} (tons/yr)	$PM_{2.5}$ (tons/yr)
Year 2015						
Roadways	7,746	321,414	33,161	812	22,862	6,207
Aircraft	315	2,692	2,589	279	78	78
Power Plants	1,646	29,616	15,531	2,303	2,953	2,683
Total	9,707	353,722	51,281	3,394	25,894	8,968
Year 2040						
Roadways	1,029	89,456	6,518	505	28,439	7,323
Aircraft	520	4,348	4,282	464	129	129
Power Plants	2,205	45,146	20,858	3,177	3,921	3,564
Total	3,753	138,950	31,658	4,145	32,490	11,016

Source: Authority and FRA, 2017
[1] Because the Central Valley Wye alternatives would not exist in isolation without the rest of the HSR system, this table also applies to the larger HSR system. Emissions in this table show statewide emissions without either the Central Valley Wye alternatives or HSR system.
[2] The high ridership scenario applies to the No Project Alternative because the ridership scenarios involve population and growth assumptions for the state and region in the absence of the Central Valley Wye alternatives.
Totals may not add up exactly because of rounding.
CO = carbon monoxide
NO_X = nitrogen oxide
PM_{10} = particulate matter smaller than or equal to 10 microns in diameter
$PM_{2.5}$ = particulate matter smaller than or equal to 2.5 microns in diameter
SO_2 = sulfur dioxide
VOC = volatile organic compounds
yr = year

As shown in Table 3.3-12, GHG emissions statewide under the No Project Alternative would decrease between 2015 and 2040 because improvements in vehicle emission technology in future years would result in lower levels of GHG emissions. GHG emissions from aircraft and power plants would increase with growth in the state's population and economic activity; however, emissions would decrease overall because of the net reduction in on-road vehicle emissions. It is likely that statewide emissions in 2040 would be lower than shown in Table 3.3-12 because of the variety of actions that the State is planning to implement. Potential reductions in emissions from increased renewable energy use and increased building energy efficiency from statewide regulations and actions could lead to a lower level of emissions in 2040.

Table 3.3-12 No Project Alternative Statewide GHG Emissions without the Central Valley Wye Alternatives[1] under the Medium and High Ridership Scenarios

Project Element	GHG Emissions (MMT CO_2e/year)	
	Medium	High
Year 2015		
Roadways	64.0	63.7
Aircraft	2.3	2.2
Power Plants	104.7	104.7
Total	171.0	170.5
Year 2040		
Roadways	41.9	43.3
Aircraft	3.3	3.6
Power Plants	122.9	122.9
Total	168.1	169.8

Source: Authority and FRA, 2017
[1] Because the Central Valley Wye alternatives would not exist in isolation without the rest of the HSR system, this table also applies to the larger HSR system. Emissions in this table show statewide emissions without either the Central Valley Wye alternatives or HSR system.
Totals may not add up exactly because of rounding.
CO_2e = carbon dioxide equivalent
GHG = greenhouse gas
HSR = High-Speed Rail
MMT = million metric tons

3.3.6.3 Central Valley Wye Alternatives

Construction and operations of the Central Valley Wye alternatives could result in temporary and permanent impacts on air quality and global climate change. The types of impacts analyzed in this section include the potential degradation of air quality within and outside the SJVAB, exposure of sensitive receptors to pollutant concentrations and elevated health risks, and GHG emission contributions to climate change.

Construction Impacts

Construction of the Central Valley Wye alternatives would involve, for example, demolition of existing structures; clearing and grubbing; handling, storing, hauling, excavating, and placing fill; possible pile driving; and construction of aerial structures, bridges, road modifications, utility upgrades and relocations, HSR electrical systems, and railbeds. Construction activities are described in Chapter 2.

Impact AQ#1: Temporary Direct Impacts on Air Quality within the SJVAB

Construction of the Central Valley Wye alternatives could temporarily affect air quality within the SJVAB. Heavy-duty construction equipment and on-road vehicle use associated with construction activities could increase emissions of the pollutants listed in Table 3.3-1 and Table 3.3-6.

The type of pollutant that would be emitted during construction of the Central Valley Wye alternatives is dependent on the type of construction activity. Fugitive dust emissions (PM_{10} and $PM_{2.5}$) would be generated from earthmoving and disturbed earth surfaces. Combustion pollutants, particularly O_3 precursors (NO_X and VOC) and CO, would be emitted by heavy equipment and trucks. VOCs would also be generated from paints and other coatings used during construction activities.

Although the construction activities would be similar in scale and technique, because the Central Valley Wye alternatives do not all follow an identical route and have different track lengths, each alternative's construction activity would be unique. Many factors influence the extent and magnitude of activity that would be required for construction, including the number and type of existing structures to be demolished, the amount of imported and exported dirt required during grading, the number of traction power substations constructed, etc. The combination of these factors is unique for each alternative and results in the emissions of pollutants that would be generated during construction. Because many factors are involved in construction activity that determine the level of pollutant emissions, it is not possible to identify a single narrative between any one factor and the resulting emissions. For instance, the Avenue 21 to Road 13 Alternative is estimated to require the least amount of demolition activity but would require the highest amount of imported dirt. The emissions for this alternative are a maximum for NO_X and PM_{10} emissions among all the Central Valley Wye alternatives but not the maximum for $PM_{2.5}$ emissions, however. The resulting emissions from each of the Central Valley Wye alternatives' unique construction activities are shown in Table 3.3-13 through Table 3.3-16. As noted in Section 3.3.4.3, the analysis of emissions presented for construction of the Central Valley Wye alternatives does not include the effect of the Authority's recent mandate for construction contractors to use equipment that meets Tier 4 standards. The emissions in Table 3.3-11 through Table 3.3-14 and the corresponding impacts thus represent a conservative assessment, because the emissions in those tables assume an average fleet mix of construction equipment, which would result in higher emission levels than a Tier 4-only equipment fleet. As discussed in Section 3.3.4.2, Impact Avoidance and Minimization Features, the Central Valley Wye alternatives incorporate numerous IAMFs to avoid and minimize impacts. The impacts associated with fugitive dust emissions would be reduced through construction practices of the Central Valley Wye alternatives, including the incorporation of a dust control plan (AQ-IAMF#1). The Authority or its contractors would prepare the fugitive dust control plan and employ measures to minimize fugitive dust emissions by washing vehicles before exiting the construction site, watering unpaved surfaces, limiting vehicle travel speed, and suspending dust-generating activities when wind speed is in exceedance of 25 miles per hour. The design of the Central Valley Wye alternatives would also minimize off-gassing emissions of VOCs that would occur from paints and other coatings by requiring the use of low-VOC paint and super-compliant or Clean Air paint that has a lower VOC content than that required by San Joaquin Valley Unified Air Pollution Control District Rule 4601. The contractor would utilize low-VOC paints to limit the emissions of VOCs, which contribute to O_3 formation (AQ-IAMF#2).

Table 3.3-13 through Table 3.3-16 compare the Central Valley Wye alternatives mass emissions during the anticipated construction period, inclusive of the IAMFs. Despite the emission reductions achieved through fugitive dust control and using low-VOC paint, all four Central Valley Wye alternatives would result in a temporary impact on air quality during construction as a result of increased NO_X, and PM_{10} emissions that would exceed the SJVAPCD CEQA thresholds. All four Central Valley Wye alternatives would exceed the annual NO_X threshold in 4 disparate years of construction. The highest exceedances of NOx would occur in 2020, and would be a maximum of 144.40 tons per year (134.40 tons per year over the threshold) for the Avenue 21 to Road 13 Alternative and a minimum of 133.86 tons per year (123.86 tons per year over the threshold) for the SR 152 (North) to Road 19 Alternative in 2020. All four Central Valley Wye alternatives would

exceed the annual PM_{10} threshold in 3 disparate years of construction. The highest exceedances of PM_{10} would occur in 2020 as well and would be a maximum of 25.77 tons per year (10.77 tons per year over the threshold) for the Avenue 21 to Road 13 Alternative and a minimum of 25.50 tons per year (10.50 tons per year over the threshold) for the SR 152 (North) to Road 11 Alternative. These exceedances represent a conservative estimate, given that these values were modeled using a fleet average mix of off-road equipment as opposed to a Tier 4-only fleet, which will be mandated by the Authority.

The thresholds have been established to ensure that the SJVAB is in attainment with the state and federal ambient standards. Construction emissions of these pollutants may impede or obstruct implementation of the 8-hour SJVAPCD 2007 Ozone Plan, or the 2004 Extreme Ozone 1-hour Attainment Demonstration Plan, and the 2007 PM_{10} Maintenance Plan. There is no mass emission CEQA threshold for SO_2 from SJVAPCD; SO_2 impacts are evaluated based on the air dispersion modeling of ambient air concentrations of SO_2 and the state requirement of using ultra-low-sulfur diesel. Impact AQ#6 discusses the conclusions of the modeled ambient air concentrations.

In addition to exceedances of SJVAPCD CEQA thresholds, direct emissions from the construction phase of any of the four Central Valley Wye alternatives would exceed the GC applicability thresholds for NO_X in 4 calendar years in which construction would occur. Because the GC threshold for NO_X applicable to the SJVAB is the same as the SJVAPCD annual NO_X threshold, the discussion above of maximum and minimum emissions for the SJVAPCD NO_X threshold is also applicable for this GC discussion. However, as discussed previously, the conclusions of this Draft Supplemental EIR/EIS would be generally consistent with or less severe than the conclusions of the Merced to Fresno Section conformity determination. The Central Valley Wye alternatives and Merced to Fresno Section overall would both result in NO_X emissions that exceed the *de minimis* threshold, but, as demonstrated in the Merced to Fresno Section GC determination, NO_X emissions have been and would continue to be offset to net zero. The overall Merced to Fresno Section would also result in VOC and PM_{10} emissions that exceed the *de minimis* threshold, but the Central Valley Wye alternatives would not result in any other pollutant exceedances of the *de minimis* thresholds aside from NO_X. Therefore, with respect to GC, the Central Valley Wye alternatives would not result in any impacts beyond those disclosed for the overall Merced to Fresno Section and a new conformity determination is not required. A memorandum describing consistency with the Merced to Fresno General Conformity Determination for the Central Valley Wye alternatives has been prepared to provide additional justification for the consistency and is presented in Appendix 3.3-B.

CEQA Conclusion

The impact under CEQA would be significant because construction of the Central Valley Wye alternatives could result in the temporary exceedance of SJVAPCD CEQA thresholds for NO_X and PM_{10}. The Central Valley Wye alternatives include design measures to minimize fugitive dust from construction vehicles and VOC emissions from paint products, which would minimize but not avoid air quality impacts in the SJVAB. AQ-MM#1, AQ-MM#2, and AQ-MM#3 would reduce and minimize impacts by requiring the cleanest reasonably available equipment and control measures to limit criteria pollutant emissions from construction equipment, vehicles, and concrete batch plants. AQ-MM#4 would offset impacts through a contractual agreement between the Authority and the SJVAPCD to provide funds for the SJVAPCD's Emission Reduction Incentive Program. With implementation of AQ-MM#1, AQ-MM#2, AQ-MM#3, and AQ-MM#4, the impact under CEQA would be less than significant because criteria pollutant emissions would be reduced as follows: exceedances of NO_X would be offset to net zero[12] because emissions of this pollutant are subject to GC offsetting requirements, and exceedances of PM_{10} would be offset to below

[12] To offset emissions to net zero, the HSR would fund grants for projects that achieve pound-for-pound emission reductions, with generated emissions associated with the project offset through purchase of emissions credits, with preference given to highly affected communities, thus offsetting project-related impacts on air quality emissions so the net effect of emissions is net zero. For more information see AQ-MM#4 in Section 3.3.7, Mitigation Measures.

SJVAPCD CEQA thresholds because emissions are in excess of SJVAPCD CEQA thresholds and below GC *de minimis* thresholds.

Table 3.3-13 SR 152 (North) to Road 13 Wye Alternative Total Emissions and Summary of San Joaquin Valley Air Pollution Control District and General Conformity Threshold Exceedances for Construction[1] (tons/year)

Activities	VOC	CO[4]	NO_X	SO_2[4]	PM_{10}[5]	$PM_{2.5}$[5]
SJVAPCD annual CEQA significance thresholds[2]	10	N/A	10	N/A	15	15
Annual GC *de minimis* levels applicable to the SJVAB[3]	10	N/A	10	100	100	100
Year 2018						
Emissions (tons/year)	0.00	0.00	0.00	0.00	0.01	0.00
Exceeds SJVAPCD CEQA thresholds?	No	N/A	No	N/A	No	No
Exceeds GC threshold?	No	N/A	No	No	No	No
Year 2019						
Emissions (tons/year)	6.74	63.32	107.72	0.35	23.52	5.11
Exceeds SJVAPCD CEQA thresholds?	No	N/A	Yes	N/A	Yes	No
Exceeds GC threshold?	No	N/A	Yes	No	No	No
Year 2020						
Emissions (tons/year)	9.73	98.99	139.49	0.45	25.75	6.70
Exceeds SJVAPCD CEQA thresholds?	No	N/A	Yes	N/A	Yes	No
Exceeds GC threshold?	No	N/A	Yes	No	No	No
Year 2021						
Emissions (tons/year)	6.75	71.37	114.9	0.37	25.40	6.03
Exceeds SJVAPCD CEQA thresholds?	No	N/A	Yes	N/A	Yes	No
Exceeds GC threshold?	No	N/A	Yes	No	No	No

Activities	VOC	CO[4]	NO_X	SO_2[4]	PM_{10}[5]	$PM_{2.5}$[5]
Year 2022						
Emissions (tons/year)	2.21	18.00	38.39	0.07	1.55	1.25
Exceeds SJVAPCD CEQA thresholds?	No	N/A	Yes	N/A	No	No
Exceeds GC threshold?	No	N/A	Yes	No	No	No
Year 2031						
Emissions (tons/year)	0.15	4.90	0.64	0.01	2.81	0.37
Exceeds SJVAPCD CEQA thresholds?	No	N/A	No	N/A	No	No
Exceeds GC threshold?	No	N/A	No	No	No	No
Year 2032						
Emissions (tons/year)	0.13	4.85	0.57	0.01	2.81	0.37
Exceeds SJVAPCD CEQA thresholds?	No	N/A	No	N/A	No	No
Exceeds GC threshold?	No	N/A	No	No	No	No

Source: Authority and FRA, 2017

[1] Detailed model parameters and assumptions are included in the Air Quality and Global Climate Change Technical Report (Authority and FRA 2016). The emissions presented are conservative, because the analysis assumed a fleet average mix of construction equipment and thus does not include the Authority's commitment to mandate Tier 4 equipment for off-road construction equipment.

[2] The SJVAPCD has significance thresholds for NO_X, ROG/VOC, PM_{10}, and $PM_{2.5}$. The district currently does not have thresholds for CO or SO_X. Section 3.3.4.3, Method for Determining Significance under CEQA, summarizes the CEQA significance for these pollutants.

[3] The GC *de minimis* thresholds for criteria pollutants are based on the SJVAB federal attainment status. The SJVAB is considered in extreme nonattainment for the ozone NAAQS, is a nonattainment area for $PM_{2.5}$, and is a maintenance area for the CO and PM_{10} NAAQS. Although the SJVAB is in attainment for SO_X, since SO_X is a precursor for $PM_{2.5}$, the $PM_{2.5}$ GC *de minimis* threshold was used.

[4] While the SJVAPCD's 2002 GAMAQI does not include quantitative thresholds for CO and SO_X, the Central Valley Wye alternatives emissions were evaluated against the SJVAPCD's 2015 GAMAQ. Determination was made that the Central Valley Wye alternatives emissions would not exceed those quantitative thresholds.

[5] PM_{10} and $PM_{2.5}$ emissions have incorporated the SJVAPCD Regulation VIII requirements and dust control measures the Authority committed to in the Statewide Program EIR/EIS (Authority and FRA 2005).

CEQA = California Environmental Quality Act
CO = carbon monoxide
EIR/EIS = environmental impact report/environmental impact statement
GAMAQI = Guide for Assessing and Mitigating Air Quality Impacts
GC = general conformity
N/A = not applicable
NAAQS = National Ambient Air Quality Standards
NO_X = nitrogen oxides
PM_{10} = particulate matter smaller than or equal to 10 microns in diameter
$PM_{2.5}$ = particulate matter smaller than or equal to 2.5 microns in diameter
ROG = reactive organic gases
SJVAB = San Joaquin Valley Air Basin
SJVAPCD = San Joaquin Valley Air Pollution Control District
SO_2 = sulfur dioxide
SO_X = sulfur oxide
SR = State Route
VOC = volatile organic compound

Table 3.3-14 SR 152 (North) to Road 19 Wye Alternative Total Emissions and Summary of San Joaquin Valley Air Pollution Control District and General Conformity Threshold Exceedances for Construction[1] (tons/year)

Activities	VOC	CO[4]	NO_X	SO_2[4]	PM_{10}[5]	$PM_{2.5}$[5]
SJVAPCD annual CEQA significance thresholds[2]	10	N/A	10	N/A	15	15
Annual GC *de minimis* levels applicable to the SJVAB[3]	10	N/A	10	100	100	100
Year 2018						
Emissions (tons/year)	0.00	0.00	0.00	0.00	0.01	0.00
Exceeds SJVAPCD CEQA thresholds?	No	N/A	No	N/A	No	No
Exceeds GC threshold?	No	N/A	No	No	No	No
Year 2019						
Emissions (tons/year)	6.57	62.60	99.80	0.32	23.19	5.08
Exceeds SJVAPCD CEQA thresholds?	No	N/A	Yes	N/A	Yes	No
Exceeds GC threshold?	No	N/A	Yes	No	No	No
Year 2020						
Emissions (tons/year)	9.63	98.67	133.86	0.42	25.62	6.74
Exceeds SJVAPCD CEQA thresholds?	No	N/A	Yes	N/A	Yes	No
Exceeds GC threshold?	No	N/A	Yes	No	No	No
Year 2021						
Emissions (tons/year)	6.82	70.56	116.46	0.34	23.24	5.99
Exceeds SJVAPCD CEQA thresholds?	No	N/A	Yes	N/A	Yes	No
Exceeds GC threshold?	No	N/A	Yes	No	No	No
Year 2022						
Emissions (tons/year)	2.53	21.98	44.24	0.08	3.91	1.63
Exceeds SJVAPCD CEQA thresholds?	No	N/A	Yes	N/A	No	No
Exceeds GC threshold?	No	N/A	Yes	No	No	No

Activities	VOC	CO[4]	NO_X	SO_2[4]	PM_{10}[5]	$PM_{2.5}$[5]
Year 2031						
Emissions (tons/year)	0.22	7.35	0.96	0.02	4.25	0.56
Exceeds SJVAPCD CEQA thresholds?	No	N/A	No	N/A	No	No
Exceeds GC threshold?	No	N/A	No	No	No	No
Year 2032						
Emissions (tons/year)	0.21	7.30	0.89	0.02	4.26	0.56
Exceeds SJVAPCD CEQA thresholds?	No	N/A	No	N/A	No	No
Exceeds GC threshold?	No	N/A	No	No	No	No
Year 2033						
Emissions (tons/year)	0.13	4.85	0.57	0.01	2.81	0.37
Exceeds SJVAPCD CEQA thresholds?	No	N/A	No	N/A	No	No
Exceeds GC threshold?	No	N/A	No	No	No	No

Source: Authority and FRA, 2017

[1] Detailed model parameters and assumptions are included in the Air Quality and Global Climate Change Technical Report (Authority and FRA 2016). The emissions presented are conservative, because the analysis assumed a fleet average mix of construction equipment and thus does not include the Authority's commitment to mandate Tier 4-only equipment for off-road construction equipment.

[2] The SJVAPCD has significance thresholds for NO_X ROG/VOC, PM_{10}, and $PM_{2.5}$. The district currently does not have thresholds for CO or SO_X. Section 3.3.4.3 summarizes the CEQA significance for these pollutants.

[3] The GC *de minimis* thresholds for criteria pollutants are based on the SJVAB federal attainment status. The SJVAB is considered in extreme nonattainment for the ozone NAAQS, is a nonattainment area for $PM_{2.5}$, and is a maintenance area for the CO and PM_{10} NAAQS. Although the SJVAB is in attainment for SO_X, since SO_X is a precursor for $PM_{2.5}$, the $PM_{2.5}$ GC *de minimis* threshold was used.

[4] While the SJVAPCD's 2002 GAMAQI does not include quantitative thresholds for CO and SO_X, the Central Valley Wye alternatives emissions were evaluated against the SJVAPCD's 2015 GAMAQI. Determination was made that the Central Valley Wye alternatives emissions would not exceed those quantitative thresholds.

[5] PM_{10} and $PM_{2.5}$ emissions have incorporated the SJVAPCD Regulation VIII requirements and dust control measures the Authority committed to in the Statewide Program EIR/EIS.

CEQA = California Environmental Quality Act
CO = carbon monoxide
GC = general conformity
EIR/EIS = environmental impact report/environmental impact statement
GAMAQI = Guide for Assessing and Mitigating Air Quality Impacts
N/A = not applicable
NAAQS = National Ambient Air Quality Standards
NO_X = nitrogen oxides
PM_{10} = particulate matter smaller than or equal to 10 microns in diameter
$PM_{2.5}$ = particulate matter smaller than or equal to 2.5 microns in diameter
ROG = reactive organic gases
SJVAB = San Joaquin Valley Air Basin
SJVAPCD = San Joaquin Valley Air Pollution Control District
SO_2 = sulfur dioxide
SO_X = sulfur oxide
SR = State Route
VOC = volatile organic compound

Table 3.3-15 Avenue 21 to Road 13 Wye Alternative Total Emissions and Summary of San Joaquin Valley Air Pollution Control District and General Conformity Threshold Exceedances for Construction[1] (tons/year)

Activities	VOC	CO[4]	NO_X	SO_2[4]	PM_{10}[5]	$PM_{2.5}$[5]
SJVAPCD annual CEQA significance thresholds[2]	10	N/A	10	N/A	15	15
Annual GC *de minimis* levels applicable to the SJVAB[3]	10	N/A	10	100	100	100
Year 2018						
Emissions (tons/year)	0.00	0.00	0.00	0.00	0.01	0.00
Exceeds SJVAPCD CEQA thresholds?	No	N/A	No	N/A	No	No
Exceeds GC threshold?	No	N/A	No	No	No	No
Year 2019						
Emissions (tons/year)	6.85	63.80	113.19	0.38	22.66	5.06
Exceeds SJVAPCD CEQA thresholds?	No	N/A	Yes	N/A	Yes	No
Exceeds GC threshold?	No	N/A	Yes	No	No	No
Year 2020						
Emissions (tons/year)	9.84	99.48	144.40	0.48	25.77	6.73
Exceeds SJVAPCD CEQA thresholds?	No	N/A	Yes	N/A	Yes	No
Exceeds GC threshold?	No	N/A	Yes	No	No	No
Year 2021						
Emissions (tons/year)	6.89	72.05	120.00	0.39	25.44	6.08
Exceeds SJVAPCD CEQA thresholds?	No	N/A	Yes	N/A	Yes	No
Exceeds GC threshold?	No	N/A	Yes	No	No	No
Year 2022						
Emissions (tons/year)	2.18	17.71	38.42	0.07	1.52	1.24
Exceeds SJVAPCD CEQA thresholds?	No	N/A	Yes	N/A	No	No
Exceeds GC threshold?	No	N/A	Yes	No	No	No

Activities	VOC	CO[4]	NO_X	SO_2[4]	PM_{10}[5]	$PM_{2.5}$[5]
Year 2031						
Emissions (tons/year)	0.15	4.90	0.64	0.01	2.81	0.37
Exceeds SJVAPCD CEQA thresholds?	No	N/A	No	N/A	No	No
Exceeds GC threshold?	No	N/A	No	No	No	No
Year 2032						
Emissions (tons/year)	0.13	4.85	0.57	0.01	2.81	0.37
Exceeds SJVAPCD CEQA thresholds?	No	N/A	No	N/A	No	No
Exceeds GC threshold?	No	N/A	No	No	No	No

Source: Authority and FRA, 2017

[1] Detailed model parameters and assumptions are included in the Air Quality and Global Climate Change Technical Report (Authority and FRA 2016). The emissions presented are conservative, because the analysis assumed a fleet average mix of construction equipment and thus does not include the Authority's commitment to mandate Tier 4-only equipment for off-road construction equipment.

[2] The SJVAPCD has significance thresholds for NO_X ROG/VOC, PM_{10}, and $PM_{2.5}$. The district currently does not have thresholds for CO or SO_X. Section 3.3.4.3 summarizes the CEQA significance for these pollutants.

[3] The GC *de minimis* thresholds for criteria pollutants are based on the SJVAB federal attainment status. The SJVAB is considered in extreme nonattainment for the ozone NAAQS, is a nonattainment area for $PM_{2.5}$, and is a maintenance area for the CO and PM_{10} NAAQS. Although the SJVAB is in attainment for SO_X, since SO_X is a precursor for $PM_{2.5}$, the $PM_{2.5}$ GC *de minimis* threshold was used.

[4] While the SJVAPCD's 2002 GAMAQI does not include quantitative thresholds for CO and SO_X, the Central Valley Wye alternatives emissions were evaluated against the SJVAPCD's 2015 GAMAQI. Determination was made that the Central Valley Wye alternatives emissions would not exceed those quantitative thresholds.

[5] PM_{10} and $PM_{2.5}$ emissions have incorporated the SJVAPCD Regulation VIII requirements and dust control measures the Authority committed to in the Statewide Program EIR/EIS.

CEQA = California Environmental Quality Act
CO = carbon monoxide
GC = general conformity
EIR/EIS = environmental impact report/environmental impact statement
GAMAQI = Guide for Assessing and Mitigating Air Quality Impacts N/A = not applicable
NAAQS = National Ambient Air Quality Standards
NO_X = nitrogen oxides
PM_{10} = particulate matter smaller than or equal to 10 microns in diameter
$PM_{2.5}$ = particulate matter smaller than or equal to 2.5 microns in diameter
ROG = reactive organic gases
SJVAB = San Joaquin Valley Air Basin
SJVAPCD = San Joaquin Valley Air Pollution Control District
SO_2 = sulfur dioxide
SO_X = sulfur oxide
SR = State Route
VOC = volatile organic compound

Table 3.3-16 SR 152 (North) to Road 11 Wye Alternative Total Emissions and Summary of San Joaquin Valley Air Pollution Control District and General Conformity Threshold Exceedances for Construction[1] (tons/year)

Activities	VOC	CO[4]	NO_X	SO_2[4]	PM_{10}[5]	$PM_{2.5}$[5]
SJVAPCD annual CEQA significance thresholds[2]	10	N/A	10	N/A	15	15
Annual GC *de minimis* levels applicable to the SJVAB[3]	10	N/A	10	100	100	100
Year 2018						
Emissions (tons/year)	0.00	0.00	0.00	0.00	0.01	0.00
Exceeds SJVAPCD CEQA thresholds?	No	N/A	No	N/A	No	No
Exceeds GC threshold?	No	N/A	No	No	No	No
Year 2019						
Emissions (tons/year)	6.66	63.00	104.21	0.34	22.75	4.93
Exceeds SJVAPCD CEQA thresholds?	No	N/A	Yes	N/A	Yes	No
Exceeds GC threshold?	No	N/A	Yes	No	No	No
Year 2020						
Emissions (tons/year)	9.66	98.67	136.32	0.44	25.50	6.57
Exceeds SJVAPCD CEQA thresholds?	No	N/A	Yes	N/A	Yes	No
Exceeds GC threshold?	No	N/A	Yes	No	No	No
Year 2021						
Emissions (tons/year)	6.67	70.91	111.56	0.35	25.14	5.90
Exceeds SJVAPCD CEQA thresholds?	No	N/A	Yes	N/A	Yes	No
Exceeds GC threshold?	No	N/A	Yes	No	No	No

Activities	VOC	CO[4]	NO_X	SO_2[4]	PM_{10}[5]	$PM_{2.5}$[5]
Year 2022						
Emissions (tons/year)	2.45	17.93	38.26	0.33	1.72	1.50
Exceeds SJVAPCD CEQA thresholds?	No	N/A	Yes	N/A	No	No
Exceeds GC threshold?	No	N/A	Yes	No	No	No
Year 2031						
Emissions (tons/year)	0.15	4.90	0.64	0.01	2.81	0.37
Exceeds SJVAPCD CEQA thresholds?	No	N/A	No	N/A	No	No
Exceeds GC threshold?	No	N/A	No	No	No	No
Year 2032						
Emissions (tons/year)	0.13	4.85	0.57	0.01	2.81	0.37
Exceeds SJVAPCD CEQA thresholds?	No	N/A	No	N/A	No	No
Exceeds GC threshold?	No	N/A	No	No	No	No

Source: Authority and FRA, 2017

[1] Detailed model parameters and assumptions are included in the Air Quality and Global Climate Change Technical Report (Authority and FRA 2016). The emissions presented are conservative, because the analysis assumed a fleet average mix of construction equipment and thus does not include the Authority's commitment to mandate Tier 4-only equipment for off-road construction equipment.

[2] The SJVAPCD has significance thresholds for NO_X ROG/VOC, PM_{10}, and $PM_{2.5}$. The district currently does not have thresholds for CO or SO_X. Section 3.3.4.3 summarizes the CEQA significance for these pollutants.

[3] The GC *de minimis* thresholds for criteria pollutants are based on the SJVAB federal attainment status. The SJVAB is considered in extreme nonattainment for the ozone NAAQS, is a nonattainment area for $PM_{2.5}$, and is a maintenance area for the CO and PM_{10} NAAQS. Although the SJVAB is in attainment for SO_X, since SO_X is a precursor for $PM_{2.5}$, the $PM_{2.5}$ GC *de minimis* threshold was used.

[4] While the SJVAPCD's 2002 GAMAQI does not include quantitative thresholds for CO and SO_X, the Central Valley Wye alternatives emissions were evaluated against the SJVAPCD's 2015 GAMAQI. Determination was made that the Central Valley Wye alternatives emissions would not exceed those quantitative thresholds.

[5] PM_{10} and $PM_{2.5}$ emissions have incorporated the SJVAPCD Regulation VIII requirements and dust control measures the Authority committed to in the Statewide Program EIR/EIS.

VOC = volatile organic compound

CEQA = California Environmental Quality Act
CO = carbon monoxide
EIR/EIS = environmental impact report/environmental impact statement
GAMAQI = Guide for Assessing and Mitigating Air Quality Impacts GC = general conformity
N/A = not applicable
NAAQS = National Ambient Air Quality Standards
NO_X = nitrogen oxides
PM_{10} = particulate matter smaller than or equal to 10 microns in diameter
$PM_{2.5}$ = particulate matter smaller than or equal to 2.5 microns in diameter
ROG = reactive organic gases
SJVAB = San Joaquin Valley Air Basin
SJVAPCD = San Joaquin Valley Air Pollution Control District
SO_2 = sulfur dioxide
SO_X = sulfur oxide
SR = State Route

Impact AQ#2: Temporary Direct Impacts on Implementation of an Applicable Air Quality Plan

Emissions from construction of the Central Valley Wye alternatives would be temporary, occurring for approximately 5 years for the majority of construction, from 2018 through 2022, and over a 2- to 3-year timeframe, between 2031 and 2033 for electrical interconnections and network upgrade elements. Once construction is complete, this temporary impact would no longer occur. However, construction could result in air quality impacts and exceed thresholds established in applicable air quality plans. As discussed for Impact AQ#1, construction pollutant emissions would be generated through earthmoving, combustion in heavy equipment and trucks, and paint and other coating application.

As previously described, the Central Valley Wye alternatives are within a nonattainment area and maintenance area for the NAAQS and is thereby subject to USEPA's GC thresholds. NO_X emissions from Central Valley Wye alternatives construction activities would exceed the GC applicability thresholds, as indicated in Table 3.3-13 through Table 3.3-16. $PM_{10,}$ $PM_{2.5}$, VOC, and SO_2 emissions are below the GC applicability thresholds. As discussed for Impact AQ#1, the GC threshold for NO_X would be exceeded in 4 years of construction. The highest exceedances would occur in 2020 and would be a maximum of 134.40 tons per year over the threshold for the Avenue 21 to Road 13 Alternative and a minimum of 123.86 tons per year over the threshold for the SR 152 (North) to Road 19 Alternative in 2020. As noted in Section 3.3.4.3, the analysis of emissions presented here does not include the effect of the Authority's mandate for construction contractors to use construction equipment that meets Tier 4 standards. The emissions in Table 3.3-11 through Table 3.3-14 and the corresponding impacts thus represent a conservative assessment, since the emissions in those tables assume a fleet average mix of construction equipment.

The SJVAPCD has also developed air quality plans with associated mass emissions thresholds, which have been prepared to attain federal and state ambient air quality standards. As described in Impact AQ #1, NO_X and PM_{10} emissions could exceed the SJVAPCD's mass emission thresholds, which would impede implementation of the 8-hour SJVAPCD 2007 Ozone Plan, the 2004 Extreme Ozone 1-hour Attainment Demonstration Plan, and the 2007 PM_{10} Maintenance Plan. As discussed for Impact AQ#1, the annual SJVAPCD threshold for NO_X would be exceeded in 4 years of construction by a maximum of 134.40 tons per year for the Avenue 21 to Road 13 Alternative and a minimum of 123.86 tons per year for the SR 152 (North) to Road 19 Alternative. The annual SJVAPCD threshold for PM_{10} would be exceeded in 2 years of construction by a maximum of 10.77 tons per year for the Avenue 21 to Road 13 Alternative and a minimum of 10.50 tons per year for the SR 152 (North) to Road 11 Alternative.

Incorporation of fugitive dust emissions plans and use of selective paints as part of the design of the Central Valley Wye alternatives (AQ-IAMF#1 and AQ-IAMF#2) would minimize the construction-period PM and VOC emissions through use of best management practices that reduce fugitive dust and limit activities that would otherwise contribute to emissions and by requiring the use of low-VOC paints. Although these design measures would reduce PM and VOC emissions, exceedances of SJVAPCD's mass emission thresholds (for PM_{10}) would still occur, as shown in Table 3.3-13 through Table 3.3-16.

CEQA Conclusion

The impact under CEQA would be significant because construction of the Central Valley Wye alternatives could result in the exceedance of the SJVAPCD thresholds for NO_X and PM_{10}, which could conflict with the SJVAPCD's ozone and PM_{10} plans. The Central Valley Wye alternatives include design measures to minimize fugitive dust from construction vehicles and VOC emissions from paint products, which would reduce emissions but not avoid exceedances of SJVAPCD thresholds for PM. AQ-MM#1, AQ-MM#2, and AQ-MM#3 would reduce and minimize impacts by requiring the cleanest reasonably available equipment and control measures to limit criteria pollutant emissions from construction equipment, vehicles, and concrete batch plants. AQ-MM#4 would offset impacts through a contractual agreement between the Authority and the SJVAPCD to provide funds for the SJVAPCD's Emission Reduction Incentive Program. With the

implementation of offsets, Central Valley Wye alternatives construction emissions would not exceed the SJVAPCD thresholds and the conflict with the air quality plans would not occur. Thus, with implementation of AQ-MM#1, AQ-MM#2, AQ-MM#3, and AQ-MM#4, the impact under CEQA would be less than significant because criteria pollutant emissions would be reduced as follows: exceedances of NO_X would be offset to net zero because emissions of this pollutant are subject to GC offsetting requirements, and exceedances of PM_{10} would be offset to below SJVAPCD CEQA thresholds because emissions are in excess of SJVAPCD CEQA thresholds and below GC *de minimis* thresholds. With emissions below the thresholds, no conflicts with air quality plans would occur.

Impact AQ#3: Temporary Indirect Impacts on Air Quality outside the SJVAB

Air quality impacts could occur outside the SJVAB associated with hauling material from locations in other air basins to the Central Valley Wye alternatives. Specifically, material hauling would occur within the SFBAAB because initial analysis of ballast and sub-ballast availability within the SJVAB indicates there may not be sufficient ballast and sub-ballast material from quarries in the SJVAB given the large quantity of material required. Consequently, the analysis assumed all ballast and sub-ballast would come from the SFBAAB to represent a worst-case hauling scenario. Transporting ballast, sub-ballast, and concrete slabs to the SJVAB would result in short-term criteria pollutant emissions in the SFBAAB because trucks hauling the material would directly cause emissions through combustion of fuel. As discussed in the Air Quality and Global Climate Change Technical Report (Authority and FRA, 2016), the SR 152 (North) to Road 19 Alternative would require the maximum amount of ballast and sub-ballast to be hauled, while the SR 152 (North) to Road 11 Alternative would result in the minimum amount of ballast and sub-ballast to be hauled (Authority and FRA 2016).

The results of an emissions evaluation for the Central Valley Wye alternatives demonstrate that the worst-case emissions from multiple hauling scenarios (see the Air Quality and Global Climate Change Technical Report for a description of the hauling scenarios) would be below the GC thresholds for all pollutants in the SFBAAB. However, emissions would exceed the Bay Area Air Quality Management District (BAAQMD) CEQA thresholds for NO_X for all of the hauling scenarios analyzed. Therefore, NO_X emissions could have an impact in the SFBAAB. Detailed analysis for material hauling emissions is presented in the Air Quality and Global Climate Change Technical Report (Authority and FRA 2016).

CEQA Conclusion

The impact under CEQA would be significant because construction of the Central Valley Wye alternatives would require the transportation of ballast, sub-ballast, and concrete slabs from the SFBAAB that would result in short-term criteria pollutant emissions that could exceed the BAAQMD thresholds for NO_x and conflict with the BAAQMD's 2010 Clean Air Plan. AQ-MM#5, Purchase Offsets and Off-Site Emission Mitigation for Emissions Associated with Hauling Ballast Material in Certain Air Districts would offset impacts by requiring the Authority to secure a sufficient quantity of NO_x offsets necessary to result in NO_x emissions below the BAAQMD threshold for each calendar year that exceedances occur. With implementation of AQ-MM#5, the impact under CEQA would be less than significant because NO_x emissions would be offset to below the BAAQMD threshold, and there would be no conflict with the BAAQMD 2010 Clean Air Plan.

Impact AQ#4: Permanent Direct and Indirect Impacts on Global Climate Change—Greenhouse Gas Emissions

The time that CO_2 remains in the atmosphere cannot be definitively quantified because of the wide range of time scales in which carbon reservoirs exchange CO_2 with the atmosphere. Consequently, there is no single value for the half-life of CO_2 in the atmosphere (International Panel on Climate Change [IPCC] 1997), and the duration that CO_2 emissions from a short-term project (i.e., construction emissions) would remain in the atmosphere is between 5 and 200 years (IPCC 2001). Other GHG pollutants, such as N_2O, can remain in the atmosphere for 121 years (IPCC 2013). During construction of the Central Valley Wye alternatives, combustion of fuels in heavy equipment and trucks would generate GHG emissions.

As shown in Table 3.3-17, GHG emissions from the construction phase of all four Central Valley Wye alternatives were quantified according to the Council on Environmental Quality (CEQ) guidance on considering GHG emissions in NEPA documents (CEQ 2016).[13] As discussed for Impact AQ#1, the level of emissions generated during construction of the Central Valley Wye alternatives is a product of many factors, and it is not possible to identify a single narrative that explains why certain alternatives have the highest or lowest emissions among all of the Central Valley Wye alternatives.

GHGs are not criteria pollutants and are thus not subject to the GC rule. The total GHG construction emissions were estimated to be less than 0.02 percent of the statewide GHG emissions.[14] To conservatively estimate the amortized GHG emissions, the usable life of the HSR system is assumed to be only 25 years, though the actual project life is expected to be much longer). A 25-year project life is conservative because a shorter period would result in higher annual GHG emissions. This is because amortized emissions are determined by dividing total construction emissions by the lifetime of the Central Valley Wye alternatives and the larger HSR system; thus, a smaller (i.e., conservative) amortizing period results in a higher amount of emissions. The estimated amortized GHG construction emissions for all four Central Valley Wye alternatives are compared in Table 3.3-17. The Avenue 21 to Road 13 Wye Alternative would have the highest total and annual 25-year amortized construction GHG emissions (91,828 and 3,673 metric tons CO_2e, respectively). The SR 152 (North) to Road 19 Wye Alternative would have the lowest total and annual 25-year amortized construction GHG emissions (79,654 and 3,186 metric tons CO_2e, respectively), approximately 15 percent lower than those for the Avenue 21 to Road 13 Wye Alternative.

GHG reductions would occur from the removal of on-road vehicle and aircraft trips in the Merced to Fresno area as people shift their modes of transportation to the HSR. Because GHG-generating car and aircraft trips would be removed with operations of the HSR, this short-term increase in GHG emissions generated during construction would be offset by the long-term net GHG reductions in operational emissions. These offsets would occur with less than 1 month of HSR operation of the Merced to Fresno Section, when calculated relative to the 2015 existing and 2040 future conditions. Therefore, while short-term increases in GHG emissions would be associated with construction activities of the Central Valley Wye alternatives, operations would result in long-term net GHG reductions.

CEQA Conclusion

The impact under CEQA would be less than significant because operations of the Central Valley Wye alternatives would remove car and aircraft trips in the Merced to Fresno area and would result in long-term statewide net GHG reductions. Short-term increases in GHG emissions would occur during construction from the combustion of fuels in heavy equipment and trucks.[15] However, GHG reductions would occur from the removal of on-road vehicle and aircraft trips in the Merced to Fresno area as people shift their modes of transportation to the HSR. Because GHG-generating car and aircraft trips would be removed with operations of the HSR, the short-term increase in GHG emissions generated during construction would be offset by the long-term net GHG reductions in operational emissions during the operations phase. Additionally, the HSR project is included in the AB 32 scoping plan as Measure #T-9 and would be consistent with the state's 2020 goal. Additionally, GHG reductions would occur for each year that the HSR system is operational, resulting in long-term GHG reductions during the post-2020 period. Such reductions in the post-2020 period would be consistent with the statewide goal specified in SB 32. Consequently, the Central Valley Wye alternatives would

[13] Presidential Executive Order on Promoting Energy Independence and Economic Growth was issued on March 28, 2017, and rescinded the CEQ guidance to consider GHG emissions. The CEQ guidance is no longer in effect; however, it has been retained in the absence of other guidance to replace it.

[14] The comparison was made to the most recent CARB emissions inventory (2012) that estimated the annual CO_2e emissions in California are about 442 MMT (CARB 2016f).

[15] Because emissions of CO_2 are not included in EPA's Tier 4 emissions standards, short-term GHG emissions would not be explicitly reduced by the Authority's commitment to mandate the use of Tier 4-only construction equipment.

not impede the state from meeting the statewide 2020 and post-2020 GHG emissions target. Therefore, CEQA does not require any mitigation.

Table 3.3-17 Central Valley Wye Alternatives Greenhouse Gas Construction Emissions (metric tons of CO_2e per year) [1, 2]

Year	Alternative			
	SR 152 (North) to Road 13 Wye	SR 152 (North) to Road 19 Wye	Avenue 21 to Road 13 Wye	SR 152 (North) to Road 11 Wye
2018	< 1	< 1	< 1	< 1
2019	23,575	20,380	25,783	22,164
2020	28,151	25,203	30,285	26,786
2021	26,462	23,895	28,663	25,047
2022	4,967	5,916	4,967	4,833
2031	1,063	1,595	1,063	1,063
2032	1,066	1,598	1,066	1,066
2033	0	1,066	0	0
Total	**85,285**	**79,654**	**91,828**	**80,960**
Amortization GHG Emissions (averaged over 25 years)				
CO_2e per Year	3,411	3,186	3,673	3,238
Payback of GHG Emissions (months)[3]				
2015 Existing Conditions (HSR System in 2015 vs 2015 No HSR System)	<1	<1	<1	<1
2040 Future No Project (HSR System in 2040 vs 2040 No HSR System)	<1 to 1	<1 to 1	<1 to 1	<1 to 1

Source: Authority and FRA, 2017
Emission factors for CO_2 do not account for improvements in technology.
[1] The CO_2e emissions for each year of construction are included in the Air Quality and Global Climate Change Technical Report (Authority and FRA 2016).
[2] Central Valley Wye alternatives life assumed to be 25 years.
[3] Payback periods were estimated by dividing the GHG emissions during construction years by the annual GHG emission reduction during the Central Valley Wye alternatives operation in the opening year. Table 3.3-23 presents the operational statewide GHG emissions reductions.
CO_2 = carbon dioxide
CO_2e = carbon dioxide equivalent
GHG = greenhouse gas
HSR = high-speed rail
SR = State Route

Impact AQ#5: Temporary Direct Impacts on Air Quality—Asbestos and Lead-Based Paint

Demolition of older structures, roadway paving materials, and bridge structures within the project footprints for HSR facilities as part of construction of the Central Valley Wye alternatives could result in the release of asbestos and lead-based paint, which could present a health hazard for workers, residences, and other sensitive receptors near the construction activities. As shown in Table 3.3-18, the quantity of structural and roadway material that would be demolished with the SR 152 (North) to Road 13 Wye Alternative is 1,765,727 cubic yards, almost double the quantity of the Avenue 21 to Road 13 Wye Alternative at 787,083 cubic yards.

Table 3.3-18 Estimated Central Valley Wye Alternative Demolition Quantities in Cubic Yards

Material Type	Alternative			
	SR 152 (North) to Road 13 Wye	SR 152 (North) to Road 19 Wye	Avenue 21 to Road 13 Wye	SR 152 (North) to Road 11 Wye
Agricultural Structures	456,500	420,500	376,250	407,750
Commercial Buildings	348,000	248,000	2,000	196,000
Residential Buildings	168,000	218,750	126,500	99,000
Roadway Paving and Bridge Structures	793,227	707,672	282,333	749,266
Total Demolition Quantities (CY)	**1,765,727**	**1,594,922**	**787,083**	**1,452,016**

Sources: Authority 2016b; Authority 2017
CY = cubic yards
SR = State Route

The demolition of asbestos-containing materials is subject to the limitations of the National Emissions Standards for Hazardous Air Pollutants regulations and would require an asbestos inspection. The SJVAPCD's Compliance Division would be consulted before demolition begins. As described in Section 3.10, the Central Valley Wye alternatives would include strict compliance with existing asbestos regulations as part of project design.

Buildings in the air quality RSA might 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. Historically, asbestos was a widely used and could make up a portion of the demolition materials, such as fire retardant materials in buildings and in cement in roadways and bridges. If encountered during demolitions, lead-based paint and asbestos would be handled and disposed of in accordance with applicable standards. Section 3.10 discusses potential issues concerning lead-based paint during construction of the Central Valley Wye alternatives.

Merced, Madera, Fresno, and Stanislaus Counties are designated by California Department of Conservation Division of Mines and Geology as areas likely to contain NOA. However, the specific locations in these counties where construction of the Central Valley Wye alternatives would occur are in areas designated not likely to contain NOA (California Department of Conservation Division of Mines and Geology 2000). Incorporation of AQ-IAMF#1 would further minimize the impact from NOA. Therefore, NOA would not likely be disturbed during construction, and sensitive receptors would not be exposed to NOA.

Additionally, compliance with existing asbestos regulations and lead-based paint handling and disposal standards would prevent sensitive receptors from being exposed to elevated pollutant concentrations from asbestos and lead (SJVAPCD 2015).

CEQA Conclusion

The impact under CEQA would be less than significant because the Central Valley Wye alternatives' design and 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 asbestos and lead-based paint. Therefore, CEQA does not require any mitigation.

Impact AQ#6: Temporary Direct Impacts on Air Quality—Localized Health Impacts

Construction along the Central Valley Wye alternatives guideways, alignments, and associated electrical infrastructure could result in localized air quality impacts that present health risks to residences and other sensitive receptors. Activities include construction of the alignment and road crossings, and concrete batch plant operations. There are residences within 1,000 feet of each of the Central Valley Wye alternatives that could be affected by construction emissions. As discussed in Table 3.3-5, the El Capitan High School, Richard Bernasconi Neighborhood Park, Washington Elementary School, and Yosemite Church are located 200, 600, 350, and 700 feet, respectively, from the existing Site 7—Le Grand Junction/Sandy Mush Road, Warnerville–Wilson 230 kV Transmission Line, which would be reconductored to support operation of the SR 152 (North) to Road 19 Wye Alternative. Alview Elementary School and Chowchilla Seventh-day Adventist Church are within the project footprint of the Avenue 21 to Road 13 Wye Alternative. Fairmead Elementary School and Fairmead Head Start childcare center are located approximately 460 and 350 feet from both the SR 152 (North) to Road 13 and SR 152 (North) to Road 11 Wye alternatives, respectively, and approximately 410 feet and 300 feet from the SR 152 (North) to Road 19 Wye Alternative, respectively.

According to the air dispersion modeling conducted, neither combined nor individual emissions from all construction activities along the guideway/alignments or Site 7—Le Grand Junction/Sandy Mush Road, Warnerville–Wilson 230 kV Transmission Line, including road crossings and concrete batch plants, would result in pollutant concentrations exceeding the applicable NAAQS and CAAQS for any pollutant, nor considerably contribute to further exacerbation of exceedances of PM_{10} and $PM_{2.5}$ standards.[16] The Air Quality and Global Climate Change Technical Report provides detailed results of the air dispersion modeling analysis (Authority and FRA 2016). The air dispersion modeling indicates that 24-hour average and annual average PM_{10} concentrations would be a maximum of 7.5 $\mu g/m^3$ and 0.6 $\mu g/m^3$, respectively. In addition, the design of the Central Valley Wye alternatives would minimize fugitive dust emissions during construction through dust-reduction measures. The Authority would require construction contractors to prepare a fugitive dust control plan and would employ measures to minimize fugitive dust emissions by limiting visible dust emissions, watering unpaved roads, limiting vehicle travel speed, and suspending dust-generating activities when wind speed is in exceedance of 25 miles per hour (AQ-IAMF#1; see, Appendix 2-B for a list of all applicable IAMFs).

The health risk assessment concludes that the incremental increase in cancer risk associated with DPM and other pollutants from construction equipment exhaust and concrete batching activities would not exceed the applicable SJVAPCD CEQA threshold of 20 in 1 million. Additionally, the acute and chronic hazard indices during construction are anticipated to be 0.7 and 0.0, respectively, which are below the SJVAPCD unit-less CEQA threshold value of 1. Furthermore, construction activities associated with the guideway/alignments and Site 7—Le Grand Junction/Sandy Mush Road, Warnerville–Wilson 230 kV Transmission Line would occur near the sensitive receptors for only short periods of time. The Air Quality and Global Climate Change Technical Report (Authority and FRA 2016) provides a detailed discussion and presentation of results from the air quality dispersion analysis and health risk assessment. The health risk assessment is based on a modeled representation of all Central Valley Wye alternatives, consistent with methodology for other HSR sections. Emissions used in the analysis are representative of a typical 2-mile length of construction that is applicable to all of the Central Valley Wye alternatives. The health risk assessment also assumes that residential uses would be adjacent to the construction fence line, which is a worst-case assumption that could occur for any of the Central Valley Wye alternatives. Therefore, the localized health impacts are identical for all Central Valley Wye alternatives. As noted in Section 3.3.4.3, the analysis of mass emissions presented in this analysis does not include the effect of the Authority's mandate for construction contractors to use construction equipment that meets Tier 4 standards. The localized air quality

[16] While the SJVAPCD's 2002 GAMAQI is used to evaluate impacts associated with the Central Valley Wye, the localized analysis is consistent with the requirements of SJVAPCD's 2015 GAMAQI, and this analysis indicates the Central Valley Wye would not exceed any localized thresholds from the 2015 GAMAQI.

impacts discussed here thus represent a conservative assessment, since the dispersion modeling was conducted with mass emissions that assumed a fleet average mix of equipment. Mass emissions of criteria pollutants from a Tier 4-only fleet would result in reduced emissions relative to the fleet average, and the corresponding pollutant concentrations and health risks would also be reduced.

Construction of the Central Valley Wye alternatives could result in localized air quality impacts that present health risks to residences and other sensitive receptors. However, the Central Valley Wye alternatives' design features and SJVAPCD rules include effective measures to minimize fugitive dust emissions. As a result, construction activities would not exceed the SJVAPCD's significant cancer risk threshold of 20 in 1 million, the hazard index threshold of 1, or the NAAQS and CAAQS standards for PM_{10}.

CEQA Conclusion

The impact under CEQA would be less than significant because the incremental increase in cancer risk associated with DPM and other pollutants from Central Valley Wye alternatives construction would not exceed the SJVAPCD's cancer risk threshold of 20 in 1 million, the hazard index threshold of 1, or the NAAQs and CAAQs standards for PM_{10}. Additionally, the Central Valley Wye alternatives' design features and SJVAPCD rules include effective measures to minimize fugitive dust emissions. Therefore, CEQA does not require any mitigation.

Operations Impacts

Operations of the Central Valley Wye alternatives would result in changes in private on-road vehicle trips and aircraft traffic across the region and state, as passengers shift to the HSR system. Additionally, operations of the Central Valley Wye alternatives would require increased output from power plants to power the trains, and the train movement itself would also generate wind-induced dust. Maintenance activities that would occur for the Central Valley Wye alternatives are more fully described in Chapter 2.

Impact AQ#7: Continuous Permanent Direct Impacts on Air Quality within the SJVAB—On-Road Vehicle, Power Plant, and Aircraft Emissions

Over the long term, on-road vehicle and aircraft emissions could decrease in the region because it is anticipated that people would shift from using on-road vehicles and aircraft to the HSR system, which is less emissions intensive than other transportation modes. These reductions, however, would be partially offset by operational emissions associated with the train itself (the HSR would be powered by electricity from the regional power grid). These emissions were analyzed for the 2015 existing conditions for CEQA purposes and future no project conditions in 2040 for NEPA purposes.

As described in the following subsection and shown in Table 3.3-19 for the two ridership scenarios, the Central Valley Wye alternatives and larger HSR system in 2040 would result in a net regional decrease in emissions of all criteria pollutants compared to conditions in 2040 without the HSR system. Table 3.3-19 also indicates the Central Valley Wye alternatives and HSR system in 2015 would result in a net regional decrease in total emissions of all criteria pollutants compared to conditions in 2015 without the HSR system. The only variation between the Central Valley Wye alternatives' permanent operational emissions is for PM_{10} and $PM_{2.5}$ emissions, which occur as wind-induced fugitive dust. Wind-induced dust emissions are a function of track length; thus, the Central Valley Wye alternatives have varying track lengths and wind-induced dust emissions. The SR 152 (North) to Road 13 Alternative and Avenue 21 to Road 13 Alternative have the highest PM_{10} dust emissions (15 tons per year of PM_{10}), while the Avenue 21 to Road 13 Alternative has the highest $PM_{2.5}$ dust emissions (2.3 tons per year of $PM_{2.5}$). The SR 152 (North) to Road 19 Alternative and SR 152 (North) to Road 11 Alternative have the lowest PM_{10} dust emissions (14 tons per year of PM_{10}), while the SR 152 (North) to Road 11 Alternative has the lowest $PM_{2.5}$ dust emissions (2.1 tons per year of $PM_{2.5}$).

Table 3.3-19 Summary of Estimated Regional Emissions Changes[1] (Project vs. No Project 2015 Existing and 2040 Future Conditions)

Project Element	VOC (tons/year)		CO (tons/year)		NO_X (tons/year)		SO_2 (tons/year)		PM_{10} (tons/year)		$PM_{2.5}$ (tons/year)	
	M	H	M	H	M	H	M	H	M	H	M	H
2015 CEQA Existing Conditions (2015 Project vs. 2015 No Project)												
Indirect Emissions[1] – All Alternatives												
Roadways	-9	-11	-324	-427	-40	-53	-1	-1	-26	-35	-7	-9
Aircraft	-2	-1	-19	-11	-19	-10	-2	-1	-1	0	-1	0
Power Plants	1	1	21	23	11	12	2	2	2	3	2	2
Direct Emissions[2]												
Fugitive dust from train operations												
SR 152 (North) to Road 13	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	15		2.2	
SR 152 (North) to Road 19	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	14		2.2	
Avenue 21 to Road 13	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	15		2.3	
SR 152 (North) to Road 11	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	14		2.1	
Total Emissions												
SR 152 (North) to Road 13	-10	-11	-323	-415	-48	-51	-1	0	-10	-17	-3	-5
SR 152 (North) to Road 19	-10	-11	-323	-415	-48	-51	-1	0	-11	-18	-3	-5
Avenue 21 to Road 13	-10	-11	-323	-415	-48	-51	-1	0	-10	-17	-3	-5
SR 152 (North) to Road 11	-10	-11	-323	-415	-48	-51	-1	0	-11	-18	-3	-5
2040 NEPA Future Conditions (2040 Project vs. 2040 No Project)												
Indirect Emissions – All Alternatives												
Roadways	-1	-1	-92	-102	-8	-10	-1	-1	-36	-34	-9	-8
Aircraft	-3	-2	-26	-15	-26	-14	-3	-2	-1	0	-1	0
Power Plants	1	1	21	23	11	12	2	2	2	3	2	2

Project Element	VOC (tons/year)		CO (tons/year)		NO_X (tons/year)		SO_2 (tons/year)		PM_{10} (tons/year)		$PM_{2.5}$ (tons/year)	
	M	H	M	H	M	H	M	H	M	H	M	H
Direct Emissions												
Fugitive dust from train operations												
SR 152 (North) to Road 13	N/A	N/A	N/A	N/A	N/A	N/A	N/A		15		2.2	
SR 152 (North) to Road 19	N/A	N/A	N/A	N/A	N/A	N/A	N/A		14		2.2	
Avenue 21 to Road 13	N/A	N/A	N/A	N/A	N/A	N/A	N/A		15		2.3	
SR 152 (North) to Road 11	N/A	N/A	N/A	N/A	N/A	N/A	N/A		14		2.1	
Total Emissions												
SR 152 (North) to Road 13	-3	-2	-97	-93	-23	-13	-2	-1	-19	-17	-6	-3
SR 152 (North) to Road 19	-3	-2	-97	-93	-23	-13	-2	-1	-20	-18	-6	-3
Avenue 21 to Road 13	-3	-2	-97	-93	-23	-13	-2	-1	-19	-17	-6	-3
SR 152 (North) to Road 11	-3	-2	-97	-93	-23	-13	-2	-1	-20	-18	-6	-4

Source: Authority and FRA, 2017

[1] Because the Central Valley Wye alternatives would not exist in isolation without the rest of the HSR system, this table also applies to the larger HSR system. This table shows regional emissions with and without the Central Valley Wye alternatives + HSR system.

Totals may not add up exactly because of rounding.

CEQA = California Environmental Quality Act

H = High Ridership Scenario

HSR = high speed rail

M = Medium Ridership Scenario

NEPA = National Environmental Policy Act

NO_X = nitrogen oxide

PM_{10} = particulate matter smaller than or equal to 10 microns in diameter

$PM_{2.5}$ = particulate matter smaller than or equal to 2.5 microns in diameter

CO = carbon monoxide

SO_2 = sulfur dioxide

SR = State Route

VOC = volatile organic compound

On-Road Vehicle Emissions

The Central Valley Wye alternatives as part of the larger HSR System would decrease VMT from other modes of travel (passenger cars, buses, diesel trains, and aircraft) and their associated emissions when it begins operations because it is anticipated that people would shift from using those modes of travel to using the HSR. As discussed previously, because the Central Valley Wye alternatives would not exist in isolation without the rest of the HSR system, a discussion of emissions scenarios with and without the Central Valley Wye alternatives also applies to the larger HSR system.

The Merced to Fresno Final EIR/EIS explained that the HSR system would reduce on-road VMT within the SJVAB and statewide, and reduce intrastate air travel (Authority and FRA 2012: page 3.3-53 through 3.3-54). As a result of the Central Valley Wye alternatives, some vehicles may need to travel additional distances to cross the HSR tracks on new roadway overpasses. On average, roadway overpasses would be provided approximately every 2 miles along the tracks. It is estimated that the four Central Valley Wye alternatives would result in no more than 1 mile of out-of-direction travel for vehicles to cross the HSR tracks. The width of the roadway overpasses would accommodate both farm equipment and school buses traveling in opposite lanes. Because of this frequency of roadway overpasses, additional distances traveled by vehicles to cross the HSR tracks are expected to be a small fraction relative to regional VMT reductions; therefore, this is not discussed further in the analysis.

At the regional level, the air quality analysis is based primarily on the regional VMT. Table 3.3-20 and Table 3.3-21 summarize the reduction in VMT and in criteria pollutant emissions, respectively, in the air quality RSA for all of the Central Valley Wye alternatives for the 2015 existing CEQA conditions and 2040 NEPA conditions, based on travel mode projections of VMT developed for the HSR system in the HSR 2016 Business Plan (Authority 2016a).

Table 3.3-20 On-Road Vehicle VMT for the No Project Alternative and the Central Valley Wye Alternatives[1] (under the Medium and High Ridership Scenarios)

Area	No Project VMT Total Annual Traffic		VMT with HSR System (including Central Valley Wye) Total Annual Traffic	
	Medium	High	Medium	High
2015 CEQA Existing Conditions				
Madera	739,860,357	724,470,074	650,104,437	610,842,505
Merced	1,239,904,084	1,217,771,426	1,095,973,335	1,023,513,300
Regional Total	1,979,764,441	1,942,241,501	1,746,077,772	1,634,355,805
2040 NEPA Future Conditions				
Madera	1,089,403,184	1,351,421,592	964,659,976	1,193,501,450
Merced	1,842,074,869	2,205,535,193	1,642,039,221	1,935,554,314
Regional Total	2,931,478,053	3,556,956,785	2,606,699,197	3,129,055,764

Source: Authority and FRA, 2017

[1] Because the Central Valley Wye alternatives would not exist in isolation without the rest of the HSR system, this table also applies to the larger HSR system. This table shows regional VMT with and without the Central Valley Wye alternatives + HSR system.

CEQA = California Environmental Quality Act
HSR = high-speed rail
NEPA = National Environmental Policy Act
VMT = vehicle miles traveled

Table 3.3-21 On-Road Vehicle Emission Changes from Operation of the Central Valley Wye Alternatives[1] vs. No Project (under the Medium and High Ridership Scenarios)

Element	VOC (tons/yr)		CO (tons/yr)		NO_X (tons/yr)		SO_2 (tons/yr)		PM_{10} (tons/yr)		$PM_{2.5}$ (tons/yr)	
	M	H	M	H	M	H	M	H	M	H	M	H
2015 CEQA Existing Conditions (2015 Project vs. 2015 No Project)												
Madera	-3	-4	-127	-161	-15	-20	0	0	-10	-13	-3	-3
Merced	-5	-7	-196	-265	-24	-33	-1	-1	-16	-22	-4	-6
Total Regional Net Emissions	-9	-11	-324	-427	-40	-53	-1	-1	-26	-35	-7	-9
2040 NEPA Future Conditions (2040 Project vs. 2040 No Project)												
Madera	0	-1	-36	-39	-3	-4	0	0	-13	-17	-3	-4
Merced	-1	-1	-56	-63	-5	-6	0	-1	-22	-17	-6	-3
Total Regional Net Emissions	-1	-1	-92	-102	-8	-10	-1	-1	-36	-34	-9	-8

Source: Author's compilation, 2017

[1] Because the Central Valley Wye alternatives would not exist in isolation without the rest of the HSR system, this table also applies to the larger HSR system. This table shows regional emissions with and without the Central Valley Wye alternatives + HSR system. Totals may not add up exactly because of rounding.

CEQA = California Environmental Quality Act
CO = carbon monoxide
H = High ridership Scenario
M = Medium Ridership Scenario
NEPA = National Environmental Policy Act
NO_X = nitrogen oxide
PM_{10} = particulate matter smaller than or equal to 10 microns in diameter
$PM_{2.5}$ = particulate matter smaller than or equal to 2.5 microns in diameter
SO_2 = sulfur dioxide
VMT = vehicle miles traveled
VOC = volatile organic compounds
yr = year

It is anticipated that all the Central Valley Wye alternatives would have the same regional VMT impacts and, therefore, the same regional impacts on air quality. The variations in routes among the Central Valley Wye alternatives would not result in differences in VMT, HSR ridership, or passenger purchasing decisions because all alternatives would have the same origins and destinations and similar travel times. Because there would be a reduction in VMT and emissions, there would be no impact from on-road vehicle emissions.

Power Plant Emissions

Analysts conservatively estimated the electrical demands caused by propulsion of the trains and the trains at terminal stations and in storage depots and maintenance facilities as part of the Central Valley Wye alternatives design. Analysts derived average emission factors for each kilowatt-hour required from CARB statewide emission inventories of electrical and cogeneration facilities data along with USEPA eGRID2012 (released October 2015) electrical generation data (see Table 3.3-22). The energy estimates used in this analysis for the propulsion of the HSR include the use of regenerative brake power.

The HSR system is currently analyzed as if it would be powered by the state's current electric grid. This is a conservative assumption because of the state requirement that an increasing fraction of electricity (50 percent by 2030) generated for the state's power portfolio comes from renewable energy sources. As such, the emissions generated for the HSR system are expected to be lower in the future than the emissions estimated for this analysis. Furthermore, under the 2013 Policy Directive POLI-PLAN-03, the Authority has adopted a goal to purchase 100 percent of the HSR system's power from renewable energy sources. It is anticipated that all the Central Valley Wye alternatives would have the same power plant emissions impacts and, therefore, the same regional impact on air quality. The minor variations in routes among the Central Valley Wye alternatives are not anticipated to result in quantifiable differences in electricity consumption.

Aircraft Emissions

The HSR system, including the Central Valley Wye alternatives, could affect travel at the regional airports within the San Joaquin Valley. When in operation, the HSR is predicted to reduce the number of aircraft flights because travelers could use the HSR rather than fly to their destinations. Table 3.3-23 summarizes the number of flights under the No Project Alternative and the Central Valley Wye alternatives/HSR system for the 2015 existing CEQA conditions and 2040 NEPA conditions, developed using ridership estimates in the HSR 2016 Business Plan (Authority 2016a).

As shown in Table 3.3-24, the HSR system, including the Central Valley Wye alternatives, is predicted to result in reduced regional and statewide emissions from aircraft when compared to the 2015 CEQA conditions and 2040 NEPA conditions. The minor variations in routes among the Central Valley Wye alternatives would not result in differences in aircraft flights, HSR ridership, or passenger purchasing decisions because all alternatives would have the same origins and destinations and similar travel times.

Table 3.3-22 Power Plant Emission Changes from Operation of the Central Valley Wye Alternatives[1] vs. No Project (under the Medium and High Ridership Scenarios)

Area	VOC (tons/year)		CO (tons/year)		NO_X (tons/year)		SO_2 (tons/year)		PM_{10} (tons/year)		$PM_{2.5}$ (tons/year)	
	M	H	M	H	M	H	M	H	M	H	M	H
2015 CEQA Existing Conditions (2015 Project vs. 2015 No Project)												
Statewide	12	14	207	227	105	116	17	19	23	25	21	23
Regional	1	1	21	23	11	12	2	2	2	3	2	2
2040 NEPA Future Conditions (2040 Project vs. 2040 No Project)												
Statewide	12	14	207	227	105	116	17	19	23	25	21	23
Regional	1	1	21	23	11	12	2	2	2	3	2	2

Source: Authority and FRA, 2017

[1] Because the Central Valley Wye alternatives would not exist in isolation without the rest of the HSR system, this table also applies to the larger HSR system. This table shows state and regional emissions with and without the Central Valley Wye alternatives + HSR system.

Totals may not add up exactly because of rounding.

CEQA = California Environmental Quality Act

CO = carbon monoxide

H = High Ridership Scenario

HSR = high-speed rail

M = Medium Ridership Scenario

NEPA = National Environmental Policy Act

NO_X = nitrogen oxide

PM_{10} = particulate matter smaller than or equal to 10 microns in diameter

$PM_{2.5}$ = particulate matter smaller than or equal to 2.5 microns in diameter

SO_2 = sulfur dioxide

VOC = volatile organic compounds

yr = year

Table 3.3-23 Aircraft Flights for Operation of the Central Valley Wye Alternatives[1] and the No Project Alternative (under the Medium and High Ridership Scenarios)

Area	Total No Project Number of Flights (per year)		Total Number of Flights with HSR System including Central Valley Wye (per year)	
	Medium	High	Medium	High
2015 CEQA Existing Conditions (2015 Project vs. 2015 No Project)				
Regional (San Joaquin Valley)	3,438	3,117	1,644	2,110
Statewide Total	268,567	250,276	188,430	173,177
2040 NEPA Future Conditions (2040 Project vs. 2040 No Project)				
Regional (San Joaquin Valley)	4,831	6,097	2,337	4,698
Statewide Total	380,189	416,659	268,814	309,505

Source: Authority and FRA, 2017

[1] Because the Central Valley Wye alternatives would not exist in isolation without the rest of the HSR system, this table also applies to the larger HSR system. This table shows state and regional flights with and without the Central Valley Wye alternatives + HSR system.

CEQA = California Environmental Quality Act
HSR = high-speed rail
NEPA = National Environmental Policy Act

Table 3.3-24 Aircraft Emission Changes from Operation of the Central Valley Wye Alternatives[1] vs. No Project (under the Medium and High Ridership Scenarios)

Element	VOC (tons/yr)		CO (tons/yr)		NO_X (tons/yr)		SO_2 (tons/yr)		PM_{10} (tons/yr)		$PM_{2.5}$ (tons/yr)	
	M	H	M	H	M	H	M	H	M	H	M	H
2015 CEQA Existing Conditions (2015 Project vs. 2015 No Project)												
Regional (San Joaquin Valley)	-2	-1	-19	-11	-19	-10	-2	-1	-1	0	-1	0
Total Statewide Net Emissions	-101	-97	-862	-829	-829	-798	-89	-86	-25	-24	-25	-24
2040 NEPA Future Conditions (2040 Project vs. 2040 No Project)												
Regional (San Joaquin Valley)	-3	-2	-26	-15	-26	-14	-3	-2	-1	0	-1	0
Total Statewide Net Emissions	-139	-134	-1,162	-1,118	-1,145	-1,101	-124	-119	-35	-33	-35	-33

Source: Author's compilation, 2017

[1] Because the Central Valley Wye alternatives would not exist in isolation without the rest of the HSR system, this table also applies to the larger HSR system. This table shows state and regional emissions with and without the Central Valley Wye alternatives + HSR system.

Totals may not add up exactly because of rounding.

CEQA = California Environmental Quality Act
CO = carbon monoxide
H = High Ridership Scenario
HSR = high-speed rail
M = Medium Ridership Scenario
NEPA = National Environmental Policy Act
NO_X = nitrogen oxide
PM_{10} = particulate matter smaller than or equal to 10 microns in diameter
$PM_{2.5}$ = particulate matter smaller than or equal to 2.5 microns in diameter
SO_2 = sulfur dioxide
VOC = volatile organic compounds
yr = year

Because long-term reductions of on-road vehicle and aircraft emissions resulting from operations of the HSR system, including the Central Valley Wye alternatives, would offset the increase in air pollutant emissions from increased power plant operations necessary to power the HSR system and increase in fugitive dust emissions from train movement, the Central Valley Wye alternatives would result in a net reduction of total pollutant emissions. For PM_{10} emissions, the SR 152 (North) to Road 13 Alternative and Avenue 21 to Road 13 Alternative have the lowest net reduction (i.e., lowest benefit) because, as discussed previously, these have the highest wind-induced PM_{10} dust emissions. The SR 152 (North) to Road 19 Alternative and SR 152 (North) to Road 11 Alternative have the highest net reduction (i.e., highest benefit) because these have the lowest wind-induced PM_{10} dust emissions. For $PM_{2.5}$ emissions, all of the Central Valley Wye alternatives would result in approximately the same net reduction, except for the SR 152 (North) to Road 11 Alternative, which would result in a slightly larger net reduction of $PM_{2.5}$ emissions for the high ridership scenario in 2040 relative to the 2040 no project conditions baseline. Thus, operations of the Central Valley Wye alternatives are anticipated to result in net reductions of criteria pollutant emissions in 2015 relative to the 2015 existing conditions and in 2040 relative to the 2040 no project conditions baseline.

CEQA Conclusion

The impact under CEQA would be less than significant because operations of the Central Valley Wye alternatives are anticipated to result in a net reduction of criteria pollutant emissions in 2015 relative to the CEQA existing conditions in 2015. Therefore, CEQA does not require any mitigation.

Impact AQ#8: Continuous Permanent Direct Impacts on Implementation of an Applicable Air Quality Plan

During operations, the Central Valley Wye alternatives could result in net decreases in all criteria pollutant emissions (VOC, CO, NO_X, SO_2, PM_{10} and $PM_{2.5}$) under both 2015 CEQA and 2040 NEPA conditions when compared to conditions without the Central Valley Wye alternatives, as shown in Table 3.3-19. As discussed for Impact AQ#7, as people shift from using on-road vehicles and aircraft to the HSR system, which is less emissions intensive than other transportation modes, emissions are anticipated to decrease. All Central Valley Wye alternatives would result in net decreases of emissions; however, as discussed for Impact AQ#7 with respect to PM_{10} emissions, the SR 152 (North) to Road 13 Alternative and Avenue 21 to Road 13 Alternative would have the lowest net decrease, and the SR 152 (North) to Road 19 Alternative and SR 152 (North) to Road 11 Alternative would have the highest net decrease. For PM2.5 emissions, all of the Central Valley Wye alternatives would result in approximately the same net decrease, with the exception of the high ridership scenario in 2040 for the SR 152 (North) to Road 11 Alternative. The net decrease in emissions for all Central Valley Wye alternatives would be consistent with the SJVAPCD 8-hour Ozone Plan (SJVAPCD 2007a and SJVAPCD 2016a), the 2004 Extreme Ozone 1-hour Attainment Demonstration Plan[17] (SJVAPCD 2004), the 2007 PM_{10} Maintenance Plan, the 2015 $PM_{2.5}$ Plan (SJVAPCD 2015), and the RTPs for Merced and Madera Counties (MCAG 2014; MCTC 2014). Therefore, operations of the Central Valley Wye alternatives would not conflict with or obstruct implementation of applicable air quality plans.

During operations, the VOC, NO_X, PM_{10}, and $PM_{2.5}$ emissions for any of the Central Valley Wye alternatives would not exceed the GC and SJVAPCD thresholds relative to the 2015 CEQA existing and 2040 NEPA future conditions and, therefore, would not conflict with or impede the implementation of the air quality plans for attainment of NAAQS.

CEQA Conclusion

The impact under CEQA would be less than significant because operations of the Central Valley Wye alternatives are anticipated to result in a net reduction of pollutant emissions relative to the

[17] The 1-hour O_3 standard was revoked by the USEPA, effective June 15, 2005, for areas including the SJVAB. However, the USEPA still approved the 2004 Extreme Ozone Attainment Demonstration Plan for 1-hour O_3 on March 8, 2010 (SJVAPCD n.d. (a)).

2015 CEQA conditions. Therefore, criteria pollutant emissions associated with operations of the Central Valley Wye alternatives would not conflict with or obstruct implementation of applicable air quality plans. Therefore, CEQA does not require any mitigation.

Impact AQ#9: Continuous Permanent Direct and Indirect Impacts on Global Climate Change—Greenhouse Gas Emissions—On-Road Vehicle, Power Plant, Electrical Equipment, and Aircraft Emissions

As discussed for Impact AQ#7, as people shift from using on-road vehicles and aircraft to the HSR system, which is less emissions intensive than other transportation modes, emissions are anticipated to decrease. Overall, the operations of the Central Valley Wye alternatives would have a net beneficial impact on GHG emissions. Table 3.3-25 and Table 3.3-26 compare the statewide and regional, respectively, GHG emission changes from the 2015 existing conditions and 2040 future conditions (expressed in terms of CO_2e) resulting from operations of the Central Valley Wye alternatives. The analysis estimated the emission changes from on-road vehicles, aircraft, and power plants.[18]

Unlike criteria pollutant emissions, the GHGs of primary concern to global climate change have lifetimes long enough such that mixing into the entire global atmosphere occurs; thus, the Central Valley Wye alternatives' contribution to global climate change is most accurately evaluated by assessing the Central Valley Wye alternatives' net GHG emissions at the state level. Because statewide decreases in emissions from on-road vehicles and aircraft would offset the increase in GHG emissions from increased power plant operations, the Central Valley Wye alternatives would result in a net reduction in statewide GHG emissions relative to the 2015 CEQA existing conditions and 2040 NEPA future conditions (see Table 3.3-25). The reduction in statewide GHGs would occur from technological improvements in on-road vehicles, and despite population and economic growth in the state. At the regional level, there would also be a net decrease in GHGs relative to the 2015 existing conditions and 2040 future conditions (refer to Table 3.3-26). However, as discussed previously, GHGs are global pollutants, so the regional level analysis for GHG is included for informational purposes only.

As described in Section 3.3.4.5, Determining Significance under CEQA, for projects to have a less than significant impact under CEQA on an individual and cumulative basis, the project must comply with an approved Climate Change Action Plan and demonstrate that it would not impede the state from meeting the statewide 2020 GHG emissions target. The HSR, which is included in the AB 32 scoping plan as Measure #T-9, would help the state meet the 29 percent reduction in GHG emissions by 2020 (CARB 2008). Further, as indicated in Table 3.3-25, the Central Valley Wye alternatives would result in a net reduction in GHG emissions relative to the 2015 existing conditions, ensuring the Central Valley Wye alternatives would be consistent with the reduction requirements outlined in AB 32, and the SB 32 reduction target of 40 percent below 1990 levels by 2030.

[18] GHG emissions associated with electrical equipment are so minor relative to the other sources (150 metric tons relative to millions of metric tons) that it is not included in Table 3.3-25. Specific information pertaining to GHG emissions from electrical equipment is discussed in the subsection Electrical Equipment and SF_6.

Table 3.3-25 Annual Estimated Statewide Greenhouse Gas Emission Changes from the Central Valley Wye Alternatives[1] under the Medium and High Ridership Scenarios

Project Element	Change in CO_2e Emissions because of HSR (MMT/year)	
	Medium	High
2015 CEQA Existing Conditions (2015 Project vs. 2015 No Project)		
Roadways	-1.1	-1.5
Aircraft	-0.7	-0.7
Power Plants	0.5	0.5
Total	-1.3	-1.6
2040 NEPA Future Conditions (2040 Project vs. 2040 No Project)		
Roadways	-0.5	-1.1
Aircraft	-1.0	-0.9
Power Plants	0.5	0.5
Total	-1.0	-1.5

Source: Authority and FRA, 2017
[1] Because the Central Valley Wye alternatives would not exist in isolation without the rest of the HSR system, this table also applies to the larger HSR system. This table shows statewide emissions with and without the Central Valley Wye alternatives + HSR system.
Totals may not add up exactly because of rounding.
CEQA = California Environmental Quality Act
HSR = high-speed rail
NEPA = National Environmental Policy Act
CO_2e = carbon dioxide equivalent
MMT = million metric tons

Table 3.3-26 Summary of Regional Annual Greenhouse Gas Emissions Changes from Operation of the Central Valley Wye Alternatives[1] under the Medium and High Ridership Scenarios

Emission Sources	Change in CO_2e Emissions because of HSR (MMT/year)	
	Medium	High
2015 CEQA Existing Conditions (2015 Project vs. 2015 No Project)		
Regional On-Road	-0.07	-0.10
Aircraft	-0.02	-0.01
Indirect Regional Power Plants	0.05	0.05
Net Regional Difference	-0.06	-0.06
2040 NEPA Future Conditions (2040 Project vs. 2040 No Project)		
Regional On-Road	-0.05	-0.08
Aircraft	-0.02	-0.01
Indirect Regional Power Plants	0.05	0.05
Net Regional Difference	-0.03	-0.04

Source: Authority and FRA, 2016
[1] Because the Central Valley Wye alternatives would not exist in isolation without the rest of the HSR system, this table also applies to the larger HSR system. This table shows regional emissions with and without the Central Valley Wye alternatives + HSR system.
CEQA = California Environmental Quality Act
HSR = High-Speed Rail
NEPA = National Environmental Policy Act
CO_2e = carbon dioxide equivalent
MMT = million metric tons

On-Road Vehicle Emissions

The HSR is predicted to reduce GHG emissions associated with roadways because operations of the HSR system are less emissions intensive than on-road vehicles. Thus, as HSR passengers would shift from motor vehicle travel to the HSR, there would be a net reduction in emissions from on-road vehicles. As shown in Table 3.3-27, the Central Valley Wye alternatives would reduce statewide GHG emissions relative to the 2015 existing conditions and 2040 future conditions. GHG emissions from on-road vehicles would be the same for all Central Valley Wye alternatives because, as discussed for Impact AQ#7, the variations in routes would not result in differences in on-road vehicle activity.

Table 3.3-27 On-Road Vehicles Greenhouse Gas Emission Changes from Operation of the Central Valley Wye Alternatives[1] under the Medium and High Ridership Scenarios

Element	Change in CO_2e Emissions because of HSR (MMT/year)	
	Medium	High
2015 CEQA Existing Conditions (2015 Project vs. 2015 No Project)		
Merced	-0.05	-0.06
Madera	-0.03	-0.04
Total Regional Net Emissions	-0.07	-0.10
2040 NEPA Future Conditions (2040 Project vs. 2040 No Project)		
Merced	-0.03	-0.05
Madera	-0.02	-0.03
Total Regional Net Emissions	-0.05	-0.08

Source: Authority and FRA, 2017

[1] Because the Central Valley Wye alternatives would not exist in isolation without the rest of the HSR system, this table also applies to the larger HSR system. This table shows regional emissions with and without the Central Valley Wye alternatives + HSR system.

Totals may not add up exactly because of rounding.

CEQA = California Environmental Quality Act

CO_2e = carbon dioxide equivalent

HSR = High-Speed Rail

MMT = million metric tons

NEPA = National Environmental Policy Act

Power Plant Emissions

The electrical demands necessary for propulsion of the trains and the trains at terminal stations and in storage depots and maintenance facilities were calculated as part of the Central Valley Wye alternatives design. Average GHG emission factors for each kilowatt-hour required were derived from USEPA eGRID2012 electrical generation data. The energy estimates used in this analysis for the propulsion of the HSR include the use of regenerative brake power. As shown in Table 3.3-28, the electrical requirements for the Central Valley Wye alternatives would increase statewide and regional indirect GHG emissions.

In addition, because of the state requirement that an increasing fraction (50 percent by 2030) of electricity generated for the state's power portfolio comes from renewable energy sources, the emissions generated for the HSR system are expected to be lower in the future when compared to emissions estimated for this analysis. GHG emissions from power plants would be the same for all Central Valley Wye alternatives because, as discussed for Impact AQ#7, the variations in routes would not result in quantifiable differences in electricity consumption.

Table 3.3-28 Power Plant Greenhouse Gas Emission Changes from Operation of the Central Valley Wye Alternatives[1] under the Medium and High Ridership Scenarios

	Change in CO_2e Emissions because of HSR (MMT/year)	
	Medium	High
2015 CEQA Existing Conditions (2015 Project vs. 2015 No Project)		
Regional	0.05	0.05
Statewide	0.5	0.5
2040 NEPA Future Conditions (2040 Project vs. 2040 No Project)		
Regional	0.05	0.05
Statewide	0.5	0.5

Source: Authority and FRA, 2017

[1] Because the Central Valley Wye alternatives would not exist in isolation without the rest of the HSR system, this table also applies to the larger HSR system. This table shows state and regional emissions with and without the Central Valley Wye alternatives + HSR system. Totals may not add up exactly due to rounding.

CEQA = California Environmental Quality Act
HSR = high-speed rail
NEPA = National Environmental Policy Act
CO_2e = carbon dioxide equivalent
MMT = million metric tons

Aircraft Emissions

The operations of trains associated with the Central Valley Wye alternatives would reduce the number of aircraft flights, as passengers would shift from aircraft travel to the HSR. The Statewide Program EIR/EIS (Authority and FRA 2005) demonstrated that the long-distance, city-to-city aircraft take-offs and landings within the Merced to Fresno Section would be reduced by about seven flights per day. The latest analysis shows that the Central Valley Wye alternatives would reduce the regional long-distance, city-to-city aircraft take-offs and landings within the Merced to Fresno Section by four to seven flights per day in 2040 (refer to Table 3.3-23). On a regional level, this reduction would have a beneficial impact on regional aircraft-related CO_2e emissions relative to the 2015 existing conditions and 2040 future conditions as shown in Table 3.3-29. On the statewide level, emissions would also decrease under the 2015 existing conditions and 2040 future conditions, as shown in Table 3.3-29. GHG emissions from aircraft operations would be the same for all four Central Valley Wye alternatives because, as discussed for Impact AQ#7, the variations in routes would not result in differences in aircraft activity.

Table 3.3-29 Aircraft Greenhouse Gas Emission Changes of the Central Valley Wye Alternatives[1] under the Medium and High Ridership Scenarios

Element	Change in CO_2e Emissions due to HSR (MMT/year)	
	Medium	High
2015 CEQA Existing Conditions (2015 Project vs. 2015 No Project)		
Regional (San Joaquin Valley)	-0.02	-0.01
Total Statewide Net Emissions	-0.70	-0.67
2040 NEPA Future Conditions (2040 Project vs. 2040 No Project)		
Regional (San Joaquin Valley)	-0.02	-0.01
Total Statewide Net Emissions	-0.97	-0.94

Source: Authority and FRA, 2017

[1] Because the Central Valley Wye alternatives would not exist in isolation without the rest of the HSR system, this table also applies to the larger HSR system. This table shows state and regional emissions with and without the Central Valley Wye alternatives + HSR system. Totals may not add up exactly because of rounding.

CEQA = California Environmental Quality Act
HSR = high-speed rail
NEPA = National Environmental Policy Act
CO_2e = carbon dioxide equivalent
MMT = million metric tons

Electrical Equipment and SF_6

PG&E substations and switching stations would require the installation of electrical equipment, including up to 12 power circuit breakers with SF_6 gas type insulated switchgear. As discussed in Chapter 2, PG&E would incorporate the new circuit breakers into their system-wide SF_6 emission reduction program, consistent with CARB's adopted Regulation for Reducing Sulfur Hexafluoride Emissions from Gas Insulated Switchgear. It is assumed that the annual SF_6 leakage rates associated with the 12 additional circuit breakers with switchgear equipment that use SF_6 (up to 230 pounds each) would not exceed 0.5 percent. Based on the global warming potential of SF_6, as noted in the USEPA's Mandatory Reporting Regulation (40 C.F.R. Part 98, Subpart A), the additional equipment would result in up to 150 metric tons of CO_2e emissions, annually.[19] Taking into consideration the relative length of time (between 4 and 7 days) over which such emissions would be paid back annually as a result of reduced vehicular and plane emissions, the GHG emissions associated with the substations are considered minimal. Additionally, all equipment would be maintained in accordance with PG&E's maintenance guidelines and SF_6 emission reduction program and monitored to ensure that emissions do not exceed a manufacturer's guaranteed 0.5 percent or less SF_6 leakage rate.

Operations of the Central Valley Wye alternatives would result in net statewide decreases of GHG emissions as travel modes shift away from on-road vehicles and aircraft trips to the HSR, which would offset any increases in GHG emissions from power plants. The GHG emissions associated with the Central Valley Wye alternatives have been quantified, consistent with CEQ guidance, and the quantification results show that over the long-term there would be a net GHG reduction.

CEQA Conclusion

The impact under CEQA would be less than significant because operations of the Central Valley Wye alternatives would result in net statewide decreases of GHG emissions as travel modes shift away from on-road vehicles and aircraft trips to the HSR, which would avoid significant impacts from GHGs on the environment. Additionally, the HSR project is included in the AB 32 scoping plan as Measure #T-9 and would help the state attain its GHG reductions goals as identified in AB 32 and SB 32. Consequently, the Central Valley Wye alternatives would not impede the state from meeting the statewide 2020 or 2030 GHG emissions reductions targets. Therefore, CEQA does not require any mitigation.

Impact AQ#10: Continuous Permanent Direct Impacts on Air Quality—Localized Mobile Source Air Toxics

An MSAT impact would occur if the Central Valley Wye alternatives have a higher potential for MSAT emissions than the No Project Alternative or existing conditions. The qualitative MSAT analysis presented in the Air Quality and Global Climate Change Technical Report (Authority and FRA 2016) indicated that there would be no impacts from MSAT emissions for any of the Central Valley Wye alternatives because the Central Valley Wye alternatives do not include stations or maintenance facilities that would result in additional vehicle trips. Thus, there would be no localized increases in MSAT emissions as a result of the Central Valley Wye alternatives.

Because none of the Central Valley Wye alternatives would include stations or maintenance facilities, there would be no appreciable increase in vehicle trips and no corresponding localized increases in MSAT emissions. Consistent with FHWA guidance, none of the Central Valley Wye alternatives has the potential for meaningful MSAT impacts.

CEQA Conclusion

The impact under CEQA would be less than significant because the Central Valley Wye alternatives would not include stations or maintenance facilities, and therefore, there would be no substantial increase in vehicle trips and no corresponding localized increases in MSAT

[19] A global warming potential of 23,900 was used to convert SF_6 emissions to CO_2e emissions. This value is based on the global warming potential in the USEPA Mandatory Reporting Program Regulation (40 C.F.R. Part 98, Subpart A).

emissions. Consistent with FHWA guidance, the Central Valley has no potential for meaningful MSAT impacts. Therefore, CEQA does not require any mitigation.

Impact AQ#11: Continuous Permanent Direct Impacts on Air Quality—Carbon Monoxide

A CO hot-spot analysis typically is performed for roadway intersections that could potentially cause a localized CO hot spot. For other sections of the HSR project, CO analyses have been conducted for intersections and parking structures associated with the train stations and heavy maintenance facilities.

The Central Valley Wye alternatives would not include stations or heavy maintenance facilities and would not worsen traffic conditions at intersections along the alignment because the alignment and roadways would be grade-separated. Some roadways would be permanently closed or rerouted where HSR tracks would either transect or be near an existing roadway. Chapter 2 and Section 3.2, Transportation, discuss the number and type of road closures and reroutings. As discussed in Section 3.2, for Impact TR#8, however, permanent road closures and rerouting would result in rural roadways continuing to operate at acceptable level-of-service conditions. Therefore, a CO analysis is not necessary at intersections along the alignment. Because the Central Valley Wye alternatives would not worsen traffic conditions at intersections in the air quality RSA, a CO hot-spot analysis has not been conducted.

CEQA Conclusion

There would be no impact under CEQA because operations of the Central Valley Wye alternatives would not include stations or heavy maintenance facilities and would not worsen traffic conditions that could result in localized CO hot spots. As a result, there would be no exceedances of the CAAQS with respect to CO. Therefore, CEQA does not require any mitigation.

Impact AQ#12: Continuous Permanent Direct Impacts on Air Quality—Particulate Matter

For purposes of identifying and evaluating potential impacts under NEPA and CEQA, a PM hot-spot analysis was prepared because the area where the Central Valley Wye alternatives would be located is designated nonattainment for $PM_{2.5}$ and maintenance for PM_{10}. In accordance with USEPA guidance, if a project meets one of several criteria, it is considered a project of air quality concern and a quantitative $PM_{10}/PM_{2.5}$ analysis is required. The criteria are listed as follows, along with an evaluation of their applicability to the Central Valley Wye alternatives:

- **New or expanded highway projects that have a significant number of, or significant increase in, diesel vehicles.** The Central Valley Wye alternatives are not a new highway project, nor would they expand an existing highway beyond its current capacity. The HSR vehicles would be electrically powered. The Central Valley Wye alternatives would not measurably affect traffic conditions on roadways that have been realigned to accommodate the Central Valley Wye alternatives right-of-way because the roadways would be grade-separated and they would not measurably affect truck volumes on the affected roadways. Furthermore, the Central Valley Wye alternatives could improve regional traffic conditions by reducing traffic congestion, increasing vehicle speeds, and reducing regional VMT.
- **Projects affecting intersections that are at Level-of-Service D, E, or F with a significant number of diesel vehicles or those that would degrade to Level-of-Service D, E, or F because of increased traffic volumes from a significant number of diesel vehicles related to the project.** The Central Valley Wye alternatives would not change the existing traffic mix at signalized intersections. Roadways would be closed, realigned, or rerouted to accommodate the Central Valley Wye alternatives right-of-way. However, closures, realignment, and/or rerouting would not result in increased traffic volumes or worsened level-of-service conditions. As discussed in Section 3.2, Impact TR#8 concludes that rural roadways would continue to operate at acceptable level-of-service conditions. Therefore, the Central Valley Wye alternatives would not measurably increase the number of diesel vehicles at these affected intersections.

- **New bus and rail terminals and transfer points that have a significant number of diesel vehicles congregating at a single location.** The Central Valley Wye alternatives would not include any bus or rail terminals or transfer points and, therefore, would not affect the congregation of diesel vehicles at a single location. The trains used for the Central Valley Wye alternatives would be electric multiple-unit trains powered by electricity, not diesel fuel.
- **Projects in, or affecting, locations, areas, or categories of sites that are identified in the $PM_{2.5}$- or PM_{10}-applicable implementation plan or implementation plan submission, as appropriate, as sites of violation or possible violation.** The Central Valley Wye alternatives are not in an area identified as sites of violation or possible violation in the USEPA-approved 2003 SIP, the USEPA-approved PM_{10} Maintenance Plan and Request for Redesignation, or the adopted 2012 and 2015 $PM_{2.5}$ plans for San Joaquin Valley (SJVAPCD 2007b, 2012, 2015).

As a result, none of the Central Valley Wye alternatives were determined to be a project of air quality concern, as defined by 40 C.F.R. Part 93.123(b)(1), and none of the Central Valley Wye alternatives would likely cause violation of PM_{10}/$PM_{2.5}$ NAAQS or any localized impact with respect to particulate matter on sensitive receptors during operations. Thus, CAA 40 C.F.R. Part 93.116 requirements are met without a quantitative hot-spot analysis.

CEQA Conclusion

The impact under CEQA would be less than significant because operation of the Central Valley Wye alternatives is not considered to be a project of air quality concern based on the descriptions as indicated in 40 C.F.R. Part 93.123(b)(1). Therefore, the Central Valley Wye alternatives would not expose sensitive receptors to substantial pollutant concentrations of particulate matter during the operational phase. Therefore, CEQA does not require any mitigation.

3.3.7 Mitigation Measures

This section presents an updated mitigation approach that is consistent with the mitigation required under the Merced to Fresno Final EIR/EIS. The Merced to Fresno Final EIR/EIS includes two additional mitigation measures for two additional impacts that are unique to that analysis. However, the five mitigation measures proposed for the Central Valley Wye alternatives are the same as those required under the Merced to Fresno Final EIR/EIS because the impacts that are common to both are caused by the same mechanisms (i.e., construction equipment exhaust, earth-disturbing activities, on-road truck travel, etc.). Table 3.3-30 presents an overview of the mitigation measures applicable to all Central Valley Wye alternatives; detailed descriptions of the individual measures follow the table.

Table 3.3-30 Mitigation Program for Air Quality and Global Climate Change, Central Valley Wye Alternatives

Measures
▪ AQ-MM#1: Reduce Criteria Exhaust Emissions from Construction Equipment
▪ AQ-MM#2: Reduce Criteria Exhaust Emissions from On-Road Construction Equipment
▪ AQ-MM#3: Reduce the Potential Impact of Concrete Batch Plants
▪ AQ-MM#4: Offset Project Construction Emissions through an SJVAPCD Voluntary Emission Reduction Agreement (VERA)
▪ AQ-MM#5: Purchase Offsets and Off-Site Emission Mitigation for Emissions Associated with Hauling Ballast Material in Certain Air Districts

Source: Authority and FRA, 2017

AQ-MM#1: Reduce Criteria Exhaust Emissions from Construction Equipment

Prior to issuance of construction contracts, the Authority would incorporate the following construction equipment exhaust emissions requirements into the contract specifications. All heavy-duty off-road construction diesel equipment used during the construction phase would use

the cleanest reasonably available equipment (including newer equipment or tailpipe retrofits), but in no case less clean than the average fleet mix for the current calendar year, as set forth in CARB's OFFROAD 2011 database, and no less than a 40 percent reduction compared to a Tier 2 engine standard for NO_X emissions. The contractor would document efforts undertaken to locate newer equipment (such as, in order of priority, Tier 4, Tier 3, or Tier 2 equipment) or tailpipe retrofit equivalents. The contractor would provide documentation to the Authority of such efforts, including correspondence with at least two construction equipment rental companies. A copy of each unit's certified tier specification and any required CARB or air pollution control district operating permit would be made available by the Authority at the time of mobilization of each piece of equipment. The contractor would keep a written record (supported by equipment-hour meters where available) of equipment usage during Central Valley Wye alternatives construction for each piece of equipment. The contractor would provide the Authority with monthly reports of equipment operating hours (through the Environmental Mitigation Management and Assessment system) and annual reports documenting compliance.

This mitigation measure would be effective at reducing emissions from off-road construction equipment at the construction site; however, this measure would be only capable of reducing emissions to the extent that is feasible under current technology. Exhaust emissions from off-road construction equipment still would be emitted with implementation of this mitigation measure in amounts that could result in air quality impacts. The success of this mitigation would hinge on the availability of newer and cleaner equipment and the contractor's efforts to obtain the equipment. By requiring documentation of the contractor's efforts, the Authority and FRA would hold contractors accountable if they failed to show reasonable effort in acquiring cleaner equipment.

The methodologies used to reduce emissions may result in increased fuel or energy consumption associated with emissions control equipment. The change in fuel consumption likely would be small on a per-equipment basis; however, given the number of equipment pieces and the construction duration, the total fuel consumption would result in a moderate increase in volume, but still a small percentage of the total volume. If aftermarket control devices are used, such as diesel particulate filters, a small amount of additional waste would be generated associated with the disposal of spent filters. In comparison to the scope of the Central Valley Wye alternatives, these additional increases would likely be orders of magnitude smaller relative to the Central Valley Wye alternatives' emissions that would occur without mitigation. This mitigation measure would affect air quality in the SJVAB, although the impacts would be temporary. Because this mitigation measure would result in increases in fuel or energy consumption, secondary impacts on public utilities and energy could occur. However, the magnitude of such increases is expected to be minor in comparison to the scope of the construction of the Central Valley Wye alternatives.

AQ-MM#2: Reduce Criteria Exhaust Emissions from On-Road Construction Equipment

Prior to issuance of construction contracts, the Authority would incorporate the following material hauling truck fleet mix requirements into the contract specifications: All on-road trucks used to haul construction materials, including fill, ballast, rail ties, and steel, would consist of an average fleet mix of equipment model year 2010 or newer, but no less than the average fleet mix for the current calendar year as set forth in CARB's EMFAC2014 database. The contractor would provide documentation to the Authority of efforts to secure such a fleet mix. The contractor would keep a written record of equipment usage during construction of the Central Valley Wye alternatives for each piece of equipment and provide the Authority with monthly reports of vehicle miles traveled (through the Environmental Mitigation Management and Assessment system) and annual reports documenting compliance.

This mitigation measure would be effective at reducing emissions from on-road construction vehicles; however, this measure would be only capable of reducing emissions to the extent that is feasible under current technology. On-road exhaust emissions from construction vehicles still would be emitted with implementation of this mitigation measure in amounts that could result in air quality impacts. The success of this mitigation would hinge on the availability of the current calendar year's fleet mix and the contractor's efforts to obtain the equipment. By requiring

documentation of the contractor's efforts, the Authority and FRA would be able to hold contractors accountable if they failed to show reasonable effort in acquiring such fleet mix.

Maintaining an average fleet mix the same or newer than the average fleet mix for the current calendar year in CARB's EMFAC2014 database would not result in any physical change to the environment, and therefore would not result in other secondary environmental impacts.

AQ-MM#3: Reduce the Potential Impact of Concrete Batch Plants

Prior to construction of any concrete batch plant, the contractor would provide the Authority with a technical memorandum documenting consistency with the Authority's concrete batch plant siting criteria and utilization of typical control measures. Concrete batch plants would be sited at least 1,000 feet from sensitive receptors, including daycare centers, hospitals, senior care facilities, residences, parks, and other areas where people may congregate. The concrete batch plant would utilize typical control measures to reduce fugitive dust, such as water sprays, enclosures, hoods, curtains, shrouds, movable and telescoping chutes, central dust collection systems and other suitable technology, to reduce emissions to be equivalent to the USEPA AP-42 controlled emission factors for concrete batch plants. The contractor would provide to the Authority documentation that each batch plant meets this standard during operation.

This mitigation measure would be effective at reducing emissions from concrete batch plants; however, this measure would be only capable of reducing emissions through control measures to the extent that is feasible under current technology. Emissions from concrete batch plants still would be emitted with implementation of this mitigation measure in amounts that could result in air quality impacts. However, establishing a buffer between sensitive receptors and concrete plants would further reduce the potential for PM to migrate from the plant to the sensitive receptors. According to the *Air Quality and Land Use Handbook: A Community Health Perspective* (California Environmental Protection Agency and CARB 2005), emission impacts at receptors would be greatly reduced by locating a facility 1,000 feet from sensitive receptors.

The control measures utilized at the batch plant may increase water usage and energy consumption, and may generate additional waste from consumables used by the control devices. These impacts would be minor in comparison to the operations as a whole. This mitigation measure could affect air quality in the SJVAB, although the impacts would be temporary. Because this mitigation measure would result in increases in water usage and energy consumption, secondary impacts on public utilities and energy, hydrology, and water resources could occur. However, the magnitude of such increases is expected to be minor in comparison to the scope of the Central Valley Wye alternatives construction.

Summary of Mitigation Measures AQ-MM#1 through AQ-MM#3

With implementation of AQ-MM#1, AQ-MM#2, and AQ-MM#3, regional construction phase emissions of NO_X, and PM_{10} for certain years could still be greater than applicable thresholds. These construction phase emissions would be offset through the implementation of AQ-MM#4 and AQ-MM#5.

AQ-MM#4: Offset Project Construction Emissions through an SJVAPCD Voluntary Emission Reduction Agreement (VERA)

The Authority and SJVAPCD have entered into a contractual agreement to mitigate (by offsetting) the Central Valley Wye alternatives' actual emissions from construction equipment and vehicle exhaust emissions of NO_X and PM_{10} . Exceedances of NO_X would be offset to net zero because emissions of this pollutant are subject to GC offsetting requirements. Exceedances of PM_{10} are not subject to GC *de minimis* thresholds and therefore would be offset to below the SJVAPCD CEQA threshold of 15 tons per year. The agreement would provide funds for the SJVAPCD's Emission Reduction Incentive Program [1] (SJVAPCD n.d. (b)) to fund grants for projects that achieve emission reductions, with preference given to highly affected communities, thus offsetting project-related impacts on air quality. Projects funded in the past include electrification of stationary internal combustion engines (such as agricultural irrigation pumps); replacement of old heavy-duty trucks with new, cleaner, more efficient heavy-duty trucks; and replacement of old

farm tractors. The project will commit to reducing construction emissions for NO_X and VOC through the Voluntary Emission Reduction Agreement (VERA) program. To lower overall cost, funding for the VERA program to cover estimated construction emissions for any funded construction phase would be provided at the beginning of the construction phase. At a minimum, mitigation/offsets would occur in the year of impact or as otherwise permitted by 40 C.F.R. Part 93 Section 93.163.

This mitigation measure would be effective in offsetting emissions generated during construction of the Central Valley Wye alternatives through the funding of emission-reduction projects. It is anticipated that sufficient offsets are available from the SJVAPCD, and this measure would be fully effective at reducing emissions to net zero and below both the SJVAPCD and GC thresholds.

A VERA is a mitigation measure by which the project proponent (the Authority, in this case, in partnership with the FRA) would provide pound-for-pound offsets of emissions that exceed GC thresholds through a process that develops, funds, and implements emissions reduction projects, with the SJVAPCD serving as administrator of the emissions-reduction projects and verifier of the successful mitigation effort.

To implement a VERA, the project proponent and the SJVAPCD would enter into a contractual agreement in which the proponent agrees to mitigate the project's emissions (NO_X and PM_{10}, in this case, in the years of exceedance) by providing funds for the SJVAPCD's Emission Reduction Incentive Program to fund grants for projects that achieve emission reductions, thus offsetting project impacts on air quality. The SJVAPCD is obligated under the VERA to seek and implement such reductions using the project proponent's funds. The types of projects that have been used in the past to achieve such reductions include electrification of stationary internal combustion engines (such as agricultural irrigations pumps); replacing old trucks with new, cleaner, more efficient trucks; and a host of other emissions-reducing projects.

In implementing a VERA, the SJVAPCD verifies the actual emission reductions that have been achieved as a result of completed grant contracts, monitors the emission reduction projects, and ensures the enforceability of achieved reductions. The initial agreement is generally based on the projected maximum emissions that exceed thresholds as calculated by an SJVAPCD-approved Air Quality Impact Assessment and/or the project's EIR/EIS. The agreement then requires the proponent to deposit funds sufficient to offset those maximum emissions exceedances. However, because the goal is to mitigate actual emissions, the SJVAPCD has designed adequate flexibility into these agreements such that the final mitigation is based on actual emissions related to the project, actual equipment used, hours of operation, and so on, which the proponent tracks and reports to the SJVAPCD during construction. After the project is mitigated, the SJVAPCD certifies to the lead agency that the mitigation is completed. Thus, a VERA provides the lead agency with an enforceable mitigation measure that would result in emissions exceedances being fully offset.

According to the SJVAPCD, since 2005 the SJVAPCD has entered into 29 VERAs with project proponents and achieved total emissions reductions of 1,700 tons of NO_X, 200 tons of VOC, and 120 tons of PM_{10} reductions (SJVAPCD 2016c). It is the SJVAPCD's experience that implementation of a VERA is a feasible mitigation measure that effectively achieves actual emission reductions and mitigates the project to a net-zero air quality impact.

The Authority has negotiated a VERA with the SJVAPCD for all construction package contracts. Additional VERAs would be negotiated for future construction packages. Final approval and execution of the VERA by the Authority and the SJVAPCD was given concurrently with the final approval of the GC determination. The SJVAPCD has stated that it is certain there are enough emission-reduction projects within its air basin to offset exceedances of NO_X to net zero and offset exceedances of PM_{10} to below the SJVAPCD CEQA threshold of 15 tons per year.

The implementation of this mitigation measure would not be expected to affect air quality in the SJVAB because purchasing emissions offsets would not result in any physical change to the environment, and therefore would not result in other secondary environmental impacts. In addition to NO_X and PM_{10}, the implementation of emission-reduction projects could result in

reductions of other criteria pollutants and/or GHGs. However, this would be a secondary effect of this mitigation measure and is not a required outcome to mitigate any impacts of the Central Valley Wye alternatives.

AQ-MM#5: Purchase Offsets and Off-Site Emission Mitigation for Emissions Associated with Hauling Ballast Material in Certain Air Districts

By January 31 of each calendar year the contractor would inform the Authority through the submittal of a technical memorandum of any planned hauling of ballast material from quarries outside the SJVAB and if the hauling activities result in the exceedance of the local air basin CEQA threshold(s) for NOx. To determine whether an exceedance would occur based on actual hauling activities, the Authority would at the beginning of each calendar year, or as soon as practicable thereafter, obtain the most up-to-date information, based on actual or projected contractor-specific information about hauling in the BAAQMD, and calculate for the next calendar year using the same methodology used in this Draft Supplemental EIR/EIS the expected NO_X emissions from hauling activities in that district. If, based on that calculation, exceedance of the applicable NO_X threshold(s) is anticipated to occur in the next calendar year, the Authority would secure from the air district or other appropriate source the production or generation of a sufficient quantity of NO_X offsets for that calendar year necessary to reduce net NO_X generation below the applicable CEQA threshold. At a minimum, sufficient mitigation/offsets would be secured so they are generated in the year of impact or as otherwise permitted by 40 C.F.R. Part 93 Section 93.163.

This mitigation measure would be effective in offsetting NO_X emissions generated from hauling ballast material by purchasing sufficient offsets to achieve conformity or result in NO_X generation below the applicable CEQA threshold. It is anticipated that sufficient offsets are available from the BAAQMD, and this measure would be fully effective at reducing emissions to below the thresholds.

The implementation of this mitigation measure would not be expected to affect air quality in the SJVAB because purchasing NOx emissions offsets would not result in any physical change to the environment, and therefore would not result in other secondary environmental impacts.

3.3.8 Impacts Summary for NEPA Comparison of Alternatives

This section summarizes the impacts of the Central Valley Wye alternatives and compares them to the anticipated impacts of the No Project Alternative. Table 3.3-31 provides a comparison of the potential impacts of each of the Central Valley Wye alternatives, summarizing the more detailed information provided in Section 3.3.6. A comparison of the impacts on air quality and global climate change of the different Central Valley Wye alternatives follows Table 3.3-31.

Table 3.3-31 Comparison of Central Valley Wye Alternative Impacts

Impacts	SR 152 (North) to Road 13 Wye	SR 152 (North) to Road 19 Wye	Avenue 21 to Road 13 Wye	SR 152 (North) to Road 11 Wye
Construction				
Impact AQ#1: Temporary Direct Impacts on Air Quality within the SJVAB[1]				
Effects related to maximum annual construction NO_X emissions exceeding the GC *de minimis* threshold (tons per year)	139.49 (2020)	133.86 (2020)	144.40 (2020)	136.32 (2020)
Impact AQ#2: Temporary Direct Impacts on Implementation of an Applicable Air Quality Plan[1]				
Effects related to maximum annual construction NOX emissions exceeding the GC de minimis threshold (tons per year)	139.49 (2020)	133.86 (2020)	144.40 (2020)	136.32 (2020)

Impacts	SR 152 (North) to Road 13 Wye	SR 152 (North) to Road 19 Wye	Avenue 21 to Road 13 Wye	SR 152 (North) to Road 11 Wye
Impact AQ#3: Temporary Indirect Impacts on Air Quality outside the SJVAB				
Effects related to ballast hauling	Ballast hauling emissions outside of the SJVAB associated with all of the Central Valley Wye alternatives would be below the GC thresholds for all pollutants in the SFBAAB.			
Impact AQ#4: Permanent Direct and Indirect Impacts on Global Climate Change—Greenhouse Gas Emissions				
Effects related to total construction GHG emissions (metric tons CO_2e)	85,285	79,654	91,828	80,960
Effects related to 25-year amortized construction GHG emissions (metric tons CO_2e per year)	3,411	3,186	3,673	3,238
Impact AQ#5: Temporary Direct Impacts on Air Quality—Asbestos and Lead-Based Paint				
Effects related to demolition quantities (CY)	1,765,727	1,594,922	787,083	1,452,016
Impact AQ#6: Temporary Direct Impacts on Air Quality—Localized Health Impacts	All of the Central Valley Wye alternatives would avoid localized health impacts.			
Operations				
Impact AQ#7: Continuous Permanent Direct Impacts on Air Quality within the SJVAB—On-Road Vehicle, Power Plant, and Aircraft Emissions	All of the Central Valley Wye alternatives would avoid continuous permanent direct impacts on air quality. Anticipated net reduction in emissions within the SJVAB.			
Impact AQ#8: Continuous Permanent Direct Impacts on Implementation of an Applicable Air Quality Plan	All of the Central Valley Wye alternatives would avoid continuous permanent direct impacts on an air quality plan. Anticipated net reduction in emissions within the SJVAB.			
Impact AQ#9: Continuous Permanent Direct and Indirect Impacts on Global Climate Change—Greenhouse Gas Emissions—On-Road Vehicle, Power Plant, Electrical Equipment, and Aircraft Emissions	All of the Central Valley Wye alternatives would avoid continuous permanent direct and indirect impacts on global climate change. Anticipated net reduction in GHG emissions.			
Impact AQ#10: Continuous Permanent Direct Impacts on Air Quality—Localized Mobile Source Air Toxics	All of the Central Valley Wye alternatives would avoid impacts on localized mobile source air toxics.			
Impact AQ#11: Continuous Permanent Direct Impacts on Air Quality—Carbon Monoxide	All of the Central Valley Wye alternatives would avoid carbon monoxide impacts.			
Impact AQ#12: Continuous Permanent Direct Impacts on Air Quality—Particulate Matter	All of the Central Valley Wye alternatives would avoid particulate matter hot-spot impacts.			

Source: Authority and FRA, 2017

[1]These maximum emissions are conservative, because the analysis was conducted assuming a fleet average mix of construction equipment and thus does not include the Authority's commitment to mandate Tier 4 equipment for off-road construction equipment

CO_2e = carbon dioxide equivalent
CY = cubic yards
GC = general conformity
GHG = greenhouse gases
NO_X = nitrogen oxides
SFBAAB = San Francisco Bay Area Air Basin
SJVAB = San Joaquin Valley Air Basin
SR = State Route

Under the No Project Alternative, development pressures resulting from an increasing population in the SJVAB would continue to lead to associated direct and indirect impacts on air quality and global climate change. The No Project Alternative is anticipated to result in a continuation of recent development trends that have led to direct and indirect impacts on air quality and global

climate change. While emissions for some pollutants such as VOC, CO, and NO_X are expected to decrease as a result of anticipated increased efficiency and improvement in vehicle emission technology, emissions for pollutants such as SO_2, PM_{10}, and $PM_{2.5}$ are expected to increase as a result of increased energy demands and on-road fugitive dust emissions. Additionally, because of the state requirement that an increasing fraction (50 percent by 2030) of electricity generated for the state's power portfolio come from renewable energy sources, it is likely that the emissions from power plant sources in the future would be lower than the emissions estimated for this analysis. Development under the No Project Alternative would result in similar types of impacts on air quality and global climate change as the Central Valley Wye alternatives, although the reductions in emissions from decreased on-road vehicle and aircraft emissions with the Central Valley Wye alternatives would not be realized under the No Project Alternative.

The Merced to Fresno Final EIR/EIS concluded that development of the HSR System would result in potential impacts on air quality, global climate change, and localized health risks during the construction period in the SJVAB. Those impacts would be mitigated through implementation of cleaner on-road and off-road construction equipment (to mitigate air quality and GHG emissions and localized health impacts), batch plant control measures and siting criteria (to mitigate air quality emissions and localized health risks), and the purchase of emissions offsets (to mitigate NO_X and PM_{10} emissions that exceed the SJVAPCD thresholds). Impacts on air quality would also occur in the BAAQMD and South Coast Air Quality Management District for NO_X during hauling of the ballast material, but these impacts would be mitigated through the purchase of NO_X offsets in those air districts. The Merced to Fresno Final EIR/EIS concluded that the HSR system would result in beneficial impacts on air quality and global climate change during operations because it would result in reduced on-road vehicle and aircraft travel. Implementing the Central Valley Wye alternatives could also result in impacts on air quality and global climate change, and these impacts would be comparable to the impacts evaluated in the Merced to Fresno Final EIR/EIS.

The Central Valley Wye alternatives design incorporates measures to minimize impacts on air quality and global climate change, including the incorporation of the dust control plan (AQ-IAMF#1) and requiring the use of low-VOC paint (AQ-IAMF#2). However, construction of the Central Valley Wye alternatives would still have the potential to cause temporary and significant localized air quality impacts under CEQA, including the exceedance of applicable GC *de minimis* and SJVAPCD thresholds. All four Central Valley Wye alternatives would result in exceedances of the GC *de minimis* thresholds for NO_X for multiple years and the SJVAPCD thresholds for NOx and PM_{10} for multiple years. These emissions would conflict with implementation of SJVAPCD air quality plans and obstruct attainment of the federal ambient air quality standards. On-site mitigation (i.e., AQ-MM#1, AQ-MM#2, and AQ-MM#3) would reduce NO_X and PM_{10} impacts. The purchase of emission offsets for these pollutants through a VERA with the SJVAPCD (AQ-MM#4) would further reduce the impacts by offsetting the emissions of NO_X to net zero, and offsetting the emissions of PM_{10} to below SVJAPCD thresholds.

As discussed for Impact AQ#1, the Central Valley Wye alternatives do not all follow an identical route and have different track lengths; thus, each alternative's construction activity would be unique. Many factors influence the extent and magnitude of activity that would be required for construction, including the number and type of existing structures to be demolished, the amount of imported and exported dirt required during grading, the number of traction power substations constructed, etc. The combination of these factors is unique for each alternative and results in the emissions of pollutants that would be generated during construction. Because there are many factors involved in construction activity that determine the level of pollutant emissions, there is no clear relationship between any one factor and the resulting emissions. Therefore, although construction of all four Central Valley Wye alternatives would cause exceedances of the applicable thresholds, the extent of the impact (i.e., the magnitude of the exceedance above the GC *de minimis* NO_X threshold) would vary based on alternative. The maximum exceedance of the NO_X threshold would be 134.40 tons per year for the Avenue 21 to Road 13 Alternative, and the minimum would be 123.86 tons per year for the SR 152 (North) to Road 19 Alternative.

It is anticipated that all four Central Valley Wye alternatives would result in exceedances of a threshold outside of the SJVAB. Namely, during hauling of ballast and sub-ballast material, emissions could exceed the BAAQMD's NO_X threshold. The SR 152 (North) to Road 19 Alternative would require the maximum amount of ballast and sub-ballast to be hauled, while the SR 152 (North) to Road 11 Alternative would result in the minimum amount of ballast and sub-ballast to be hauled. Emissions for the SR 152 (North) to Road 19 Alternative have been evaluated as a worst-case hauling scenario, and the results of the analysis are discussed in the Air Quality and Global Climate Change Technical Report (Authority and FRA 2016). Emissions offsets purchased from the BAAQMD (AQ-MM#5) would reduce the impact for all of the Central Valley Wye alternatives by offsetting emissions to below the BAAQMD threshold.

The Central Valley Wye alternatives would generate direct and indirect GHG emissions during construction that could contribute to global climate change. Total construction GHG emissions would be a maximum for the Avenue 21 to Road 13 Alternative and a minimum for the SR 152 (North) to Road 19 Wye Alternative. The emissions from all Central Valley Wye alternatives would be temporary and would be offset from the emissions benefit that would occur during the operations period. The emissions benefit achieved during the operations period would be equal for all of the Central Valley Wye alternatives. As a result, none of the Central Valley Wye alternatives would result in global climate change impacts from GHG emissions.

Construction of the Central Valley Wye alternatives could result in the release of asbestos and lead-based paint that could present a health hazard for workers, residences, and other sensitive receptors. The SR 152 (North) to Road 13 Wye Alternative would result in the maximum amount of demolition quantity, while the Avenue 21 to Road 13 Wye Alternative would result in the minimum amount of demolition quantity. However, the Central Valley Wye alternatives' design and compliance with existing asbestos and lead-based paint handling and disposal standards would prevent exposure of sensitive receptors to asbestos and lead-based paint.

Exhaust emissions and fugitive dust would be emitted during construction and have the potential to pose localized health impacts. These pollutants include heavy metals from batching, oxides of nitrogen, and DPM from construction equipment, and other pollutants. Detailed modeling was conducted using emissions levels that would be representative of all four Central Valley Wye alternatives equally. Modeling of these activities has shown that no gaseous air pollutant emitted from construction activities would exceed the NAAQS or CAAQS, and that PM emissions would not exceed the SJVAPCD's significant impact level. Neither acute nor chronic noncancer health impacts from these pollutants are anticipated to be significant from these activities during the construction period, and incremental cancer risks are lower than the SJVAPCD's threshold of significance.

During operations, none of the Central Valley Wye alternatives would result in exceedances of the *de minimis* thresholds or SJVAPCD thresholds because the Central Valley Wye alternatives would result in net reductions in operational emissions, resulting in an overall benefit to emissions during the operations phase. The reductions in emissions from reduced on-road vehicle and aircraft activity and the increase in emissions from electricity consumption to power the trains would be equal for all four Central Valley Wye alternatives. Direct emissions of wind-induced dust would be emitted from train movement, with the Avenue 21 to Road 13 Wye Alternative resulting in maximum dust emissions and the SR 152 (North) to Road 11 Wye Alternative resulting in the minimum dust emissions. The net impact of all emissions sources would be a reduction, with the SR 152 (North) to Road 11 Wye Alternative resulting in the greater reduction, and the Avenue 21 to Road 13 Wye Alternative resulting in the lowest reduction. Thus, the Central Valley Wye alternatives would not conflict with any air quality plans or obstruct attainment of any air quality standards during operations. There would be an emissions benefit for GHG emissions as well, and the Central Valley Wye alternatives would result in a net reduction of GHG emissions statewide relative to both 2015 CEQA existing conditions and 2040 NEPA future conditions. Consequently, no significant direct or indirect GHG impacts would occur.

The Central Valley Wye alternatives would not include stations or maintenance facilities that result in additional vehicle trips and would not affect a significant number of diesel vehicles on

highways, rail or bus terminals, or intersections. This conclusion would be equally true for all four Central Valley Wye alternatives. Thus, there would not be any localized increases in MSAT, CO, or $PM_{10}/PM_{2.5}$ emissions as a result of Central Valley Wye alternatives operations.

3.3.9 CEQA Significance Conclusions

Table 3.3-32 provides a summary of the CEQA determination of significance for all construction and operations impacts discussed in Section 3.3.6.3. If there are differences in impacts before or after mitigation between the four Central Valley Wye alternatives, it is noted in the table. Where there is no difference in the CEQA level of significance before and after mitigation for a particular impact, the level of significance for that impact is the same for all Central Valley Wye alternatives.

Table 3.3-32 CEQA Significance Conclusions for Air Quality and Global Climate Change for the Central Valley Wye Alternatives

CEQA Impacts	Impact Description and CEQA Level of Significance	Mitigation Measure	CEQA Level of Significance after Mitigation
Construction Impacts			
Impact AQ#1: Temporary Direct Impacts on Air Quality within the SJVAB	Significant: All Central Valley Wye alternatives could result in the temporary exceedance of SJVAPCD CEQA thresholds for NO_X and PM_{10}	AQ-MM#1 AQ-MM#2 AQ-MM#3 AQ-MM#4	Less than significant for all Central Valley Wye alternatives
Impact AQ#2: Temporary Direct Impacts on Implementation of an Applicable Air Quality Plan	Significant: All Central Valley Wye alternatives could result in the exceedance of the SJVAPCD thresholds for NO_X and PM_{10}, which could conflict with the SJVAPCD's ozone and PM_{10} plans	AQ-MM#1 AQ-MM#2 AQ-MM#3 AQ-MM#4	Less than significant for all Central Valley Wye alternatives
Impact AQ#3: Temporary Indirect Impacts on Air Quality outside the SJVAB	Significant: Central Valley Wye alternatives would result in short-term criteria pollutant emissions that could exceed the BAAQMD thresholds for NO_X and conflict with the BAAQMD's 2010 Clean Air Plan	AQ-MM#5	Less than significant for all Central Valley Wye alternatives
Impact AQ#4: Permanent Direct and Indirect Impacts on Global Climate Change –Greenhouse Gas Emissions	Less than significant	No mitigation measures are required	Not applicable
Impact AQ#5: Temporary Direct Impacts on Air Quality—Asbestos and Lead-Based Paint	Less than significant	No mitigation measures are required	Not applicable

CEQA Impacts	Impact Description and CEQA Level of Significance	Mitigation Measure	CEQA Level of Significance after Mitigation
Impact AQ#6: Temporary Direct Impacts on Air Quality – Localized Health Impacts	Less than significant	No mitigation measures are required	Not applicable
Operations			
Impact AQ#7: Continuous Permanent Direct Impacts on Air Quality within the SJVAB—On-Road Vehicle, Power Plant, and Aircraft Emissions	Less than significant	No mitigation measures are required	Not applicable
Impact AQ#8: Continuous Permanent Direct Impacts on Implementation of an Applicable Air Quality Plan	Less than significant	No mitigation measures are required	Not applicable
Impact AQ#9: Continuous Permanent Direct and Indirect Impacts on Global Climate Change—Significant Greenhouse Gas Emissions—On-Road Vehicle, Power Plant, and Aircraft Emissions	Less than significant	No mitigation measures are required	Not applicable
Impact AQ#10: Continuous Permanent Direct Impacts on Air Quality—Localized Mobile Source Air Toxics	Less than significant	No mitigation measures are required	Not applicable
Impact AQ#11: Continuous Permanent Direct Impacts on Air Quality—Carbon Monoxide	No impact	No mitigation measures are required	Not applicable
Impact AQ#12: Continuous Permanent Direct Impacts on Air Quality—Particulate Matter	Less than significant	No mitigation measures are required	Not applicable

Source: Authority and FRA, 2017
BAAQMD = Bay Area Air Quality Management District
CEQA = California Environmental Quality Act
NO_X = nitrogen oxides
PM_{10} = particulate matter smaller than or equal to 10 microns in diameter
SJVAB = San Joaquin Valley Air Basin
SJVAPCD = San Joaquin Valley Air Pollution Control District